

# Overhead Valve Cylinder Heads

*By Murray Fahnestock*

*Originally appearing in the December 1926 issue of Ford Dealer and Service Field, this article describes the features of the then-new overhead-valve heads available for the Model T Ford. The original article has been edited somewhat and additional contemporary ads have been included here.*

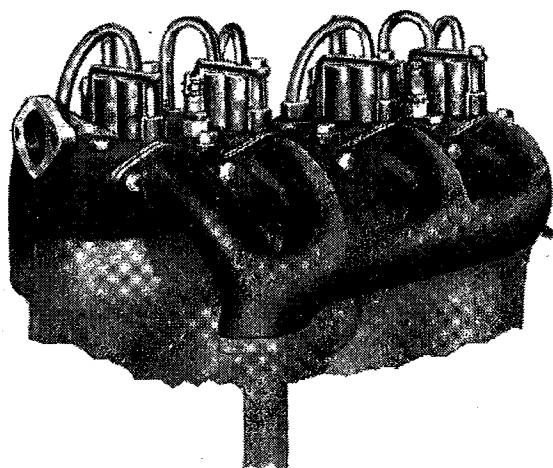
*Bruce McCalley*

## AKRON-HED

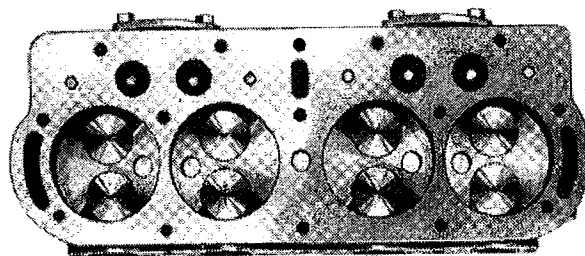
The Akron-Hed is an overhead valve head of the eight-valve type. The cylinder head is cast in one piece, of the same height and with the same bolt holes as the regular Ford head, but with more space for water. Regular Ford cylinder head bolts are used and no cutting into metal dash, or moving of coil box on old wood dash of earlier Fords is necessary.

The accurately machined combustion chamber is 1-1/4 by 3-27/32 inch, so that it can be used with a rebored block if desired. Being machined, all four combustion chambers are of exactly the same size, giving even compression in all four cylinders and a smoother running engine with greater power and speed. The spark plug openings are centered over the cylinders so that the flame resulting from the spark spreads in all directions, giving quicker and more efficient combustion and requiring less spark advance for changes in engine speed.

The manner of operating the valves on the Akron-Hed is most unusual. To get the thrust



*The Akron-Hed featured steel balls in tubes to operate the valves instead of rocker arms as in the other types*



*Interior view of the Akron-Hed shows the location of the valves and spark plugs*

around-the-corner from the upward thrust of the push rod to a downward thrust on the stems of the overhead valves, a series of steel balls, closely packed in seamless steel tubes, is used. This strikingly new system is claimed to be extremely quiet in action—distributing the wear over large areas of tubes and balls, instead of concentrating the wear at three points, as in usual rocker-arm construction. With this method, rocker arms and other moving parts are eliminated, allowing ideal locations of valves and spark plugs.

For lubrication, it is only necessary to shoot grease into the operating tubes which are provided with grease clips for just this purpose. No cover is required with this head, as all operating parts are packed in grease and fully enclosed.

Valves are of carefully hardened alloy steel, of 1-3/4 inch diameter and the valve opening is 1/4 inch (the same as the usual Ford valve lift). This is quiet in action and gives plenty of power with the larger valves.

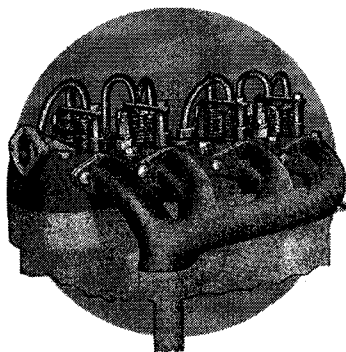
The exhaust valves are located close to the side of the head, which allows short exhaust ports and causes less heating in head. Exhaust manifold is of ample size and is located on opposite side of engine intake, to reduce back pressure to a minimum.

