FIG. 2—¾ Front View of Carburetor

The filter element should be cleaned each 4,000 miles and replaced each 24,000 miles. The element can be cleaned by tapping it against a hard surface. **Do not tap hard enough to deform the element. Do not immerse the element in a cleaning solvent or blow it out with compressed air.**

When the element is cleaned or replaced, clean the air cleaner body and cover in cleaning solvent, then wipe it dry.

To remove the air cleaner, remove the wing nut retaining the air cleaner on the carburetor, then lift the air cleaner off the carburetor. Remove the cover and lift the element out of the air cleaner body.

3 CARBURETOR

The engine has a four-barrel downdraft carburetor (Figs. 2, 3, and 4). It consists of two main assemblies, the air horn and the main body.

The air horn assembly, which serves as the main body cover, contains the choke plate and the primary fuel bowl vent.

The main body houses the primary and secondary throttle plates, the accelerating pump assembly, the power valve assembly, the secondary operating diaphragm assembly, and the fuel bowls. The automatic choke housing is attached to the main body.

The two primary (front) barrels each contain a main and booster venturi, main fuel discharge, accelerating pump discharge, idle fuel discharge, and the primary throttle plate.

The two secondary (rear) barrels each have a main and booster venturi, idle fuel discharge, secondary main fuel discharge, and a vacuum operated throttle plate.

OPERATION

The carburetor has a primary fuel circuit, and a vacuum operated secondary fuel circuit.

The primary circuit has four basic fuel metering systems. They are the idle fuel system, the accelerating system, the main fuel system, and the power fuel system. A fuel inlet system for both the primary and secondary circuits provides the various fuel metering systems with a constant supply of fuel. In addition, an automatic choke system provides a means of temporarily enriching the mixture to aid in starting and operating a cold engine.

The differences in air pressure within the carburetor causes the proper fuel discharge for various engine speed and load conditions.

FUEL INLET SYSTEM

The primary and secondary barrels have separate fuel bowls (Fig. 5). Each bowl contains a float assembly, and a fuel inlet needle and seat assembly. The fuel first enters the primary fuel bowl through the fuel inlet fitting and screen assembly. A drilled passage through the right side of the main body connects the fuel bowls. The pressure in the two fuel bowls are balanced by means of a pressure equalizing chamber built in the left side of the main body.

The amount of fuel entering either bowl is determined by the distance the fuel inlet needle is raised off its seat and by fuel pump pressure. Movement of the fuel inlet needle in relation to the seat is controlled by the float and lever assembly which rises and falls with the fuel level. As the fuel level drops, the float lowers, raising the fuel inlet needle to allow fuel to enter the bowl. When the fuel reaches a pre-set level, the float lowers the fuel inlet needle to a position where it restricts the flow of fuel, admitting only enough fuel to replace that being used. Thus, any change in the fuel level causes a corresponding movement of the float, raising or lowering the fuel inlet needle to maintain the pre-set level of fuel. The fuel inlet system must maintain this pre-set level, because the carburetor is calibrated to deliver the proper mix-
FIG. 4—Top View of Carburetor

ature only when the fuel is at the proper level.

A retracting clip is attached to the fuel inlet needle and hooks over the tab of the float assembly. This clip assures reaction of the fuel inlet needle to any movement of the float.

The primary fuel bowl is vented externally at all times.

AUTOMATIC CHOKE SYSTEM

When a cold engine is being started, much of the fuel discharged by the carburetor is unable to vaporize during its travel to the combustion chamber until sufficient heat is developed in the intake manifold to maintain a homogeneous mixture for efficient combustion. Therefore, a much larger quantity of fuel must be supplied to compensate for this lack of vaporization when starting and running a cold engine.

The choke plate, located in the air horn above the primary venturis, when closed, provides a high vacuum above as well as below the throttle plates. With a vacuum above the throttle plates, fuel will flow from the main fuel system as well as from the idle fuel system, thus bringing about the extremely rich fuel mixture necessary for cold engine operation.

The carburetor choke shaft is linked to a thermostatic choke control mechanism mounted on the main body (Fig. 6).

The bi-metal thermostatic spring in the choke housing mechanism un-winds when cold and winds up when warm. When the engine is cold, the thermostatic spring, through attaching linkage, holds the choke plate in a closed position. When the engine is started, enough air is drawn through
the spring loaded choke plate valve to enable the engine to run and prevent flooding.

As the engine continues to run, manifold vacuum, channeled through a passage on the bottom of the main body to the choke housing, draws heated air from the exhaust manifold heat chamber. The amount of air entering the choke housing is controlled by restrictions in the air passages in the carburetor.

