HR EXCLUSIVE: Chevy Fans Wait No Longer-

D.O.H.C. SMALL-BLOCK CHEVY!

NEW: MANLEY 351 CLEVELAND ADJUSTABLE ROCKERS

WILD WEST COAST VANS!

TRICK STRIP SETUPS: TIRES AND SUSPENSION

HOT ROD

EVERYBODY'S AUTOMOTIVE MAGAZINE

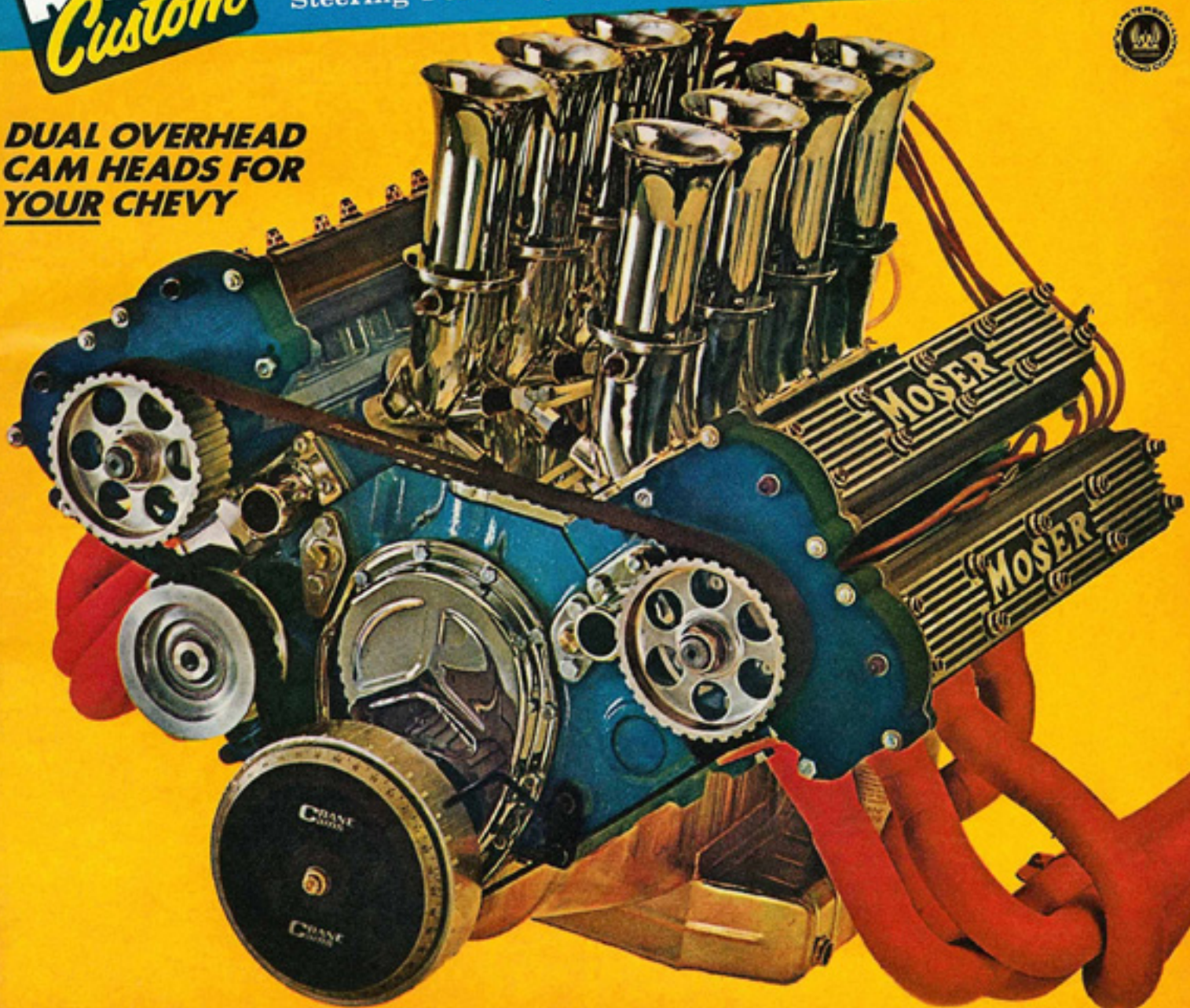
75c AUGUST 1971 Sweden Skr. 6.50 inkl. moms UK 29p

