

Dec. 19, 1961

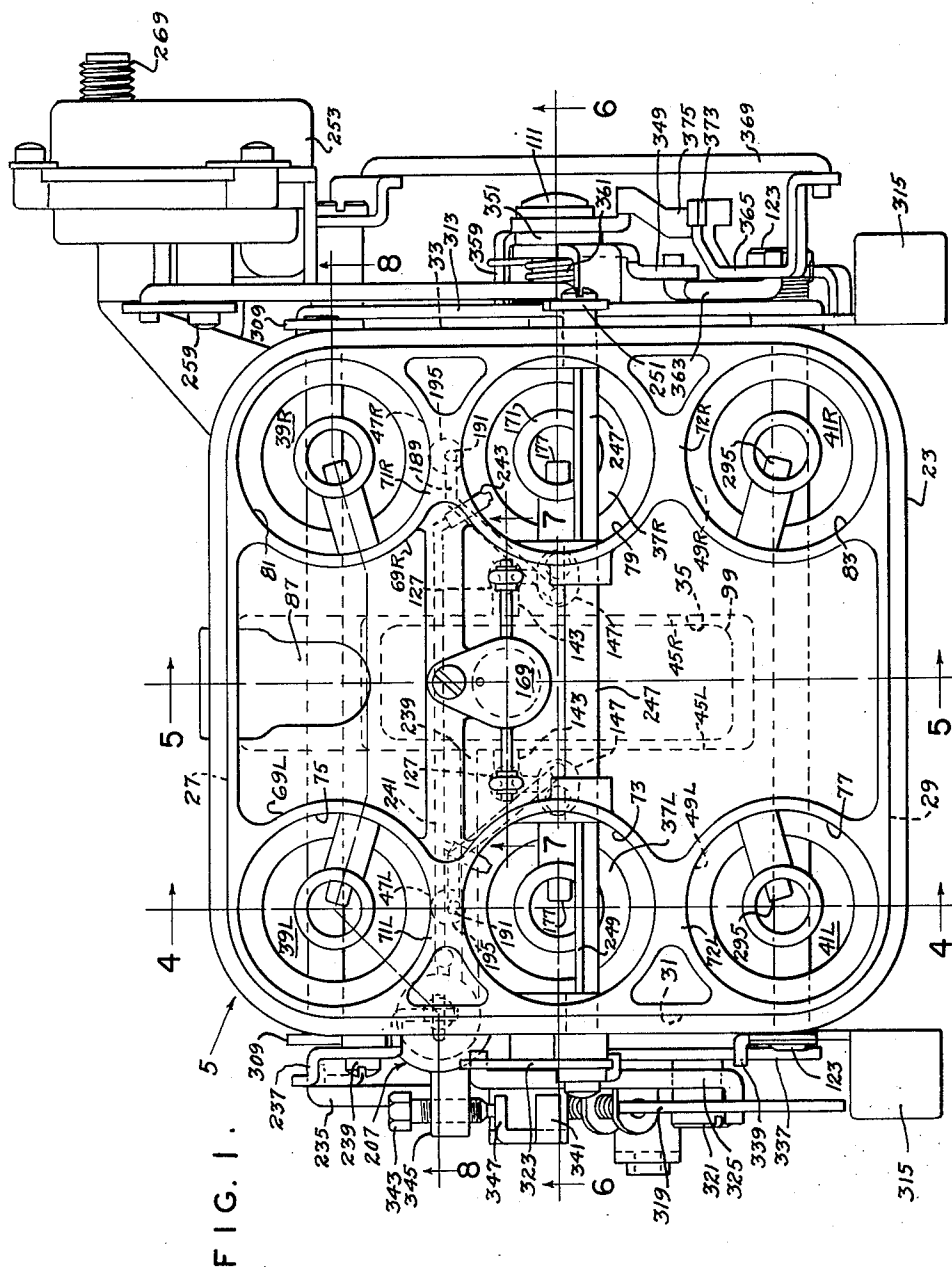
H. A. CARLSON ET AL

3,013,778

MULTI-BARREL CARBURETOR

Filed May 27, 1959

5 Sheets-Sheet 1



INVENTORS
HAROLD A. CARLSON
