BOSCH MAGNETO

for FORD *cars*

The BOSCH FORD ATTACHMENTS

METHODS FOR ADAPTING THE
BOSCH MAGNETO TO FORD CARS.
DESCRIPTION AND INSTRUCTIONS

BOSCH MAGNETO COMPANY
223-225 WEST 46th STREET, NEW YORK
Factories, Springfield, Mass., and Plainfield, N. J.

They All Use The Bosch Magneto

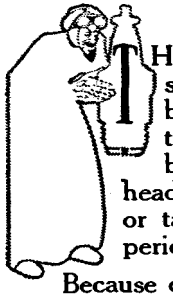
Some of the Automobiles that Use the Bosch Magneto as Regular Ignition

Packard	Peerless	Locomobile	Fiat
Chandler	Stutz	Lozier	Overland { Mod. 80 / Mod. 82
Marmon	Stearns	White	Mercer
Chalmers (Mod. 24)	Jeffery	Moline-Knight	Winton
A. E. C.	Delahaye	Metallurgique	Simplex
Auburn	Delaunay-Belleville	Metropol Roadster	Renault
Benz	Diamond T	Metz	Richmond
Bergdoll	Dorris	Mitchell-Lewis (exp.)	Rockwell
Berliet	G. J. G.	N. A. G.	Rolls-Royce
Buick (export)	Garford	Nagant	Saxon (export)
Burg	Hupp Model H A	Napier	S. G. V.
Charron	Isotta	Norwalk Six	S. P. A.
Clement-Bayard	Itala	Ogren	S. P. O.
Crawford	Kline Kar	Paige-Detroit	Sheffield
Crow (export)	Klondike	Panhard	Stafford
Cunningham	Lancia	Peugeot	Victory
Daimler	Lexington Six	Pierce-Arrow	W. F. S.
Darracq	Luverne	Princess Cycle Car	Wolseley
De Dietrich	Mercedes	Regal (export)	Wright
De Dion Bouton			

These cars include the cream of the automobile industry. Your Ford car can have as good ignition as any of them by fitting a BOSCH-FORD ATTACHMENT

THE BOSCH-FORD ATTACHMENTS

Gear Driven and Chain Driven



THAT every car owner desires his engine to operate smoothly, noiselessly and with the greatest economy, is but natural, but perhaps the paramount desire is to materially increase the power of his engine so that it will be possible to drive a mile or two faster against a stiff headwind, plow more surely through deep sandy stretches, or take a mountain climb without resorting to low gear or periodic rests for the purpose of cooling the engine.

Because of the desire for added efficiency and complete reliability, many Ford owners, both here and abroad, have had Bosch High Tension Magnetos fitted to their engines. The results have been such that a vast improvement over normal conditions is evident, and a continued and pressing demand has been brought to bear upon many in the trade to fit Bosch Magnetos to Ford engines. That the demand is but a natural one can be readily understood when it is known that the installing of a true high tension magneto of such a standard as the Bosch, eliminates the more or less unreliable and unsynchronized battery systems employing single or multiunit coils, which in themselves have caused much of the overheating, misfiring, etc., experienced with cars using them.

The methods for the installation of Bosch Magnetos on Ford cars have been many and varied, and often necessitated the cutting away of the crank case or the alteration of other vital parts of the engine, with unsatisfactory results due to oil leakage and its resultant effects.

The knowledge of these conditions and of the excellent results obtained by Bosch-Equipt Ford cars in racing and hill climbing contests, both in America and abroad, drew the attention of the Bosch Magneto Company to the proposition of providing special Bosch outfits for Ford cars and, with a view to meeting all demands, the outfits are now offered in two forms, gear driven and chain driven. The gear driven attachment, which is the one most in favor, is mounted on the valve side of the engine but, where the addition of a special carburetor or other fittings precludes such an installation, the chain driven attachment, mounted on the opposite side of the engine, meets all requirements.

The Bosch-Ford Attachments have for their main features ease of attachment, simplification of the entire ignition system, and the fact that it is unnecessary to remove or alter any of the vital units of engine or car. The Bosch-Ford Attachments are the only ones that have all these features. Furthermore, it should be noted that while the fittings for both Bosch-Ford outfits are necessarily special, the magneto itself is absolutely standard, so there can be no question as to its satisfactory performance.

The Prominent Cars of the World Use Bosch

Since the very inception of the motor car, efficiency has been the watchword of the designer, followed closely by the express desire for simplicity. The high tension magneto has been the paramount factor in attaining both ideals and, in substantiating this statement, one need merely refer to the list of motor car manufacturers throughout the world, among practically all of whom the Bosch High Tension Magneto is standard: from the Packard or Pierce-Arrow cars to the Krit or Metz, in this country, and from the Mercedes of Germany to the smallest cyclecars of England, no other method of ignition is so popular or so widely used as the Bosch Magneto.