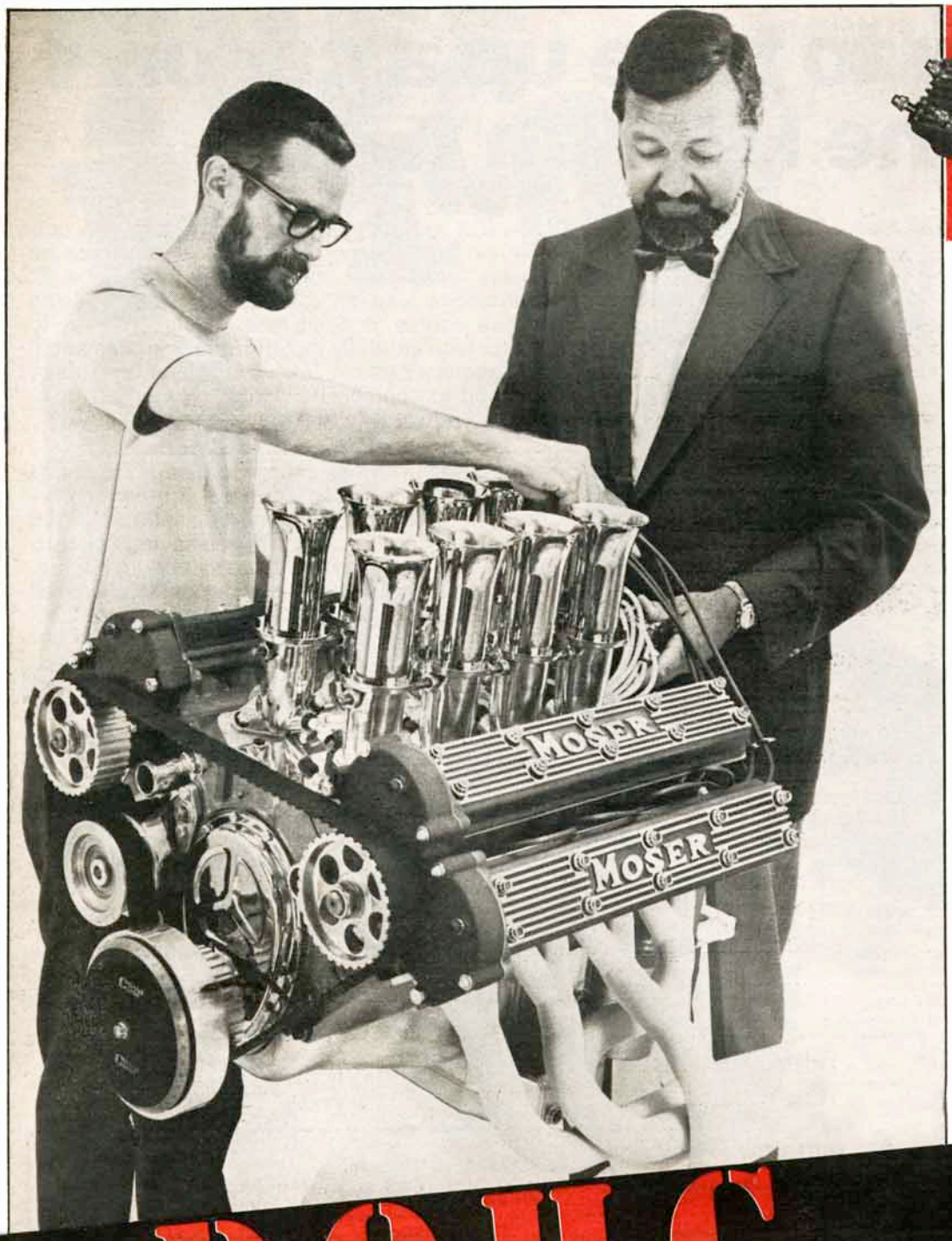
Combined with ROD & Custom

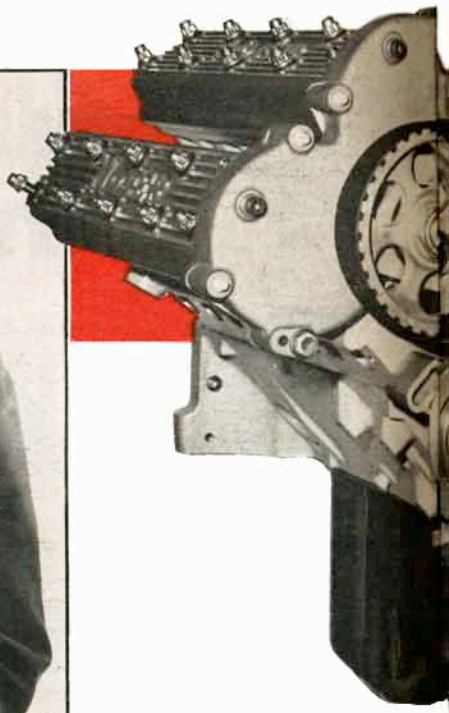
STREET ROD NATIONALS!

How It's Done: Streetkhana & Rod Run ★ Jag Rack & Pinion Steering For Early Iron ★ '29 Highboy Project – Interior

DUAL OVERHEAD CAM HEADS FOR YOUR CHEVY







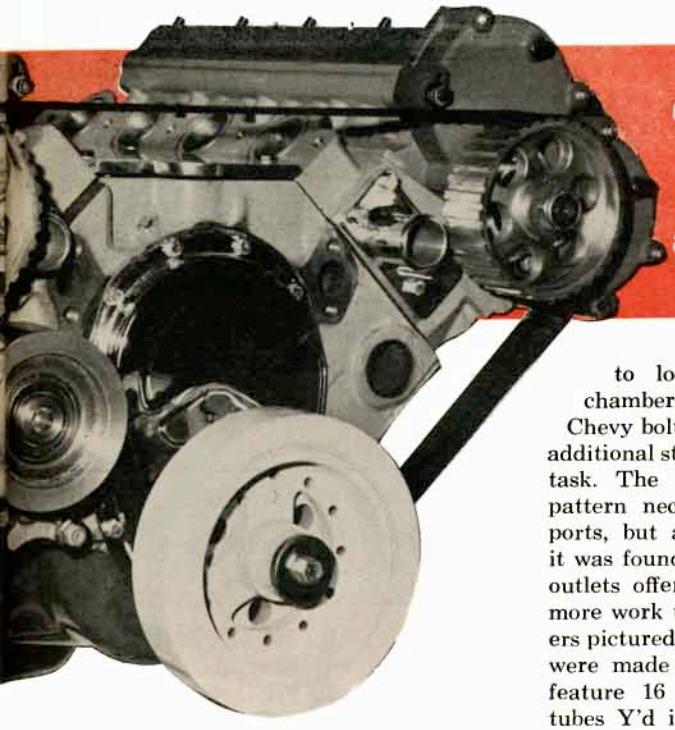
The above engine with DOHC heads is pictured complete less induction system. Initially the only available system is a fuel injection unit by Moser.

Richard Moser (left) and Harvey Crane, Jr., pose with the unique DOHC Moser Chevy. These two gentlemen have turned a dream into available reality.

D.O.H.C. SMALL-BLOCK CHEVY

by John Dianna

photography: Mike Brenner



Chevy lovers are not known for their patience, but one thing they have waited awhile for is a dual overhead cammer. Richard Moser and Harvey Crane, Jr., have ended the waiting

Richard Moser of Moser Engine Corporation, affiliated with Crane Cams, has been working on a dual overhead cam head design since early '65. While Richard worked as an engineer for Chrysler, he handled a portion of the development work on the late-model 426 hemi. However, during this time he never forgot his desire to adapt his head design to a current production engine. His first thought was to develop a two-valve-per-cylinder design, and the 340 engine looked like a promising target. After much investigation, Dick decided the way to go was to incorporate four valves per cylinder and develop the heads for the most popular engine available, the small-block Chevy.

