

EVINRUDE

presents

CARBURETOR

MAINTENANCE

"ZEPHYR THROTTLE VALVE TYPE"

This is Film No. 2 of a series presented to assist Evinrude Dealers in their service work on Evinrude Outboard Motors. For complete information on this program write —

EVINRUDE MOTORS

MILWAUKEE, WISCONSIN

Form No. R4045M



SANDERS: Hiya, Bob.

MYERS: Hello, Art. Haven't seen you since last fall.

SANDERS: No. Gotta keep my nose to the grindstone all winter so I can get time for fishing in the spring.

SANDERS: But I need your help now, Bob. Don Hopkins tells me you're a carburetor expert now. He says you fixed his in no time yesterday.

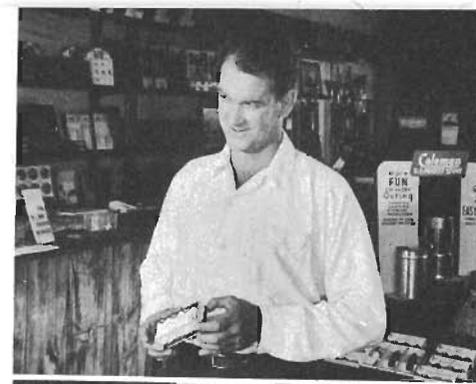
MYERS: Oh . . . that was nothing . . . gotta help good customers out when you can, you know.

SANDERS: Well, that's what this town has needed for a long time . . . a repair service like that. You doing the work yourself, Bob?

MYERS: Oh, sure. There's no trick to it.

SANDERS: I didn't know you had it in you.

SANDERS: Well, my motor's kicking up, Bob. I'm not sure but it seems like the carburetor. Think you can do a job for me like you did for Hopkins?





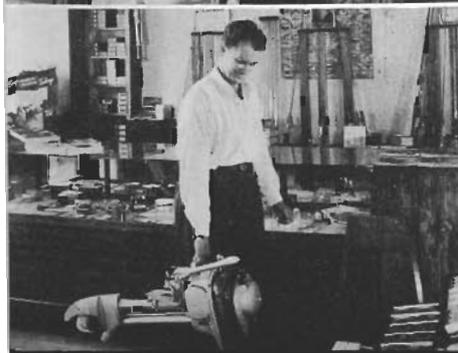
MYERS: Oh, I think we can. We'll try anyway. Drop back on your way home tonight. I think it will be ready for you.



SANDERS: Brother, you're a life saver. I know a lot of fellows who are going to be mighty happy fishermen when they know you've started a service department.



MYERS: That little guy PUTT . . . hmmm . . . Doctor J. Puttington Fischer . . . He wasn't so far off the beam. This repair business is alright.



MYERS: I made a nice piece of change on Don Hopkins' motor yesterday. He talked about what I did for him. And now here's another motor to fix.

MYERS: Should be able to put it in shape in a couple of hours . . . and there's another nice little profit and another happy customer. Yup . . . I'm going to like this repair business.



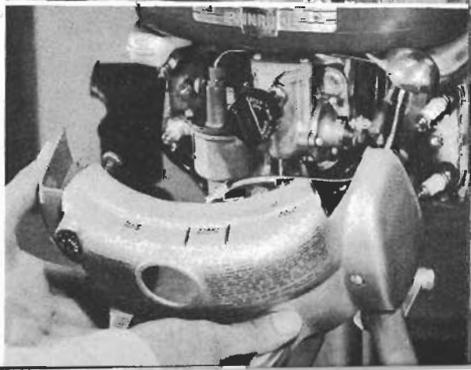
MYERS: Hmmm . . . The Zephyr's a little different from that Sportwin I fixed yesterday. But I suppose it won't be too different when I get inside it.

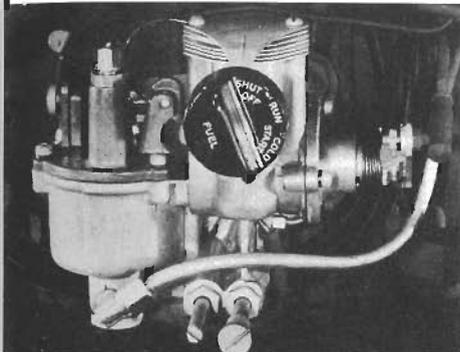


MYERS: Let's see . . . if I take out these two screws, that will take the cover off.

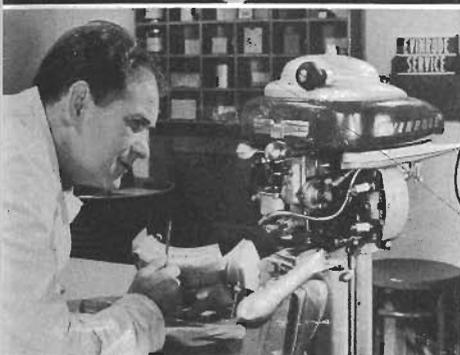


MYERS: There . . . that's easy. Now I can . . . Oh, brother . . . what have we here.





MYERS: There's the carburetor . . . that's it alright. But it sure isn't the same kind I fixed yesterday. I don't know anything about this job.



MYERS: Now what? Guess I better send this one to the plant . . . and disappoint Sanders. Why didn't that little guy, PUTT, tell me about this. Why . . . that little . . .

PUTT: . . . Talking about me, Bob?



MYERS: Well, I'll be darned. Where did you come from? Look what I've got here.



PUTT: Yeah . . . I know. This is a Zephyr with a throttle valve type carburetor.

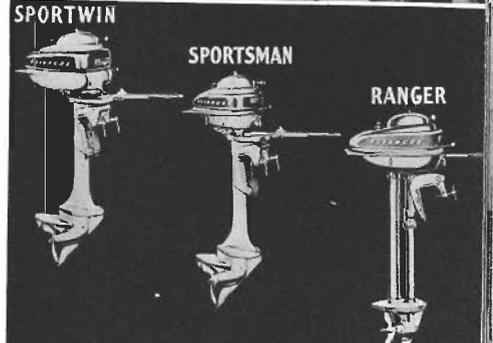
MYERS: Well, what are we going to do about it?



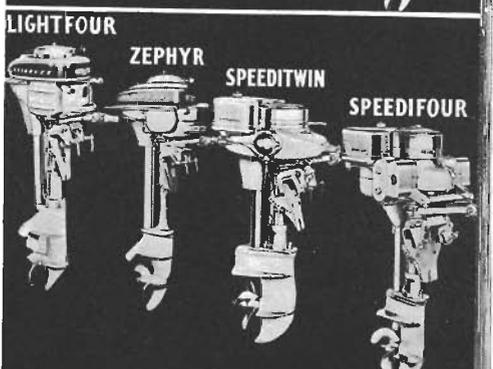
PUTT: Fix it, of course. We can't disappoint a good customer. But first, you should know what carburetors you can expect to find on all the motors.

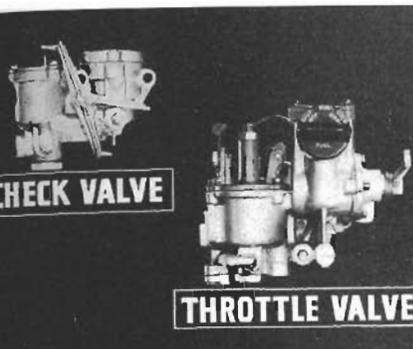


PUTT: The check valve type carburetor, like the one we fixed yesterday, is used on these motors—the Sportwin, the Sportsman and the Ranger.



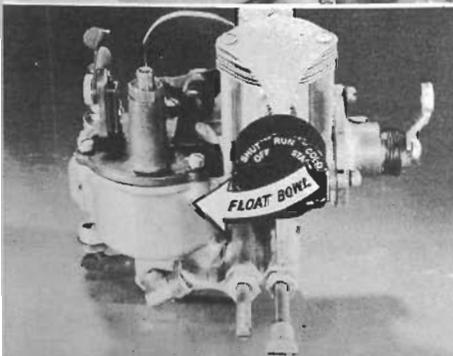
PUTT: This kind, which we call the throttle valve carburetor, is used on these motors—the Zephyr, the Lightfour, the Speeditwin and the Speedifour.





CHECK VALVE

THROTTLE VALVE



PUTT: Those are the two most used carburetors. If you can repair those you can handle most of the carburetor trouble of Evinrude motors.

PUTT: There's quite a difference in the operation of this carburetor. Let's go over it.

PUTT: Getting it off the motor is no problem. Just don't force anything; that's all.

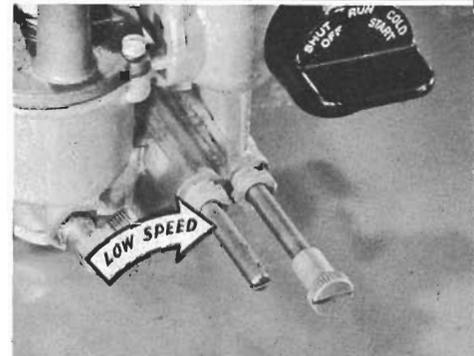
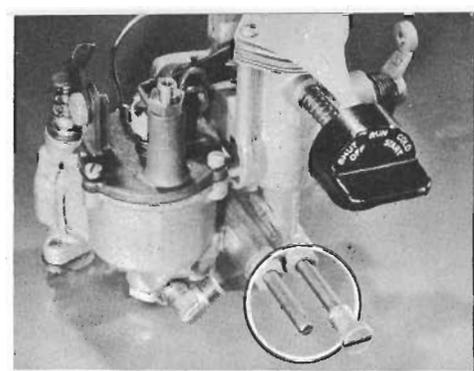
PUTT: There is the float bowl, much like on the check valve type.

PUTT: On this carburetor you've got two needle valves to adjust the mixture.

PUTT: There's a low speed needle valve.

PUTT: And there's this one for high speeds.

PUTT: There is the throttle valve. It does the final mixing of fuel and air like the check valve did in the other type.





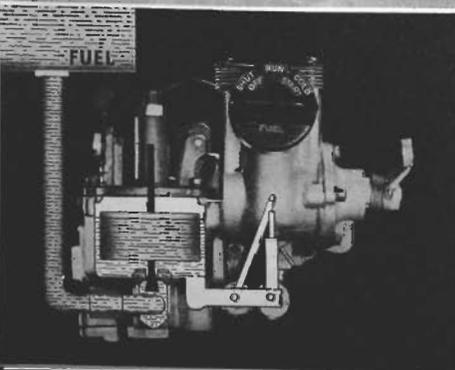
PUTT: And this one has a different primer mechanism too. It has a primer body there.



PUTT: And a primer reservoir up here. In between the primer body and the primer reservoir is . . .

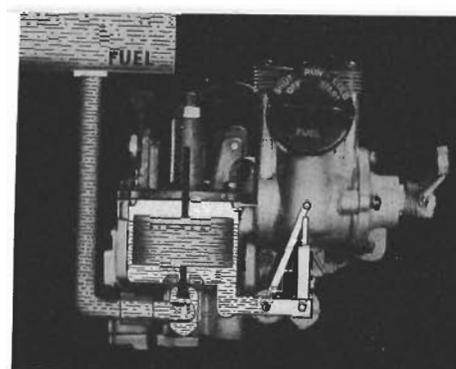


PUTT: . . . a piece of thin tubing. Now here's how this carburetor works.



