

The Kisselgraph

★ ★ ★ THE KISSEL DISTRIBUTORS, DEALERS AND SALESMAN'S NEWS- ★ ★ ★
PAPER—OFFICIAL ORGAN OF THE KISSEL MOTOR CAR CO.

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NO. 12

SIXTEEN MONTHS OF KISSEL ENGINEERING ACTIVITIES

NEW MOTOR CHASSIS AND BODY DEVELOPMENTS ON CARS AND TRUCKS

Summary Shows Scores of Exclusive Sales Pointers

As a result of the Kissel engineers concentrating on one chassis only, that of the present Kissel Custom-Built Six, each month has produced new improvements and developments, all of which have been recorded in different issues of The Kisselgraph since January 1st, 1919.

To give Kissel distributors and salesmen a complete digest of these improvements, we herewith summarize the results of our engineers' activities for the past sixteen months.

Checking right down this list, you will find improvements and features that insure a smoother, sweeter running, more powerful and speedy motor—a chassis composed of custom-built features and units that make it the best chassis regardless of price in the 124" wheelbase class, and exclusive body workmanship in original designs that are distinctly custom-built.

In talking with prospects emphasize the fact that 'custom-built' when applied to a Kissel passenger car or truck is a Standard—a gauge by which every item in designing, development, construction and finish are measured.

Here are scores of exclusive features found only on the Kissel Custom-Built Six and motor trucks. In fact you can show this Kisselgraph to any prospect with only one result—He Cannot Fail to Be Impressed With The Minuteness of Detail With Which Every Kissel Product is Manufactured, Inspected and Finished.

Part 1—Custom Built Six Motor

1—The new Kissel Automatic Oil Control that results in the following:

A—When the motor is pulling its maximum load, or using its full horse power, with the throttle wide open, the new Kissel Automatic Oil Control provides the "maximum oil pressure

needed" as well as the necessary "oil supply" to maintain the proper oil film under this full load condition.

B—When the motor load is reduced and the throttle closed the new Kissel Automatic Oil Control automatically reduces the oil pressure as well as the oil supply.

C—It prevents the piling of oil at either end of the oil basin, i. e., when going up or down a grade.

D—It distributes the correct amount of oil in the oil pockets for each cylinder, regardless of the grade, load, condition or speed. No cylinder is ever starved of oil or gets too much. (See Jan. 1919 and Jan. 1920 issues Kisselgraph.)

2—Heat treating of connecting rods in order to maintain maximum lightness of rods, yet getting maximum tensile strength and stiffness. This is not needed to prevent any breakage of connecting rods because that is an item which seldom gives any trouble. It does happen, however, that a rod will twist or bend or otherwise lose its shape sufficiently to get out of line. This special steel and special heat treating overcomes this. (See Jan. 1919 Kisselgraph.)

3—Connecting rod bolts and nuts have been changed to Chrome Nickel steel with special heat treatment. After giving a number of motors very severe tests at their maximum horsepower and with the throttle wide open, on night and day runs, we found that we could stretch the connecting rod bolt just a trifle. For this reason we changed to Chrome Nickel steel as outlined above, eliminating this entirely. (See Jan. 1919 Kisselgraph.)

4—A special lock bolt in front spindle bolt is provided to eliminate any chances of this spindle working out. (See Jan. 1919 Kisselgraph.)

5—The back-lash in the transmission gear clutch has been eliminated entirely by having all of the teeth on the male and female gears machined on Fellows Gear Shaper. Special attention is also paid to the regular gears as well as careful inspection to insure the transmission being up to specifications. (See Jan. 1919 Kisselgraph.)

6—All machined parts are carefully inspected at the machines and as fast as the operations are finished we eliminate all parts from going through which are not right up to the standards set. (See Jan. 1919 Kisselgraph.)

7—Pistons are checked and fitted by a carefully trained and experienced man, to eliminate having a piston which may be machined at the minus limit, to a cylinder machined at the plus limit, thus making sure that all are fitted strictly in accordance to the standards set. This is also true, and handled in the same way, with the piston pins, which are now fitted by one man, carefully trained who sees that they are fitted with a light drive fit. (See Jan. 1919 Kisselgraph.)

8—Push rods pass inspection department with an allowance from one half to one thousandths maximum for squareness; all other dimensions being carefully checked with special attention paid to better threads for adjusting screws. (See April 1919 Kisselgraph.)

9—The new piston has a straight head finished by buffing it to a perfectly smooth surface, minimizing the possibility of building up carbon on same. Piston ring grooves will be very accurately finished both for size and smoothness. Rings will be made to correct sizes and will pass a strict inspection for size and finish as well as for hardness. Accurate jigs have been designed to produce correct piston pin bearings. The dimensions from center of piston to top of head can only pass inspection if it is held within a limit of 3-1000". (See April 1919 Kisselgraph.)

10—The valve spring clearance has been increased $\frac{1}{8}$ ", eliminating any possibility of the coils of the spring touching each other, producing a noise when springs are compressed. (See April 1919 Kisselgraph.)

11—All timing gears are fitted with unusual care—while cap screws for camshaft gears fit perfectly by

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KISSEL PRICES ARE ADVANCED

**DUE TO INCREASED LABOR
AND MATERIAL COST**

**Raise Necessary to Keep Kissel
Quality**

The Kissel Custom-built cars and motor trucks have been raised \$300. While the necessity of an advance is not new to Kissel distributors, many of whom wondered how we have been able to maintain Kissel quality at the old prices, they are all surprised that it can be maintained at only a \$300 increase in the face of present labor and material conditions.

Confirmation of this condition is found in the fact that a good many automotive manufacturers have made recent advances in price, ranging from \$300 to as high as \$500, and it is noticeable that the higher the quality product, the higher the increase. Cars claiming to be in the same price range as that of the Kissel Custom-built models, have in a good many cases advanced more than \$300 going as high as \$400, \$450 and \$500.

The same is true of trucks, the raise being according to the different models, the average price advance being around \$300. In the "General Utility" class, practically all have advanced beyond our price. The same is true of leading trucks in the "Freighter" class, even giving consideration to the fact that a "Freighter" is a 2½ ton truck in place of some of the others which are only 2 ton, and a scant 2½ in many cases. The same is true in the "Heavy Duty" class. They all are obliged to do this for the same reason that we have, i. e., to maintain quality, in the face of rising cost in labor and material.

As an example, pressed steel frames for our "Freighter" trucks, which have just been shipped to us, have taken a new price which is 77% higher than the last shipment. Pig iron has just advanced another \$14 per ton. Sheet metal which is used on bodies, fenders and enclosures, i. e., the kind that we must use to maintain Kissel quality, has advanced practically 100% the last shipment.

These are only a few of the items to show existing conditions. In addition to this we have been obliged to meet a marked advance in the better class of labor in many departments, to maintain our standard of workmanship.

We are determined to continue the policy of bettering our quality of work, holding our inspection more rigid, getting a better finish on the product as we go along, and to do that means skilled help.

All this is in line with our decision

to concentrate all efforts on a quality product, without making a lot of radical changes, using all efforts to secure the best materials obtainable, the very last word in the way of details, and refinements, going the limit in the way of good work, inspection, etc., keeping the lines snappy and up-to-date, showing each day, week and month, marked improvements in the product, improving and correcting any point that may show up at all weak or on which improvement can be made; all to accomplish this one thing, namely, that we conscientiously can say, "That We Have the Best Chassis that is on the American Market in the 124" Wheelbase Class."

You will agree with us that we have carried out the above plan of detail changes and refinements which are going on now and all of which will soon be incorporated.

So far as the Custom-built bodies are concerned, we expect to continue keeping them up to date with advanced designs and lines that appeal to the better-buying class.

A part of the Kissel policy is to so build the Kissel Custom-built Six as to create a demand for it by that better class of buyers who are particularly interested in a car that is distinctive, which means easier business when competition is keenest.

The past year and a half has satisfied us that there is a class, a big class which takes in a good range of buyers and which is found in every community of men and women who are keenly interested in just such a product, and a matter of \$300 in price makes no difference at all. By adhering to this policy of bettering our product, we will not be able to fill all orders, provided the factory and all the distributors and dealers will concentrate their efforts along one line—to sell the product for what it is and to that class of buyers for whom it is made.

To sum up the situation, we feel certain that by considering the price secondary and putting all efforts toward building up a reputation for the best car in the 124" wheelbase class, we can have in each community a demand from good buyers, even with competition that will mean a very profitable business for every Kissel distributor.

Comments from the majority of Kissel Zone distributors are to the effect that—"Irrespective of price, the high manufacturing ideals necessary to attain the high place the Kissel Custom-built models hold, must be maintained." We here at the factory can see that we are making very rapid strides towards a better and finer product; and while our ideal of standard is above what we are now turning out, we can see that we are fast approaching that point, and it is bound to count to the advantage of Kissel distributors and dealers selling our products.

This is an age when the public demands quality, especially in automobiles and motor trucks, both of which have become utilities. They have become necessities—automobiles

RESULTS OF THER- MOSTATIC CON- TROL ON C. B. SIX

**NINE SALES POINTERS FOR
KISSEL SALESMEN**

While primarily a thermostat on a motor is to accelerate starting in cold weather, the Kissel thermostatic control accomplishes other results of an efficiency and economy nature—features every Kissel salesman should be familiar with and which are as follows:

1—The motor quickly warms up when starting on the coldest day, because circulation through the radiator is retained until the temperature of the engine rises to the point of maximum all-around efficiency.

2—The circulation of cold water from radiator to jacket, when you stop your motor, is automatically shut off, thus keeping your engine warm for a long time.

3—Spitting, backfiring and missing due to cold cylinders is prevented.

4—The necessity of frequent carburetor adjustment for varying weather conditions is eliminated.

5—Regardless of the weather your engine is kept at all times at exactly that running temperature which has been found to be the most efficient by the Society of Automotive Engineers.

6—Carbon deposits are reduced to a minimum.

7—It reduces the consumption of gasoline; (24% being a good average saving.)

8—Lubrication is more satisfactory; economical condensation of gasoline and kerosene on the cylinder walls, which works down into the crank-case, cutting and diluting the oil, vitiating its lubrication qualities, causing loss of compression, scored pistons and cylinders, and burnt bearings.

9—The wear of valves, pistons and cylinders is greatly reduced because the uniform temperature overcomes unequal expansion and contraction of parts.

biles in our social life—motor trucks in our commercial life—both transportation units that must be of the highest mechanical and structural construction throughout, rendering maximum service at minimum upkeep.

To that end the Kissel products are dedicated and indications have proved that if we continue our strenuous efforts toward attaining the high ideals we have set for ourselves we will make it, not only to the advantage of ourselves, but Kissel distributors and dealers located throughout the country.

THE PROPER CARE OF RADIATORS

IMPORTANT POINTS FOR OWNERS AND DRIVERS

Editor's Notes—Herman Palmer, the Kissel Chief Engineer, says that the following points should be carefully noted by all Kissel distributors, dealers and salesmen—and passed on to all customers by furnishing them with typewritten copies. A copy should also be posted in your salesroom and service stations—in fact all possible publicity should be given this article, even if cold weather is giving way to Spring. A better understanding of the radiator will result.

When a radiator is first put in service it should be flushed out with 10 or 15 gallons of clean water, after which it should be filtered through the screen in the filler tube with clean water free from salts, acids or mine drainage.