Dick also worked as a cam designer for some time, so naturally, with his interests in racing and his automotive engineering background, it figures that he would settle with an aggressive cam manufacturing company to work out the manufacturing and cost problems for the heads. Harvey Crane, Jr., the founder of Crane Cams, saw a definite market for "available" DOHC small-block Chevy heads, so he and Richard joined forces. It's taken nearly two years to get the head assemblies off the drawing boards and ready for the dyno, but the time has arrived. The heads are a reality.

Basically, the reason for going through all the additional development time required in fitting 32 valves over eight combustion chambers is the total valve area that can be obtained with very short-duration cams. To eliminate valve-to-valve clearance problems, to allow higher compression ratios, and to stimulate more active air flow, the valves are placed at very low angles. Of course to locate the valves over the chambers and not alter the stock Chevy bolt pattern (other than adding additional studholes) was indeed a major task. The standard Chevy head bolt pattern necessitated the dual exhaust ports, but after further air-flow work, it was found that the dual-port exhaust outlets offered no loss in power – just more work to make headers. The headers pictured in the accompanying photos were made for Moser by Hooker and feature 16 1⅛-inch-diameter primary tubes Y'd into eight 1¾-inch-diameter intermediate pipes which dump into an adjustable 3½-inch-diameter collector. Of course header design and size will be determined by the particular application for which the engine will be used.

By design, the head castings were made to provide ample water passages around all-important hot-spot areas. The exhaust valve seat areas were generously supplied with sufficient coolant capacity, even though this created major problems in coring and head bolt locations. Fortunately, these stumbling blocks were cleared, and the Moser heads now utilize the stock bolt pattern, plus four additional 7/16-inch holes (per side) that need to be drilled and tapped in the block's head surface. Richard has a spacer that acts as a guide for this operation and also supplies a reamer to enlarge the dowel pin holes. The only other modification is the installation of two oil plugs in the two back lifter bosses to seal off the main oil galleys. With installation of the plugs, the distributor is still pressurized, as are the rods and mains.

As might be expected, before the final head design was decided upon, Richard spent many air-flow hours developing port shapes and valve head configurations. Symmetrical and asymmetrical intake ports were checked, with both tuliped and flat-faced valves. The production head will have asymmetrical intake ports with flat-faced valves. The combustion chambers were really designed for naturally aspirated use, but turbo usage wasn't completely out of Dick's mind. The chambers feature a penthouse roof design and have matching JE pistons fitted with the required valve reliefs.

In order to maintain the dependability needed with this type of engine, the heads were fitted with valve seats with a high nickel content and standard cast-iron valve guides. The reason for the cast-iron guides is that there is very little side-wall loading from the overhead cams. It's more of a direct up-and-down movement, so there is less wear. The design work for the valve springs, which was done on Crane's computer, consists of an outer spring, a dampener and an inner spring. The inner spring is designed to take one-fourth of the load and features stacked or dead coils at one end. These coils are placed on the seat and actually dampen out vibrations, limit the amount of valve float at maximum lift and dissipate valve spring harmonics.

Valve adjustment on the Moser heads is made by installing different-thickness shims, which are available from Jaguar. These discs fit into the hardened Crane retainers and are infinitely adjustable. This is a much better method of adjusting valve lash than grinding the valve stems. Rather than using steel tappets (not known for prolonged life) as used in many of the European overhead cam engines, Dick used lifters made of standard tappet material. This eliminated the need for trick coatings and steel cams.

The camshafts, although basic in design, are difficult to manufacture. The cams are hollow, and the lobes are drilled for oil. The straightforward cam profiles were computer-designed by Crane and are 250° duration (at .050-inch checking clearance) and .450-inch lift for both the intake cams and the exhaust cams. Of course, with a DOHC engine, if the lobe centers of the cams need changing, all that's required is to move the cam location. New cams don't need to be ground, as is normally the case with conventional single-cam engines. Another interesting feature is that there aren't four different cam grinds for the engine. The two cams on the right bank are identical and are interchangeable, as are the cams on the left bank. Cam timing is adjustable in 1½-degree increments and is accomplished by rotating the front cam gear in relationship to the drive belt. The front drive is a 1:1 ratio, and the timing