The warmed air enters the choke housing and heats the thermostatic spring causing it to wind up. The tension of the thermostatic spring gradually decreases as the temperature of the air from the heat chamber rises, allowing the choke plate to open. The air is exhausted into the intake manifold.

When the engine reaches its normal operating temperature the spring no longer exerts an opposing tension on the choke plate. The air velocity acting on the offset choke plate as well as manifold vacuum acting below the choke plate forces it to the full open position. A baffle plate (Fig. 7) located in the choke housing, controls the speed of the temperature rise in the thermostatic spring housing. Small holes in the plate pass the heated air directly onto the thermostatic spring at low temperatures when the choke plate is closed. As the temperature rises and the choke plate opens, the baffle plate moves and the heated air is directed onto the spring by an alternate longer route which slows up the rate of temperature rise. When the spring allows the choke plate to be fully opened, the heated air is passed directly onto the spring and out of the choke housing by the shortest route. The thermostatic spring thus remains heated and the choke plate remains fully open until the engine is stopped and allowed to cool.

The fast idle cam pick-up lever actuates the fast idle cam during choking. Steps on one edge of the fast idle cam contact the fast idle adjusting screw which permits a faster engine idle speed for smoother running when the engine is cold. As the choke plate is moved through its range of travel from the closed to the open position, the pick-up lever rotates the fast idle cam. Each step on the fast idle cam permits a slower idle rpm as engine temperature rises and choking is reduced.

During the warm-up period, if the engine should reach the stall point due to a lean mixture, manifold vacuum will drop considerably. The tension of the thermostatic spring then overcomes the lowered vacuum and air velocity acting on the choke plate, and the choke plate will be moved toward the closed position, providing a richer mixture to help prevent stalling.

The linkage between the choke lever and the throttle shaft is designed so the choke plate will partially open when the accelerator pedal is fully depressed. This permits unloading of a flooded engine.

**Idle Fuel System**

At idle and low speed operation, the engine does not draw sufficient air through the primary booster venturi to create a vacuum great enough to operate the primary circuit main fuel system. Therefore, an idle fuel system is provided, which is not dependent upon venturi vacuum, to discharge fuel (Fig. 8). At idle and low engine speeds, intake manifold vacuum is high. This high manifold vacuum provides a pressure differential great enough to operate the idle fuel system.

Idle fuel is discharged into both the primary and secondary barrels. Idle fuel for the primary barrels is drawn from the primary fuel bowl, and idle fuel for the secondary barrels is drawn from the secondary fuel bowl.

The carburetor has identical idle fuel systems for each primary barrel and identical idle fuel systems for each secondary barrel.

At idle speed, the normal air pressure in the fuel bowls cause fuel to flow through the idle fuel system passages of the primary and secondary circuits to the greatly reduced pressure area (vacuum) below the throttle plates. Fuel flows from the fuel bowls through the main jet and into the bottom of the main well.

From the main well the fuel flows up through the idle tube and through a short diagonal passage in the nozzle bar and booster venturi assembly into the idle passage in the main body. A calibrated restriction at the upper tip of the idle tube meters the flow of fuel.

**Primary Circuit.** Air is introduced into the primary circuit idle fuel system from the idle air bleed which is located directly above the idle tube. The air bleed also acts as a vent to prevent siphoning in the idle fuel system at off idle or high speeds and when the engine is stopped. Additional air is bled into the system through an air bleed located at the bottom of the diagonal passage in the nozzle bar where the fuel enters the idle passage in the main body.

Fuel flows down the idle passage in the main body past two idle transfer holes. The idle transfer holes act as additional air bleeds at curb idle. The fuel then flows past the pointed tip of the adjusting needle which controls the idle fuel discharge in the primary circuit. From the adjusting needle chamber, the fuel flows through a short horizontal passage and is discharged below the primary throttle plate.

During off idle when the primary throttle plate is moved slightly past the idle transfer holes, each hole begins discharging fuel as it is exposed to manifold vacuum. As the primary throttle plate is opened still wider and engine speed increases, the air flow through the carburetor is also increased. This creates a vacuum in the booster venturi strong enough to bring the main fuel system into operation. Fuel flow from the primary circuit idle fuel system begins tapering off as the primary circuit main fuel system begins discharging fuel.

**Secondary Circuit.** Air is introduced into the secondary circuit idle fuel system from the idle air bleed which is located directly above the idle tube. The air bleed also acts as a vent to prevent siphoning in the idle fuel system at high speeds and when the engine is stopped.