In service, only clean water should be used, and should always be filtered through the screen. If filled to the top the surplus water will, when the motor is started, escape through the overflow tube leading from the filler to the bottom of the radiator. This tube also offers a means of escape for any steam that may form in the water.

Every two or three weeks the radiator and cooling system should be drained, and the flushing operation should be repeated. A drain cock in the bottom of the radiator or on outlet casting permits of easy drainage.

In Cold Weather

It is best to keep the radiator filled at all times, and as it must not be allowed to freeze it is necessary, in freezing weather to provide against this. The only safe means of accomplishing this is to use grain or denatured alcohol (not wood alcohol) in the water in the following proportions, depending on the weather:

Alcohol	Water	Freezes at
25%	75%	Zero
30%	70%	5 deg. below
40%	60%	20 deg. below

The rapid evaporation of alcohol will necessitate occasional adding to the supply in order to maintain the proper proportions of water and alcohol. This will be especially true if the motor is heated up above 160 degrees F.

If glycerine be added it will prevent evaporation of the alcohol to a large extent. The following proportions are recommended:

Alcohol	Glycerine	Water	Frgz at:
15%	15%	70%	0°
16%	16%	68%	5° below
20%	20%	60%	20° below

In the case of machines equipped with thermostat temperature control one of the glycerine mixtures will be

found necessary.

We caution owners against the use of any other anti-freezing solutions as they are apt to very seriously damage the radiator.

In any emergency with no alcohol available the radiator should be entirely drained to prevent freezing, but to insure long life it is best to keep it Always Filled with Water.

In Event of Leaks

In the event of leaks we recommend sending the radiator to a man thoroughly experienced in repair work, as attempted repairs by an inexperienced workman will usually do more harm than good. We advise against the use of meal, bran or patented preparations for stopping leaks, as usually the relief is only temporary and the efficiency of the radiator impaired.

Cleaning Radiator

For cleaning the radiator, use nothing except sal-soda or common washing soda, dissolved in water of the strength of about one teaspoon full to two gallons of water. Fill the cooling system with a solution of this strength, start the motor and run on retarded spark for 15 to 20 minutes until the solution has become hot and has been well circulated through the water jackets and the radiator. Drain off the soda solution and thoroughly flush the entire cooling system with clean water, using a garden hose if possible.

Be sure that all of the soda solution has been removed and that the system has been thoroughly flushed with clean water. Do not allow the soda solution to stand in the radiator for more than one hour and do not permit any of the soda solution to spill on any painted or varnished surface, as it will cause damage to the surface finish.

"REBEL" RAILROAD STRIKE HANDICAPPING OUTGOING AND INCOMING SHIPMENTS

Many Kissel dealers do not realize just what the present carload shipping situation means, probably, because they were not directly effected locally. It is not uncommon to receive advice from a dealer that shipments can move over a certain line, not knowing that Milwaukee and Chicago are the controlling points for embargoes on shipments from Hartford.

This condition will naturally cause delay on all shipments for some time and to offset it we suggest to points not too far distant to arrange for drive-aways.

As a means of reducing cost of driving and to preserve a car's newness, passenger cars should be loaded on truck chassis.

We are doing everything possible to keep production moving, even to the extent of sending trucks out to points as far as Valparaiso, Indiana, to haul axles and other parts, regardless of expense, in order to keep up reasonable deliveries to all points.

CHANGE IN WA- TER CONNECTION

INSURES BETTER COOLING AND CARBURETION

To secure better cooling conditions and more perfect carburetion the Kissel engineers decided to make certain improvements in the water connection of the Custom-built Six.

Many tests and analyses showed that it would be necessary to have the incoming water enter at the rear of the cylinder for obvious reasons.

A motor was built with the incoming water leaving the pump and entering into a water pipe, located underneath the exhaust manifold leading to the rear of the sixth cylinder, where it was attached to the cylinder block by a flange.

With this arrangement it was found that an even water temperature all through the cylinder block was maintained. Since the cooled water here always enters at the warmest part of the cylinder block, it works gradually forward where cooler water is found, due to the fan and natural air draft while on the road.

Further we found that with the new arrangement, carburetion is more perfect, since the intake manifold temperatures are kept more even, while condensation of gasoline is prevented at the forward end of the intake manifold.

NEW BRAKE SHAFT BUSHINGS

The brake cross shafts are now fitted to frame through a new type of bronze oilless bushings which will make it unnecessary to get under car to oil these shafts—as the bushings are self lubricating.

HEAVIER FENDER IRONS

Fender irons are much heavier in every way to take away the road vibration of fenders, these new irons holding fender rigid under all strains and speeds of car.

NEW TYPE CHASSIS OILER

The entire chassis is fitted with a new type of oiler, having a cap which is fitted to fill with oil, this cap being dust and water tight. The inside of oiler is filled with a special felt which prevents oil from splashing, acts as a filter and only allows the proper amount of oil to reach bearing, doing away with oil over-flowing and picking up dust.

When a man makes up his mind to do more work than he is paid to do, no force on earth can hold him back.

A salesman's sweetest revenge is the name on the dotted line.

(Continued from 1st Page)

being pulled up tight, and lock wires properly applied. (See April 1919 Kiselgraph.)

12—All cylinder heads are annealed to relieve them of any possibility of strains. (See April 1919 Kiselgraph.)

13—Balancing Rotating Parts. The custom-built crankshaft has been redesigned in order to have it stiffer and to properly distribute the weight at different points for balancing. These two factors together with having the crankshaft balanced statically and dynamically on a special balancing machine, makes possible a perfectly balanced crankshaft. This with the reciprocating parts perfectly balanced, makes possible the smooth running motor at various speeds without vibration and roughness characteristic of all motors.

Instead of putting balancing weights on the crankshaft, as is being done by a few companies and which only permits balancing to a certain degree, our Engineers have figured out the correct points where the weight is needed when at high speed and we put the weight at those points.

To make the shaft stiffer the following measurements have been changed—On all crank cheeks, the four straight cheeks are made 3-32" thicker and 1-2" deeper in section, while the curved cheeks are made 1/2" deeper in section. (See Jan. 1920 Kiselgraph.)

14—Balancing Reciprocating Parts Closely followed by the static and dynamic balance of the crankshaft came as a necessity the balancing of the reciprocating parts of the Custom-Built motor, such as the piston, connecting rods, wrist pins and their smallest details to insure a smooth-running motor. (See Jan. 1920 Kiselgraph.)

15—New Design of Cylinder Head, increasing the water space—the shape of the riser changed—more air cooling and water cooling is admitted to the spark plugs which are of the A. C. Titan long 3/8" type. Location of spark plugs improved making them accessible. (See Jan. 1920 Kiselgraph.)

Custom Built Chassis

1—Speedster rear fenders have reinforcement preventing excessive vibration. (See April 1919 Kiselgraph.)

2—Rattles in steering posts eliminated. (See April 1919 Kiselgraph.)

3—Plate on Speedster step protects the body finish from getting scratched when entering or leaving car. (See April 1919 Kiselgraph.)

4—More curtain fasteners and better curtain fit on all new models. (See April 1919 Kiselgraph.)

5—New frame and springs on Kisel Custom-built chassis. (See this issue Kiselgraph.)

8—How to make proper carburetor adjustments on the Kisel Custom-built Six motor. (See this issue Kis-

selgraph.)

7—New rear axles designed and constructed by Kisel for Custom-built chassis. (See this issue Kiselgraph.)

8—Heavier fender irons. (See this issue of Kiselgraph.)

9—Tungston steel valves on Custom-Built chassis. (See this issue of Kiselgraph.)

10—Longer levers on Custom-Built chassis. (See this issue of Kiselgraph.)

11—Brake cross shaft fitted with new type bearings. (See this issue Kiselgraph.)

12—New hood hooks on Custom-Built chassis. (See this issue Kiselgraph.)

13—Brass screws and parts instead of nickle-plated. (See this issue Kiselgraph.)

14—All enclosed bodies entirely covered with metal. (See this issue Kiselgraph.)

15—New lynite wiring tube brackets. (See this issue Kiselgraph.)

16—Chassis fitted with new type of oiler. (See this issue Kiselgraph.)

17—How to properly care for both passenger car and motor truck radiators. (See this issue Kiselgraph.)

Kisel Truck Chassis

1—Adams Westlake lamps standard on Kisel trucks. (See April 1919 Kiselgraph.)

2—Tiflex Metal hose, a strong reliable connection between vacuum tank and carburetor is furnished in place of copper tubing. (See April 1919 Kiselgraph.)

3—New feature for proper suspension and location of tail lamps. (April 1919 Kiselgraph.)

4—Transmission on 2 1/2 and 4 ton trucks supplied with front transmission support on which the cap screws are locked by a wire to prevent screws from working loose. (April 1919 Kiselgraph.)

5—New radiator of cast iron shell type with tubular core and continuous fins. Insures easy repairing as the radiator can be disassembled and tubes repaired or replaced very rapidly. In case of accident to the radiator, new sections can be installed without replacing the entire radiator. (June 1919 Kiselgraph.)

6—New fan bracket fastened direct to crank case allowing more easy adjustment of the tension of the fan belt by simply raising or lowering the fan itself on its spindle. (June 1919 Kiselgraph.)

7—Improved fan of highest efficiency type, employing four blades in place of six, insuring larger capacity for moving air. Has a diameter of 20 inches, driven by a two inch belt. (June 1919 Kiselgraph.)

8—New oilless bushing in gear cover for Kisel truck starting crankshaft. (See this issue Kiselgraph.)

9—Why military cup center springs were substituted for banded springs on Kisel trucks. (See this issue Kiselgraph.)

10—How the suspension of Kisel truck motors has been improved. (See this issue Kiselgraph.)

KISSEL QUALITY STARTS WITH KISSEL ENGINEERS

CONTINUOUS IMPROVEMENT PROGRAM FOR CARS AND TRUCKS

Custom Quality Built-In Motor, Chassis and Body

This issue of The Kiselgraph is undoubtedly the most important issue, ever published from the purchaser's standpoint, as well as that of the Kisel distributor's and salesman's standpoint for the following reasons:

1—It is devoted almost entirely to the activities of the Kisel engineering and experimental departments, not only listing those improvements made since Jan. 1st, 1919, but containing news of recent improvements now going through the factory.

2—These improvements are fundamental—insuring a higher development of the Kisel Custom Built Six and motor trucks from a mechanical and technical standpoint, reaching new heights in the little things that count so big in the performance and economy of an automobile and motor truck.

3—The term "Custom-built" has indeed become a fact and not a theory—a practice and not a phrase—a Reality of the Present and not a Promise of the Future. It pertains to not only on the surface, but under the surface. It permeates every unit in the chassis and body.

4—The Kisel manufacturing policy of concentrating on one chassis only—that of the present Kisel Custom-built six—has resulted in our indomitable purpose of building the best chassis in the 124 inch wheel-base, regardless of price. That we are attaining this goal is proved in the present edition of The Kiselgraph, which contains many articles dealing with added chassis improvements.

5—Our extraordinary progress in maintaining the Kisel manufacturing ideal is the result of our present Zone distribution plan in which the heads of each Zone every 4 months, meet the factory heads, in a body to suggest and discuss plans and ideas to still further make Kisel Custom-built models and motor trucks the best on the market. The Kisel Zone Distributors are mainly responsible for the many improvements that have been made and are now being made, even on those accessories and units that apparently offer no further improvements. Because a unit functions satisfactorily does not make it

immune from an analysis by the Kissel engineering department to see if it cannot be still further improved.