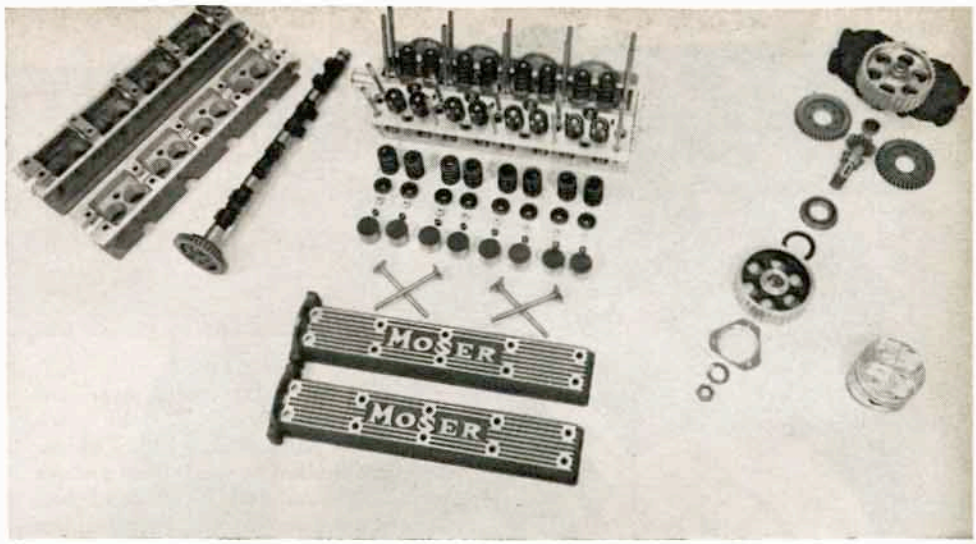
(Continued on following page)

D.O.H.C. SMALL-BLOCK CHEVY

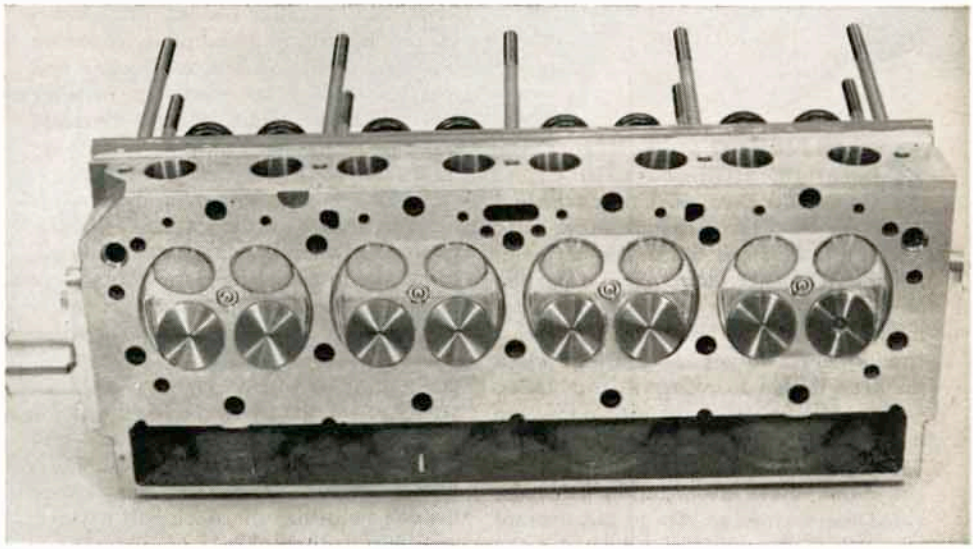
belt is a U.S. Rubber Gilmer design. Before it was decided that the belt was the way to go, the chain drive arrangement and a gear drive were considered. Cost and complications killed the gear drive idea, and the chain didn't offer the timing characteristics Richard was looking for. The 2:1 reduction is taken within a dual gear assembly located at the front of the cams, and this eliminates such problems as big pulleys windmilling at the top of the engine and failures common to small crank pulleys.