Fuel flows down the idle passage in the main body past two transition holes above the closed throttle plate and flows through a metered restriction into a short horizontal passage and is discharged into the secondary barrel below the closed throttle plate. The transition holes act as air bleeds at idle. The secondary idle system continues discharging fuel until the secondary main fuel system comes into operation.
FIG. 7—Choke Housing Baffle Plate

FIG. 8—Idle Fuel System

FIG. 9—Accelerating System

ACCELERATING SYSTEM

Upon acceleration, the air flow through the carburetor responds almost immediately to the increased throttle opening. There is, however, a brief interval before the fuel, which is heavier than air, can gain speed and maintain the desired balance of fuel and air. During this interval, the accelerating system (Fig. 9) supplies fuel until the other systems can once again provide the proper mixture.

When the throttle is closed, the diaphragm return spring forces the diaphragm toward the cover, drawing fuel into the chamber through the inlet. The inlet has a ball check which opens to admit fuel from the primary fuel bowl and closes when the accelerating pump is operated to prevent a reverse flow. A discharge ball check prevents air from entering when fuel is drawn into the chamber.

When the throttle is opened the diaphragm rod is forced inward, forcing fuel from the chamber into the discharge passage. Fuel under pressure forces the pump discharge ball check off its seat and fuel passes through the accelerating pump discharge screw and is sprayed into each primary booster venturi through discharge ports in the nozzle bar assembly.

FIG. 10—Primary Main Fuel System

The difference in pressure between the venturi and fuel bowl causes fuel to flow through the main fuel system (Fig. 10).

At a predetermined venturi vacuum, fuel flows from the primary fuel bowl, through the main jets, and into the bottom of the main well. The fuel moves up the main well tube past air bleed holes. Filtered air from the high speed air bleed enters the fuel flow in the main well tube through holes in the side of the tube. The high speed air bleed meters an increasing amount of air to the fuel as venturi vacuum increases maintaining the

PRIMARY MAIN FUEL SYSTEM

As engine speed increases, the air passing through the booster venturi creates a vacuum. The amount of vacuum is determined by the air flow through the venturi, which in turn is regulated by the speed of the engine.
GROUP 1—POWER PLANT

required fuel-air ratio. The mixture of fuel and air is lighter than raw fuel and responds faster to changes in venturi vacuum. It also vaporizes more readily than raw fuel. The fuel and air continue up the main well tube past another air bleed which also acts as a vent to prevent siphoning when the engine is shut down. The fuel is discharged into the booster venturi where it is vaporized and mixed with the air flowing through the carburetor.

The throttle plate controls the amount of the fuel-air mixture admitted to the intake manifold, regulating the speed and power output of the engine.

A balance tube is located in each primary barrel directly below the booster venturi. When decelerating, the balance tube siphons off any excess fuel droplets remaining around the edge of the booster venturi and discharges the droplets into the equalizing slots in the base of the carburetor where they are mixed with the idle fuel. The balance tube also acts as an additional air bleed during the idle fuel system operation.

POWER FUEL SYSTEM

During periods of increased road loads or high speed operation, the fuel-air ratio must be increased for added power. The added fuel required during this period is supplied by the power fuel system (Fig. 11).

The power fuel system is controlled by manifold vacuum, which gives an accurate indication of the power demands placed on the engine. Manifold vacuum is highest at idle speeds and decreases as the load on the engine is increased.

Manifold vacuum is transmitted from an opening in the base of the main body, through a passage in the main body and power valve chamber to the power valve diaphragm. The manifold vacuum, acting on the power valve at idle speed or normal road load conditions, is great enough to hold the power valve diaphragm down, overcoming the tension of the spring on the valve stem and holding the valve closed. When high power operation places a greater load on the engine and manifold vacuum drops below a predetermined value, the spring opens the power valve. Fuel from the primary fuel bowl flows through the power valve and into passages leading to both primary circuit main fuel wells. Here the fuel is added to the fuel from the primary circuit main fuel system enriching the mixture.

As engine power demands are reduced, manifold vacuum increases. The increased vacuum overcomes the tension of the valve stem spring and closes the power valve.

SECONDARY THROTTLE OPERATION AND MAIN FUEL SYSTEM

To provide sufficient fuel-air mixture to operate the engine at maximum power, the mixture supplied by the primary circuit of the carburetor is supplemented by an additional quantity of fuel-air mixture from the secondary circuit (Fig. 12).