Valve springs are enclosed in tubing to prevent dust and grit from coming in contact with valve stems. The push rods are made in two pieces for quick removal of head without removing rods. Valves are easily adjusted with ball end nuts and check nuts on the lower push rods.

With such heads, sustained road speeds of 60 miles an hour should be easily possible with a regular Ford engine.

## The New **AKRON** -HED for Fords

**Lets you take the hills on high  
and saves 25% of your gas**



Exhaust Side of Improved  
AKRON-HED

**Fits OLD or NEW Fords without alteration**

### Consider These Outstanding Features

- 1st—Head cast in one piece, same height and same bolt holes as regular Ford head but more space for water. The regular cylinder head bolts are used and no cutting into metal dash or moving of coil box on wood dash is necessary.
- 2nd—Spark plug openings are centered over cylinders so spark ignites gas in all directions giving complete perfect combustion.
- 3rd—Valve operators on the AKRON-HED replace the usual noisy rocker-arm system. They allow ideal locations for valves and spark plugs and make rocker arms, rocker-arm bearings, rocker-arm ball joints, shafts and stands unnecessary.
- 4th—Exhaust manifold is designed and placed to reduce back pressure to a minimum.

These condensed specifications will indicate plainly that the AKRON-HED is an entirely new departure in overhead blocks for Fords—combining tremendous improvement in operation with simplicity of construction and installation.

**DEALERS—Write today for prices  
and complete specifications.**

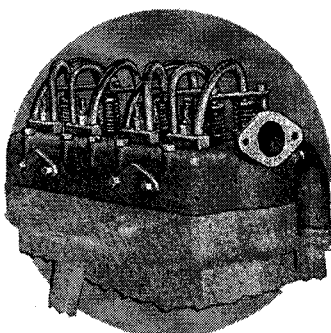
Years of experience in building overhead valve blocks for Fords have resulted in the new AKRON-HED. This new head develops the utmost power, flexibility and economy possible from a Ford engine.

It is designed for and is ideal for pleasure, business and sport cars—giving them, at a low first cost, a great continuous saving in gasoline, and an unusual increase in power, speed and pick-up.

The market which this improved head opens is tremendous. One or two installations among fleet owners and among the "college boys chariots" will generate this business rapidly.

Priced at

**\$6750** *Retail*



Intake Side of Improved  
AKRON-HED

**The Williams Foundry & Machine Company**  
"In Business Since 1887" AKRON, OHIO, U. S. A.

*Ad from Ford Dealer and Service Field, July 1926*

### LAUREL SUPER-POWER HEAD

The new Laurel Super Power head is of the eight-valve type. One of the features of this head is the spherical combustion chamber, which is designed to prevent detonation and spark knock, and also to reduce the effect of carbon deposits in curtailing the power of the engine.

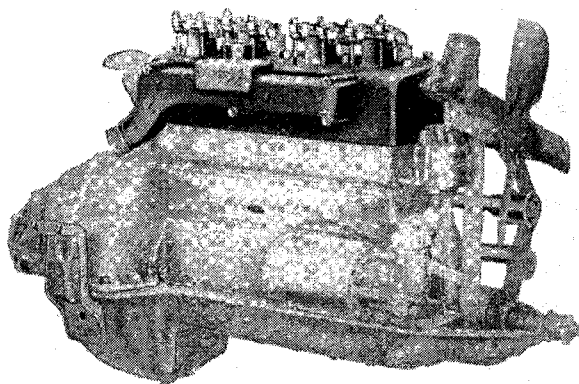
The Laurel head is designed to give thorough water cooling around the valves, around the spark plugs, and over the entire head. The manifold is built into the head, and is known as the single port manifold, down-flow principle, giving access to the combustion chamber so that the valves open, the gases are drawn in rapidly than with any other construction.