For external drives that are sometimes required in various forms of racing applications, there are four provisions at the rear of the cams to drive tachs, water pumps, fuel pumps, oil pumps, etc. Also, the front crank snout can be used as a primary drive link.

Items like the O-ring intake gaskets, aircraft-quality bolts, six head bolts per cylinder (instead of five), all help make this engineering masterpiece a welcome addition to the racing world. The initial dyno engines Dick built for development work are 302 cubic inches, but that needn't bother you. The short-block can be "sized" to fall within sanctioning body limitations, simply because these heads fit *any* small-block Chevy. Initially, Moser Engine Corporation will make available complete engines; however, the heads can be purchased separately and, surprisingly, well within a price range racers can afford. At this time, no final figures are available, but we've been assured they will be competitive with the cost of a standard-type Chevy racing engine available from many of the leading engine builders. We know it's hard to believe the door has really been opened; but, Chevy fans, it has. ■ ■

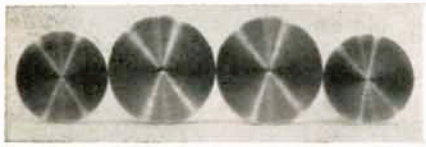


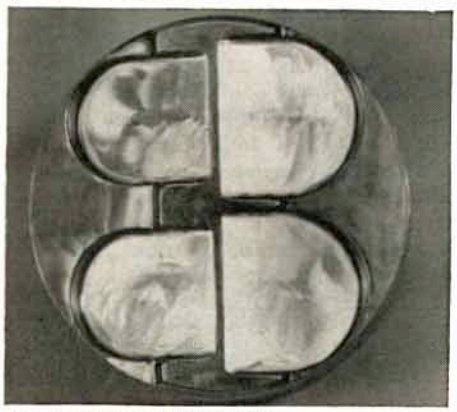
The above pieces are most of the individual components that make up the Moser DOHC head assembly. Each and every part was engineered specifically for racing.

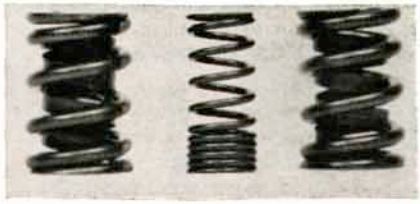


ABOVE – The aluminum head castings were the most difficult of the many components to design, but the end result is beautiful. Adequate cooling, exceptional gasket sealing, etc., is a plus.

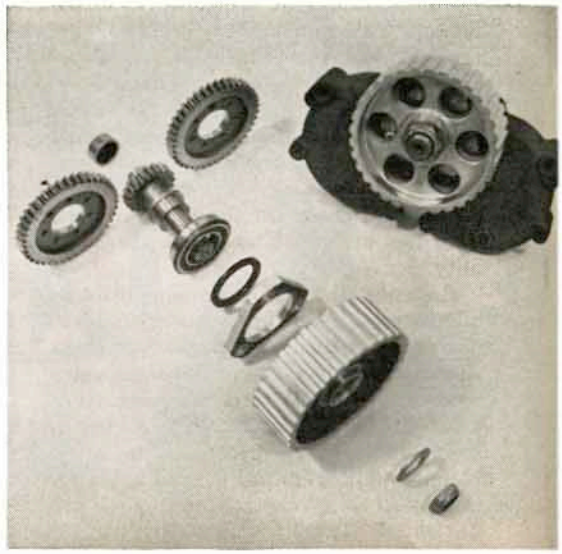
BELOW – The 2:1 crank-to-cams relationship is taken via a dual gear assembly located at the front of the cams. This arrangement eliminates the need for large pulleys at the cams.