This additional supply of fuel-air mixture is delivered through the two secondary (rear) barrels of the carburetor. The secondary circuit throttle plates are operated by a spring-loaded vacuum diaphragm assembly attached to the main body and linked to the secondary throttle shaft.

Opening of the secondary throttle plates is controlled by vacuum from the left primary booster venturi. The vacuum is transmitted from a pick up tube through passages in the air horn, main body, and behind the secondary operating diaphragm.

As the primary throttle plates are opened, primary venturi vacuum increases. When the vacuum reaches a pre-determined amount, it starts to act on the secondary circuit operating diaphragm, which in turn starts to open the secondary throttle plates.

A ball check, located in the vacuum passage in the diaphragm housing, controls the rate at which the secondary throttle plates are allowed to open. Any rapid increase in vacuum which would tend to open the secondary throttle plates too suddenly holds the ball check against its seat. The opening of the secondary throttle plates is slowed to a rate governed by the amount of vacuum passing through a bleed in the ball seat.

As the secondary throttle plates begin to open, fuel flows from the secondary fuel bowl through the secondary main jets into the bottom of the main well and up the main well tube past air bleed holes. Air is introduced through an air bleed at the top of the tube. When the secondary throttle plates are moved slightly past the secondary transition holes, each hole begins discharging fuel as it is exposed to manifold vacuum. As secondary venturi vacuum is increased the fuel is discharged into the secondary booster venturi. Fuel from the transition holes tapers off and the holes act as additional air bleeds.

When decelerating, vacuum in the primary venturi decreases, and the secondary throttle plates begin to close. The ball check in the diaphragm housing passage will unseat when the throttle is closed quickly, allowing the low pressure on the vacuum side of the diaphragm to rapidly return to atmospheric pressure. Linkage on the opposite side of the secondary throttle shaft (coupled to the throttle lever) will mechanically overcome any lag in the vacuum system, closing the secondary plates, thereby assuring rapid and positive engine deceleration.

CARBURETOR REMOVAL

1. Remove the air cleaner. Remove the throttle rod from the throttle lever. Disconnect the distributor vacuum line, the fuel line, and the choke heat tube at the carburetor.

2. Remove the carburetor retaining nuts and lockwashers, then remove the carburetor. Remove the spacer and two gaskets from the manifold.

3. Install bolts about 2½ inches long of the correct diameter through the carburetor retaining stud holes with a nut above and below the flange (or install carburetor legs) to facilitate working on the carburetor and prevent damage to the throttle plates.

CARBURETOR DISASSEMBLY

Use a separate container for the component parts of the various assemblies to facilitate cleaning, inspection and assembly.

AIR HORN

1. Remove the air cleaner anchor screw and lockwasher. Disconnect the choke plate operating rod at the choke housing lever.

2. Remove the air horn retaining screws and lockwashers, then remove the air horn by tilting it slightly as it is lifted off the main body to remove the choke plate operating rod from the choke housing lever. Remove the air horn gasket.
3. Remove the choke rod seal retainer from the air horn and slide the felt seal and two washers off the rod.

4. If it is necessary to remove the choke plate, remove the secondary throttle vacuum pick-up tube by prying it out with needle nose pliers. Discard the tube after removal. Remove the choke plate screws, then remove the choke plate assembly by sliding it out of the shaft from the bottom of the air horn. Remove the choke plate operating rod, then slide the choke shaft from the air horn.

**MAIN BODY**

1. Remove the fuel inlet fitting, gasket and screen.

2. Using a hook, disconnect the float shaft retainer from each float (Fig. 13), then remove the float and shaft, and the fuel inlet needle and clip from each fuel bowl.

3. Remove the fuel inlet needle seat and float shaft retainer from each fuel bowl and remove the primary circuit and secondary circuit main jets.

4. Remove the accelerating pump discharge screw and gasket from the primary side, then lift the nozzle bar and booster venturi assembly and gasket out of the main body. Invert the main body and let the accelerating pump discharge ball fall into the hand.

5. Remove the secondary circuit nozzle bar and booster venturi assembly and gasket.

6. Remove the accelerating pump operating rod, then remove the accelerating pump cover, diaphragm assembly, and spring. Remove the inlet ball check retainer screw and gasket, then remove the ball check.

7. Remove the secondary diaphragm operating rod. Remove the diaphragm cover, return spring, and diaphragm.

8. Invert the main body and remove the power valve cover and gasket, then remove the power valve and gasket. Remove the idle fuel adjusting needles and springs.