The valves used are of special high grade steel (the same as used on Miller and Dusenburg racing cars) and are one-piece drop forgings. The push rods are also of one-piece design, and are cup shaped where the ball adjusting screw centers the push rod near the rocker arm. Rocker arms are of special high grade steel, drop forged and bronze bushed, with special oil groove for lubricating.

An interesting feature of these Laurel heads is that the rocker arm brackets are cast integral with the cylinder head casting, becoming one piece with the head. The rocker arm shaft is of special cold rolled material, heat treated to give the best of service. Valve springs are of special spring steel which is very resilient, enabling the springs to act quickly, as is necessary for high speed use.

The exhaust manifold is of special broad design, to reduce back pressure when the explosions occur. A hot air stove is cast on the exhaust manifold, on which is fastened the hot air tube for the carburetor. A special rolled-edge cylinder head gasket is used, and the cylinder head bolts are of nickel steel.

The carburetor is a semi-racing type, of 1-1/4 inch size. A Zenith or Winfield carburetor is suggested. All controls, bolts and nuts are furnished. Welsh plugs are furnished to insert where the

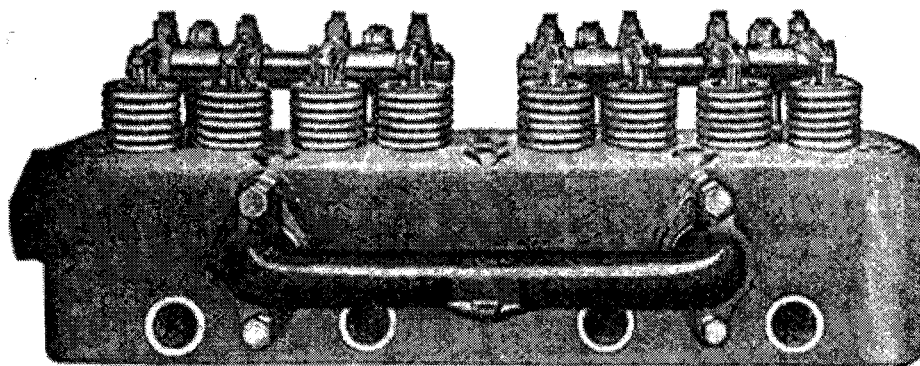


*The Laurel (Roof) 8-valve Super Power Head*

# Roof 8 Overhead Valve Equipment

For Ford Touring Cars and Trucks

**Price \$75**



Including Spark Plugs and Wires, Everything Ready to Install. Valves carry Liberty Locks and keepers. The Last Word in Power and Motor Efficiency for Standard Service from 8 Valves. This is a Full Cylinder Head with Eight Valves—Not a Half Cylinder Head with Four Valves. **LIBERTY 8 VALVE RACING HEAD**, fastest Eight made with Rocker Arm System. **VICTORY 8** with Single Overhead Camshaft, fastest Eight Valve Head possible to design.

## ROOF 16 OVERHEAD VALVE EQUIPMENTS FOR FORD AND DODGE MOTORS

Most powerful cylinder heads ever designed. In service in every state in the Union and in forty-five foreign countries. Improved mechanical equipment, including finest rocker arm system ever put on a motor. Sand, mud or the steepest grades are unnoticed by the car owner with Roof valve 16 head. Nearly 100% increase in power for touring car and truck owners and still more power for racing car drivers.

*Holder of Many Dirt Track Records*

### SPEED AND POWER EQUIPMENT

We are the largest manufacturers and distributors of power and speed specialties in the world. Whatever you want ask for it. Headquarters for Magnesium, Triple-lite and Gray Iron pistons and rings, special connecting rods, parts for undersliding chassis, nickel steel racing gears, 3 to 1 and 4 to 1 ratios, racing carburetors, high tension magnetos and other ignition equipment, attachable counterbalances for crankshafts, also high speed camshafts, wire wheels, worm and gear steering gears, four and six forward speed transmission, special oiling systems, ball bearing safety rear wheel hubs, side radius rods, racing steering knuckles and arms and ball bearings for rear of transmission. Highest quality. Prices far below competition. Racing bodies and Radiators—our own special designs. Get low price body circular.