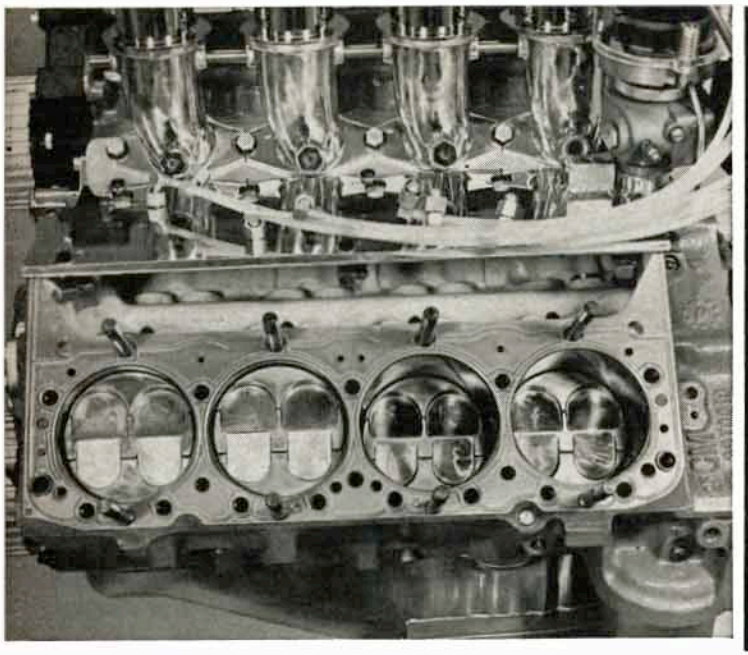


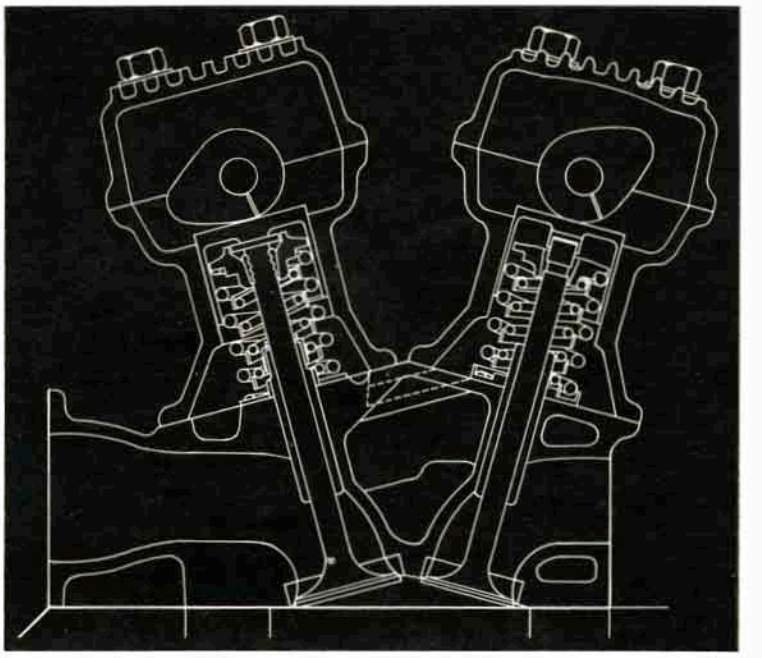




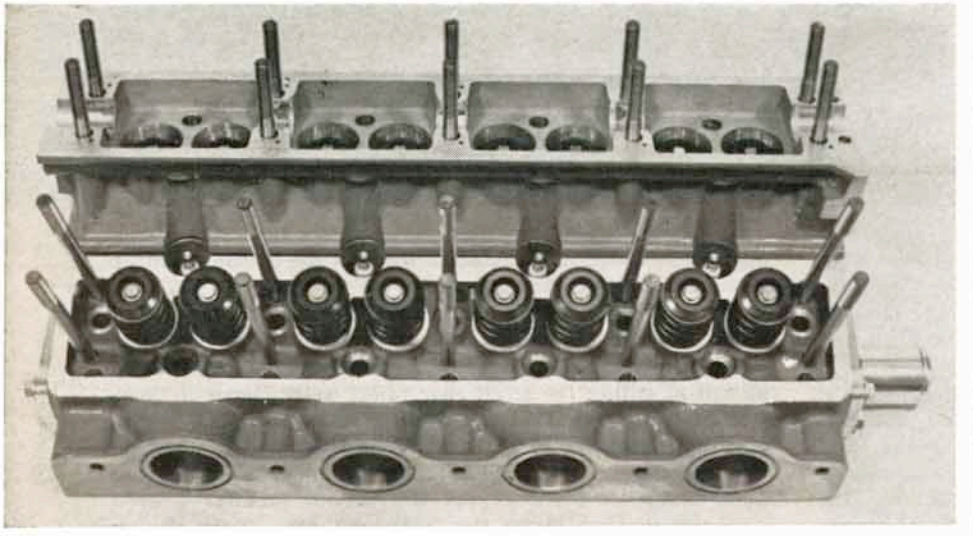
ABOVE RIGHT – Considerable flow work was done in determining the shape of the valves, and the flat face showed a better curve than did the tulip design. LEFT – The JE pistons are notched for adequate piston-to-valve clearance; however, they still offer over 14:1 compression. ABOVE – The Crane valve springs feature an inner spring that accepts ¼ total load and has an end "coil-stacked" to absorb vibrations.