PUTT: Fuel flows by gravity into the float bowl and the level is regulated by a float valve just as in the check valve carburetor.

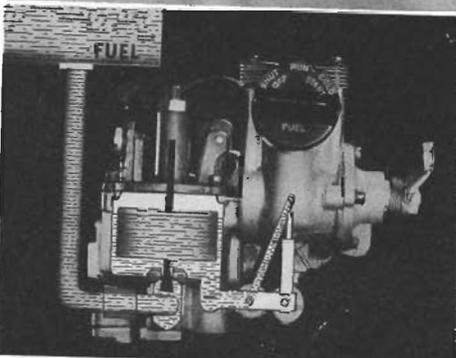
PUTT: From the float bowl it travels across and comes first to the low speed adjusting needle valve.



PUTT: The low speed adjusting needle valve is a simple tapered valve . . . nothing unusual about it. Screw it in and the line is closed. Unscrew it and you let more fuel pass up to the inlet hole.

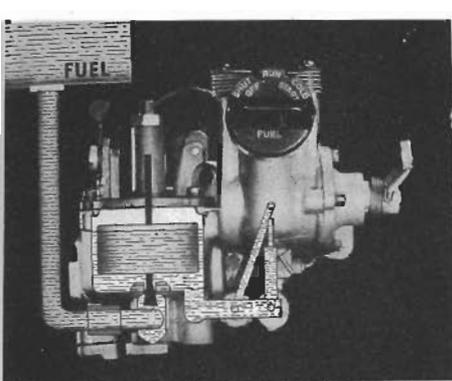


PUTT: A fuel line from here carries fuel up to the inlet hole in the low speed inlet port that opens into the crank case.

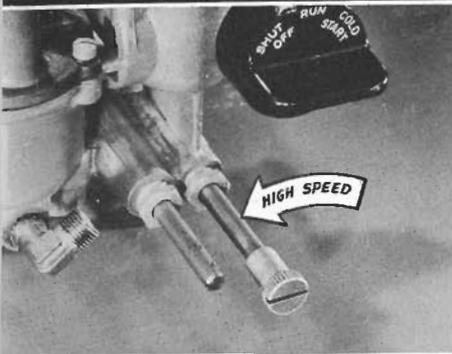


PUTT: Fuel comes out of this small idling port.

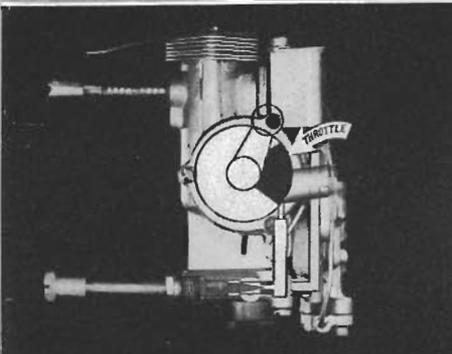




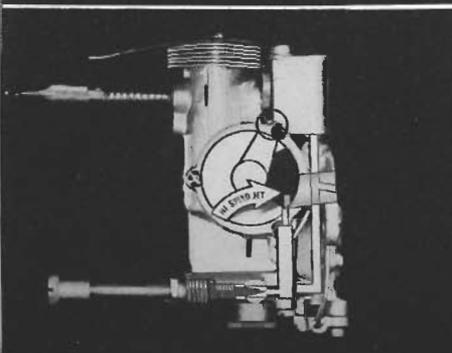
PUTT: The other branch of the fuel line passes the high speed adjusting needle and takes fuel up to a jet in the throttle valve.



PUTT: This one is just a simple tapered needle too. But it tapers faster than the low speed needle.

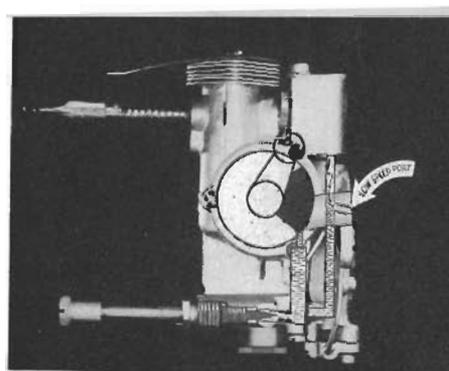


PUTT: Here's a side view of the throttle valve. Inside the throttle chamber is a bakelite throttle that closes and opens the ports into the crank case. Now let's see how all these parts work when the motor is running.

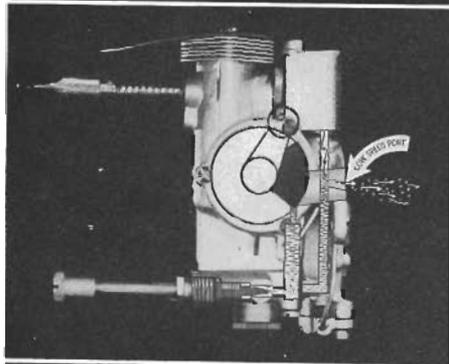


PUTT: When the motor is idling, the throttle is closed down tight in the throttle chamber and no fuel can come through to the chamber from the high speed fuel line.

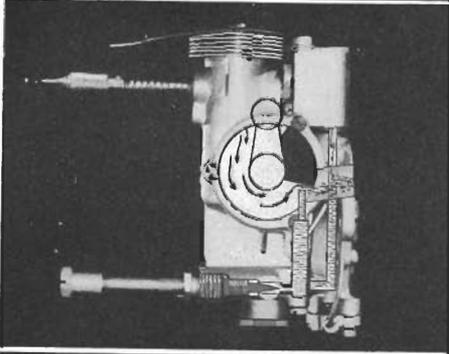
PUTT: But the low speed line is always open. Fuel comes up to the low speed port to the crank case, is mixed with air coming in from above, and . . .



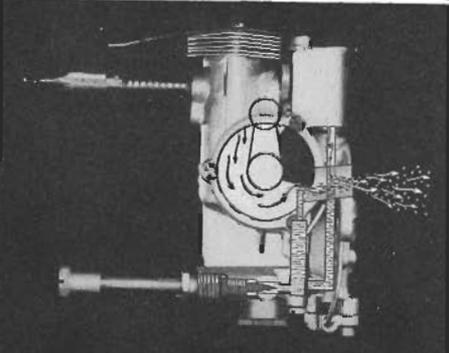
PUTT: . . . the suction stroke of the piston draws the mixture of fuel and air into the crank case to keep the motor idling at a very low speed.

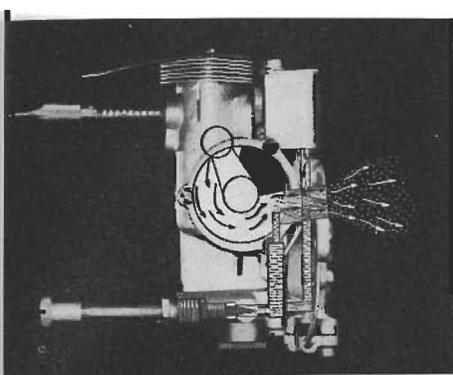


PUTT: Now, when the throttle is advanced a little, the high speed jet in the throttle chamber is opened. Fuel is drawn up through that jet. Air comes down from above. The two are mixed in the chamber and . . .

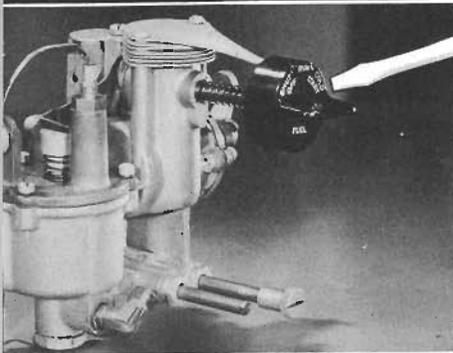


PUTT: . . . the suction stroke draws the mixture into the crank case.

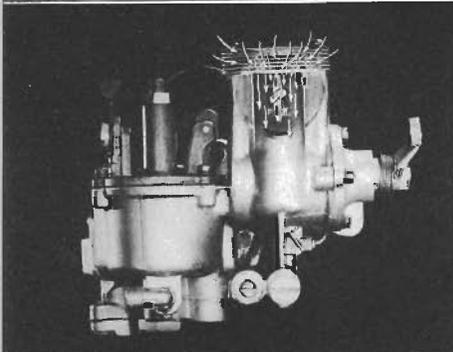




PUTT: Open the throttle further, and you increase the amount of mixture drawn out of the throttle chamber.



PUTT: Now, you notice on this carburetor you have a choke. Here's how it works.

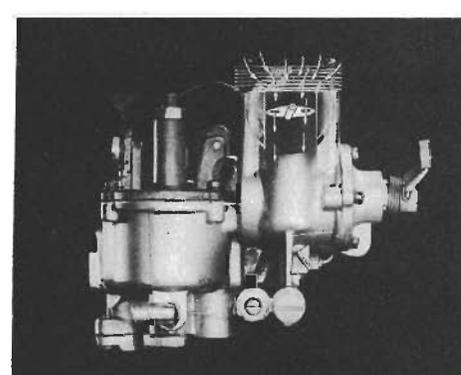


PUTT: In the air inlet hole there is a shutter. When the motor is running normally, that shutter is vertical in the air passage and the air passes through freely.

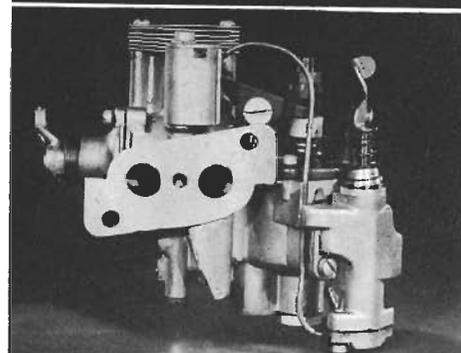


PUTT: But when the motor is cold and you want a richer mixture to get it started, you turn the dial to the "Cold Start" position.

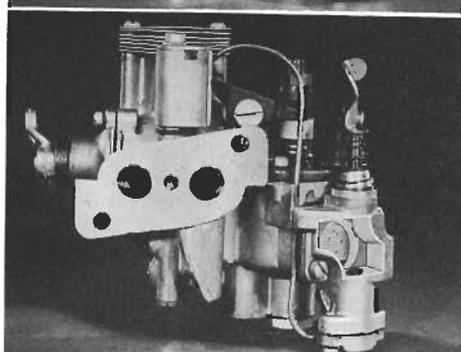
PUTT: The amount of air allowed into the throttle valve is restricted so you get a richer mixture and an easier start.



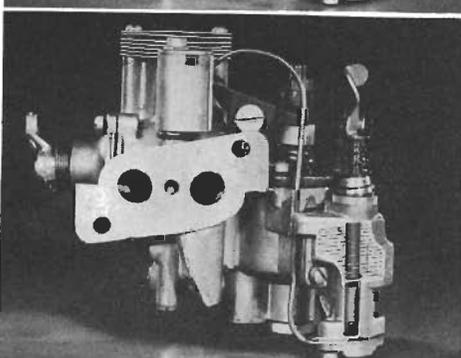
PUTT: Now, there's one more thing. Here's a rear view, showing the primer body, the primer reservoir and the tube between.