Vibrating Coil Systems Generally Prove Troublesome

It is a well-known fact that synchronized ignition cannot be obtained on multicylinder engines when the ignition system used employs a separate unit vibrating coil for each cylinder. Not only is there a decided lag before the spark is produced in the cylinder but, due to the obvious impossibility of adjusting four separate vibrators to act absolutely in accord, the time of the spark occurrence in each cylinder must vary in its relation to the others. This results in counter vibrations in the engine, making it impossible to obtain full efficiency or smooth operation. The fact that the ignition lag becomes greater as the engine speed increases, causes the spark to occur even later in the stroke when the throttle is opened, resulting in a very slow burning mixture which accounts for the almost chronic cases of overheating and the necessity of adding various accessories which are designed for the purpose of better spark control and for the proper cooling of the engine.

It has been suggested that by the addition of a so-called master vibrator, for the purpose of controlling the unit coils, it is possible to eliminate the defects caused by uneven firing periods, and thus not only will better efficiency be obtained but the trouble of "overheated" engine will be eliminated. The pro and con arguments covering the master vibrator principle are long and technical, but it easily can be understood that, even though the master vibrator should assist somewhat in controlling the action of the numerous coils, it does not eliminate the lag nor the delay in the building up of the current which produces the spark. At its best it adds further complications to an already complex system and requires knowledge and patience when making the frequently necessary adjustments that a vibrator system always will require.

The Bosch Magneto Gives Efficiency and Simplicity

When a Bosch Magneto is installed, complications and difficulties are immediately eliminated. With a properly adjusted carburetor, and engine in good order, starting can be accomplished quite readily on the magneto. The engine runs more smoothly and is much more efficient at both low and high speeds. Excellent results are obtained with very small throttle openings, increasing materially the mileage per gallon; in fact a general all-round betterment results.

This is so, because a Bosch Magneto gives a hotter and quicker spark than any other ignition system, making the combustion of the gases in the cylinders more rapid and producing the greatest pressure upon the piston at the very beginning of the power stroke. The result is increased power, as well as greater speed and, besides, the completeness of the gas combustion before the exhaust stroke, affords

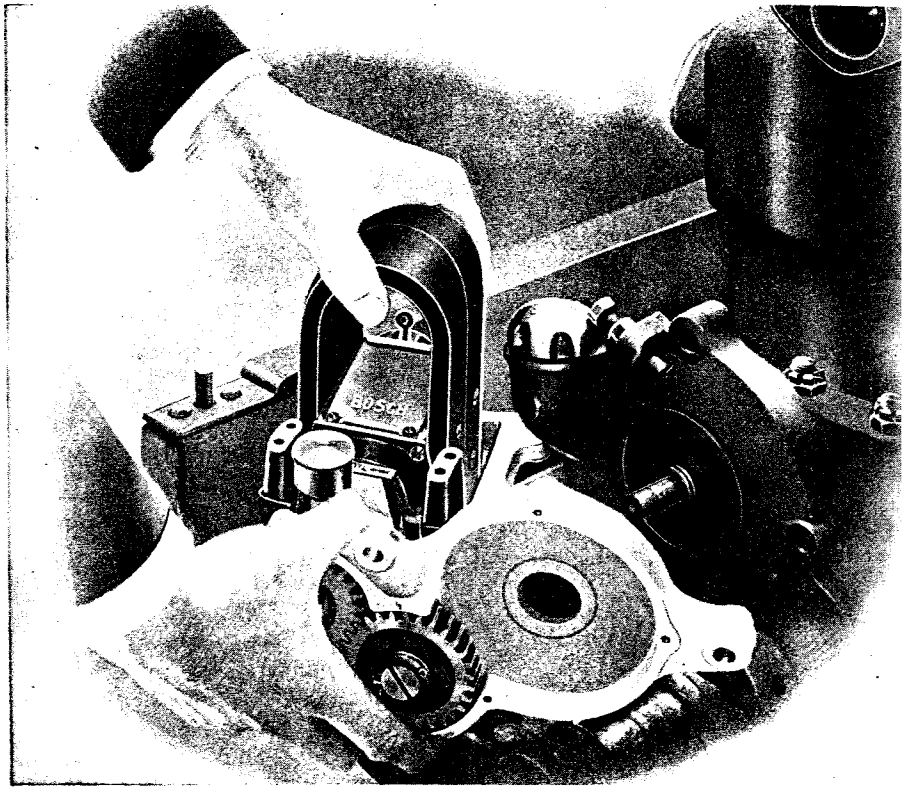


Fig. 1—Illustrating how Complete the Attachment is and how Simply it is Installed. Nothing of Vit Importance to the Ford Engine is Disturbed.

a cooler engine and eliminates entirely the overheating of the cylinders and boiling of water in the radiator. In short,

The Bosch Magneto Eliminates

Complicated wiring,
Misfiring at low and high speeds,
Adjusting of vibrators,
Frequent filing and renewing of platinum points,
Overheating of engine,
Boiling of water in the radiator,
And permits the use of the Ford generator solely for lighting and operation of other electrical accessories.