9. Remove the choke shield. Disconnect the fast idle cam pick-up lever at the fast idle cam. Remove the thermostatic spring housing retaining screws and clamp, then remove the housing gasket, and the choke housing baffle plate. Remove the choke
FIG. 14—Throttle Plate Removal

housing to main body screws and lockwashers, then remove the choke housing and gasket. Remove the choke housing lever. Loosen the screw on the bellcrank clamp and slide the bellcrank off the choke housing shaft and lever assembly. Remove the retainer from the choke housing shaft and lever assembly and slide the shaft out of the choke housing. Remove the fast idle cam retainer and slide the cam off the boss on the main body.

10. Remove the nut and washer securing the fast idle adjusting lever assembly to the primary throttle shaft and remove the lever assembly. Remove the distributor vacuum line fitting, the anti-stall dashpot if so equipped, and the hot engine idle adjusting screw and spring.

11. If it is necessary to remove the throttle plates, lightly scribe the primary and secondary throttle plates along the throttle shafts and mark each plate and its corresponding bore with a number or letter for proper installation (Fig. 14).

12. Slide the primary and secondary throttle shafts out of the main body. Slide the accelerator over-travel spring and lever off the primary throttle shaft.

CLEANING AND INSPECTION

The cleaning and inspection of only those parts not included in the carburetor overhaul repair kit are covered here. All gaskets and parts included in the repair kit should be installed when the carburetor is assembled and the old gaskets and parts should be discarded.

Wash all the carburetor parts (except the accelerating pump diaphragm, the power valve, the secondary operating diaphragm, and the anti-stall dashpot) in clean commercial carburetor cleaning solvent. If a commercial solvent is not available, lacquer thinner of denatured alcohol may be used. Rinse the parts in kerosene to remove all traces of the cleaning solvent, then dry them with compressed air. Wipe all parts that can not be immersed in solvent with a clean, soft, dry cloth.

Force compressed air through all passages of the main body, choke housing, and nozzle bar and booster venturi assemblies. Do not use a wire brush to clean any parts or a drill or wire to clean out any openings or passages in the carburetor. A drill or wire may enlarge the hole or passage changing the calibration of the carburetor.

Check the choke shaft for wear and excessive looseness or binding in the air horn. Inspect the choke plate for nicked edges and the choke plate valve for ease of operation.

If the throttle shafts are excessively loose or bind in the main body, or if the plates are burred preventing proper closure, replace the main body.

Inspect the main body, air horn, nozzle bars and booster venturi assemblies, choke housing, power valve cover, the accelerating pump cover, and secondary operating diaphragm cover for cracks.

Check the floats for leaks by holding them under water that has been heated to just below the boiling point. Bubbles will appear if there is a leak. If a float leaks, replace it. Replace the float if the arm needle contact surface is grooved. If the floats are serviceable, polish the needle contact surface of the arm. Replace the float shafts if they are worn.

Replace all screws and nuts that have stripped threads.

Replace all distorted or broken springs.

Inspect the idle tubes in each nozzle bar assembly. If they are plugged, bent, or broken replace the booster venturi and nozzle bar assembly.

Examine the power valve gasket mating surface, and replace the main body if this surface is damaged so that the valve gasket will not seal properly.
This would cause fuel to leak past the power valve.

Inspect the rubber boot of the anti-stall dashpot for proper installation in the groove of the stem bushing. Check the stem movement for smooth operation. Do not lubricate the stem. Replace the assembly if it is defective.

Inspect all gasket surfaces. Repair or replace any parts that have damaged gasket surfaces. Replace the thermostatic spring housing if it is cracked, if the gasket surface is chipped, or if the thermostatic spring is broken.

CARBURETOR ASSEMBLY

Make sure all holes in the new gaskets have been properly punched and that no foreign material has adhered to the gaskets. Make sure the accelerating pump diaphragm and secondary operating diaphragm are not torn or cut.

AIR HORN

Refer to Fig. 15 for the correct location of the parts. If the choke plate was removed, position the choke plate shaft and lever assembly in the air horn, then slide the choke plate operating rod through the opening in the air horn assembly and connect it to the choke lever. Slide the choke plate in the shaft through the bottom of the air horn. Close the choke plate and position it in the shaft, then install and tighten the screws. Position the rod seal between the two brass washers and slide them on the choke plate operating rod, then secure them in place with the seal retainer. Start a new secondary throttle vacuum pick-up tube in the air horn so that the pick-up end of the tube is perpendicular (or as near as possible) to the mounting surface of the air horn. Drive the tube into the air horn by grasping it lightly below the shoulder with pliers and striking the pliers with a hammer.
FIG. 18 — Main Body Assembly

FIG. 20 — Primary and Secondary Throttle Levers and Fast Idle Cam Installed

Drive the tube in until it stops against its shoulder. **Do not crush or bend the tube.**

**MAIN BODY**

Refer to Figs. 16, 17, and 18 for the correct location of the parts.