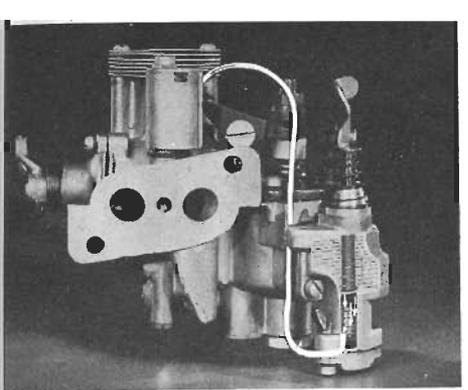


PUTT: The primer body opens into the float bowl.

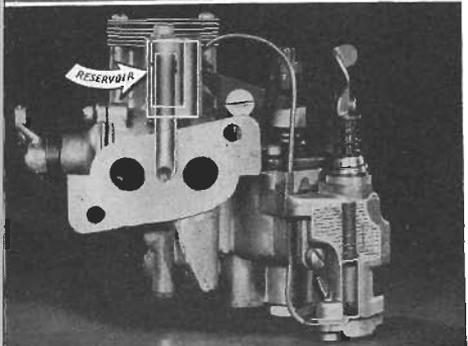


PUTT: Inside the body is a plunger, surrounded by fuel from the float bowl.

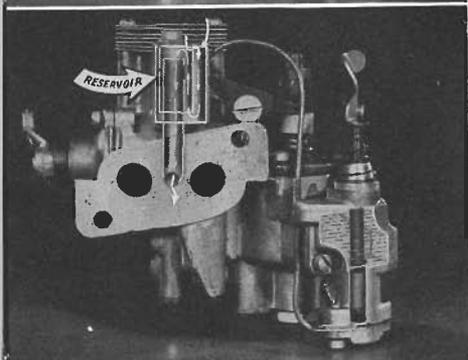




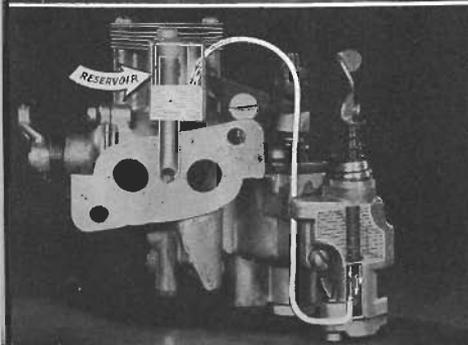
PUTT: When you push down on that plunger, you force fuel through the tube up to the reservoir.



PUTT: Now, notice the construction of this reservoir. It's like a covered well.

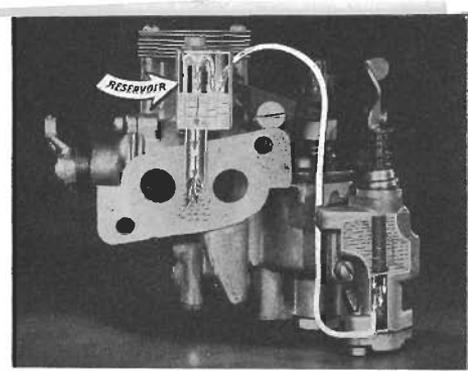


PUTT: When the motor is running, air has to travel under, neath the cover, up to the top of the reservoir and then down to the low speed port.



PUTT: But when you fill this well with fuel from the primer, no air can get through.

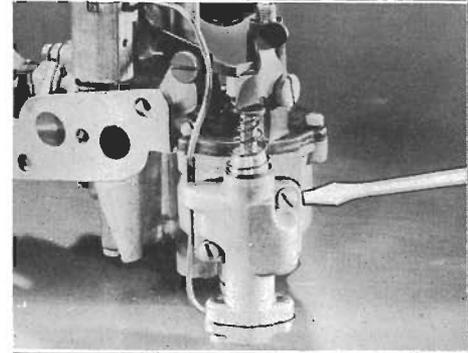
PUTT: And the suction of the pistons draws the fuel down to the low speed port and into the crank case.



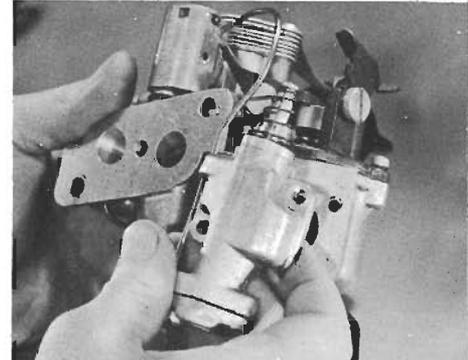
PUTT: Well, that's how the throttle valve carburetor works. Now, let's take this one apart and see what's wrong with it.

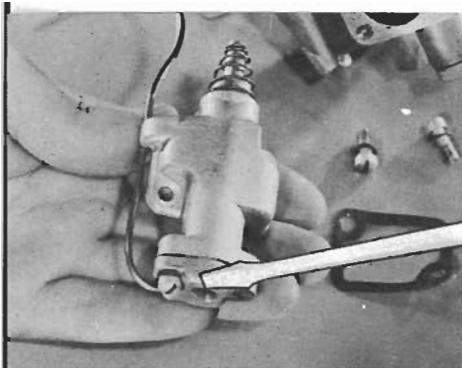


PUTT: First we should take the primer body off. It's held on by those two screws. Take them out.

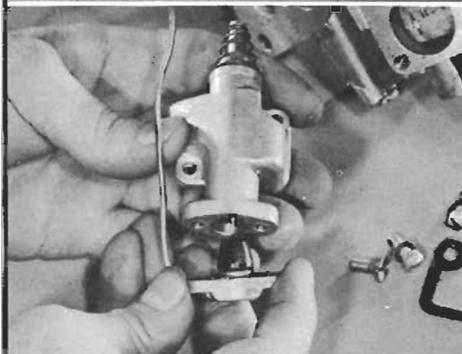


PUTT: Now, be careful how you lift it off. Don't bend that tubing. The tubing just lifts out of the primer reservoir.

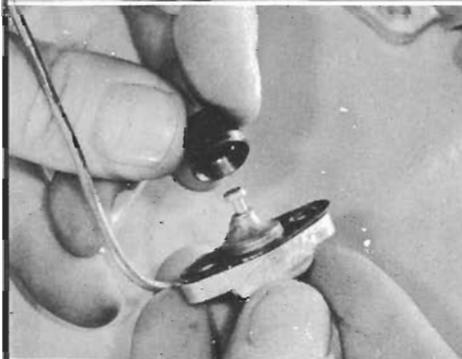




PUTT: That's it. Now these two screws are holding the cap to the body. Take them out so that we can get at the inside.



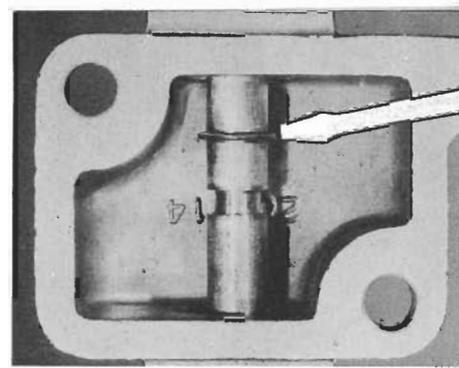
PUTT: There's the base of the primer body with one of the plunger cups.



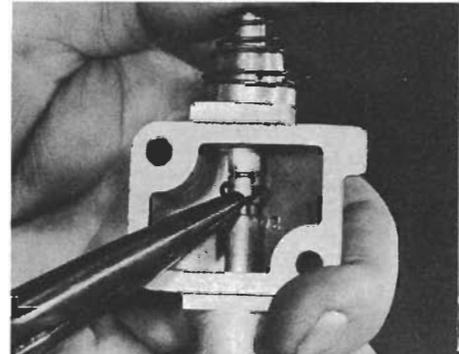
PUTT: The cup lifts off the cap. Take it off now.



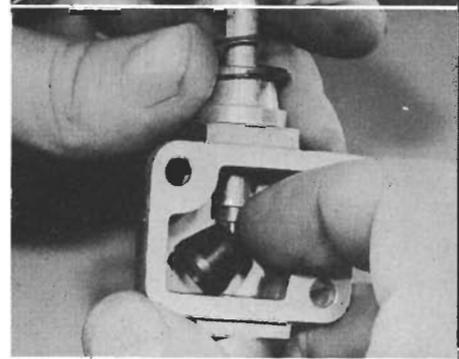
PUTT: Now for the rest of the primer body. To get that plunger stem out we have to push it down from the top. Now, look in here.



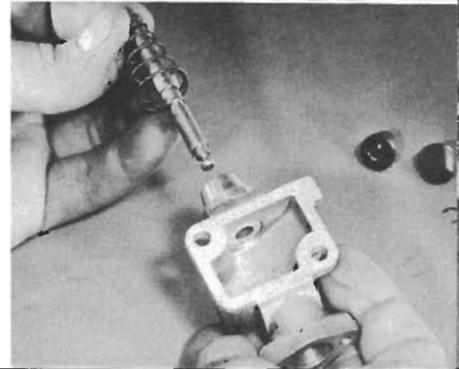
PUTT: Right there, on the stem, is a small ring. That's the stem stop. Get your pliers and we'll pull it off.



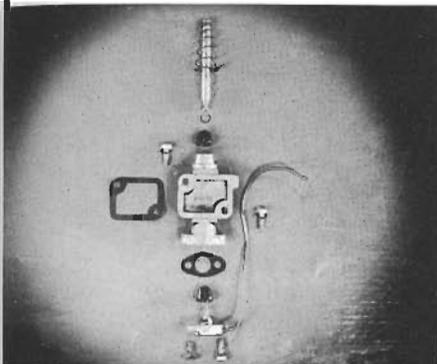
PUTT: Just push the stem down with your thumb until you can get your pliers in to get a grip on the stem stop. Then it's just a straight pull.



PUTT: Now the other plunger cup can be pulled off the stem.



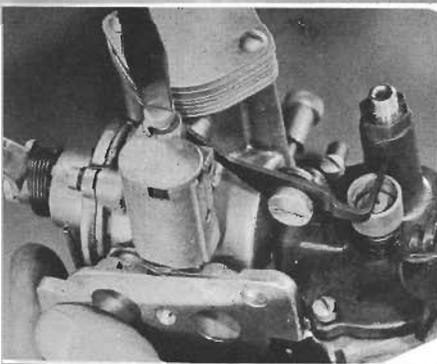
PUTT: And the stem can be pulled right out of the body. That's all there is to it.



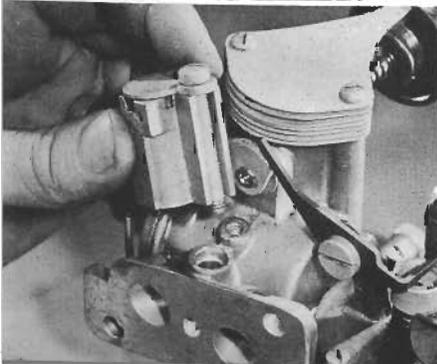
PUTT: There are all the parts of the primer body. The stem and spring, the stem stop, one rubber plunger cup, the body, the other plunger cup and the cap with its tubing.