OLIN J. EICKMANN
ROBERT J. SMITH

BY
Laurence M. Shodridge
ATTORNEY

ATTORNEY

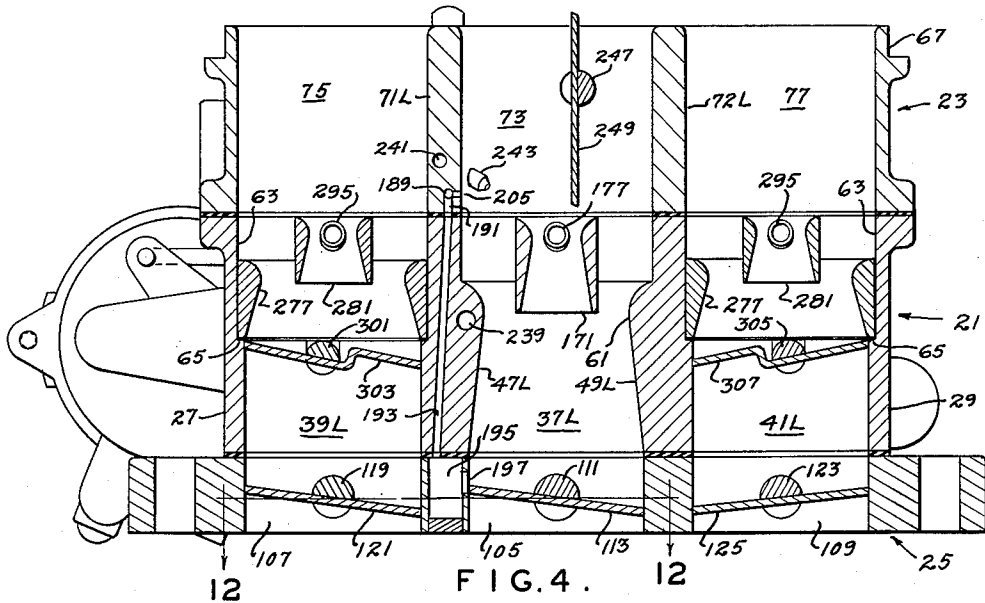
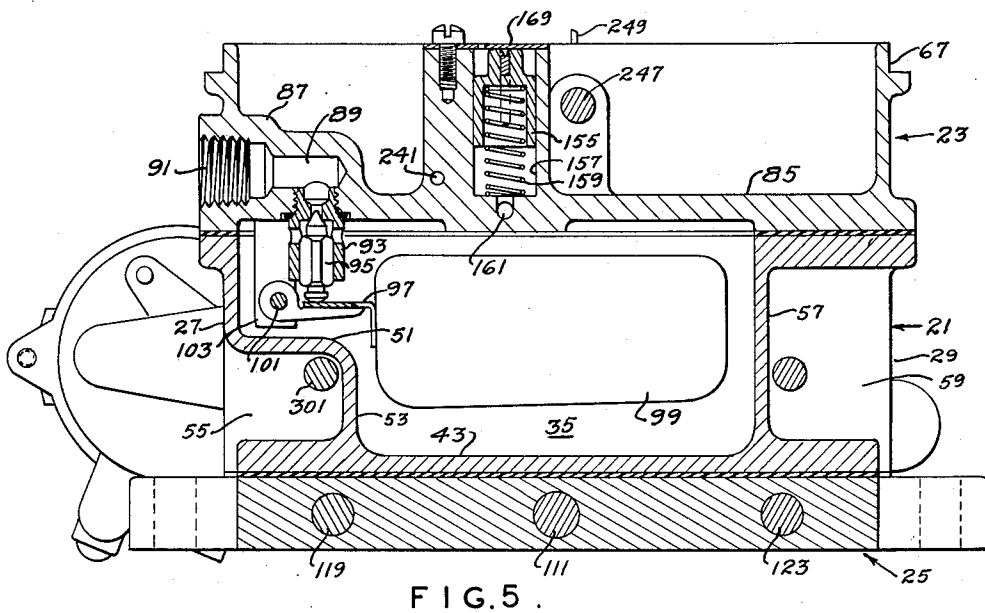
Dec. 19, 1961