The Bosch Magneto Adds

More power,
More speed,
Simplifies wiring to four short wires,
Clears the dashboard of cumbersome c box,
Permits an easy diagnosis of trouble,
The reliability of ignition on $5,0(cars.

The practically exclusive use of Bos Magnetos on the well-known cars of eve country of the world no doubt is a grea testimonial than can be presented by t use of words. The Ford car in itself

excellent value, but by a small expenditure at the very beginning it can be made even more efficient, more long-lived and more satisfactory in every respect.

The Price

The price of the complete Bosch-Ford Attachment, either gear driven or chain driven, including all fittings (Bosch type "NU4" independent magneto, bracket, key switch, cable, etc.), suitable for all Ford cars made since 1910, is $48.00, f. o. b. any Bosch Branch, Distributor's establishment, or Supply Station, in the United States.

Any of the 275 Bosch Representatives will attach the Bosch Magneto at a minimum additional charge. Practically any garage can fit the attachment, and in fact anyone handy with ordinary tools will be successful.

Installing the Gear Driven Attachment

The first procedure includes removing the hood, draining the water from the radiator, removing the coils from the dashboard and loosening the holding nut of the radiator rod at the radiator end. After detaching the water inlet and outlet connections at the engine and disconnecting the priming wire, as well as the gas or electric connections to the headlights, the radiator itself is to be lifted off and the fan assembly and belt removed, leaving the forward end of the engine clear.

Next to be removed are the actuating rod leading from the foot of the steering column to the timer, the bolt and spring holding the

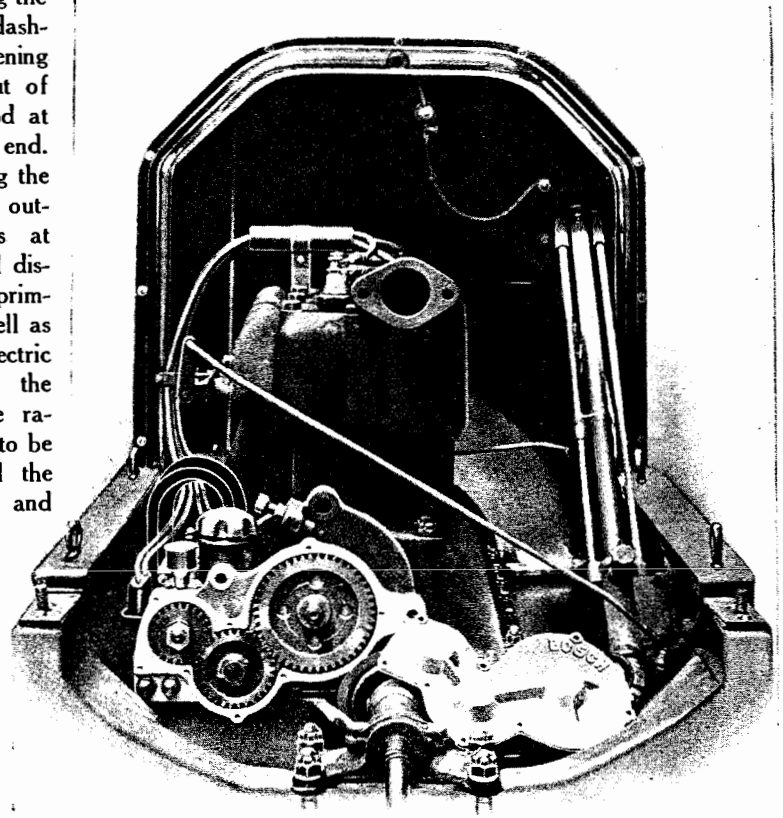


Fig. 2—Attachment in Place. Cables Connected and the Gear Covering Ready to be Placed.

timer in place and the timer case with contacts, as well as the wires leading thereto, all of which may be discarded. The hexagon headed nut, washer and cotter pin holding the timer brush assembly are to be removed and the arm and roller pried off with a screw driver.

The cotter pin at each end of the crank shaft starting pin, on the inside of the lower fan pulley, is to be withdrawn and the pin itself driven out through the opening in the engine support. The starting handle or crank is then to be removed and the lower fan pulley pried loose by means of two screw drivers placed behind it, one on each side. In order that the fan belt may clear the Bosch gear housing, a new fan drive pulley F 161 is to be substituted for the old one and the original crank shaft starting pin, with cotter pin at each end, is to be used to secure it in place. Should the ends of the pin project beyond the rim of the new pulley, they are to be filed down flush. The fan belt and starting crank are then to be replaced.