PUTT: Now, let's get at the primer reservoir.



PUTT: There's only one long screw holding it on. Just loosen it.

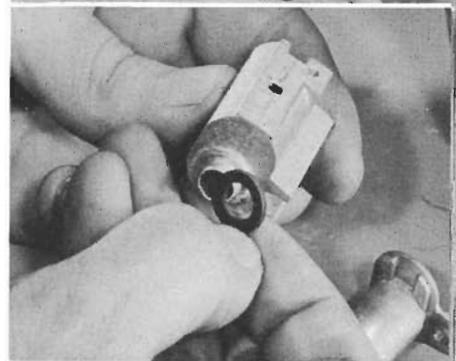


PUTT: With the screw loosened, the whole reservoir assembly just lifts off the carburetor.

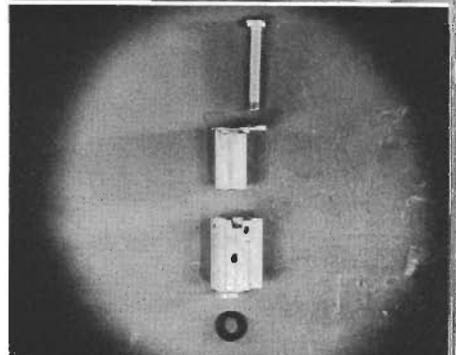
PUTT: And the cover lifts right out of the reservoir.



PUTT: Down at the base there's a rubber washer. Don't lose that.

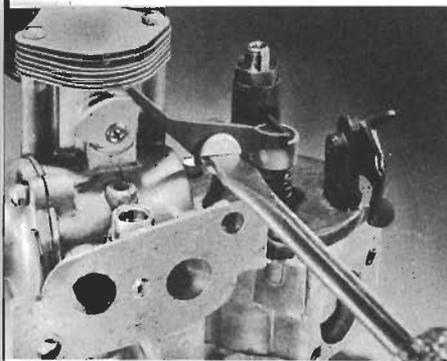


PUTT: There's the primer reservoir assembly. Screw, cover, reservoir and washer, that's all.



PUTT: Now let's get this fuel shut-off lever out of the way.

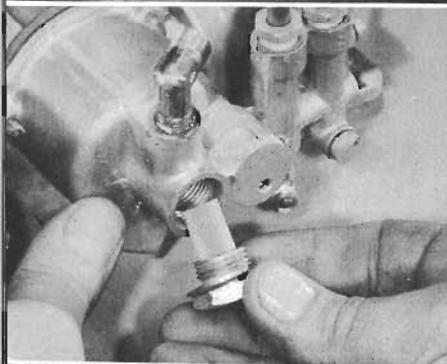




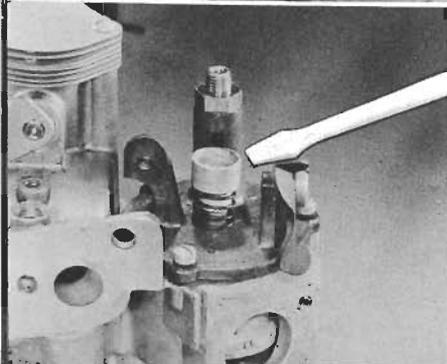
PUTT: Just take out that one screw and the lever comes off. Watch for the washer behind the lever though.



PUTT: Now the strainer body plug and the screen. This has to be screwed out just like in the check valve carburetor we took apart yesterday.

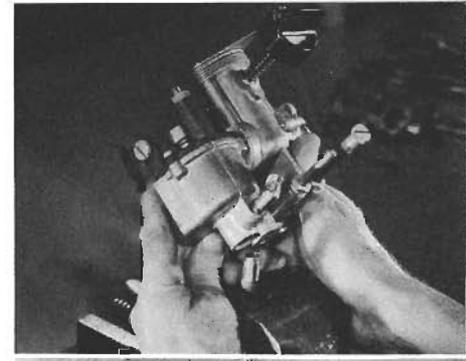


PUTT: There they are . . . the strainer plug and the screen.

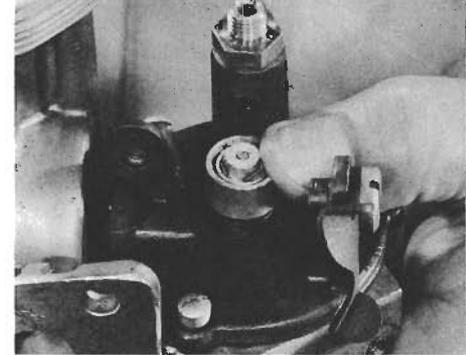


PUTT: Now . . . before we can get at the float valve we have to get this sleeve and spring off the cover. Here's how you do it.

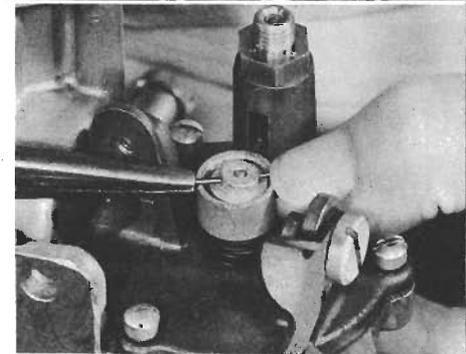
PUTT: Set a punch in the vise, broad end up. And set the carburetor over it so that the needle of the float valve rests on the punch.



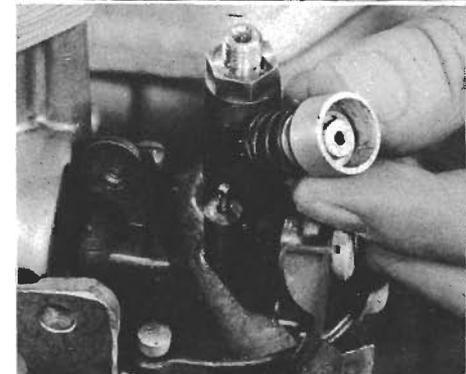
PUTT: Now push the sleeve down and you'll see a small lock pin. Pull that pin out.

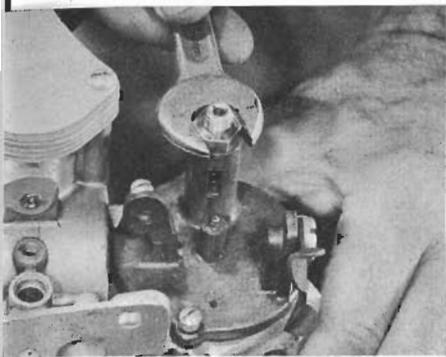


PUTT: There. That will release the sleeve, the lock and the spring.

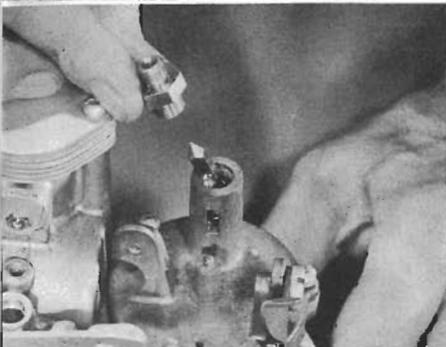


PUTT: There they are . . . the sleeve, the lock and the spring.

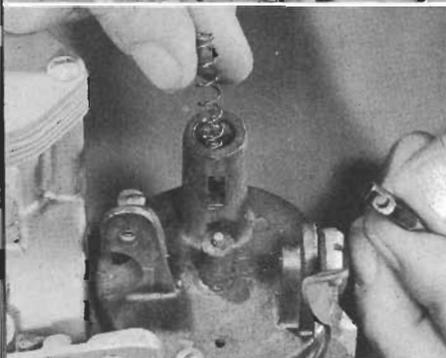




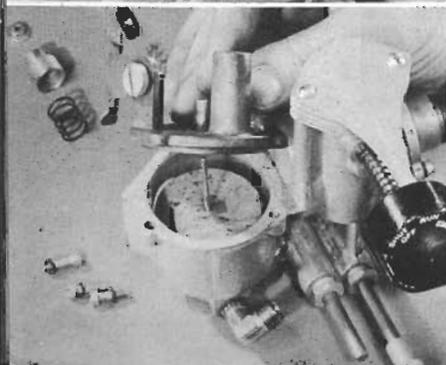
PUTT: This vent assembly should be taken apart, too. First take off that nut.



PUTT: Then lift out the needle underneath the nut.

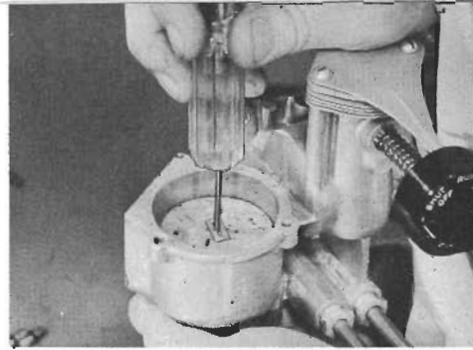


PUTT: And finally the spring. That's all there is to it.

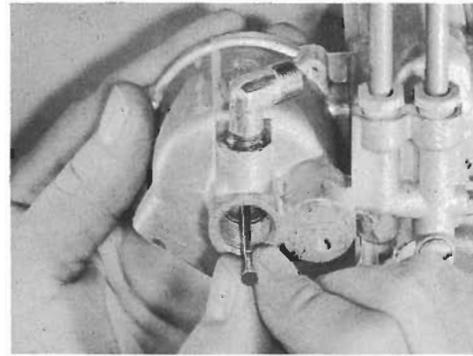


PUTT: Now you can take the float valve assembly apart just as you did with the check valve carburetor.

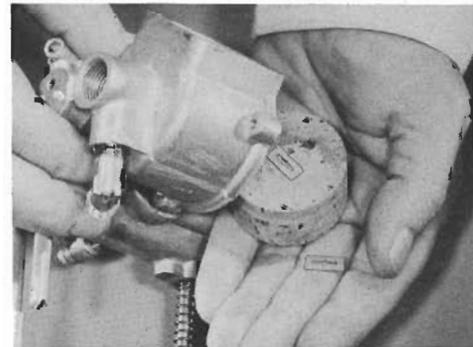
PUTT: Gently drive the needle down.



PUTT: Pull it out from below.

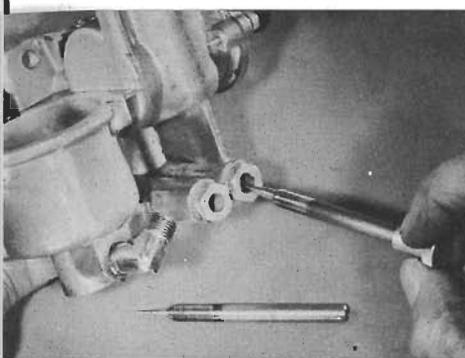


PUTT: And the float and float locks will fall right out.

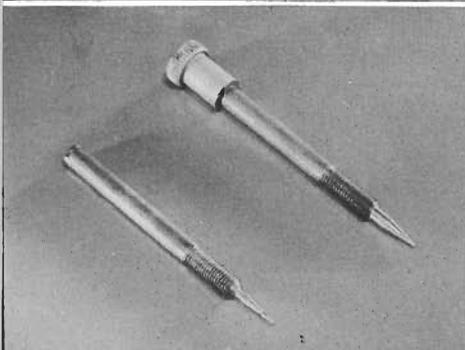


PUTT: Now for the adjusting needle valves. And here it's important to remember where you get each needle . . . which needle is for the low speed valve and which is for high.