**COUNTERBALANCED CRANKSHAFT** — Three Bearing, wanted by every Ford Touring Car Owner. Special Five Large Bearing Crankshaft for Ford Racing Car.

**TYPE C, NEW MODEL, 16 VALVES, 1 3/4" FOR FORD MOTOR**, 4 intake ports—4 exhaust ports—racing rocker arm system—4 large size racing carburetors and Special High Speed Camshaft, complete Equipment one low price for racing only. **SPECIAL TYPE C 2 OVERHEAD CAMSHAFTS WITH FOUR CARBURETORS**. World's Record breaker, fastest ever designed.

**FORD TRUCK OWNERS**, Our 8 and 16 Valve Heads will double the economic value of your truck. Make your Ford a two ton truck instead of a one ton truck.

If there is no agent in your territory send for circulars and special proposition to new dealers. It will interest you.

**LAUREL MOTORS CORPORATION**

**ANDERSON, IND.**

*Ad from Ford Dealer and Owner, September 1925*

folds were located, making a complete installation and a very neat job.

It is not necessary to cut away the dash or to do any drilling. After the installation has been completed, the cylinder head should be thoroughly lubricated, and the special pressed steel covers (with oil pad for automatic lubrication) should be fitted. The cover protects the valve stems and rocker arms from dust and grit, thus prolonging the life of these parts and giving a very quiet motor. Some drivers claim that an overhead valve system is quieter than the regular Ford valve action.

It is advisable when using an overhead valve head to install a water circulating pump, to ensure faster circulation of the water. Many good makes are on the market. The ignition is also an important factor and our experiments indicate that Delco is very good for use with overhead

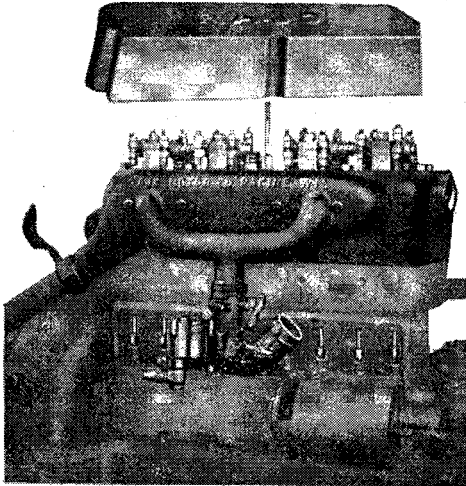
valve heads.

When installation is completed, be sure that water is placed in the cooling system and a sufficient amount of oil in the crank case. We are now ready to start the engine and, after the engine has idled for ten or fifteen minutes, the carburetor adjustment should be corrected and the valve tappets properly adjusted. The car should not be driven at speeds over thirty-five miles an hour for the first few hundred miles.

After all parts have been thoroughly worked in the driver can then open up to speeds of from sixty to seventy miles per hour. This is when installed on a Ford roadster, touring car, sedan or coupe. For racing purposes, the Liberty 8, and Super-Type C 16-valve cylinder heads should be used.

## RAJO MODEL C-35

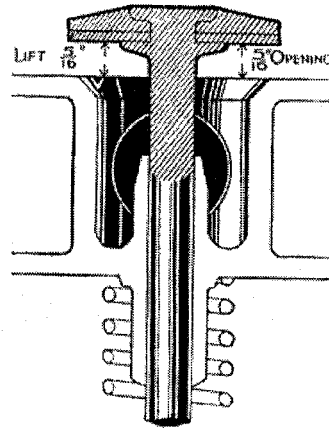
The new Rajo head, model C-35, has eight overhead valves and is designed for easy installation on Ford cars and trucks. Every connection is in the same position as with the regular Ford head and there are no extra fittings to buy.