6—Recent tests of the Kissel Custom-built motor with similar size motors of different makes, leave nothing to be desired in the way of efficiency, economy, smoothness and, indeed, all elements of higher mechanical development.

7—The Kissel engineers are constantly checking and re-checking, investigating, analyzing and probing with the thought uppermost in their minds of improving where improvements seem impossible—of developing new heights of perfection in those units and accessories where further improvements are deemed unlikely.

8—From a sales standpoint, this issue of The Kisselgraph, if properly used by Kissel distributors, dealers and their salesmen can convince prospects that Kissel engineering principles, mechanical construction and body craftsmanship reach that point of development that more than inures lasting satisfaction to the owner, giving him a product that is a joy forever, and one that will justify his judgment in becoming a Kissel owner.

9—The one outstanding feature in the Kissel product is that it is not only custom-built in name, but custom-built in design, construction and assembly. That not only is custom-built quality found in the materials and workmanship, but this quality goes deep down into the engineering practices of the Kissel engineers, forming a bedrock of quality for the other custom-built features.

NEW REAR AXLE FOR CUSTOM BUILT CARS

GREATER BEARING SURFACE AND STRENGTH SECURED

We have improved the rear axle of the Kissel Custom-built passenger cars by slightly changing the internal construction at some points to give greater strength.

The driveshafts are now fitted into the differential with splines instead of the square end as heretofore. The pinion shaft part of the housing has been made much larger, giving us a chance to get 100% greater bearing surface and using much larger and heavier bearings. The sleeve that these bearings fit into and the parts pertaining to this sleeve will be found to be increased 100% in area.

Due to the spring construction, the spring pads will be found practically flat on account of flat spring construction. The new brake anchor is made in a slightly different manner, being perfectly straight, which gives us a much more rigid anchor having more strength and one that will eliminate brake trouble.

The brakes are mounted in the same manner as before with the exception that where the brake is fastened to the anchor, instead of each

brake being mounted separately, we now mount both of these brakes at this point on one casting to the anchor on a round pin instead of square. Each brake will work individually of the other, but it has been found that it was not necessary to have them mounted separately. This construction gives us a brake that will not "chatter," that has perfect brake action either forward or reverse and will not rattle.

The wheels are held on the end of the axle tubing by the new type of nut and lock nut, which are made almost 100% larger, than heretofore. The lock between these two nuts is much stronger than before, making it impossible to shear one of the "lock gloves" which might cause the loss of a wheel. The bearings for the wheels are the conventional designed Timken. The brakes continue to be adjusted as heretofore as this adjustment has proven satisfactory for more than five years.

BRASS SCREWS USED ON MODELS

From now on all screws used in bodies, hoods and other exposed parts of the new series Custom-Built models, will be made from brass, nickel-plated, thus eliminating any possibility of their rusting, tarnishing or the plating chipping or peeling off.

We have tried steel, nickel-plated, which requires a special process of plating in order to get a good finish, but which resulted in some of these screws rusting in the weather in spite of this special process.

This rusting would not as a rule start on the nickel-plated head, but sometimes on the screw or under the head and work up until finally it covered the entire screw.

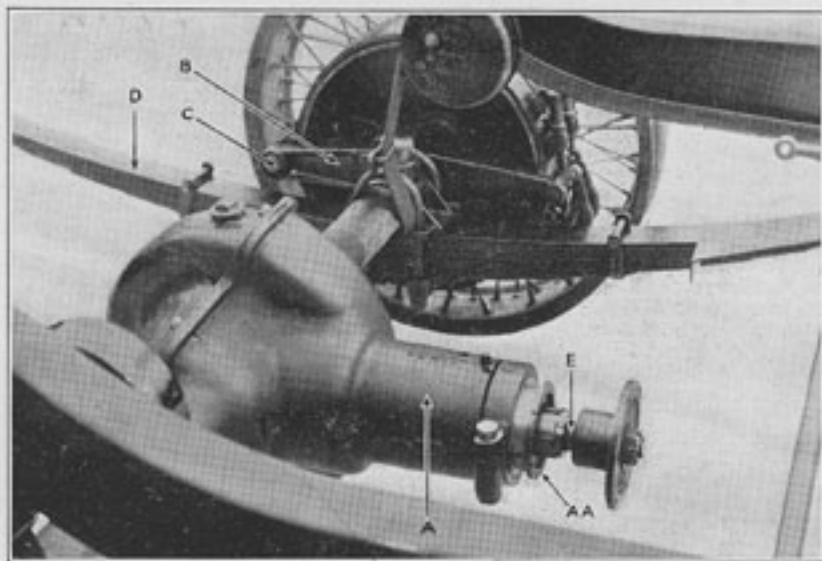
Brass screws, nickel-plated, will eliminate this bad feature, possessing all the points to recommend their use, as experiments with them have proven that they will not rust or tarnish, and that the plating on it will not chip or peel off.

All other exposed nuts and parts are being made from brass and then nickel-plated, and in places where brass does not give required strength they are made of steel and then painted the color of the car.

In other words, from now on you will find no exposed steel parts. Where it is advisable not to use brass on account of the necessary strength, steel-painted, will be used.

These improvements will eliminate the unsightly nickel-plating due to rain, fog or damp weather, thus keeping up the reputation the Kissel Custom-Built models have attained—that of quality cars not only in the big features, but in the smallest details.

NEW REAR AXLE ON CUSTOM-BUILT CHASSIS



A—New axle housing steel casting.

AA—New pinion shaft sleeve containing large bearings and shaft.

B—New brake anchor springs seat cast in one piece.

C—New and much heavier brake anchor pin of rounded design instead of square.

D—New 58" x 2 1/4" rear spring.

WHY KISSEL USES THE 3 RING PISTON

FALLACY OF 4 RING PISTON EXPOSED

Results of Special Kissel Experiment

By Herman Palmer,
Chief Engineer, Kissel Motor Car Co.

"When the period of the two ring piston neared its end someone recalled the proverb—"The More the Merrier."

So he set out and made pistons with four rings, and followers of that creed came out and put in even five rings per piston. Many adopted the four ring creed until they had practically all honest people believing that it was a truth about piston rings—"The More the Merrier."

Then along came another man with a creed saying: "Enough is Plenty."

So he made pistons with three rings and did certain things to the oiling system which he found to be correct, as regards the number of rings.

Then came the time when people found that the phrase, "The More the Merrier," did not apply to piston rings as well as, "Enough is Plenty." So they asked the three word creed man how he found that with changes in the oiling system the fourth ring was not called for, and the man spoke as follows:

What About the Fourth Ring?

Regarding the use of a fourth ring situated below the wrist pin of a piston and in that location, acting as a scraper ring, much time has been spent guessing, and little experimenting has been done, to pass a reasonable judgment on this mysterious member of an internal combustion engine.

Some designers copied the fourth ring—they let their thoughts travel the way of least resistance, repeating in parrot-like manner the soothing phrase—"the more rings, the less danger of oil getting by." Today some still hang onto the fourth ring, which they honestly think is helping them to eliminate oiling trouble.

When developing the oiling system of our Custom-Built Six motor, careful attention was paid to Every Detail belonging to or connected with The Oiling System.

The Kissel Custom-Built piston has been equipped so far with three rings located above the wrist-pin, and a fourth ring located below the wrist-pin. This construction was used in good faith, and with the same imagination others had, namely that the fourth ring was doing wonders for us as regards any oiling trouble. There never had been made any exhaustive experiments proving this hopeful im-

agination.

We noticed by observing our oiling system that the fourth ring was a sort of preventative and while working and experimenting along this line, the following thought came to us.

"Which would be the best way to go after oiling trouble? Should we find and eliminate the cause of this trouble, or should we employ preventative methods at such points where this trouble would be noticed but still retain the cause of the trouble?"

Thus our thoughts ran, and we decided that the only lasting and honest way would be to attack the root of the trouble, The Oiling System.

Close investigation soon revealed that the oiling system was furnishing a good deal more oil than necessary to that particular part of the motor which caused trouble, namely the cylinder walls and pistons; at a closed throttle and low speeds with a high vacuum in the cylinders, there would be a Surplus of Oil against which our preventer, the fourth ring, battled in vain. The fourth ring would minimize, but its action was far from eliminating the trouble because the trouble was more serious. As a last resort a fourth ring could not cure the defect.

So we went after the root of the evil—The Oiling System.

We established by tests the minimum quantity and pressure needed, (quantity as far as the oiling of the cylinder was concerned) to maintain a proper oil film in the cylinders, at high speed. It may be said here that the pressure is only related to the crankshaft.

Then we introduced the plunger and by-pass to establish the very minimum of oil the cylinders needed at slow speed, with an almost closed throttle. That meant we eliminated that which was present in our old oiling system, namely "Over Supply to the Cylinders," especially at low speeds and high vacuum.

Now, after the oiling system had been corrected, we again started observing the action of oil in the cylinders on the pistons and rings. We found that the fourth ring had no place in our motor. We found further that it actually was a disadvantage to use it. It was not needed as a preventer, because the cause of our trouble had been removed.

During our experiments we made a celluloid cylinder in which a piston could run, so we could closely imitate the action of a piston in a cylinder lubricated with oil. There we observed the following:

A—While the piston was moving up and down, there was a constant tendency to rupture the oil film on that portion of the piston located between the 3rd and 4th rings. The fourth ring, with a properly developed oiling system, showed its incorrect application.

B—In its hunt for Surplus Oil, which it formerly found in great quantities, the fourth ring was disappointed and had to content itself with whatever it could scrape from the

top of the proper thickness of oil film on the cylinder wall, which in time meant starving the portion of the piston mentioned.

The fourth ring had lost out with this properly regulated oiling system, for starving the center field would not be permissible on any piston. This center field carries the piston pin bosses, and while there is a relief at that portion of the piston right opposite these bosses, it is a well-known fact that right close by at the sides of these reliefs all pistons bear heavy, caused by a slight expansion, due to heat accumulated in the piston bosses. This is a part of the piston body where if any scoring starts, it always can be found to start right there, and for this reason this particular part of the piston must not be deprived of a good, constant film.

From these observations we concluded that the fourth ring would have no place in the Kissel Custom-Built Six Motor.

On the three ring piston, the third ring and the drainage groove below it, are used to keep the oil film of the proper thickness below the third ring and the three rings above the wrist pin, together with the drainage system, are sufficient in our oiling system to prevent the properly maintained oil film from being drawn past the rings during the suction stroke.

Eliminating the fourth ring has also the advantage of reducing vibration, for its arrangement calls for an increase in weight of from three to five ounces per piston, quite an item when we fight for every 1/8 ounce reduction on total piston weight to reduce vibration.

Drainage System

On the new three ring piston there is one small field 1-16" wide, located directly underneath the third ring and above the drainage groove. This field is 1-32" smaller in diameter than the cylinder barrel, exposing the lower edge of number three ring, forming a keen scraper edge. With this edge the third ring can even cut the oil film below the third ring on the cylinder wall. The small surplus of the film is thus collected into the drainage groove and escapes through drain holes to the inside of the piston, from where the oil runs down into the splash plate, not touching the cylinder walls again.