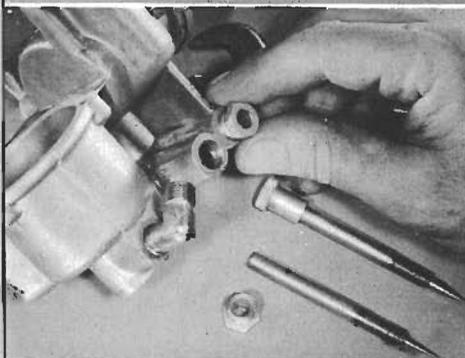




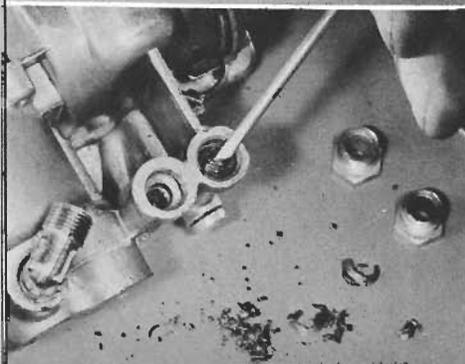
PUTT: These just turn out . . . screw them out all the way.



PUTT: There are the two needles . . . the low speed on the left, the high speed on the right, just as you got them out of the carburetor. The only difference between them is that the low speed needle has a much longer, sharper taper than the high speed needle.



PUTT: Now take out the packing needle glands, one for each needle.

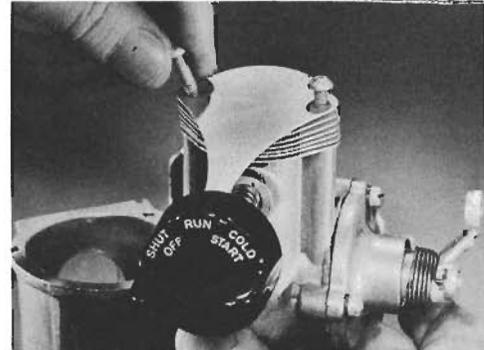


PUTT: You'll have to pick the packing out. Don't try to save it. You'll have to replace it anyway.

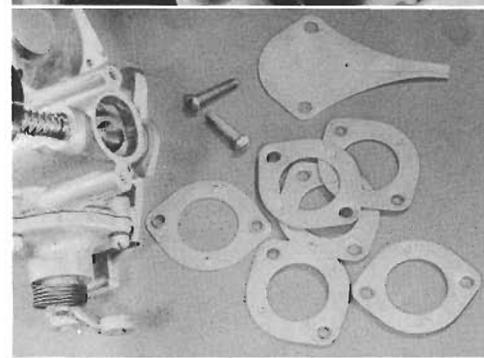
PUTT: Now, here's the flame arrestor . . . a series of discs held down by those two screws.



PUTT: Take the screws out and . . .

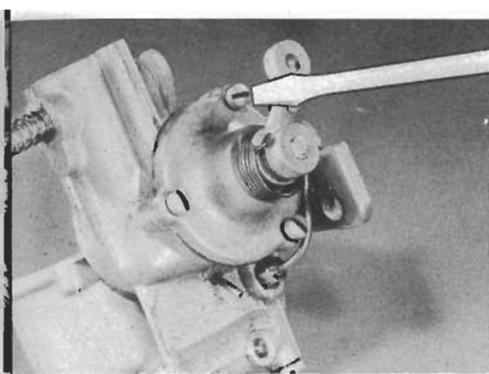


PUTT: . . . the discs fall right off.

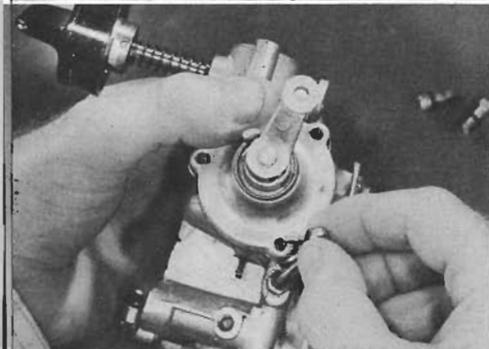


PUTT: Now we're getting close to the end. All that's left is the throttle valve.

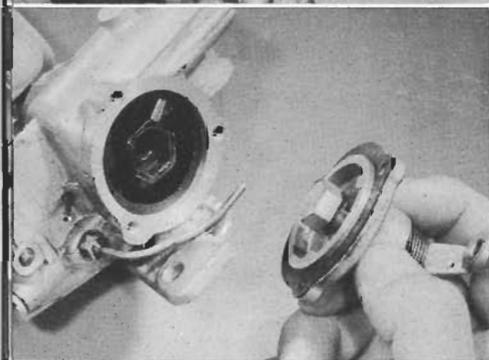




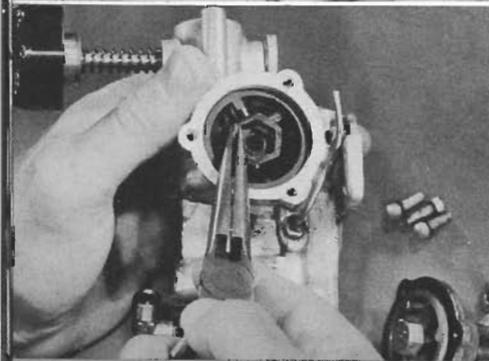
PUTT: Those three screws are holding the cover assembly on. Take them out first.



PUTT: That's it . . . and watch those lock washers.

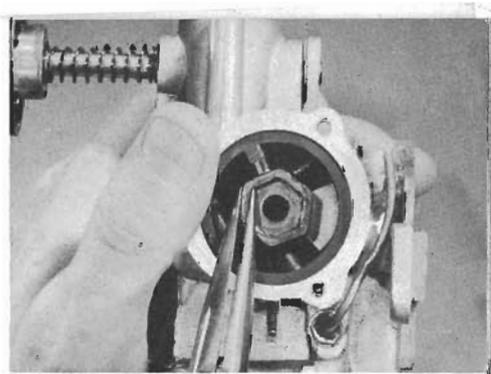


PUTT: There's the throttle valve assembly and here's where you can get into trouble unless you follow this definite procedure. Listen carefully now.

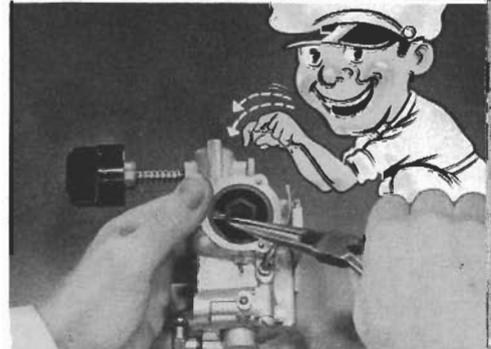


PUTT: With small pliers get a grip on the throttle like that.

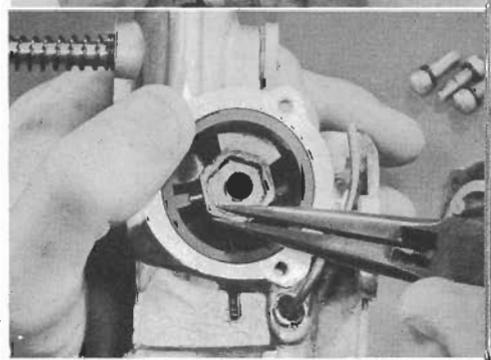
PUTT: Hold the carburetor with your other hand, with your thumb on the edge of the throttle chamber. That's it.



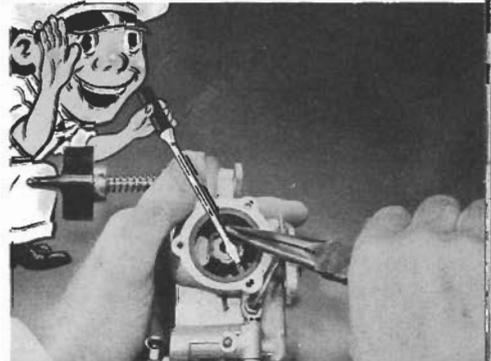
PUTT: Now, turn the throttle toward the left and at the same time pull it out just a little.

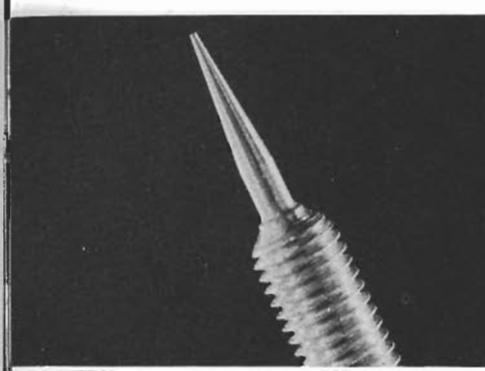


PUTT: Take it easy now. Pull it out until the throttle is flush with the edge of the chamber . . . just against your thumb . . . that's all. Don't pull outward any more, but keep on turning.



PUTT: That's it . . . stop there. See, you've turned it to the left until this boss is lined up with the lower screw hole. That's as far as you have to go. Now just pull straight out.

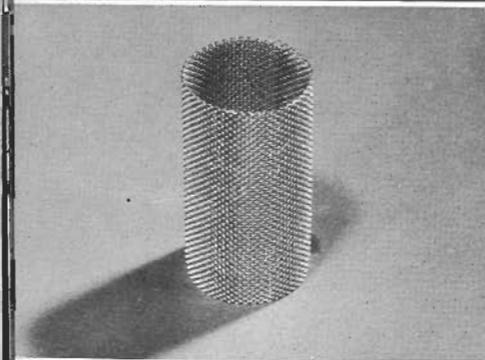




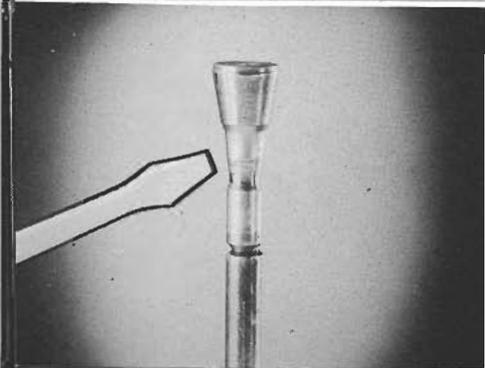
PUTT: Here's a new one. Just look at the difference. Well, we'll put the new one in for him.



PUTT: The high speed adjusting needle looks okay.



PUTT: And the strainer screen looks good. If this were broken it could be letting dirt through into the jets. Or if it were plugged, it could stop the gas from flowing into the float bowl.

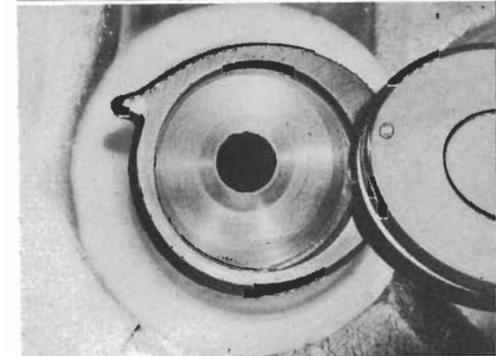


PUTT: Here's another cause of trouble. Look how it's worn where it fits against the seat. Now let's see the float valve seat.