1. If the throttle plates were removed, place the accelerator overtravel spring, with the shortest tang end first, over the boss on the overtravel lever. Place the short tang of the spring under the lug on the lever. Slide the overtravel lever and spring assembly on the throttle shaft. Hook the longest tang of the spring over the closed throttle lug of the throttle lever (Fig. 19). Slide the primary throttle shaft assembly into the main body.

2. Referring to the lines scribed on the throttle plates, install the primary throttle plates in their proper location with the screws snug, but not tight. Invert the main body and hold it up to the light. Little or no light should show between the throttle plates and the throttle bores. Tap the plates lightly with a screwdriver handle to seat them, then tighten the screws.

3. Slide the secondary shaft into the main body. Referring to the lines scribed on the secondary throttle plates, install the throttle plates in their proper location. Adjust the secondary throttle plates (refer to "Carburetor Bench Adjustments").

4. Install the hot engine idle spring and screw and the anti-stall dashpot if so equipped. Install the distributor vacuum passage fitting. Place the fast idle lever assembly on the primary throttle shaft and install the retaining washer and nut (Fig. 20). Slide the fast idle cam on the boss on the main body and install the retainer.

5. Insert the choke housing shaft and lever assembly into the choke housing and install the retainer (Fig. 21). Position the bellcrank on the choke housing shaft and tighten the screw on the bellcrank clamp (refer to "Carburetor Bench Adjustments"). Install the fast idle cam pick-up lever on the bellcrank. Position the choke housing lever on the choke housing shaft and install the spacer, washer, and nut. Place a new choke housing gasket on the main body and position the choke housing on the main body engaging the fast idle cam pick-up lever in the hole in the fast idle cam. Install the choke housing lockwashers and screws. Install the choke housing baffle plate (Fig. 7). Be sure the holes in the inner plate fit over the vacuum passage boss and air inlet boss. Position the thermostatic spring housing gasket and housing on the choke housing aligning the index mark on the spring housing with the middle index mark on the choke housing. Install the clamp and retaining screws.

6. Drop the accelerating pump inlet ball check in the inlet passage of the accelerating pump chamber and install the washer and retaining screw. Install the diaphragm return spring on the boss in the chamber. Insert the diaphragm assembly in the cover and place the cover and diaphragm assembly in position on the
main body. Install the cover screws finger tight, then push the accelerating pump plunger the full distance of its travel and tighten the cover screws. Install the accelerating pump operating rod on the link on the accelerating pump cover and on the over-travel lever as shown in Fig. 22.

7. Invert the main body and install the power valve and gasket, then install the cover and gasket. Install the idle adjusting needles and springs. Turn the needles in gently with the fingers until they just touch the seat, then back them off 1-1½ turns for a preliminary idle adjustment.

8. Install the fuel inlet filter screen, fitting, and gasket.

9. Install the secondary operating diaphragm on the secondary operating lever. Install the diaphragm return spring on the cover, then install the cover with the screws finger tight. With the diaphragm in the extended position, tighten the cover screws. Install the secondary diaphragm operating rod.

10. Install the primary main jets. Position the float shaft retainer in the groove on the primary fuel inlet needle seat, then install the seat and gasket. Slide the float shaft in the float lever. Install the clip in the groove on the fuel inlet needle and hook the assembly on the float tab. Install the float assembly in the fuel bowl so that the fuel inlet needle enters the needle seat, and the float shaft rests in its guides. Using a hook, position the shaft retainer in the grooves on the shaft. Refer to "Carburetor Bench Adjustments," and check the float setting.

11. Repeat step 10 on the secondary circuit fuel bowl.

12. Drop the accelerating pump discharge ball into its passage in the primary side of the main body. Seat the ball with a brass drift and a light hammer. Make sure the ball is free, then position the primary nozzle bar and booster venturi assembly and gasket in the main body. Install the accelerating pump discharge nozzle screw and gasket.

13. Position the secondary nozzle bar and booster venturi assembly and gasket in the main body and install the gasket and retaining screw.

14. Position the air horn gasket on the main body, then position the
air horn on the main body so that the choke plate operating rod engages the choke housing lever (Fig. 23). Install the air horn retaining screws. Using needle nose pliers, install the choke plate operating rod to choke housing lever retaining pin. Install the air cleaner anchor screw.