The key F 55 for the large Bosch gear is to be set in place on the cam shaft after first enlarging the hole in the protruding end of the shaft by means of the $^{5}/_{32}$" drill F 69 furnished with the attachment. Any burr left by the drill is to be filed down before placing the key in position.

The second and third bolts holding the crank case on the valve side of the engine are to be removed, also the cylinder front cover tap bolt immediately to the right of the cam shaft. The three bolts, two vertical and one horizontal, at the base of the cylinder front cover and to the left of the starting crank, are to be removed and their heads ground down about half way so as not to interfere with the placing of the Bosch gear housing.

In order to provide sufficient clearance for the idler section of the Bosch gear housing F 46, an opening about 2" by 3" is to be cut in the engine pan directly beneath the housing, the exact location an size of the opening being determined b applying the housing loosely to the engine first, however, attaching to the housing th magneto supporting bracket F 45, usin for the purpose the two hexagon heade cap screws F 64 and washers F 65. Th positions of the four bolts F 34 securin the magneto to its supporting bracket ar to be marked off on the engine pan and hole about an inch square cut at each poir so that the magneto may be removed a any time after completion of the installa tion merely by disconnecting the couplin and withdrawing the four magneto bolt F 34. The cutting of the openings in th pan may be done with hammer and col chisel and an ordinary jack used to sup port the pan during the operation.

If these details are properly execute the gear housing and magneto bracke should drop readily into position. Th being assured, the magneto end F 141 c the coupling is to be secured to the magnet shaft by means of the nut, washer, an crescent shaped Woodruff key accompany ing the magneto. The magneto is to b secured to its supporting bracket by th four bolts F 34, with lock washers F 35 and the magneto end F 141 of the coup ling is to be connected with the bolt en F 140 of the coupling, by means of th four slotted hexagon headed bolts F 21 and leather center coupling piece F 142

In assembling the coupling, it should b remembered that the leather center piec F 142 is intended to afford a flexibl drive from the gears to the magneto, so a to compensate for any slight irregularitie in alignment. In order to secure the flex ible drive effect however, the two flange of each coupling end, F 140 and F 141 must be bolted directly to the leather cen ter piece at right angles to each other o in other words, the flanged ends must b set crosswise one to the other, using a four bolts provided for the purpose. Unde

o circumstances should the flanges of the wo coupling ends be bolted directly together, i. e., in a straight line using only wo bolts, as such an arrangement would ive a rigid, not a flexible drive.

The Bosch gear housing cover F 47 nd large gear F 51 are then to be removed and the entire attachment mounted n the engine and held loosely by the four upporting bolts, one F 67 and one F 66 or the gear housing and two F 66 for the magneto bracket, he former two being partially ightened.

It is possible that slight inqualities in the engine casting nay interfere with the proper lignment of the Bosch outfit, o that special care is to be aken that both lugs of the nagneto bracket F 45 bear on he flange of the crank case and that the two holes in the oracket lugs register with those n the crank case flange. Any rregularities which exist may oe readily corrected by slightly iling the face of the Ford oil cup casting (or the shoulder of the Bosch gear housing resting thereon), or by placing washers under both lugs of the magneto oracket.

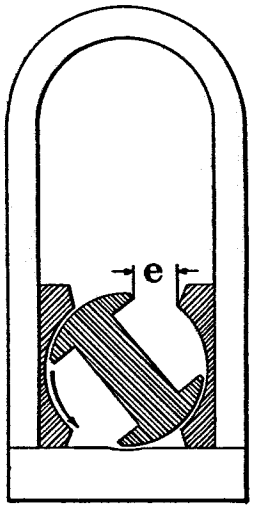


Fig. 3—Showing Where the Measurement "e" is to be taken.

Timing the Magneto and Meshing the Gears

The dust cover over the magneto armature, also the slipring brush holder farthest from the engine, are now to be removed and the piston of No. 1 cylinder (that nearest the radiator) brought on top dead center of the compression stroke and maintained so. The magneto armature is to be turned by hand, by means of its coupling, in the direction in which it is to be driven until, first, the metal slipring segment is visible in the slipring groove corresponding to the figure "1" of the brush holder which has been removed and, second, the trailing end of the armature is about $^{9}/_{16}$" from the pole shoe on the right side of the magneto, viewed from the shaft end. The $^{9}/_{16}$" distance should be measured as shown by the letter "e" in Fig. 3. With the armature held in this position, the large gear F 51 is to be slipped into place on the cam shaft and meshed with idler gear F 53, care being taken to see that the piston of No. 1 cylinder has not moved from the top dead center position.

It is important that the gears should not mesh too tightly and, after tightening both bolts supporting the housing, it should be seen that there is approximately the same play between the large gear and the idler gear as between the idler and the small magneto gear. In case the large gear meshes too tightly the two bolts supporting the gear housing should again be loosened and the entire housing shifted slighly to the left, which may be done quite readily as the two bolt holes in the gear housing are a trifle oversize. In like manner, the housing should be shifted slightly to the right in case it is found that the gears F 51 and F 53 mesh too loosely (see also "Completing the Installation," page 9).