The drain groove on the three ring piston has a different shape than the groove used on the four ring piston. The shape of the groove was determined after a good deal of experimenting. It is a sort of an undercut gutter shape, which very readily collects oil, the piston going downward, and on the upward stroke this shape groove does not give off oil that it may retain, but the action is to drive the oil downward out of the drainage holes even with the piston moving upward.

Testing Six Makes of Rings

The piston rings did not escape our close watch, since they are also related to the oiling system. We experimented with six different makes of

rings and finally decided on the ring found best for our purpose. (See illustration herewith.) This ring is a hammered ring, finished all over, with a step joint, circumference and both faces ground to very close limits, exerting even pressure all around the cylinder.

It may sound peculiar to speak of a ring as round. By this we mean Perfectly Round so that when inserted in a gauge the exact size of the cylinder No Light will escape at any place on its circumference when tested in a specially built dark chamber, with the underside of the ring exposed to a strong electric light. Out of the six different makes of rings tested, the ring selected for the Custom Built Six motor was the only one that stood this severe Light Test for roundness. All the above are qualities a good piston ring should have.

This ring also has a clearance between its inside diameter and the bottom of the piston groove of only .010" which cut the oil pumping action, taking place between this clearance space and the clearance of the ring up and down in the ring groove, down to a very minimum.

The clearance up and down on these tested rings is .0005" while on the rings previously used it was .0015". Since these rings were eccentric, the clearance between the inside of the ring and the bottom diameter of the piston ring grooves would be about .032" on the thin side of the ring this condition favoring decidedly the ring pumping action.

Now a good ring helps as a minor item to perfect a good oiling system. It is one of the biggest mistakes to imagine that by putting a set of good rings into a motor with an inferior design of oiling system, the troubles experienced from this badly designed oiling system will be eliminated.

It is not even possible in case of a bad oiling system to accomplish this by putting in every ring of the best make obtainable, not mentioning the folly of attempting to obtain results by just adding one more ring, even the best made, to each piston and hope for correction of the trouble. The only absolute cure is Do Away With the Surplus Oil.

(As far as the new light type piston is concerned, see the separate article in this issue of The Kisselgraph.)

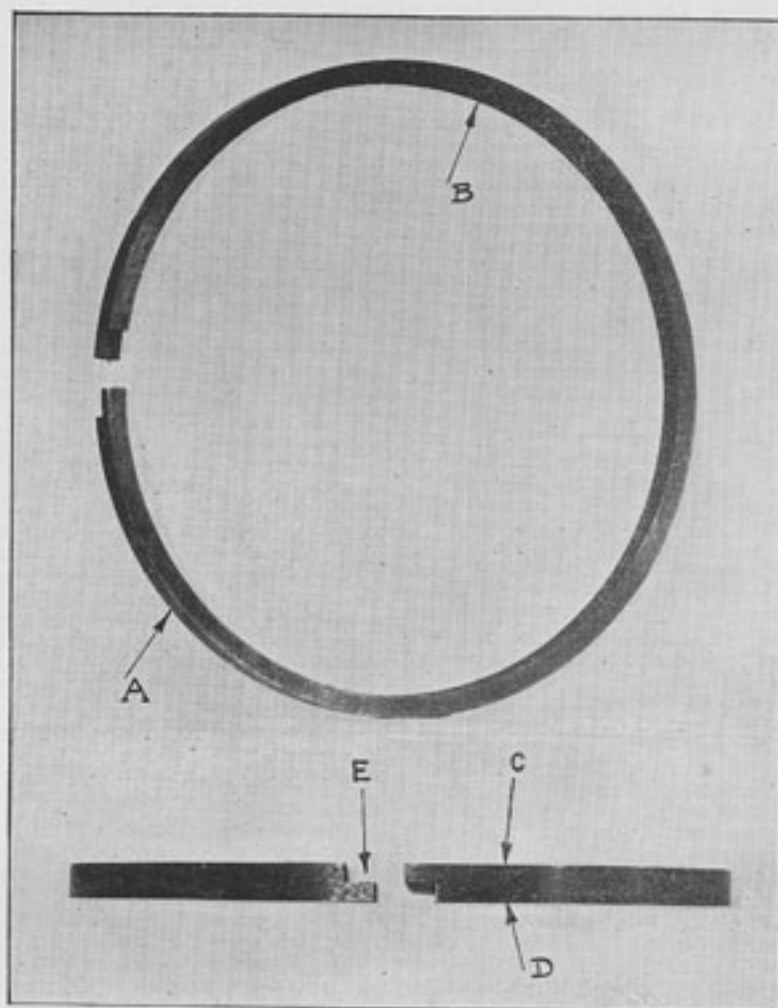
While doing the work regarding the fourth ring, we did not forget to observe what the rest of the world was doing in this respect.

There was a surprising lot of good work done last year by motor builders in refining their oiling systems, putting the fourth ring on the shelf.

We know of one big motor builder who is so devoted to the fourth ring that since nothing else seems to keep his motors away from trouble, he insists on using a heavy grade of oil against the advice of different oiling experts, who recommend Mobile "A" or equivalent as proper for his motors, because it seals better and acts as an oil prevention.

He Get Away With It. People using his motors must pay, for there is

IMPROVED TYPE PISTON RING USED ON CUSTOM-BUILT MOTOR



- A—Outside circumference, ground to exact size and perfectly round.
 B—Inside circumference hammered in semi-finished state, then finished turned to correct size—this gives correct and even wall pressures between ring and cylinder walls.
 C & D—Faces of ring, ground perfectly smooth and straight, holding distance between C & D within 0.0005", eliminating oil pumping effect on ring, insuring a perfect fit in groove.
 E—Shows leakproof step joint.

more carbon and more vibration with a too heavy oil. If he would manage to use the proper oil direct to his cylinders and forget his fourth rings, the world would be better for it.

We read in 1920 "Motor Builder Statistics," that 72 1/2% of the motors have three rings above piston pin only. We read further that 73 1/2% of six cylinder motors built for 1920 have three rings above the piston pin only.

Further investigation of many prominent and nationally advertised motor manufacturers shows that the majority are using three rings above the wrist pin ONLY.

After seeing what others are doing we naturally concluded that they they must have been working and

experimenting too, finding reasons to gradually drop the fourth ring, a kind of over-balance on the two ring craze that swept the country a few years ago.

Everything in this world of ours must swing back and forth between extremes for a certain period, until finally it becomes steadied, consoling itself with common horse sense, and with the freakish extremes disapproved and forgotten.

We think the question of "How many piston rings on an automobile piston?" is solving itself with the pendulum at THREE. And after a while anybody asking about the fourth ring will have to refer to history to be enlightened as to the practices of the past.

The Kisselgraph

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RALPH KAYE, Editor

Assisted by the Engineering, Designing, Manufacturing, Production, Sales, Advertising and Executive Departments.

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EDITORIAL

Anton Delkin of Seattle, has made a fortune selling nuts. He calls his business "The Nut House" and styles himself the "Chief Nut." Last year his sales reached the \$1,500,000 mark, because he sells ideas about nuts, rather than nuts by the pound.

Fame bows to the man who has the ability to climb out of the rut and use his brains. We all have unsuspected creative ability—ability that is now lying dormant. This ability can be developed. In your sales talk to buyers, in your letters, in your everyday conversation Do More Thinking.

There is nothing so pitiful as the salesman who has fallen into a mental slumber—"gone stale" as we say. He just trails along doing only what he is told to do and no more. His sales talk is of the same stereotyped variety that the buyer has had to listen to for the past decade. His mind is blank. There is only one way to keep from drifting into that class—DO MORE THINKING. DON'T LET YOUR MIND GET STALE.

NEW FRAMES ON PASSENGER CARS

SIDE RAIL SECTIONS DEEPER AND HEAVIER

Easier Riding, Prevents Twisting or Side-sway

The present Custom-built models are now mounted on a new frame making easier riding and preventing twisting and sidesway.

The frame side rail sections are made 3-16" deeper and the metal in the entire frame is 1-32" heavier. The front end of the frame extends forward of the radiator in the conventional manner, but has a slight raise that starts just back of the radiator and is carried forward to the front end, which forms the spring horn for the new spring. This is fastened directly to the end of the frame, in a casting, hot riveted to the frame, the rear end of spring working through a shackle directly under the frame.

Also the rear kick-up over the axle has additional clearance.

The rear cross member is bent and so shaped as to not only act as a frame-tie, but also to hold a casting for the spare wheel carrier and gas tank. Through the construction of this rear cross member we add more strength to the frame, by reason of having this cross member carried farther to the rear. This prevents twisting or straining of the frame at this point.

The side rails are carried to rear and dropped to form the spring horns for the rear springs, which work thru a shackle from the end of the frame. The front end of the spring is fastened directly to the frame by a casting on the under side of the frame. Also the side rails are wider at the bottom than at the top, as our greatest strain naturally comes on the bottom of the frame section.

The frame is slightly raised in the center which loading will straighten out, giving a flat surface for mounting the bodies and preventing the sagging of frame in the center with the consequent breaking of bodies, sticking of doors, etc.

All step irons, cross members and other attachments to the frame proper are hot-riveted, using the best rivets obtainable.

NEW SPRINGS USED ON CUSTOM BUILT SIXES

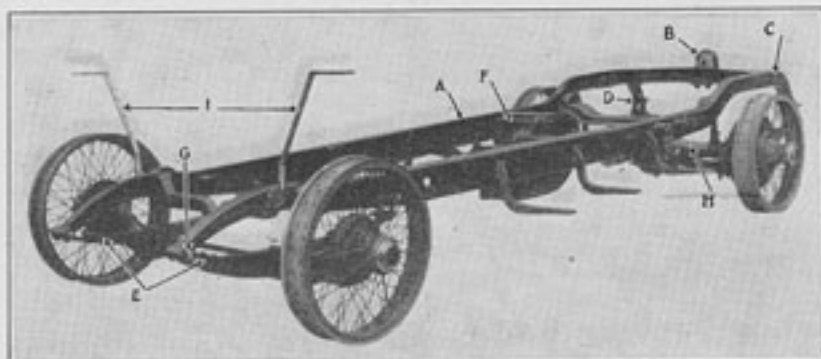
New and better springs, semi-elliptic, both front and rear, are among the latest Custom-built features to add greatly to the riding quality of the Kissel Custom-Built models.

We have increased the length of the front spring to 38", and 2" in width, the rear spring is 58" long and 2 1/4" wide. These springs are of extremely flat construction and made of the very best of spring steel, treated with the latest known treatment to give extreme flexibility, strength and long life. Both front and rear springs have more clearance over the axles and for this reason the annoying striking of the springs against the frame or axles will be practically eliminated.

The rear springs are of the semi-elliptic instead of three-quarter elliptic type. This change was finally decided on after careful discussion with Spring experts. The art of spring-making has gradually advanced to a point where it is best from a standpoint of riding quality, perfect suspension and great simplicity to use PROPERLY DESIGNED semi-elliptic springs all around on the chassis.

The springs used on the new Custom-built chassis are longer in front. The rear springs are longer and are almost perfectly flat under load. The proportion of front half length to rear half-length of the rear springs has a great influence on proper suspension and riding quality and this point was treated with the greatest care when developing the rear springs.

The new spring suspension results in easy riding, reducing side-sway to a minimum, and smooth performance under all road conditions.



- A—New and heavier frame.
- B—New spare wheel carrier.
- C—Kick-up in frame over rear axle, the end forming spring horn for rear springs.
- D—New non-reversing spring shackle.
- E—New 2" x 38" front spring.
- F—Brake cross shaft fitted through bronze oilless bushings.
- G—New type oil filler used on entire chassis.
- H—New rear axle.
- I—New and heavier fender irons.