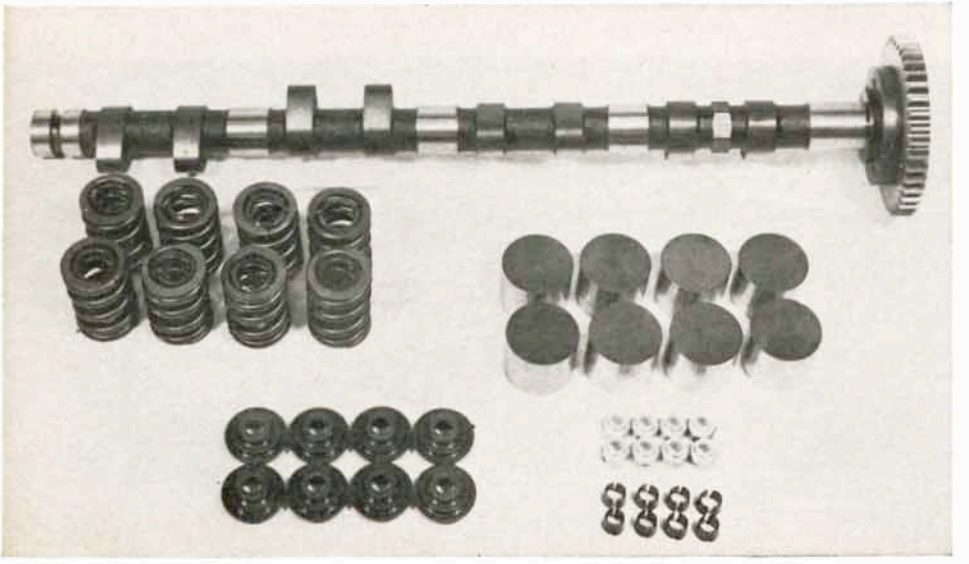


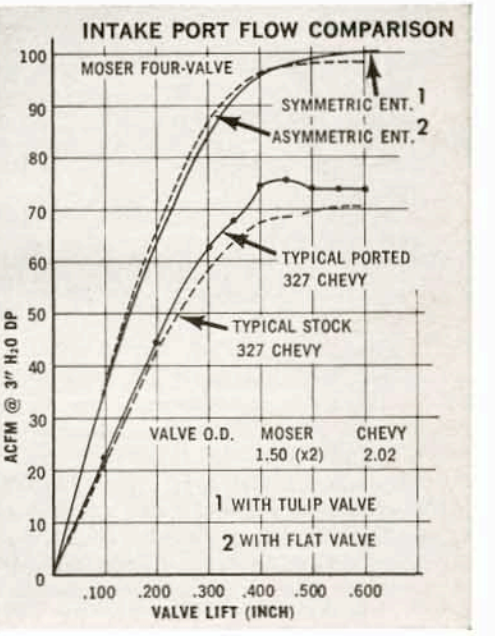


ABOVE – The stock Chevy head bolt pattern is retained; however, four additional 7/16-inch holes must be drilled and tapped per side. BELOW – The cam stands bolt directly to the head castings and are sealed by O-rings.



BELOW – One complete cam and kit. Lifters are made of standard lifter material for durability reasons. BELOW RIGHT – A shot of the siamesed intake ports.





At the extreme top is a cutaway view of the head assembly. Just under it is a flow-chart comparison between DOHC design and a typical modified Chevy.