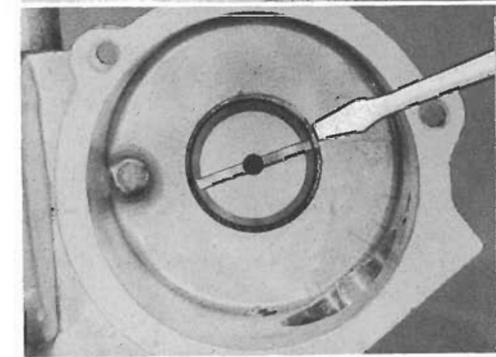
PUTT: Here we'll need the magnifying glass. A very small nick can cause a lot of trouble on these valve seats.



PUTT: Ah . . . here's some trouble. Look at that seat . . . all nicked on one side. Fortunately we can take this seat out.

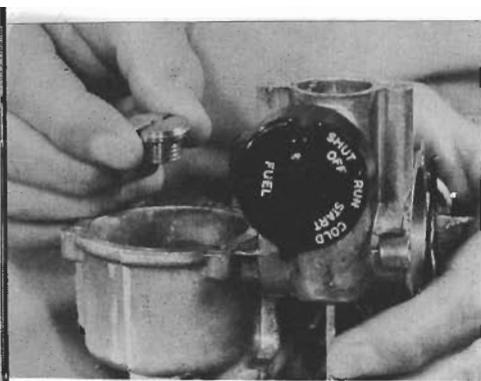


PUTT: On this carburetor the inlet needle seats are screwed into the float bowl. It's a mighty tight fit but you can get it out by heating the body.

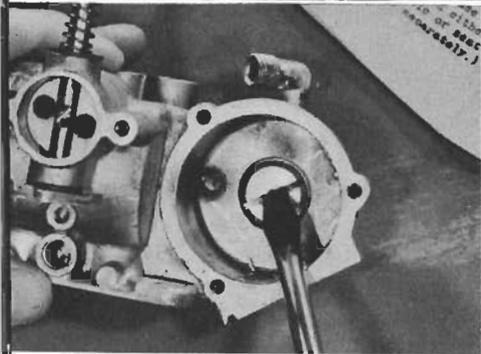


PUTT: Don't get it too hot . . . just enough to make it expand and loosen up on the threads of the needle seat.

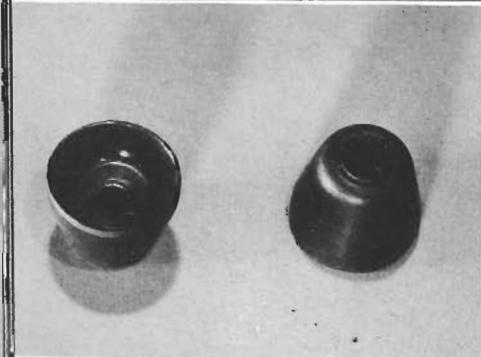




PUTT: There, now it comes out easy. Now put in another one.



PUTT: That's it. There's another of Sander's troubles solved.

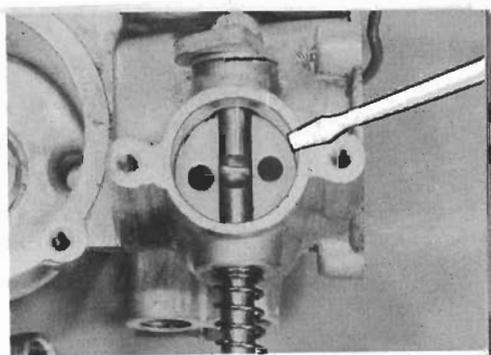


PUTT: The plunger cups look okay. Sometimes these get worn and rotted. When that happens you have to replace them.

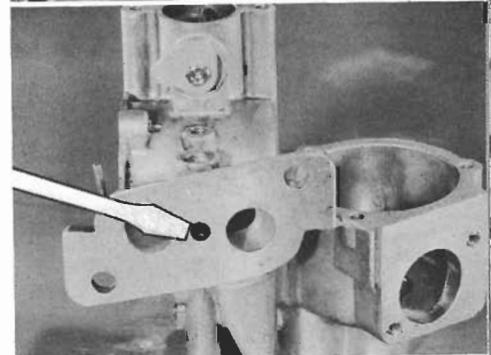


PUTT: Now, check this choke shutter on the control knob assembly. It's best not to take this apart unless you can see that something is wrong with it.

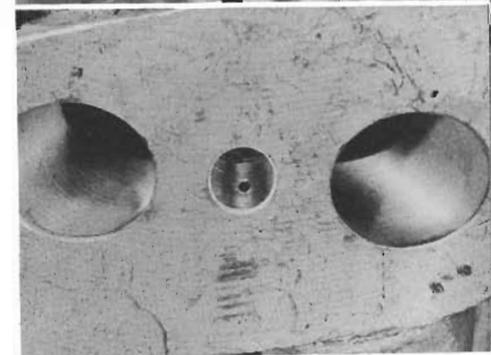
PUTT: With the control dial in the "Cold Start" position, this shutter should be horizontal . . . right across the tube, blocking the air except for those two holes. And it should be perfectly straight . . . not bent the slightest bit. This one looks good so let's not take it out.



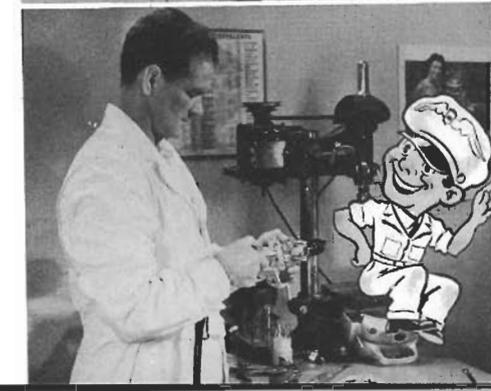
PUTT: Now, one more thing before we start reassembling . . . see this low speed inlet jet here.

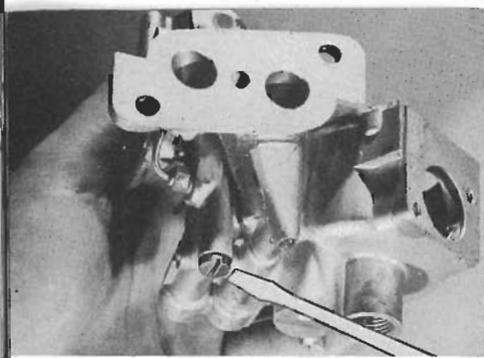


PUTT: There's a very good chance that this hole can get filled with dirt or grease and the fuel won't be able to get through.

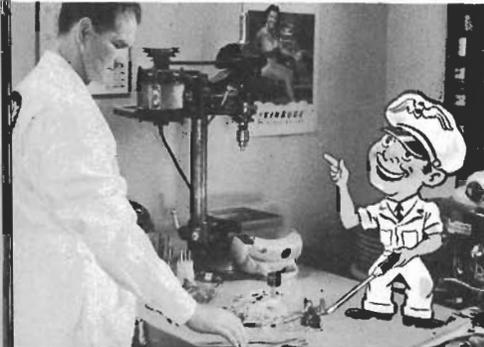


PUTT: So just to be sure, we should blow the line clear with compressed air. Blow all the lines clear, for that matter and be perfectly safe.





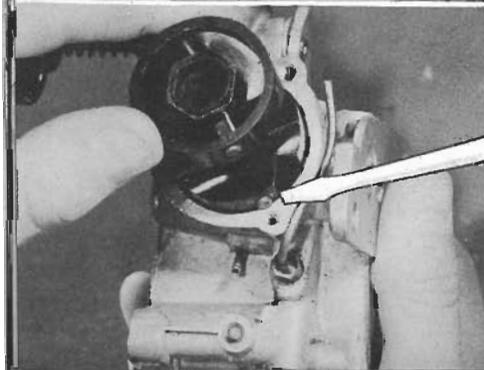
PUTT: And while you're at it, take this screw out and blow through there, too. That's what that screw is for but a lot of mechanics forget it.



PUTT: Okay . . . we're ready to put all this stuff back together. First let's work on the throttle.

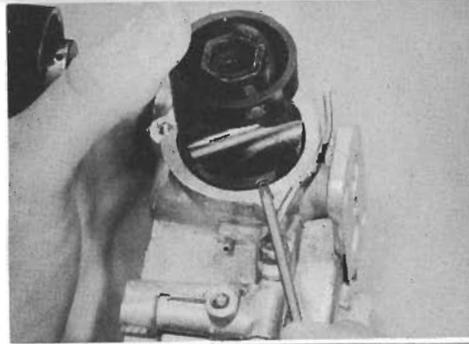


PUTT: Here's where we have to be careful again. There's a knack to getting this throttle back in, just as there was to getting it out.

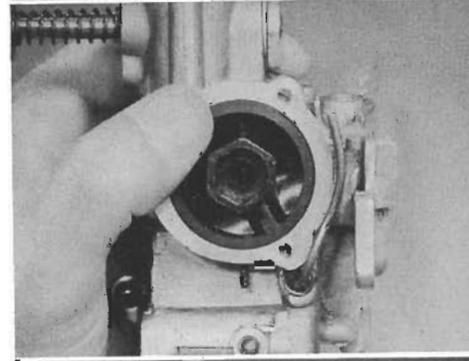


PUTT: The assembly procedure is just the reverse of the disassembly procedure. First line up this boss with the lower screw hole . . . there.

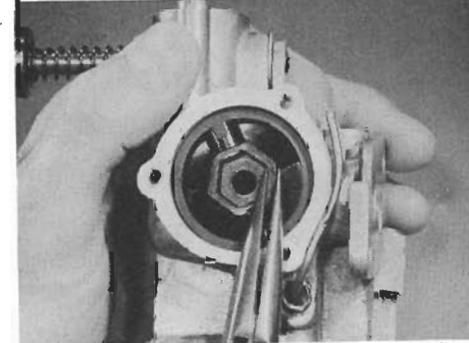
PUTT: Now, push that friction plug in and start the throttle into the chamber . . . straight in . . . don't turn it yet.



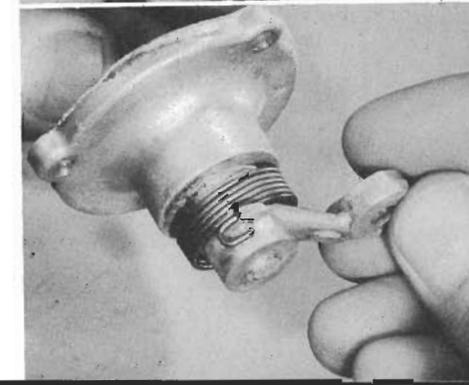
PUTT: Push it straight in until it is flush with the edge of the chamber . . . no farther. Now start turning it to the right . . . clockwise.