VALVE GEAR MECHANISM

NEW KISSEL MOTOR FEATURE

Silence, Long Wear, Accessibility Obtained

By William McConighen,
Kissel Research Engineer

A new valve gear mechanism has been adopted for the Kissel Custom-Built Six motor. The Kissel engineers' aims in perfecting it was to give:—

- 1—Greater silence.
- 2—Longer wear.
- 3—Simpler accessibility.

4—A high grade valve gear, the design, material and workmanship of which was to be in keeping with the custom-built motor.

To obtain these qualities the following changes were necessary:—

1—Complete new tools and fixtures of the highest grade were made for machining and checking all parts of the valve gear to insure absolute squareness, together with dimensions within close limits. A series of tests and experiments were carried out to establish the best wearing materials of all parts of the valve gear, for only with well wearing and perfectly square machined units can a quietly operating valve be obtained.

With the aim of keeping to highest quality only, every detail of the valve gear was critically gone over and whenever an improvement was necessary, regardless of price, this improvement was made.

The Valve

To get down to details, let us start at the valve seats in the cylinder block. These are machined with new tools, and must check perfectly square in order to pass inspection.

The valves were greatly improved. The intake valve in the future will be furnished in low Tungsten steel, while the exhaust valve will be made of Cobalt Chromium Tungsten steel.

These are the finest valves that can be made as they will not pit, warp, burn or gas-cut, and are of a one-piece forging, finished in the finest possible manner.

The ends of the valve stems have a flat spot of 3-16" in diameter and are hardened. This will avoid the end of the valve stem digging a pit into the adjusting screw of the push rod. It also makes it possible to properly use a feeler for setting valves after the motor has been run for a while.

The Valve Springs

These are made of the highest grade, properly tempered, spring steel, and are thoroughly inspected for proper gauge of wire, correct pressure and deflection.

While these springs are so figured that no overload is put on to the camshaft, at the same time enough pressure is given to keep the valves securely seated at the higher speeds.

Push Rods and Guides

The construction of the push rods and guides is such that they can be removed as a unit. The push rod guides are held down by drop-forged clamps, one clamp holding down two guides.

With the new construction the removal of the cylinder head and valve enclosure cover is all that is necessary in case a push rod is to be removed, for then by simply removing the valve above the push rod in question, one is able to loosen the push rod guide clamp and remove the respective push rod and guide as a unit. If desired, it can be replaced with a new unit. The push rod guide is made of a high grade bronze, very tough and of great wearing quality. These guides are machined very carefully, and close inspection is used for sizes and especially for absolute squareness.

The push rods themselves are made of carbon steel and are case-hardened and ground to exact limits regarding diameter. Great care is taken that the mushroom head end is absolutely square with the stem of the push rod.

Another feature is the enlarged diameter of the push rod stem, allowing a 40% increased bearing surface at this point.

The heat treatment of these push rods was established after long tests and as a result of these tests we are assured of a tough refined core, which serves as an ideal support to the case, against the cam action preventing case from breaking down while in actual use.

The construction of the mushroomed head is such that the upper face tapers towards the push rod stem, giving more body to the tough refined core already mentioned.

These push rods are subjected to very close final inspection and scleroscope test for hardness, for which a standard has been set. They must pass these rigid requirements before being accepted for use in production.

The push rod adjusting screw is also closely inspected and the thread must check absolutely square with

CLOSED BODIES METAL COVERED

GIVES ADDED STRENGTH AND BETTER FINISH

All the Custom-Built closed models consisting of the Coupe, Sedan and Urban-Sedan are now covered completely with metal for many reasons.

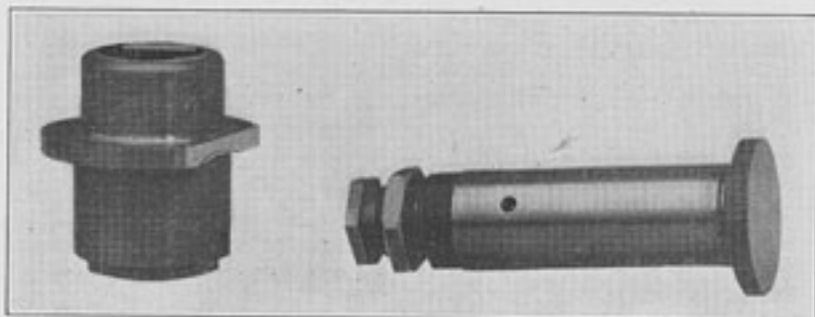
First, that of added strength which a metal covering gives. Wood being porous, requires that all pores be treated with a filler to seal the wood before the wood covering can be considered substantial.

In addition the grain in the wood must run lengthwise of post or upright in body to give strength and prevent breaking. On account of the tremendous strain in certain parts of the body when the car is going over rough roads, if wood is used without metal covering it will in time show weather effects, either warping or cracking.

Second, metal covered bodies permit a much finer surface finish, enabling the paint and finishing departments to give the smooth, velvet finish which Kissel passenger cars have been noted for. The body is substantially built of both wood and metal, making it a perfect body, not only able to withstand all strains, but permitting a smooth surface that will hold the finest kind of finish in perfect condition for a long period of time.

the top face of the screw, so that after the unit is assembled the top face of the adjusting screw will be absolutely square with the flat end of the valve stem, insuring quiet action at this point.

The push rods at the adjusting screw end and adjusting screw lock nuts, are carefully inspected in order that no burrs are left from machining, because when tightening these parts in assembling any burrs left on would tend to crowd the adjusting screw to one side and not allow a perfect alignment, resulting in a noisy valve.



The New Push-rod and Guide Used in Kissel Custom-built Motors

RIGHT AND WRONG WAYS TO ADJUST THE CARBURETOR

RELATION OF CARBURETION TO FOULED SPARK PLUGS

By Reno Halbe, Research Engineer,
Kissel Motor Car Co.

(Editors Note—This article shows what happens in the motor when your carburetor is not adjusted properly and tells you how it should be adjusted. Every Kissel distributor, his dealers and salesmen should memorize this splendid treatise and see that every owner of a Kissel Custom-Built Six thoroughly understands the pointers brought out.)

Why is it that in all the ills of the motor car, the most popular first aid treatment is to adjust the carburetor? It does not matter if it is a dirty valve, poor spark plug, pitted ignition points, loose wire connections, under charged battery, or water in the gasoline—the natural inclination is to "Adjust the Carburetor" and the trouble will disappear.

And how many mechanics and owners when they make these changes realize the conditions they create in the motor to their disadvantage.

In this regard let us explain certain conditions, as well as the composition of the present day motor fuels and their bearing on carburetion.

The well known brands of gasoline now on the market (especially those having national distribution) while not as highly volatile as the "natural" gasolines obtained in much smaller quantities in the past are perfectly satisfactory for general use. If The Carburetor Is Properly Adjusted.

Many efforts have been made to arrive at some acceptable specification for the identification of motor fuel to be known as gasoline, but up to the present writing no such specifications have met with the universal approval of oil refiners. Much valuable work has been done in bringing to light the necessary requirements of fuels containing volatility, purity and the proper chemical and physical characteristics.

Gravity alone does not indicate the quality of gasoline. The most important point to bear in mind is that hydro-carbon fuels are mixtures of different compounds that boil at different temperatures. It is unnecessary that the entire body of the gasoline be sufficiently volatile to readily and completely evaporate at ordinary temperatures.

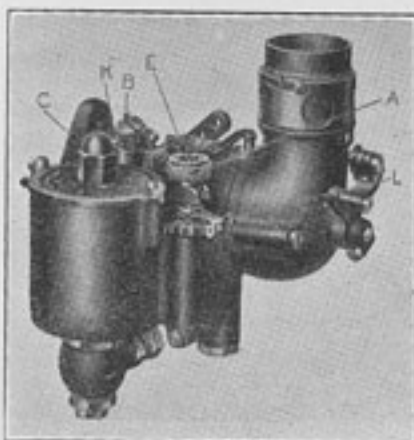
To meet ordinary service conditions there must be a sufficient quantity of volatile constituents present

to form an explosive mixture with air and thus start the motor. Once the engine is running, carburetion is much easier because of the heat conditions of operation.

The function performed by these 'light ends' in motor fuel is the same as that of kindling wood in starting a fire. To continue the analogy: Satisfactory engine fuels may be said to consist of kindling wood, cord wood and coal. This lump of coal or 'heavy end' (kerosene) can never be eliminated commercially in the manufacture of gasoline. It is small in some grades, increasing until it represents a considerable portion of the fuel charge used in engines of today.

It is of considerable importance for the motor car user to know whether the 'heavy end' of his gasoline is made up of "soft or hard coal" and just how big this lump is. The end points of today's gasoline has been rapidly ascending in the past four years and is now (1920) but little less than the end point of the kerosene of today.

In 1916 the end point was 300° F. In 1920 the end point is 475° F. Now in using the fuels of today what happens with a poor carburetor adjustment?



Carburetor on Custom-Built Six

In starting the motor when cold, we find that we have a flare back or spitting back to the carburetor. This invariably occurs provided the carburetor is properly adjusted. The reasons for this is that when the motor is cold we only ignite our 'light ends' (gasoline) and have not sufficient heat to vaporize our 'heavy ends' (kerosene.) As our 'light end' is only a very small part of our fuel it will be found necessary to keep the choke slightly on until the motor starts to warm up. At the same time we are getting a large percentage of kerosene into the cylinder which is condensing against the cold cylinder wall and not burning. This kerosene end will not commence to burn properly until our motor has reached a temperature of 170 degrees, which is the normal operating temperature.

As our air inlet will admit only a certain amount of air, why try to

burn more fuel without air? You may admit more fuel, but you cannot admit more air than the air inlet was made for. As an analogy: When you admit more fuel than air you do the same as if you went to your furnace and shoveled it full of coal and did not open the draft—the result is you have filled the furnace full but it goes out because you have not admitted air, and as a fire will not burn without air, we have either no fire or a very low one.

In the internal combustion engine, when we admit more fuel than air, it does not always stop an engine, but we only burn that part of the fuel for which we have air, while the unburned part forms carbon very rapidly, which in a cool motor, will condense and form a wet condition in the cylinder, fouling spark plugs and going past rings into oil reservoir and destroying the lubricating oil.

This fouling of spark plugs through the unburned wet fuel has led in a great many cases to the complaint of "oil pumping" or oil going past pistons. Few of the motors of today can be called oil pumpers, provided of course, that the owner does not carry his oil above the high level mark on his oil gauge, but even this does not cause fouling of more than 5% of fouled plugs.

Oil going past pistons will show up in two ways: first, the oil consumption will be very high; and second the engine will smoke excessively when hot. If neither of these conditions are present, then fouling is due to fuel conditions, not to oil pumping, and the carburetor should be looked after.

Do not underestimate the effect poor carburetor adjustments have on carbon deposit and fouling plugs. Too rich a mixture will cause a voluminous deposit of carbon. The absence of sufficient oxygen in a rich mixture renders impossible the complete burning of the fuel charge and when we remember that the fuels of today are not the same as four years ago, it can be seen that the carburetor plays an important part in the proper operation of the engines of the present.

It can be seen that the choke should be watched and not kept out any longer than absolutely necessary if we would prevent fouling plugs and diluting our crank case oil.