*The RAJO Model C-35 8-valve head*

The intake manifold is surrounded by an exhaust jacket, and the incoming fresh charges are pre-heated to a degree which results in utmost flexibility and economy. Consequently there is no loading or flat spots at any speed. This hot-spot feature is one reason for the smooth performance at slow speeds in high gear. This hot spot manifold is also an important factor in securing greater fuel economy.

Both intake and exhaust manifolds are in a single casting, forming an efficient fuel vaporizing system. The regular Ford exhaust pipe fits without change. A specially designed top outlet carburetor is furnished with each head. To prevent the accumulation of dust and dirt on the rocker arm assembly, which would in time cause excessive wear and trouble, an attractive dust cover of polished cast aluminum is used. This cover is fitted with a felt pad for rocker arm lubrication, which also aids in silencing the action of the valves. The Rajo cylinder head casting is of close-grained cylinder iron, with two inlet passages on the right side and four exhaust passages on the left side. The entire surface of the combustion chambers is machined, giving uniform compression in all cylinders. Owing to the shape of the combustion chamber, a slightly higher compression than the regular Ford is used to advantage.

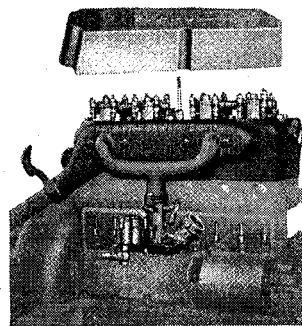


*Flat-seat Valves used in the Rajo head*

The head has exceptionally large water jackets so the regular Ford cooling system will prove efficient. However, the use of a water pump will ensure better circulation and lower engine temperature, thereby giving increased engine efficiency.



## NEW MODEL C-35

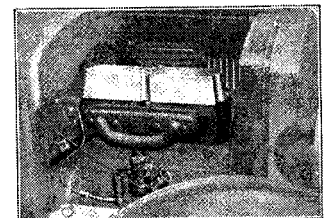


*The Rajo Model C-35 Cylinder Head*

More miles per gallon and no additional maintenance expense with the new Model C-35 Rajo Eight Valve-in-Head Equipment. Easily installed on all new model Ford pleasure cars and trucks.

**Gives You a Powerful  
Quiet and Smooth Running  
Motor at all Speeds**

Many users of the new Model C-35 have reported speeds in excess of 60 M. P. H. and more than 30 miles per gallon. This, of course, depends upon the condition of the balance of the motor. Equip your Ford Motor with C-35 and enjoy high price car performance.



**Lowest In Price On  
the Market Today!**

**\$69.75 Special Carburetor Included**

Sells at a price within reach of every motorist and pays for itself in a short time. Comes fully equipped ready for installation. Let us tell you more about this remarkable attachment. Write today.

DEALERS:—We have a liberal proposition to offer you and are especially ready to show you how to sell your fleet owner prospects.

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MAIL THIS COUPON TODAY!  
Without obligation, please mail full particulars regarding your Model C-35 Rajo Eight Valve-in-Head for Fords.

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Address \_\_\_\_\_  
City and State \_\_\_\_\_  
Please check ( ) Net ( ) Broker ( )

Ad from Ford Dealer and Service Field, May 1927

Both intake and exhaust valves are overhead and nearly double the size of the regular Ford valves. Special alloy steel permits of unusually light and durable valve design. Valves are of special Boyle "flat seat" type, with 1-5/8 inch clear diameter, and outside diameter of 1-3/4 inch. Valve lift is 7/32 inch. These flat seat valves give 40% greater opening without additional valve lift. This makes it unnecessary to use high speed cam shafts, which increase noise and wear of rocker arm mechanism. Do not change the timing or use a high speed cam shaft when this Rajo head is used on a passenger Ford.