With the adjustment of the gears correct, the two gear housing supporting bolts, as well as the two bolts securing the magneto bracket to the crank case, are to be permanently tightened, using for the two bracket bolts the original Ford nuts and new lock washers F 35. The original nut and washer are also used on the end of the cam shaft to retain the large gear F 51.

The gear housing F 46 is to be packed with a good quality grease or non-fluid oil and, after carefully fitting the paper gasket F 48, the gear housing cover F 47 is to be secured in place. During operation, the grease cup F 63 of the Bosch gear housing should be given a turn every day and the cup itself filled with grease whenever oil is supplied to the oil cup on the Ford cylinder front cover.

High Tension Cable Connections

The slipring brush holder and the dust cover over the magneto armature are to be replaced and the four high tension cables connected as follows:

The cable marked "1" in the brush holder farthest from the engine is to be connected to number "1" cylinder, while the cable marked "2" in the same brush holder is to be connected to number "2" cylinder. The cable marked "1" in the brush holder nearest the engine is to be connected to number "4" cylinder, while the cable marked "2" in the same brush holder is to be connected to number "3" cylinder.

The firing order of the Ford engine is 1, 2, 4, 3.

All cables are to be led under the arch of the magneto magnets and through cable guide F 36, supported by bracket F 37a, the latter being secured to the engine by means of the middle cylinder head bolt on the magneto side.

Completing the Installation

After engaging the short connecting rod F 151 with the arm of the interrupter housing and securing it in place by means of washer and cotter pin, the advance bracket F 146 is to be set across the first two studs holding the inlet and exhaust pipe clamps and is to be secured to the clamps with the original nuts. If necessary, the shoulders of both clamps are to be filed down to permit the nuts to fasten properly on the studs. The long connecting rod F 150, passing across the front of the engine, is to be engaged with the ball joint at the foot of the steering column to which the timer rod was originally connected.

The fan, pulley assembly and belt are to be replaced in their former position, after first placing spacing washer F 162 in back of the driven fan pulley to align it with pulley F 161 on the crank shaft.

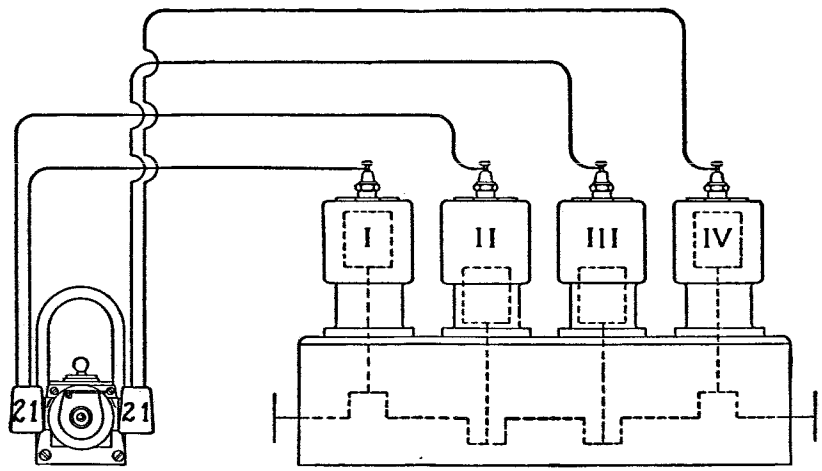


Fig. 4—Wiring Diagram of the NU4 Magneto for Gear Driven Bosch-Ford Attachment.

The face of the hole in the dashboard through which the radiator rod passes is to be slightly countersunk to receive the head of the rod and permit metal plate F 29 to set snugly against the dash, covering the holes left by the coil box. The Bosch Key Switch S 12 is also to be fitted and connected (see below).

In view of refinements incorporated in the later 1915 Ford models, the Bosch installations on such models differ slightly from those on previous models. The points of difference are two, namely: a metal dash plate F 29a, with a curve cut out of the lower edge, is supplied in place of dash plate F 29 used on earlier models, and is secured to the dash by means of the four bolts used for securing the coil. The other point is that the original cable between the terminal on the flywheel generator and the coil, also the cable between coil and lighting switch, is to be discarded, and a new low tension cable F 267 is to be connected directly between the generator and lighting switch, the terminal end being attached to the flywheel generator, and the other end to the lighting switch.

The radiator is to be returned to place and all bolts securing it and its water inlet and outlet connections tightened up, first, however, applying a coat of shellac or white lead to the gaskets between the water connections and the engine. After refilling the radiator the engine may be started and tested and, if O. K., the gas connections to the headlights are to be replaced.