To obtain the best results it is best to allow your motor to heat up for five or even ten minutes before you try to run the car.

The modern carburetor has what we will call a fixed air inlet (by this we mean that part of the carburetor where the air enters) which is of such size as the motor requires. This has no adjustments, but we have two adjustments on our fuel—one for idling and one for speeds.

When we have our carburetor properly adjusted, we are admitting the fuel in ratio to air, and at this point we obtain our maximum speed-power economy and acceleration. We also burn the entire fuel charge in the cylinder.

We find some owners who, not sat-

ified with the speed of the car, believe they can get more speed or acceleration by enriching the fuel charge on the theory of 'more gas, more speed.'

For the proper adjustment of Stromberg Carburetor L B-2 used on the Kissel Custom-Built Six, the following instructions are known to be correct. (See cut.)

First retard or close throttle and turn lever "L" into notch marked "O" as in cut, with lever "L" in notch "O". The lever directly under nut "A" should not raise or lower nut "A" when throttle is open. Now set in notch marked No. 1. In this position nut "A" should have a slight rise and fall when throttle is open. It may be found necessary to bend up a lever under nut "A" in order to get this movement. When his lever is set so that nut "A" does not have any up and down movement with the lever in "O" and has a slight movement with the lever in No. 1, it is correct.

Lever "L" should then be moved to notch marked No. 4 and left there for all running conditions. Next turn nut marked "B" to the right as far as it will go. This is the closed position. Now open one and one half turns. Next set nut "A" so that it is just a little bit below level with needle "E" as in cut. Now start motor and allow to get thoroughly warm. Then open both spark and throttle points about $2\frac{1}{2}$ ", then turn back to the left on nut "A" until motor starts to stop from lean mixture.

When this point has been reached, turn back to the right two or three notches. This is correct high speed adjustment. Now close spark and throttle and adjust idle nut "B" by turning either to the right or left to the point where motor operates smoothest. This may be 3 or 4 notches either way from $1\frac{1}{2}$ turns open. You will notice that in opening throttle, nut "A" will drop about $1-32$ " at a point corresponding to 25 miles per hour and will rise beyond that point, provided that lever "L" is set as per instructions. This is absolutely necessary and should not be altered or changed in any way, as upon the working of this lever depends your maximum economy and motor efficiency.

In Conclusion

If you have a miss at low speed, look for defective spark plugs, loose wire connections, pitted ignition points. Ignition points too close, should be .022 to .025. Spark plug gap too large should be .025. Leaking valve or carbon on valve-seat indicates water in gasoline.

If the miss is at high speed, look for pitted ignition points—spark plugs points too close, loose wire connections, under-charged battery less than 5.2 volts at terminals, loose plate inside of battery or broken down ignition coil.

But don't touch the carburetor until you have checked up all of the above and make a note of how you changed the carburetor, so you can change it back.

NEW TYPES OF HOOD HOOKS

HEAVIER IMPROVED DESIGNS. NON STICKING

New hood hooks on the Kissel passenger cars, thoroughly in keeping with the Kissel Custom-built quality standard are now going into production.

The hoods will be held in position by a new type of hood hook, holding the hood in perfect shape when meeting road twists and stress.

This hook consists of three brass castings, one of which forms a socket and is fastened to the hood, while a second casting forms the base that is fastened to the deck strip with a steel rod with ball and passing through a hole in the center.

Over this rod is fitted the third casting which is the hook proper. The hook and rod work through each other by means of a compression spring, which at all times holds the hook into the socket on the hood.

These hooks are about twice the weight of the hooks used heretofore and being made of brass nickel-plated, will not rust or stick.

The hood hook performs a function similar to that of the recoil spring in modern guns, due to the fact that the spring often takes thousands of movements each day, because every time the car goes over an uneven road there is a certain amount of movement of the hood due to the necessary twisting.

LYNITE WIRE TUBE BRACKETS

INSURE STRENGTH AND LIGHTNESS

On the new series Custom-Built motor the wire tube brackets holding the ignition wire tube on the motor, which have been made from steel straps, are now made of lynite, an aluminum alloy of great strength and lightness.

This casting is polished and does not tarnish and aside from performing its part of holding the wire tube, it is ornamental.

The tube is fitted through a machined hole making a perfect fit around the tube, and is on account of a tight fit a perfect conductor of static, which is grounded back through the motor and is prevented from building up in the wire tube.

LARGER BRAKE AND CLUTCH LEVERS

FOUR INCHES ADDED TO PEDAL LEVERS

Twenty-five Percent More Leverage Obtained

By fitting the Custom-built models with brake and clutch pedal levers four inches longer and placing them a little higher up, not only gives 25% more leverage, but permits a more natural operation—in other words, instead of a downward push the longer levers permit a more straight push, making the operation of the clutch and brake much easier and less tiresome, as well as more effective and instantaneous.

A point of great importance is that the new position of the levers not only adds more leg room and plenty of space for the left foot, but keeps the driver from riding the clutch, preventing burning out the throwout bearings.

There must be a certain amount of spring tension on the clutch to prevent its slipping. We all know a slipping clutch is about as good as no clutch at all. Also, to make the clutch work easier by releasing the springs is apt to do more harm than good.

By adding four inches to the clutch and brake pedal levers, maximum results are obtained as well as eliminating the possibility of the clutch slipping.

In fact any child above twelve years of age can operate these new levers with ease, while the woman driver will find she can drive all day without being tired from operating them.

The changing of gears in starting or letting in clutch after slowing down in city traffic, will from now on be found to be much smoother and easier, due to this added leverage.

In other words, the new brake and clutch pedal lever with its smoother action gives the Custom-Built Six what can be properly termed a "velvet" clutch.

Without a doubt the operation of the brake and clutch pedal levers can be said to be about the only feature of driving a car that can become tiresome when the levers work hard and are not of the proper length.

These improvements eliminate the possibility of hard work in changing gears or working the service brake lever and is another step toward reaching that ultimate height of mechanical development and operating efficiency which has been set for the Custom-built models.

THE KISSEL COOLING SYSTEM

KISSEL ENGINEERS' IMPROVEMENTS

Added Efficiency Throughout System

By Wm. McConighen,
Kissel Research Engineer

The cooling system on the Custom-Built Six has been under observation by the Kissel engineers for some time, and a close study made to detect defects.

The investigation of the effects of the cooling system were made on the dynamometer as well as on the car as a finished product.

The Kissel Cooling System is composed of the following units:—

- 1—Cylinders.
- 2—Water pump.
- 3—Radiator.
- 4—Fan and belt.
- 5—Radiator hose.
- 6—Hood and ventilators.

The results of analyzing and studying each unit are:

1—Cylinders—The cylinder block castings are very carefully inspected to make absolutely sure that no core sand, wires, or fins are left in the cylinders from the foundry as these defects are very detrimental to the cooling system.

A point that must especially not escape the inspector is the clearance for water between the cylinder barrels where fins easily form or even solid walls develop by broken down cores.

2—Water Pump—Tests were made regarding the delivery of water pump on Custom-Built Six.

On passenger cars the proper amount of water to circulate is from 5 lbs. to 5.85 lbs. of water per horse power, per minute. By circulating this amount of water it will be found that the temperature difference between top and bottom of the radiator can be held inside of 15 to 20 degrees F., which will give good results, providing the radiator will allow the necessary amount of water to pass through it, and providing the fan supplies enough air to effect proper cooling.

3—The Radiator—After innumerable tests had been carried out, a radiator core was developed with a free flow capacity, which very readily took care of the water brought up to it by the pump through the cylinders.

This is a point that must be very carefully covered when developing a cooling system, for if the radiator core will not take care of the water delivered by the pump, a syphon action is soon set up and the over-amount of the water delivered by the

pump will drain out through the overflow pipe, thus cutting down the supply for cooling and causing the water to heat, a fault which cannot be found in the Custom-Built Six.

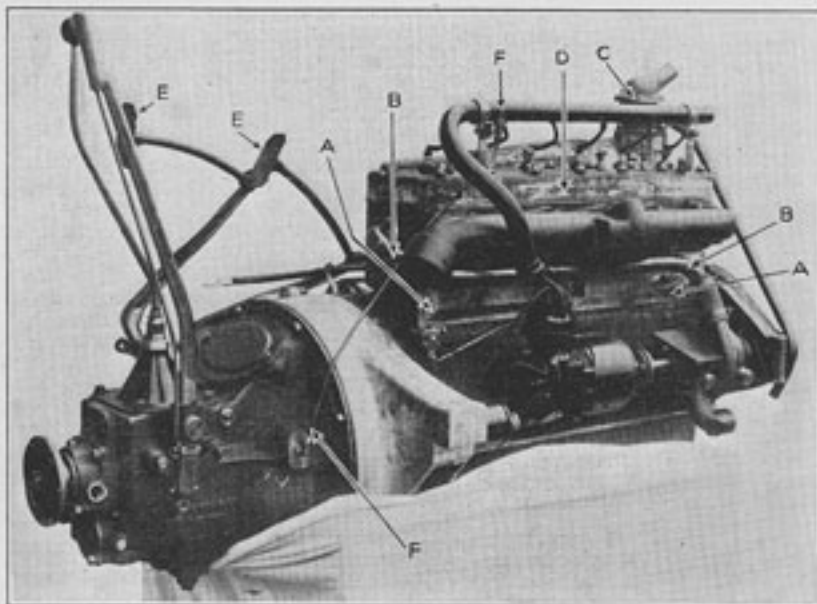
4—The Fan and Belt—The fan has been so set as to allow no less than $\frac{3}{4}$ " from rear of radiator core. This was done—first so the fan will not "sing," and second, so the fan will have ample chance to draw way out to the corners of the radiator.

A four blade 18" diameter fan with ample quiet bearings was decided on, this fan of proper blade design to insure sufficient air to maintain a perfect heat balance in the cooling sys-

value from a cooling standpoint, and instead of expelling the heated air, were sucking in air. Therefore the foremost openings were eliminated and better cooling conditions achieved.

For proper cooling it is essential that the escapes for air should be at least 20% greater than the inlet area of the radiator.

The hood ventilation being perfected, our next point to consider was the right and left underside pans. By putting extra openings into these pans as well as shortening them and by bending them downward at rear end, we were able to give the car ap-



A—New valve enclosure plate of cast aluminum having a cork gasket to prevent oil from leaking out around it. There are also breather spaces at the top of these covers.

The aluminum covers also serve as a deadener for even the slightest noises which may come from the push rods, though this point has been thoroughly covered by the use of the new push rods.

B—Improved cooling connection.

C—Thermostat for regulating heat.

D—New cylinder head.

E—Two new clutch and brake levers which are 4" longer than on the former models, making for easier operation of the car.

F—Oil cup and line for oiling clutch throwout bearing.

tem of the Custom-Built Six motor.

5—Radiator Hose—The best possible hose obtainable is used at this point as an inferior hose soon decays on the inside lining, and the small pieces fill up some of the small water spaces, especially in all cellular types of radiators, obstructing water circulation and causing heating.

In addition, lower water hose is used with loose inserted wire. Spiral wires imbedded in hose have been found injurious to inner lining.

6—Hood and Ventilation—This point was also very thoroughly covered, and some very interesting discoveries made. Instruments applied to the flutes showed that the openings nearest the radiator were of no

proximately 100 square inches more of air escape than it had before, all of which helps to make a perfect cooling system.