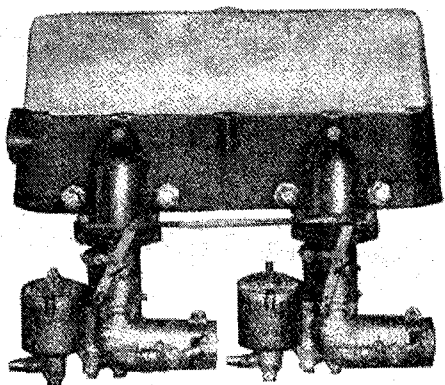
Valve guides are of ample length and removable from head casting. Valve springs are oil tempered. Spring retainers are turned from bar stock, and valve keys are of the split cone type, making a positive lock. Rocker arm shafts are of 5/8 inch diameter, hardened and ground.

Push rods are 1/4 inch cold rolled steel, guided at top and bottom by sockets. The upper socket is guided by the rocker arm ball, and the lower socket fits the Ford tappet. All wearing parts hardened. No contact with head or cylinder block, therefore no sticking or binding.

### FRONTENAC EIGHT-VALVE HEAD

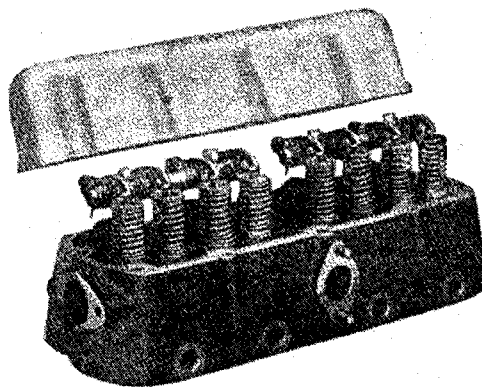
Arthur and Louis Chevrolet, world famous racing drivers and designers of automobiles, the builders of the Frontenac eight-valve cylinder head for Fords. These are the heads used on the Fronty-Ford racing cars, which have made such remarkable speeds in the Memorial Day races at Indianapolis.

The cylinder head is a one-piece casting of semi-steel, while the dust proof cover over the valve mechanism is of aluminum, giving the head a handsome finish. The combustion chambers are completely machined, making them all of the same size, and giving a smoother running engine. The head is flame-swept. No hot spot or vaporizing device is used, other than the fact that



*Fronty racing head*

the inlet passageways in the cylinder head are surrounded by hot water. The aluminum cover over the valve mechanism is held in place by a single nut, which makes the cover quickly removable for lubrication of parts or changes of adjustment.



*Frontenac 8-valve head*

Valves in Model T and S heads have a semi-steel head and carbon steel stems, both of which have proven excellent in practical use in these heads. Valves are of 1-7/8-inch diameter. Valve seats are water jacketed to prevent warping and burning.

Valve springs are oil tempered and are extra long, which adds to the quietness of operation and the proper seating of the valves at all speeds. Ford valve springs are not used. The valve spring retainers are of pressed steel. If a valve spring should break, the valve cannot drop down onto and damage the piston.

The valve stem guides are extra long, giving a longer life for the valve stem and guide, and greater quietness even when running at high engine speeds. The valve guides extend a full inch above the upper surface of the cylinder head, thus preventing dirt and foreign matter accumulating around the valve stems and working down between stems and guides. Valve guides are not integral with the cylinder head, but are removable for easy replacement in case of wear.

The rocker arms are drop forgings of 20-carbon open hearth steel and are carbonized and hardened, so that they will not give or bend at any speed. The rocker arm is so designed that, while using the regular Ford cam shaft, the usual Ford valve lift is increased to 3/8-inch for the Frontenac head, which means that the rocker arms have a ratio of 1-1/2 to one.