During the engine test, the operation of the gears, especially, should be noted. If, during operation, the gears give rise to a high pitched ring, the indications are that they have been meshed too tightly, while a rattling noise indicates gears meshed too loosely. Either

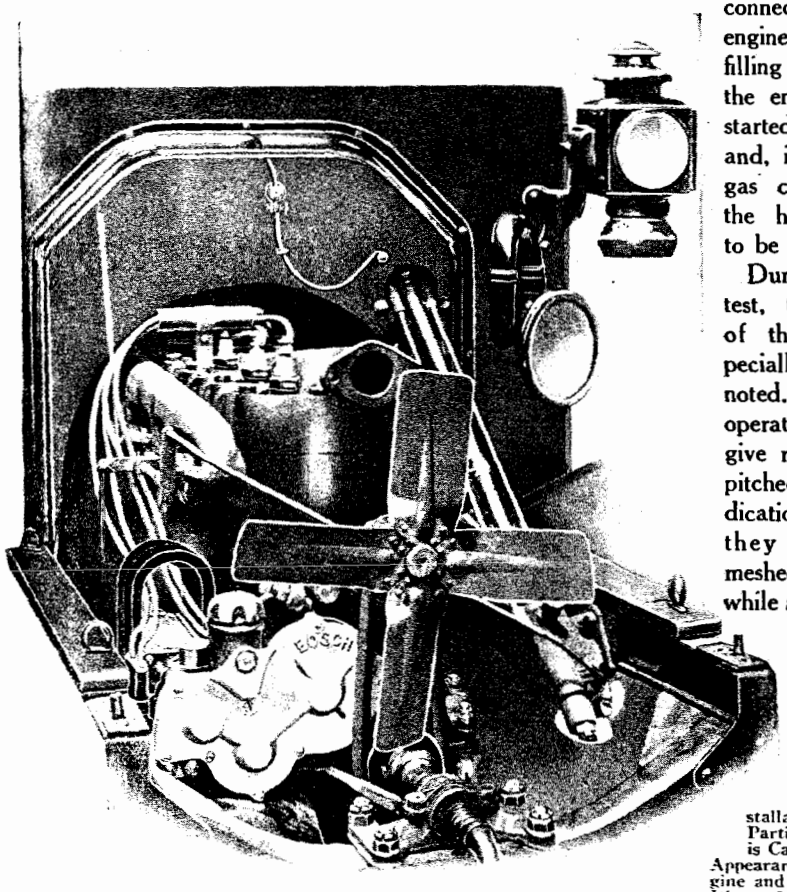


Fig. 5—The Installation Completed. Particular Attention is Called to the Clean Appearance of the Engine and how Simple and Direct the Wiring is.

condition should not be allowed to continue but should be corrected in accordance with the instructions on page 8 under the heading "Timing the Magneto and Meshing the Gears."

Under proper conditions, the engine can be started on the magneto with the spark fully retarded but, when the magneto is set according to the instructions, the spark lever may be safely advanced about one-half and in this position will permit easier starting. The proper gap between electrodes of spark plugs on Ford machines is $^1/_{32}$" and it should be seen that the gaps are maintained thus to insure the best operating results.

The timing arrangement suggested results in ignition taking place when the piston is at top dead center of its compression or working stroke, the spark lever being fully retarded. With this setting the best results are obtained on a Ford car, making it possible for the engine to idle down to especially low speed and at the same time permitting the development of maximum power at both high and low engine speeds.

The Bosch Key Switch

In order to permit the cutting off of the ignition and locking it, the Bosch Key Switch S 12 is provided with the outfi and is attached to the dashboard after th metal plate F 29 (F 29a on 1915 models has been secured in place.

The long low tension wire F 160 is a tached to the grounding terminal on th cover of the magneto interrupter housin and brought through cable guide F 36 t the thumb screw at the end of the switc barrel. The short low tension wire F 15 is led from the thumb screw on the colla clamp of the switch and attached to on of the bolts of the steering gear as show in Fig. 5. When the switch button o key is turned one-quarter turn to the righ or left, the primary is not grounded an the magneto produces current. To cut of the ignition, the switch button or key i turned in the opposite direction until re leased, when the primary current i grounded and the magneto is made inop erative.

For further details and instruction concerning the type "NU4" independen magneto furnished with the Bosch-For Attachment, a complete instruction boo may be obtained gratis from the Bosc Magneto Company, New York, or fron any of its Branches, Distributors or Supply Stations. Specify instruction book for type "NU4" independent magneto.

Installing the Chain Driven Attachment

In the installation of the chain driven outfit the preliminary work from removal of the radiator to removal of the timer is the same as with the gear driven outfit.

Proceeding further, the second and fourth bolts holding the crank case at the right side of the engine (viewed from in front of the car) are to be removed and the magneto bracket F 21 placed in position, bolts F 25 holding the bracket at its base and the bolt F 44 holding the extension support or arm to the rear of the casting to which the cylinder front cover is secured. The bolt F 44 takes the place of the fan bracket bolt.