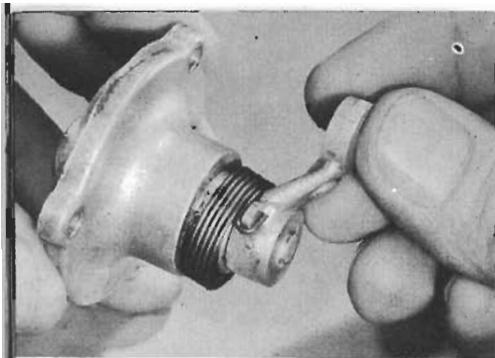


PUTT: Turn and push in . . . gently . . . at the same time. You'll feel it drop into position. That's all there is to it. Nothing difficult . . . just a knack, that's all.

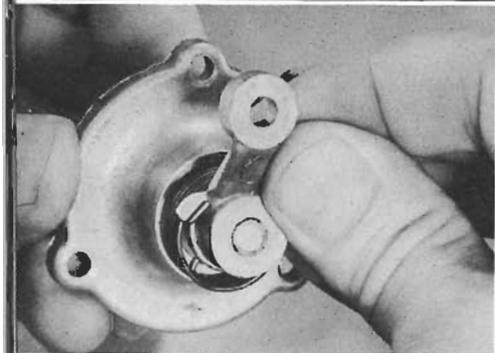


PUTT: Now the cover assembly. First twist the throttle lever around until the spring catch just fits loosely in the boss at the base of the lever.

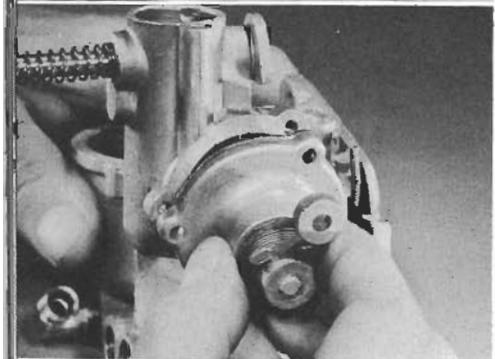




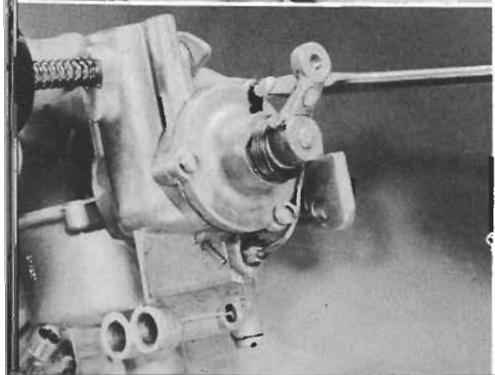
PUTT: There . . . that's it . . . no tension on the spring at all.



PUTT: Now, tighten up on the spring by turning the lever back to the first screw hole in the cover.



PUTT: And that's the way it goes on the carburetor. But be sure the throttle is in the OFF position. Keep the lever pointed upward and a little toward you . . . that's it. Don't forget the gasket.

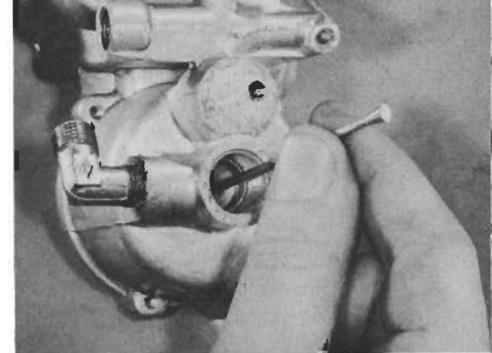


PUTT: Now the three screws . . . and the lock washers. Tighten them down.

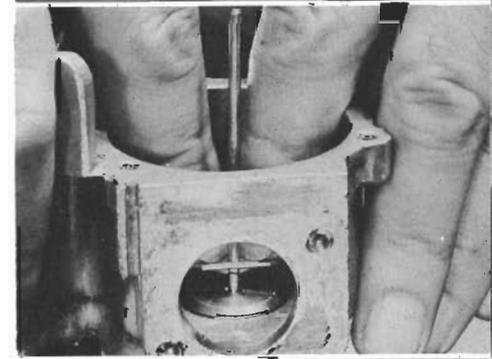
PUTT: Remember how you assembled the float valve parts yesterday? Well, this one is exactly the same.



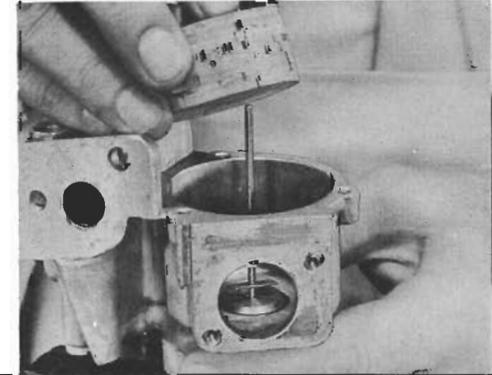
PUTT: First the needle, inserted from below.

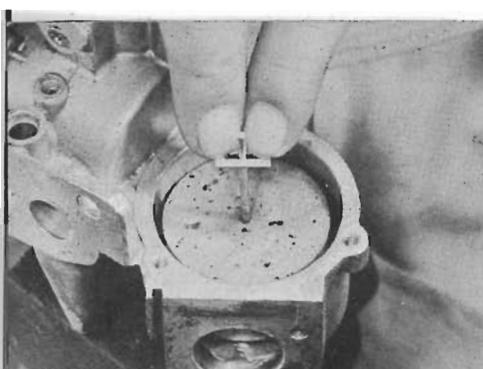


PUTT: Now, support the needle from below by setting it back on the punch. And push the first float lock down until it clicks into its groove on the needle.

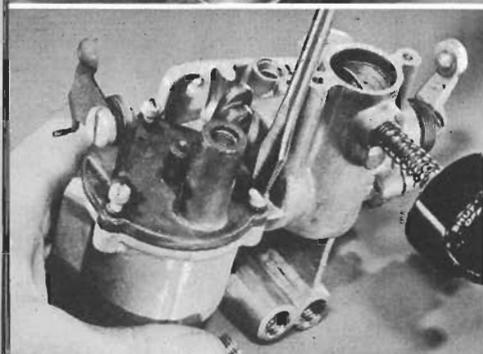


PUTT: Now the float . . . push it down snug against the bottom float lock.

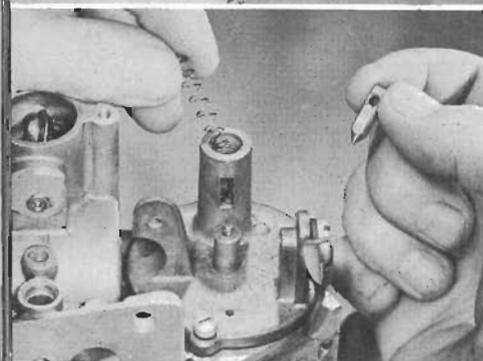




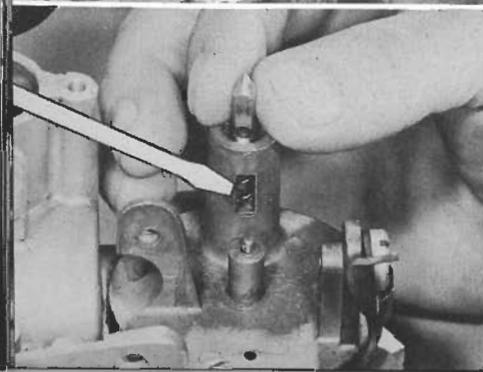
PUTT: And now the other float lock . . . tight against the float.



PUTT: When you put the cover on, don't forget a new gasket . . . or the lock washers on the screws. Tighten them down well.

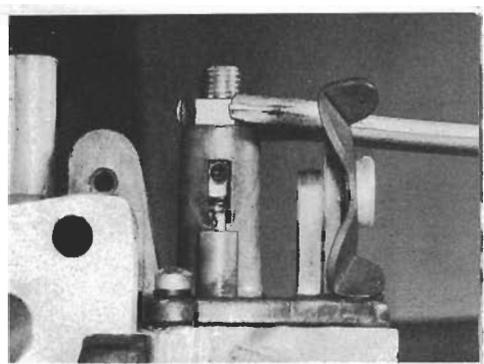


PUTT: The vent assembly goes together very simply. Just drop the needle and spring into place . . . spring first and the needle on top of it.

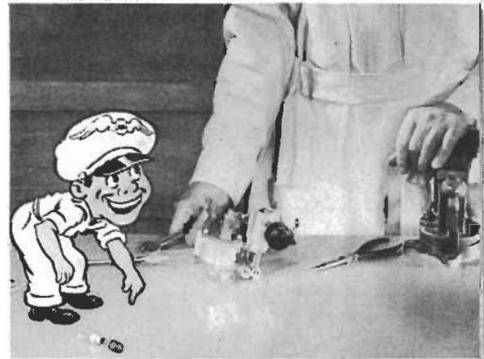


PUTT: But here's something important. When you put the needle in be sure the hole in the needle is lined up with this opening.

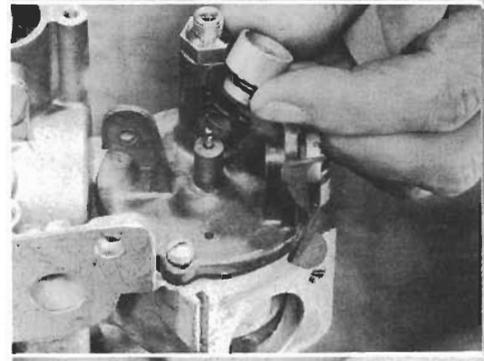
PUTT: Now screw the needle seat in tight. That's all.



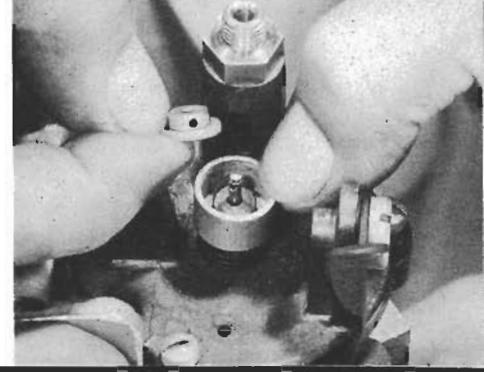
PUTT: To finish the float assembly, you'll have to put the carburetor back on the punch in your vise.



PUTT: First set the spring and sleeve down over the needle.

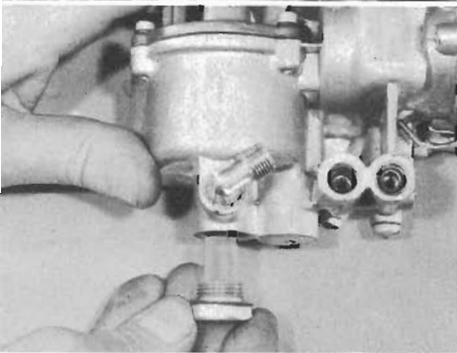


PUTT: Now the lock on top of the needle. Be sure to set it on with the dome part up. You'll have to press the sleeve down and hold it down so you can get a lock pin in that hole.