**CARBURETOR INSTALLATION**

1. Be sure all old gasket material is removed from the manifold heat riser flange, then place the spacer between two new gaskets and position them on the manifold. Position the carburetor on the manifold, and secure it with the lockwashers and nuts. Tighten the nuts alternately to 12-15 foot-pounds torque.

2. Connect the throttle rod, the choke heat tube, and the distributor vacuum line. Refer to "Carburetor In-Chassis Adjustments" and adjust the engine idle speed, the idle fuel mixture, and the anti-stall dashpot, then install the air cleaner.

**CARBURETOR BENCH ADJUSTMENTS**

After the carburetor has been overhauled, the following adjustments are usually made on the bench. However, the adjustments can be made with the carburetor installed on the engine.

**FLOAT ADJUSTMENT**

Remove the air horn. Check the float setting (Fig. 24). Place the gauge in the corner of the enlarged end section of the fuel bowl. The gauge should touch the float near the end, but not on the end radius. Depress the float tab to seat the fuel inlet needle. The height of both the primary and secondary floats should be from 0.435 to 0.465 inch, measured from the gasket surface on the main body with the gasket removed. The float should just touch the low point on the gauge (0.465 inch) and should not touch the high point (0.435 inch). If necessary, bend the tab on the float arm to bring the float setting within limits. This should provide the proper fuel level.

**SECONDARY THROTTLE PLATE ADJUSTMENT**

Hold the secondary throttle plates closed and turn the secondary throttle shaft lever adjusting screw out (Fig. 25) until the secondary throttle plates stick in the throttle bores and there is 0.005 inch clearance between the screw and the secondary throttle lever, then turn the screw in one full turn.

**CHECKING POWER VALVE**

Invert the carburetor. Remove the glass bowl from the fixture (Fig. 26). Fill the bowl half-full of water. Install the bowl on the fixture. Connect a line from a vacuum pump to the fitting on top of the fixture. Insert the large O.D. end of the wand in the tube and attach the other end of the tube to the fitting on the side of the fixture. Slip the rubber gasket (furnished with the tool) over the small O.D. end of the wand. Hold this end against the power valve vacuum pickup port. Look for bubble formations in the water in the bowl. A continuous stream of bubbles indicates leakage through the power valve diaphragm or gasket, or the cover or gasket. If leakage is encountered, the power valve, power valve gasket, the cover, and cover gasket, should be replaced one at a time with a new part and the check repeated until the source of leakage has been found. If the source of leakage can not be found, the gasket seats are damaged and the defective parts should be replaced.

A few bubbles may be noticed immediately upon attaching the vacuum line. The bubbling should stop within approximately 15 seconds or after the air has been removed from the system. If no bubbles are seen, the power valve, gaskets, and cover are sealing properly.

**CARBURETOR IN-CHASSIS ADJUSTMENTS**

**IDLE SPEED ADJUSTMENT**

The engine idle speed must be adjusted to proper hot and fast (cold) settings.

**Hot Engine Idle Speed.** Adjustment of the left side stop screw controls the hot engine idle speed (Fig. 27). Clockwise rotation increases the engine idle speed and counterclockwise rotation decreases it.

On cars with a conventional drive or overdrive transmission, place the transmission selector lever in neutral position. Operate the engine until the engine temperature has stabilized, and the choke fast idle cam is in the slow position (bottom step on cam contacting the fast idle adjusting screw). Back off the choke fast idle adjusting screw from the fast idle cam, then turn the hot engine idle adjusting screw in a direction to obtain the correct idle speed setting. Open the throttle by hand and allow
it to close normally. Recheck the engine idle speed.

On cars equipped with Cruise-O-Matic set the engine idle speed with the selector lever in drive range. Set the hand brake and place the selector lever in D1 or D2. Check the engine idle speed. Adjust the engine idle speed to the drive range specifications.

Final engine idle speed may be varied to suit the conditions under which the car is to be operated.

After the hot engine idle speed has been adjusted, adjust the fast idle speed.

**Fast Idle Speed.** The adjusting screw on the right side of the carburetor contacts steps on one edge of the fast idle cam which permit a faster engine idle speed for smoother running when the engine is cold. As the choke plate is moved through its range of travel from the closed to the open position, the fast idle cam pick-up lever rotates the fast idle cam. Each step on the fast idle cam permits a slower idle rpm as engine temperature rises and choking is reduced.