It is possible that the face of the casting to which the extension support of the Bosch bracket is to be fastened may be rough and uneven. If so a few rubs with a file will provide a solid and smooth fit for the face of the bracket.

Driving gear F 31 is to be keyed to the cam shaft by means of the special key F 55, first, however, enlarging the hole in the end of the shaft by means of the $^5/_{32}$" drill F 69, as in the gear driven installa-

F 147 Large bell crank lever.
F 148 Small bell crank lever.
F 149 Bell crank lever shaft.
F 150 Long connecting rod.
F 151 Short connecting rod.
F 152 Taper pin for bell crank levers.
F 153 Cotter pin for F 150 and F 151.
F 154 Small washer for connecting rods.
F 161 Special fan pulley.
F 162 Special washer in back of brass fan pulley.
F 210 Slotted hexagon head cap screw for F 140-142.
F 211 Washer for F 210.
F 212 Nut for F 210.

Cables for type "NU4"

F 155 L. T. 9¾", loop one end.
F 156a H. T. 30", loop or hook terminal one end, other end free.
F 157a H. T. 26", loop or hook terminal one end, other end free.
F 160 L. T. 29½", loop and loop.
*F 267 L. T. 27", loop terminal one end (1915 models only).

Cables for type "DU4"

F 155 L. T. 9¾", loop one end.
*F 156 H. T. 18½", loop and hook.
*F 157 H. T. 20", loop and hook.
*F 158 H. T. 22", loop and hook.
*F 159 H. T. 24", loop and hook.
F 160 L. T. 29½", loop and loop.
*F 267 L. T. 27", loop terminal one end (1915 models only).

* Parts marked * do not appear in illustration.

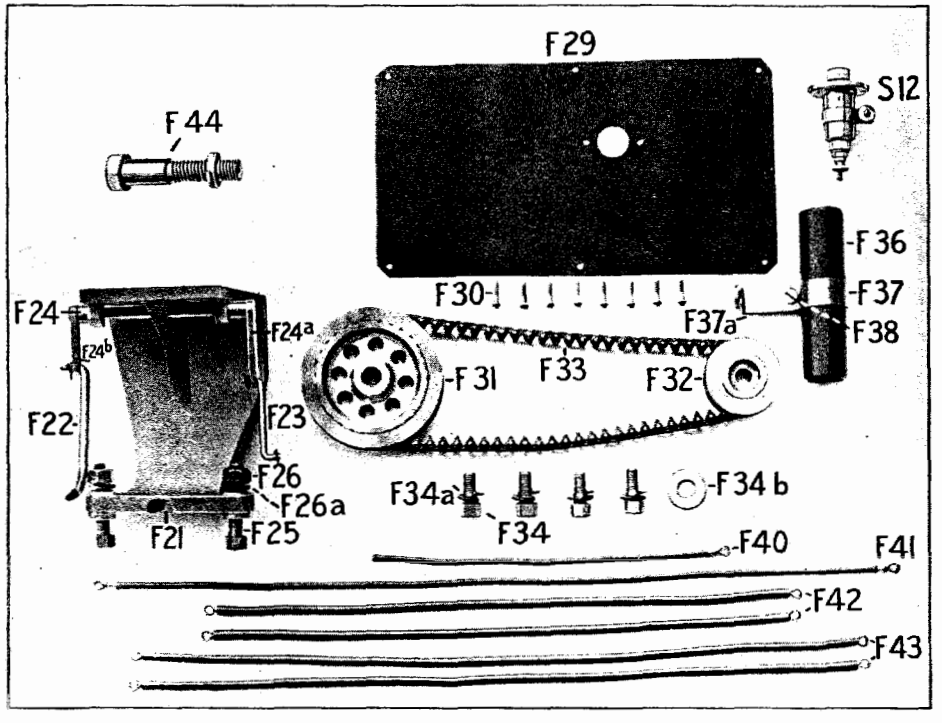


Fig. 8—The Parts of the Chain Driven Attachment.

Parts for Chain Driven Outfit

S 12 Press button key switch.
F 21 Magneto bracket (specify if for NU4 or DU4).
F 22 Long connecting rod.
F 23 Short connecting rod.
F 24 Advance lever complete with F 24a and F 24b (specify if for NU4 or DU4).

F 24a Large bell crank lever (specify if for NU4 or DU4).
F 24b Small bell crank lever.
F 25 Bolt for securing magneto bracket to crank case.
F 26 Nut for bolt F 25.
F 26a Lock washer for bolt F 25.
F 29 Metal dash plate, 1910-14 models
*F 29a Metal dash plate for 1915 models.
F 30 Wood screw for dash plate and switch.
F 31 Driving gear (large).
F 32 Small magneto gear.
F 33 Chain.
F 34 Magneto fastening bolt.
F 34a Washer for bolt F 34.
F 34b Washer in back of brass fan pulley.
F 36 Fibre tube for cables.
F 37 Brass clamp ring.
F 37a Bracket for fibre tube.
F 38 Holding screw for bracket and clamp ring.
**F 39 Hexagon nut for screw F 38.
**F 39a Washer for screw F 38.
F 44 Fan bracket bolt with washer and nut.
**F 55 Key for gear F 31.
**F 69 5/32" Drill for drilling hole in camshaft.
**F 152 Taper pin for bell crank levers.
**F 153 Cotter pin for F 22 and F 23.
**F 154 Small washer for connecting rods.