The new cylinder head of the Custom-Built Six was designed by our engineers who aimed to add more beauty to this part of the motor as well as insuring better cooling. By adopting a thermostat we made heat regulation of the motor possible. The water passages in the new head are larger thereby giving more cooling surface. These passages are constructed also to afford perfect cooling of spark plugs, a point which must be considered in motors to insure perfect operation when running at high speed.

NEW PISTON FOR CUSTOM- BUILT MOTOR

INCREASED HORSE POWER AND ACCELERATION

Reduces Vibration and Weight —Insures Perfect Balance

In designing and adopting a new piston for the Custom-Built Six motor, the aims of the engineers have been to:—

- 1—Reduce weight.
- 2—Eliminate vibration.
- 3—Increase acceleration.

All of which have been more than met in tests conducted while using these pistons.

It was necessary, in order to have this piston up to the Custom-Built standard to design new jigs and fixtures to insure perfect machining and checking.

New metal core boxes were made in the tool room for use in the foundry. The cores used are all machine-made and after being baked, are treated with a graphite compound which insures a perfectly smooth surface on the inside of the piston.

To insure a perfect casting, a new moulding machine was added to the foundry equipment for this particular piece of work; making it possible to mould fourteen pistons at one time; these cores being so placed that they are all the same distance from the skim gate, insuring a uniform flow of metal when pouring the pistons; also serving to separate any slag, and dirt which may be in the iron at the time.

In the machine shop, new fixtures were made for machining these pistons, a pneumatic chuck being made for the rough turn to insure perfect results for this operation.

For the cross bore, or wrist pin hole, another fixture was made, making the cross bore absolutely square with the side of the piston. This is a point that must be very carefully checked as the limits must be and are held very close.

On the grinders new fixtures were also made, the piston being so held that when it is taken from the machine, it is found to be perfectly round by micrometer measurement as there is no chance of springing or forcing it during this operation.

Further checking fixtures were made for the inspection department, so that the finished piston might be checked for dimensions and limits set by the engineering department. Any pistons not coming up to these requirements are rejected, as it is the

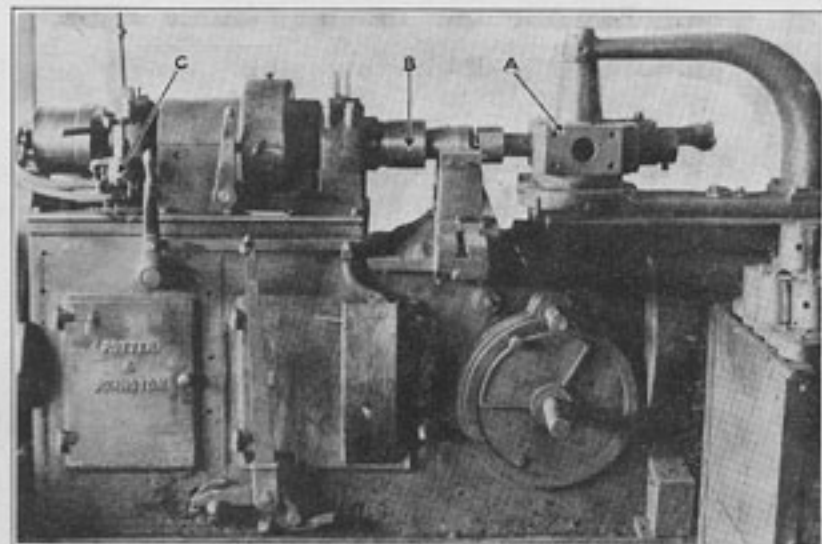
aim of all to keep the Custom-Built Six up to standard at all times, and not sacrifice at any point.

Benefits from New Piston

Tests were conducted on the Dynamometer to determine what benefits, if any, were derived from using the new type of piston.

ing above the wrist pin. Just below the lower ring is a drainage groove, cut into the piston at a 45 degree angle through which, at each 90 degrees, a 1-8" hole is drilled, these holes serving to drain off the surplus oil collected in the drainage groove, allowing no oil to pass by the rings.

MACHINE TURNING PISTONS FOR CUSTOM-BUILT MOTOR



A—Machine head holding tools for turning the piston.
B—Pneumatic chuck to hold all pistons alike, insuring perfect machining.
C—Air controls for pneumatic chuck.

It was found when substituting the new piston for the old type, and comparing the performance of both, that the motor when equipped with the new type of piston, not only showed greater horse-power, but held it longer at the higher speeds, making the peak of the power curve higher and increasing the efficiency of the motor.

Vibration Eliminated.

The lack of vibration is also very noticeable when the new Custom-Built Six piston is used. Our engineers have designed an instrument whereby every bit of vibration is recorded, and with this method of recording results, they have gone from one moving part to another, having all parts perfectly balanced, so that the amount of vibration in the Custom-Built Six motor is brought down so that it is barely noticeable; all reciprocating parts being balanced within $\frac{1}{4}$ of an ounce.

The piston ring used in the Custom-Built Six motor is a hammered ring, of the leak-proof type, and is considered by our engineers to be the best obtainable. A special testing apparatus has been made whereby each ring is subjected to a light test, and where a ring does not show perfect bearing at all points, it is marked defective, and rejected. (See piston ring article in this issue.)

The new Custom-Built Six piston is of the three ring type, all rings be-

New Custom-built Six Piston



The new piston used in the Custom built Six is designed to insure a very light piston, yet having a great amount of strength and rigidity.

It is of cast iron of the 3 ring type, finished, a 1-16" wall reinforced on the inside by a system of ribs which gives not only the above mentioned strength, but the ribs themselves form a most perfect radiator to lead off the heat from the top of the piston to the side where it can be taken up through the cylinder walls by the cooling water going through the cylinders.

Improvements In Kissel Truck Engineering and Construction.

SPECIAL TRUCK LOADING SPACE

HOW TO FIGURE SPECIAL WHEEL BASE AND FRAME LENGTHS

While we cannot lay down a hard and fast rule for figuring frame lengths and wheel bases, a general rule we frequently follow is that to every extra foot of frame length six inches of wheelbase should be added.

However, this cannot be used arbitrarily as a standard. The ratio of wheelbase to frame length is dependent upon the kinds of loads to be carried. A light load such as paper boxes, etc., can have a longer frame to the wheelbase than a heavy load of castings or sacked material.

Our engineer Mr. Palmer, advises that when any distributor or dealer has any customer wishing loading space longer than standard, to send in data to the factory on the materials or goods to be hauled and the conditions of hauling, and the Engineering Department will be glad to furnish the proper wheelbase to go with that particular frame length.

Where the customer is having the body built locally and knows just what wheelbase he requires, we will leave this matter entirely up to him. However, when in doubt, we advise sending in the order, leaving the matter of proper wheelbase for our Engineering Department to figure out.

NEW OIL-LESS BUSHING IN GEAR COVER

By interviewing Kissel fleet owners, we found that in quite a few instances the bearing for the starting crankshaft in the cast iron gear cover had worn badly. The starting crankshaft is running directly on cast iron.

For this reason we have enlarged the boss on the gear cover, through which the starting crank projects, and have inserted into it a bronze bushing with graphite lining, which requires no other lubrication.

By this method of giving a proper bearing to the starting crankshaft, the wear on same is cut down considerable, and should ever occasion arise this bushing can easily be replaced by a new one, where otherwise a whole new gear cover was necessary to repair the damage.

The smart aleck is like a sophisticated trout that can't be tempted with the brightest fly but falls for a worm on a bent pin.

IMPROVED MOTOR SUSPENSION

PERFECTED FOR ALL KISSEL TRUCK MOTORS

Makes Easier Assembling and Lubrication

An improvement that will be of great interest to Kissel truck owners, drivers and garage mechanics is the new front suspension of all Kissel truck motors. The advantages of this improvement is:—

- 1—Easy assembling.
- 2—Greatly increased wearing quality of suspension journal.
- 3—Proper provision for lubricating suspension journal is made.

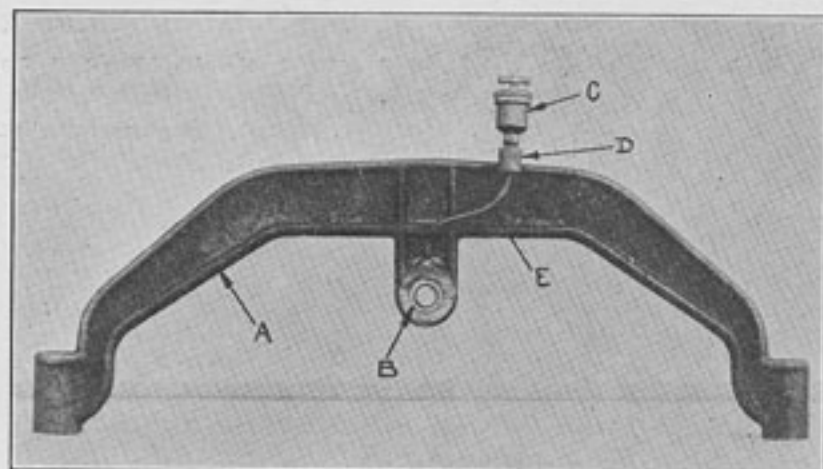
The suspension pin, heretofore of cold rolled steel, turned, is now made of Chrome Vanadium steel, heat treated and ground, and is also provided with a groove system for proper distribution of the lubricant.

The suspension beam is provided with a high grade bronze bushing for the suspension pin. The bushing is pressed into the beam and hand reamed to a fit, just allowing enough clearance for a proper film of lubricant. If, after long service, the bushing should wear, it is an easy matter to replace same.

Water Drainage Hole

A water drainage hole has been put in the pocket of the crank case casting, into which the center of the suspension beam is mounted, so that rain water or water coming from overflowing of radiator is not accumulated in this pocket to form rust which injures the bearing.

These improvements have been made after careful observation of Kissel trucks in service and by suggestions made by Kissel truck users and dealers.



Kissel Truck Motor Suspension

4—Water drainage of suspension beam pocket is arranged.

Easy Assembling

On the old suspension, removing the suspension pin, means to practically tear down the motor, even taking off the cylinders, since the suspension pin has to be driven out from the inside.

The new construction enables the mechanic to pull the suspension pin from the outside as follows—1st—remove the radiator and gear housing cover; 2nd—pull off the camshaft gear; 3rd—lay a bar across the face of the gear housing with a $\frac{1}{2}$ " hole in it; 4th—through this hole put a $\frac{1}{2}$ " bolt and screw same into the front end of the suspension pin, which is provided with a $\frac{1}{4}$ " U. S. S. Thread and pull the pin out against the bar.

Letter A—shows the suspension beam proper. Letter B—shows the high grade bronze bushing for the suspension pin. Letter C—shows the ample size grease cups. Letter D—shows the bracket for mounting the grease cups. Letter E—shows the copper tube to lead lubricant to bushing B.

Lubrication

On the old suspension beam a small oil hole was provided which we found was never used, since the driver could not find it.

The new suspension beam is provided with a big grease-cup mounted by a bracket right on top of the beam in plain sight of the driver. This grease-cup is connected with the journal by a copper tube through which the bearing surface can easily be lubricated.