The rocker arm shaft is of hardened and ground steel. The rocker arms have hardened steel bearings, floating on this shaft. The push

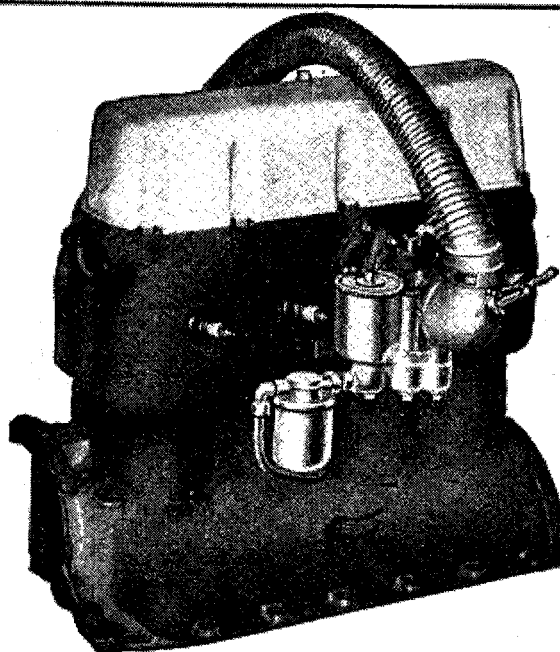
rods are of round steel, 5/16-inch stock, hardened at the ends contacting with the tappets, and with substantial adjusting nuts at their upper ends. After the correct tappet clearance has been secured, the adjusting nuts are secured by means of lock nuts. The accessible position of these adjusting nuts makes it an easy matter to adjust for valve tappet clearance. The lubrication of the rocker arms is by capillary attraction, using wick type of oilers. Standard Ford spark plugs are not used, but the head is tapped for 7/8-inch S.A.E. standard spark plugs. The spark plugs are placed at an angle, so that surplus oil will tend to drain out of the spark plugs. The position of the plugs is such that there is no danger of spark plugs being struck by pistons if extra-long spark plugs should be installed by mistake.

Two types of inlet manifold are supplied, one being for use with the regular Ford carburetor, while the other is designed for use with any one-inch vertical or top outlet carburetor. If one wishes to use a larger carburetor, a horizontal or side outlet carburetor of the 1-1/4 inch size can be attached directly to the side of the cylinder head, and no manifold is needed. With this high carburetor position, some form of pressure fuel feed or vacuum tank is necessary to raise the gasoline to the carburetor.

The inlet manifold is of the high velocity type, to keep the larger fuel particles from being deposited on the walls of the manifold. This type of manifold was designed to give easier starting, good acceleration and fuel economy. Manifold passageways to and from the inlet and exhaust valves, are larger than the valve area and are free from abrupt bends and corners. Both inlet and exhaust passageways are surrounded by water jackets.

The stream-line manifold allows easy exit of the gases without interference from the different cylinders. The end of the exhaust manifold is threaded to fit the Ford exhaust pipe packing nut, allowing the regular Ford exhaust pipe to be used.

Water jacketing the inlet and exhaust passages inside the cylinder head insures proper vaporization of the fuel before it enters the cylinders, thus giving greater fuel efficiency and reducing carbon deposits. The water capacity of the Frontenac is a full gallon, as compared with



## ***A Record Breaker!***

New records for sales as well as for races have been made everywhere with the **FRONTENAC** Head for Fords. No wonder! It practically doubles a Ford's pick-up and power—it increases the speed 50%. And in one year's driving time, the Fronty saves its price in increased gas mileage. It carries a mighty attractive proposition for you, too. Get all the details now by sending us your name and address in the margin of this ad.

**Frontenac**  
CYLINDER HEAD

**Chevrolet Bros. Mfg. Co.**

410 West Tenth Street  
Indianapolis, Ind., U. S. A.

*Ad from Ford Dealer and Service Field, June 1926*

the one-half gallon capacity of the regular Ford cylinder head. No water pump should be necessary with this head, as the water spaces are so ample in size to prevent stoppage of water circulation. The Fronty racing head is fitted with two carburetors of the 1-1/2 inch size, and the intake passages are of over 1-5/8 inch diameter throughout. The valves are of high grade tungsten steel and of 1-7/8 inch diameter. This head is provided with three exhaust ports.

The special feature of the Fronty racing head is that it is fitted with two spark plugs per cylinder, metric thread. According to Chevrolet Brothers, the double spark really makes a material difference in the power and speed, as they have proven to their satisfaction time and again. □