Cables for type "NU4"

F 40 L. T. 9¾", with loop terminal on one end.
F 41 L. T. 22¼", with loop terminal on each end.
*F 42a Short high tension cable with loop or hook terminal on one end, other end free.
*F 43a Long high tension cable with loop or hook terminal on one end, other end free.
*F 267 L. T. 27", loop terminal one end (1915 models only).

Cables for type "DU4"

F 40 L. T. 9¾", with loop terminal on one end.
F 41 L. T. 22¼", with loop terminal on each end.
F 42 H. T. 16⅜", with loop and hook terminals (or loop and loop terminals).
F 43 H. T. 20⅛", with loop and hook terminals (or loop and loop terminals).
*F 267 L. T. 27", loop terminal one end (1915 models only).

* Parts marked * do not appear in illustration.
** Appear in gear driven parts illustration, Fig. 7.

When ordering parts, state if same are identical with those shown in this booklet, 5th edition.

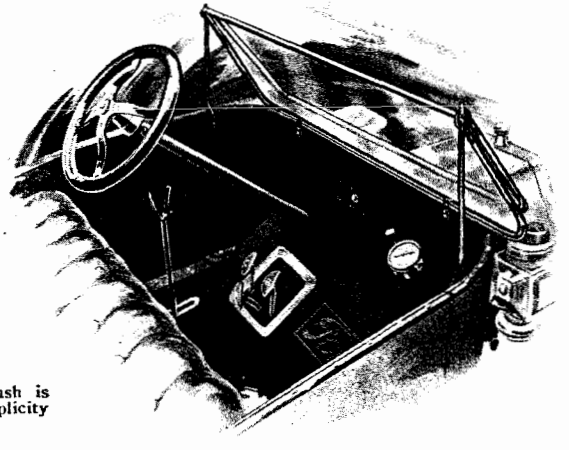


Fig. 9—Even the Dash is Given an Air of Simplicity and Style.

BOSCH SERVICE

BOSCH BRANCHES

NEW YORK, ... Bosch Magneto Company
CHICAGO, ... Bosch Magneto Company
DETROIT, ... Bosch Magneto Company
SAN FRANCISCO, ... Bosch Magneto Company
TORONTO, ... Bosch Magneto Company, Limited

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Bangor, Me.
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Glenwood Springs, Colo.
Gloucester, Mass.
Gloversville, N. Y.
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Great Falls, Mont.
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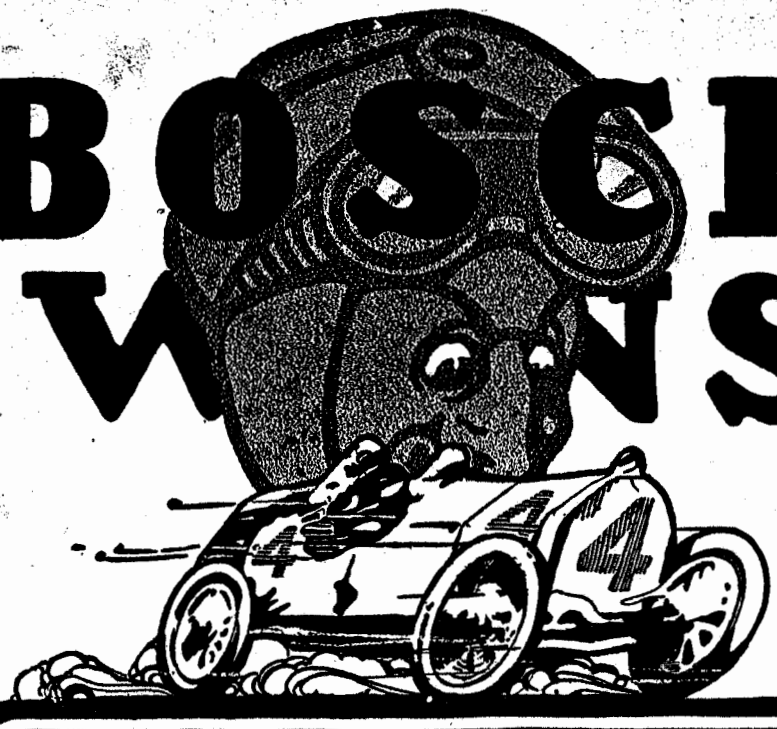

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