BANDED SPRINGS DISCONTINUED ON KISSEL TRUCKS

SPRINGS WITH MILITARY CUP CENTERS TO BE USED

Proved Successful on Type "A"
and "B" Army Trucks

For a number of years the rear springs on Kissel trucks have been of the banded type, i. e., a band shrunk around the center of these springs, fitting into recesses in the spring seats to prevent the shifting of springs. This method has been successful in earlier years, especially on our chain driven trucks where both ends of the rear springs were shackled.

It proved a success also on worm drive trucks even with the Hotchkiss Drive, until there came a time when complaints were heard about rear springs shifting. It was found that this was caused by not shrinking on the bands properly, and further investigation, especially since the late war, showed that spring makers were unable to secure the proper material for the bands.

A soft grade of high class steel is required, which is pressed and shrunk onto the springs under a big hydraulic press. Since the consequent shifting of springs could not be overcome, it was decided to look for a new method of holding the springs. The military cup center, developed for government trucks was chosen. This method prov-

ed very successful on Class "A" and Class "B" government trucks.

Each spring leaf has a cup center, i. e., a depression of about 1" diam. and 3-16" deep. The depression of one leaf always fits into the depression of the next leaf, the last depression extending out on the lower part of the bottom leaf, fitting into a hole in the spring seat. All leaves are held together by a center bolt, which however, carries no load as it has 1-32" play in the holes of the spring leaves.

The whole system acts as if the spring had a 1" diam. center bolt to resist the possibility of shifting. Test springs were put on all trucks of the Standard Oil Co., of Milwaukee, who reported trouble with banded springs shifting. After installation of military center cup springs no more trouble in this respect was found by them.

On a 2 1/2 ton Kissel truck, employed here at the factory, a set of military cup center springs were installed and the driver was instructed to hit curbs with front as well as rear wheels to see whether springs would shift. It proved that the military cup center springs, even under these severe conditions d'd not shift.

The banded spring had a decided disadvantage, namely, in case of a leaf breaking, the spring had to be returned to the spring maker, and if the dealer did not keep a stock of complete springs on hand, which was pretty expensive on the larger types, the customer would be held up until the spring maker could take off the band, repair the spring, put on a new band and return it.

With the military cup center spring this trouble is eliminated, since no band has to be removed or put on again, and the spring can be repaired in any small spring shop, which seldom has a banding press.

Illustration "A" on this page shows a side and a bottom view of the banded type of truck spring. Illustration "B" shows a side and bottom view of the military cup center type spring.

Do Today's Work Better Than It was Ever Done Before. It is one of the oldest known formulae for success but it is just as good, and just as unfalling of results, today as it was a hundred years ago. Try it and see.

A good memory is one of the biggest assets a salesman can have. Don't think it has to be a natural gift. You can train your memory just as you train your voice. It is a matter of making up your mind to do it.

One moment of weakness will undo years of upbuilding. Get the executive view-point. Make customers look up at you, not down at you.

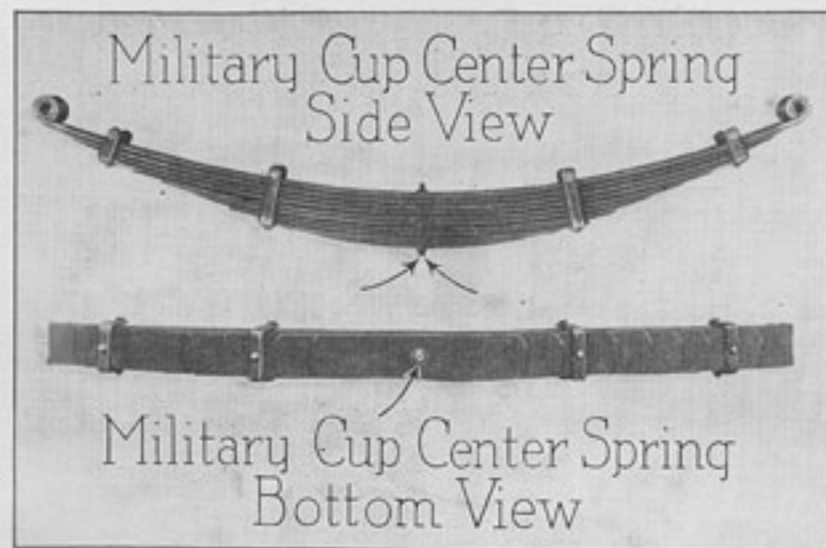


Illustration "B" Referred to in this Article

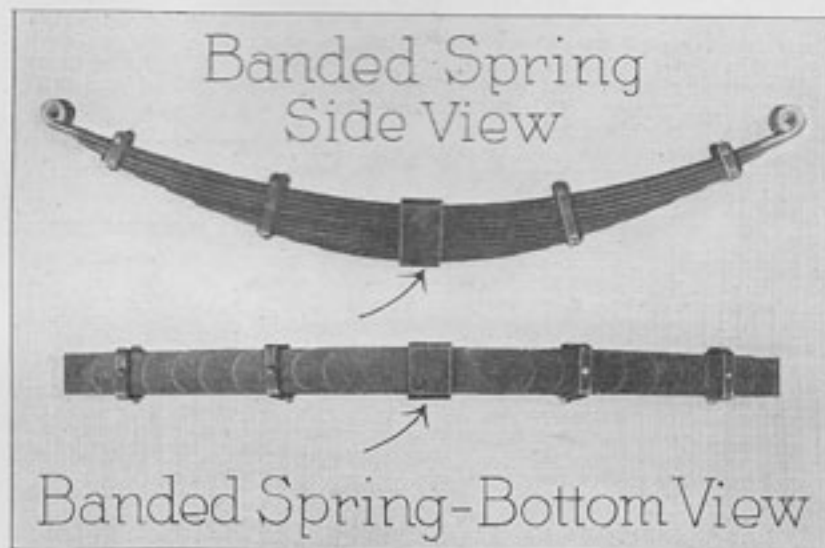


Illustration "A" Referred to in this Article

NEW CYLINDER BLOCK ASSEMBLY

TO REPLACE FIRST SERIES CUSTOM-BUILT MOTORS

Gives Owners Benefits of Present Motor Improvements

Owing to the many improvements now being made on the present Custom-built Six motors, and realizing that owners of Custom-built cars with the first series motors would greatly desire availing themselves of the advantages of these features, the factory is prepared to furnish a new cylinder block assembly that includes these improvements, so constructed that by furnishing it complete with fittings, it can be used on Custom-built cars, already in service, having first series motors.

In other words when you have occasion to order a new cylinder block for a Custom Built Six, First Series motor, we will furnish you with this new cylinder block assembly, giving you the very latest type of motor. And what will prove of particular interest to you is that even though we are furnishing many additional parts, making the cost of this assembly considerably more, we will invoice it at the same price charged for the first series cylinder block assembly.

This will prove unusually good news for your old customers of Custom Built Six models, because on all motors now being assembled we are using a detachable pushrod guide and improved valve enclosure plates (see special article in this issue.) The removable pushrod guide makes it very easy to take care of any push rod replacement that might be necessary. These guides are held in place by means of clamps and are easily removed. The valve enclosure plates are better appearing and are also much more convenient, being easily removed.

This assembly is known as Number 90001-21, Cylinder Block Assembly Complete with the following fittings:—

- 6 Pistons and rings
- 12 Push rod guides
- 6 push rod guide clamps
- 6 push rod guide clamp stud and nut
- 1 front main bearing, lower
- 1 front main bearing, upper
- 1 center main bearing, lower
- 1 center main bearing, upper
- 1 rear main bearing, lower
- 1 rear main bearing, upper
- 1 front cam shaft bearing
- 1 center cam shaft bearing
- 1 rear cam shaft bearing
- 1 pump shaft bearing in case
- 1 water pump assembled
- 1 oil pump, regular, for plunger

and control rods

- 1 oil dist. line assembled complete
- 1 lower water pipe
- 1 lower water pipe hose
- 1 hose clamp
- 1 valve and plate—front
- 1 valve and plate—rear
- 3 valves and plate studs
- 3 valve and plate stud nuts
- 2 valve and plate gaskets

The list price of the assembly at present is \$292.50, this being the same price that we have been charging for the first series cylinder block assembly on service orders.

The price quoted applies only on an order for a new cylinder block assembly. We can make no allowance for a returned first series block as the parts would all show some wear and be of no value to us.

We are mentioning this to avoid misunderstanding. We cannot send out these new blocks to replace others, except where, due to some accident, such as lack of oil, or some other reason a cylinder block becomes so badly damaged that a new assembly must be purchased. In a case of that kind we would furnish the latest type block and would make no additional charge for the extra parts to enable you to make the change, the list price for the assembly being, as above mentioned, \$292.50.

In placing an order always specify that Cylinder Block Assembly No. 90001-21 is wanted, giving the car number on that particular motor.

ALWAYS REPORT YOUR CAR SALES

Consider the postal card attached to all car invoices so you can conveniently report your sales.

This postal card serves two purposes—

1—We retain a duplicate on file under your name, which serves as a memorandum of cars you have in stock. Unless these cards are transferred to their permanent files promptly, it may give us the wrong impression of cars you have on hand, incidentally being the means of delaying further shipments. (To put it another way—it would be using poor judgment on our part to ship you cars you may not need when other dealers are waiting for them.)

2—Probably of greater importance is the necessity of keeping our owner's files right up to date, particularly truck owners, so we can send personal letters expressing our appreciation of their orders as well as sending literature and data from time to time to keep them thoroughly posted, having in mind their future requirements. (You know a repeat order is very profitable from every standpoint.)

We are now preparing a special follow-up campaign on Kissel Truck Owners and it is very important from a sales standpoint that all Kissel owners throughout your territory receive this follow-up literature, which

RESEARCH WORK REDUCES MOTOR NOISES

Increases Horse Power and Reduces Friction

Kissel Research Engineers, by conducting exhaustive motor tests, have found that nearly all motor noises can be eliminated, giving the motor that velvety smoothness and perfect balance of high speed Turbine. By reducing friction in motor bearings and keeping the motor drive shafts in perfect alignment, motor noises can be reduced to a minimum. This can be done only through having proper aligning fixtures.

Every manufacturer's motor is different, consequently it is up to each manufacturer to make up his own aligning fixtures and jigs. To get the exact dimensions to make the jigs from is no easy job.

Every vibration and pulse of the motor must be checked at all speeds. This was made possible by a vibrating machine developed by the Kissel Research Engineers. This machine, in which is inserted a chart, records every vibration of the motor at all speeds. After exhaustive motor tests they reached the point at which they were satisfied. This motor was then developing maximum power and recording vibrations within the limits of twelve-thousands of one inch with speeds ranging from 100 to 2400 revolutions per minute.

Then they took this motor as a standard and with the experience gathered from the test, they had such aligning fixtures and jigs designed that would, when applied to the regular Kissel Custom-built motor, hold the various working parts to very close alignments (much closer than customary assembling standard.)

Every owner of a new Kissel Custom-built motor can rest assured that he is not going to have motor noises due to poor aligning of crank shafts, cam shafts or pump shafts, as each of these shafts must conform to aligning fixtures, which reduces friction to the very minimum.

There is no such thing as a work-ed-to-death territory.

they will if you return car sales report postal cards.

One word of caution: In returning these reports first, write distinctly and whenever possible use a typewriter. (You know what impression you receive on mail addressed you that would indicate from the spelling that it might be meant for any one but yourself.) Second, fill in the postal report completely. You are in a position to do so at the time of making the report, so please do not make it necessary for us to write you for something that may have been omitted.