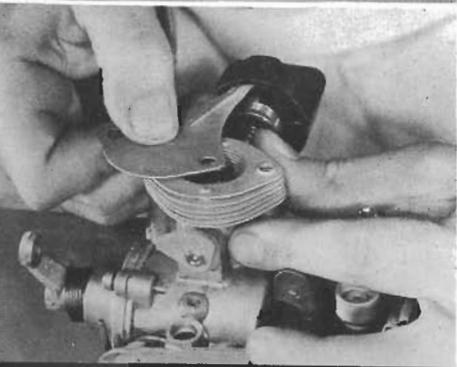
PUTT: The lock pin goes through the holes in both the dome and the needle. Bend the pin around the dome at both ends and it's in to stay. That's it.



PUTT: When you put the strainer screen and plug back, make sure the screen goes in straight. If it's at an angle it might press against the needle of the float valve and keep the valve closed.

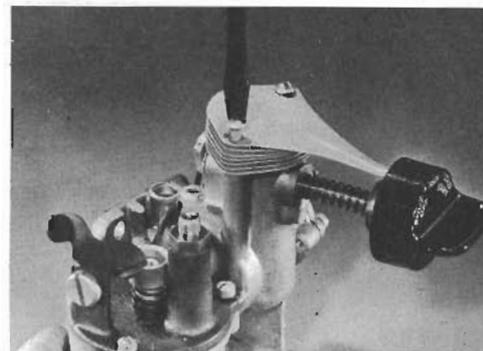


PUTT: There's nothing very tricky about these flame arrester discs. Just make sure they're all right-side-up so that there is a space between all of them.



PUTT: The flame arrester plate goes on top of the discs with the pointer under the inside edge of the control dial.

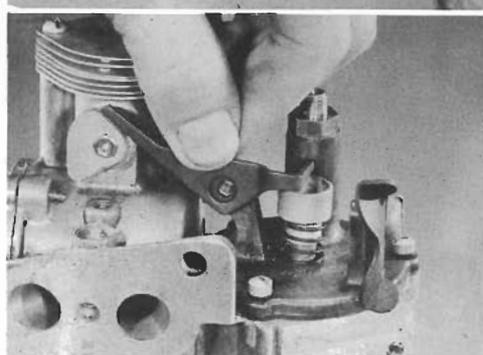
PUTT: Screw the discs down tight and . . . that's that.



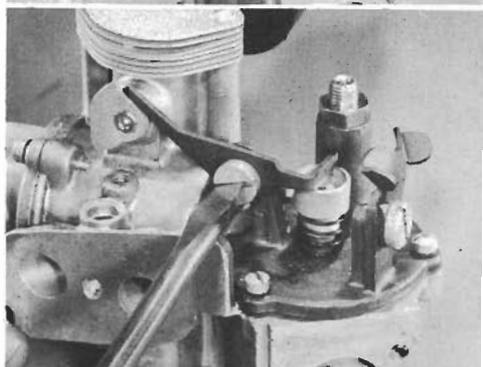
PUTT: The easiest way to get this fuel shut off lever back on is to turn the control dial to the "Shut Off" position.

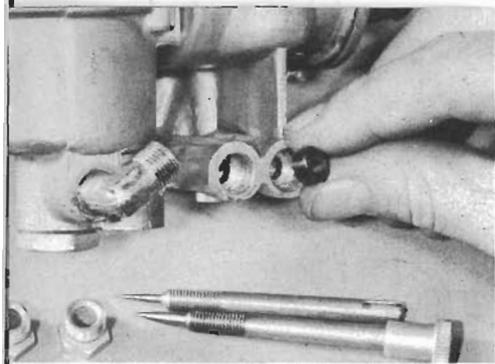


PUTT: Slip the angled end of the lever into the hole in the vent needle and the other end on the cam at the end of the choke shaft assembly.

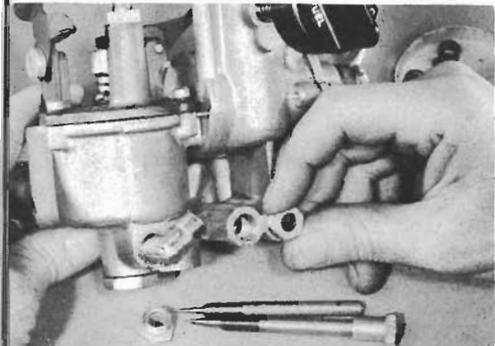


PUTT: And when you put this screw in don't forget that the fibre washer goes between the lever and its support, not between the lever and the screw head.

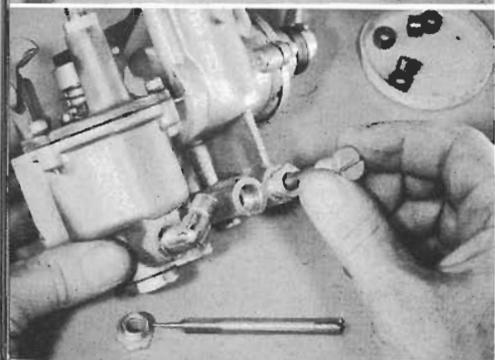




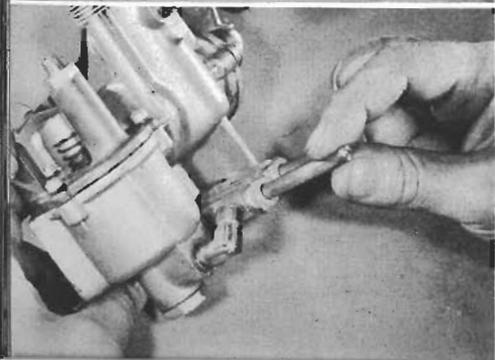
PUTT: Now for the adjusting needles. First, put in some new packing.



PUTT: Then the gland. Don't tighten it yet.



PUTT: Now the needle just screws in. Don't tighten it. Just ease it in until you can feel it contact with the seat. That's how these needles get damaged . . . by tightening them too tight against the seats.



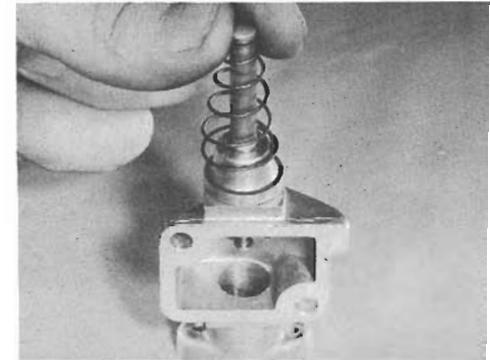
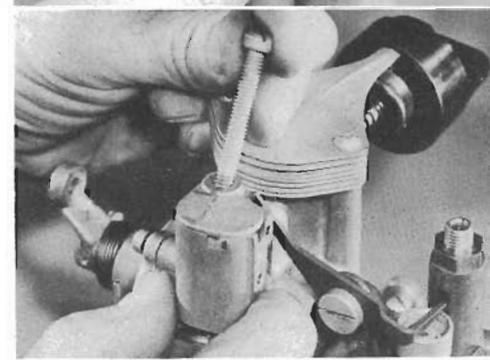
PUTT: That's particularly important with the low speed needle. It has a long taper and it doesn't take much pressure to make quite a ring on it.

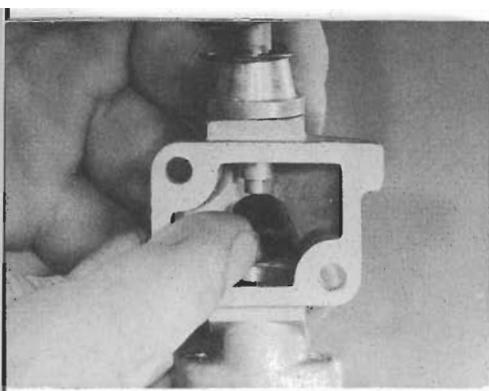
PUTT: Well, all we have left now is the primer assembly. Let's put it together.

PUTT: First, fit the cover inside the reservoir. And don't forget that rubber washer.

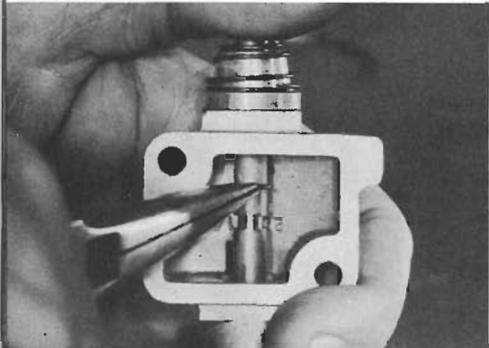
PUTT: The long screw holds both parts of the body of the carburetor.

PUTT: Now for the primer body. First slip the stem into the body. The spring fits down on the top of the body.

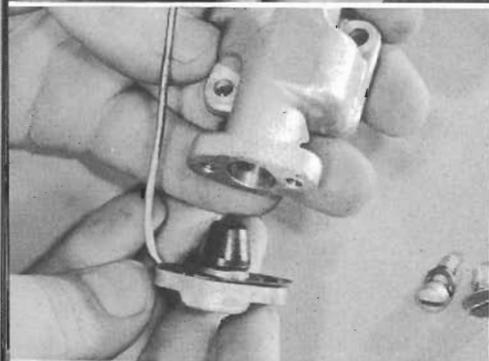




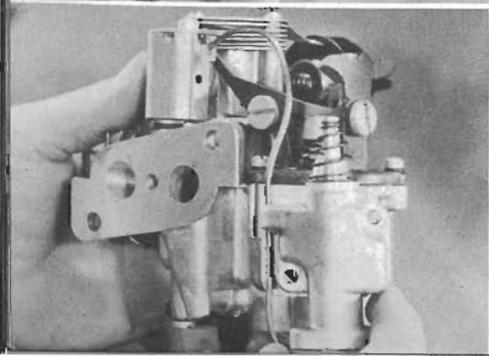
PUTT: Now press the stem down and put one of the plunger cups on the stem, open end of the cup down.



PUTT: The stem lock clips into the small upper groove on the stem.

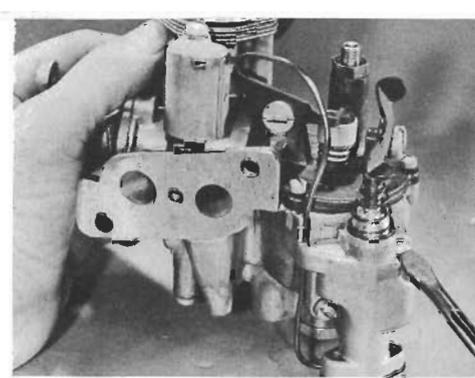


PUTT: The cap, with the other plunger cup, fits onto the body with two screws.



PUTT: The tubing from the primer body fits into the hole at the top of the reservoir . . . don't try to put it in the lower hole — that's only an overflow. And the tubing fits into that groove cut for it in the carburetor body.

PUTT: A gasket and two screws . . . and the job is done. But be sure to use a gas proof gasket cement here and also as a safety measure with all gaskets.



PUTT: Well, Bob, there it is . . . all finished. We've checked everything and, if Sanders has nothing wrong with the rest of his motor, it should be in top shape now. Let's put it on the tank and test it.





PUTT: Well, there's another one, Bob. Before you know it, you're going to have a nice repair business here.



PUTT: One job yesterday . . . another today. A motor a day makes a nice day's pay.