Adjust the hot engine idle speed to the recommended rpm before attempting to set the fast idle speed. Make this adjustment with the engine at normal operating temperature.

Turn the fast idle speed adjusting screw in until it just touches the lowest step on the fast idle cam, then back it off 1/4-1/2 turn. In localities where normal setting of the fast idle speed may be considered unnecessarily high, the speed may be reduced by backing off the adjusting screw not in excess of one full turn.

**Idle Mixture Adjustment**

The idle fuel mixture is controlled by the idle mixture adjusting needles (Fig. 27). Turn the needles in to lean the mixture, and out to enrich the mixture. Make the initial mixture adjustment by turning the needles in until they lightly touch the seat, then back them off 1-1/4 turns. Do not turn a needle against the seat tight enough to groove the point. If a needle is damaged, it must be replaced before a proper mixture adjustment can be obtained.

Operate the engine until the engine temperature has stabilized.
GROUP 1—POWER PLANT

Turn the mixture needles in until the engine begins to run rough from the lean mixture. Turn the needles out until the engine begins to "roll" from the rich mixture. Then, turn the needles in until the engine runs smoothly. Always favor a slightly rich mixture rather than a lean mixture.

It may be necessary to reset the engine idle speed after the correct idle mixture is obtained.

ANTI-STALL DASHPOT ADJUSTMENT

Adjust the engine idle speed, then loosen the anti-stall dashpot locknut. Hold the throttle in the closed position and depress the anti-stall dashpot plunger with a screwdriver blade, then turn the anti-stall dashpot in its bracket in a direction to provide the specified clearance of 0.060-0.090 inch. Tighten the locknut to secure the adjustment.

AUTOMATIC CHOKE ADJUSTMENT

The automatic choke is provided with an adjustment to control its reaction to engine temperature. By loosening the three screws that retain the thermostatic spring housing to the choke housing (Fig. 28), the spring housing can be turned in a counterclockwise direction which will require a higher thermostatic spring temperature to fully open the choke plate. Turning the thermostatic spring housing in the opposite direction (clockwise) will cause the choke plate to fully open at a lower thermostatic spring temperature. This is the lean direction as indicated by the arrows. Proper adjustment will be very close to the mid-position mark as indicated by the divisions on the choke housing. The setting should not be over 2 divisions on either side of the mid-position mark.

4 THROTTLE LINKAGE ADJUSTMENTS

CONVENTIONAL AND OVERDRIVE TRANSMISSIONS

Adjust the engine idle speed to specifications. Set the accelerator pedal height to 3/8 inches and adjust the carburetor connecting link as necessary to allow smooth operation (Fig. 29).

FIG. 29—Conventional and Overdrive Transmission
Throttle Linkage Adjustment

CRUISE-O-MATIC TRANSMISSION

The throttle linkage adjustments for Cruise-O-Matic are covered in Group 3, Part 2.

5 FUEL PUMPS AND VACUUM BOOSTER

The fuel pump is mounted on the left side of the cylinder front cover. All fuel pumps are actuated by the camshaft eccentric.

A combination fuel pump and vacuum booster is also available.

COMBINATION VACUUM BOOSTER AND FUEL PUMP

The combination vacuum booster and fuel pump is shown disassembled in Fig. 30.

TESTS. The tests are performed with the fuel pump installed on the engine.

Pressure Tests. Disconnect the fuel line at the carburetor. Install a pressure gauge and a "T"-type fitting with a petcock between the gauge and the carburetor fuel inlet fitting.

Vent the system, by opening the petcock momentarily, prior to taking a pressure reading. Operate the engine at 500 rpm. After the pressure has stabilized, it should be 4.5-6.5 psi.

Capacity Test. Perform this test only when the pressure test is within specifications. Open the petcock, and expel the fuel into a suitable container. Operate the engine at 500 rpm and observe the time required to expel one pint. It should be 20 seconds or less. Do not condemn a fuel pump, as the result of a poor capacity test, until it is certain that the fuel filter is clean and in good condition.

Vacuum Booster Test. Connect a vacuum gauge to the windshield wiper connection of the pump. Disconnect the pump to manifold line at the manifold and plug the line. Operate the engine at approximately 500 rpm, and observe the vacuum gauge. The pump should develop a vacuum of at least 10 inches of mercury.

REMOVAL

Disconnect the fuel lines at the pump. Disconnect the vacuum lines at the vacuum booster. Remove the pump retaining screws, then remove the pump and gasket.

DISASSEMBLY

1. Remove the sediment bowl, filter, and gaskets.