H. A. CARLSON ET AL
MULTI-BARREL CARBURETOR

3,013,778

Filed May 27, 1959

5 Sheets-Sheet 3



INVENTORS
HAROLD A. CARLSON
OLIN J. EICKMANN
ROBERT J. SMITH

BY

Laurence M. Goodridge

ATTORNEY

Dec. 19, 1961

H. A. CARLSON ET AL

3,013,778

MULTI-BARREL CARBURETOR

Filed May 27, 1959

5 Sheets-Sheet 4

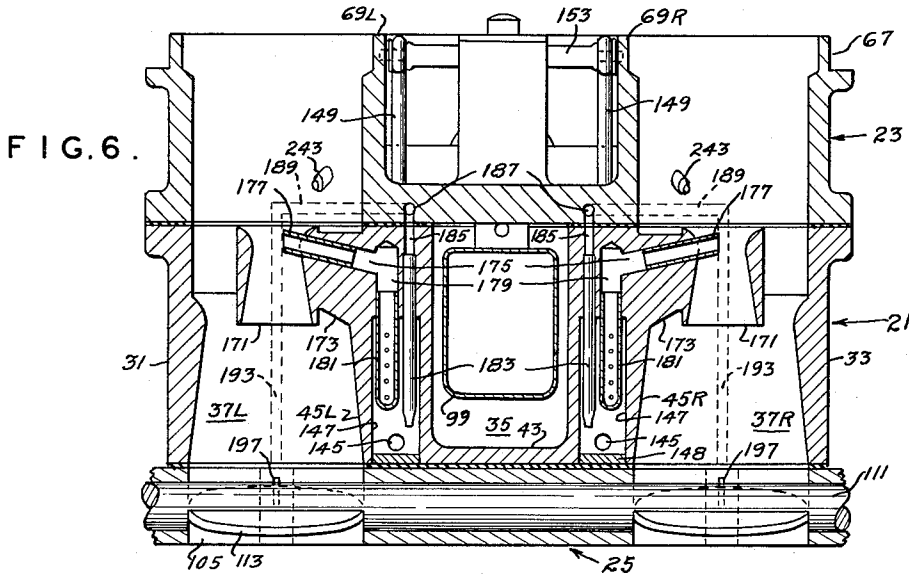
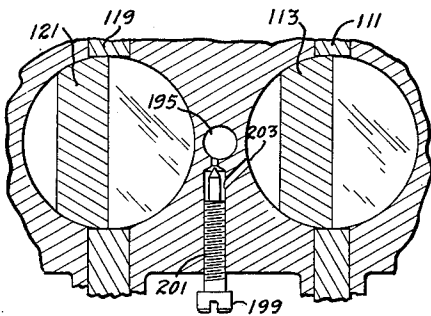


FIG. 9.

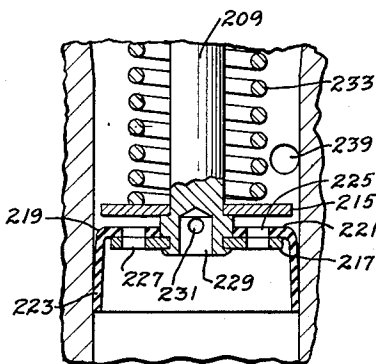


FIG. 10.

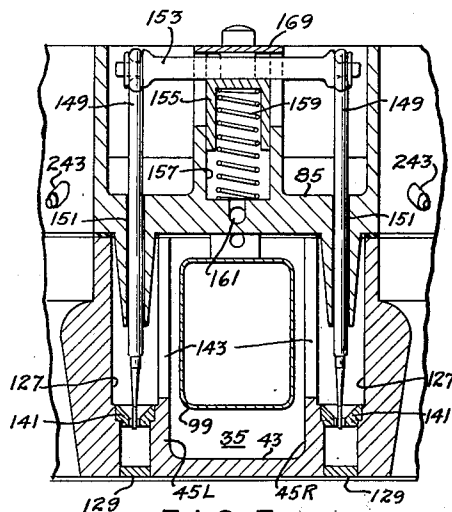


FIG. 7.

INVENTORS
HAROLD A. CARLSON
OLIN J. EICKMANN
ROBERT J. SMITH

BY

Laurence M. Goodridge

ATTORNEY

Dec. 19, 1961

H. A. CARLSON ET AL
MULTI-BARREL CARBURETOR

3,013,778

Filed May 27, 1959

5 Sheets-Sheet 5

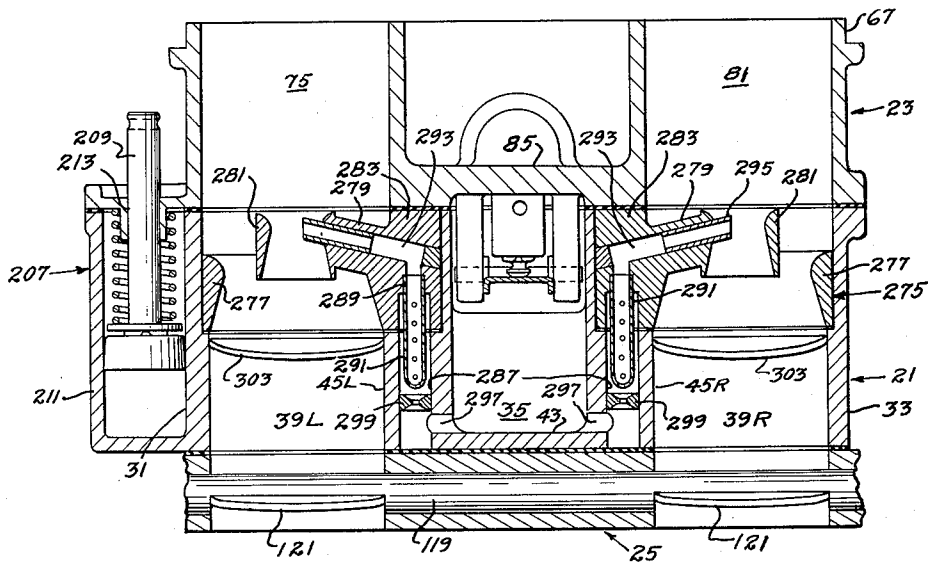


FIG. 8 .

INVENTORS
HAROLD A. CARLSON
OLIN J. EICKMANN
ROBERT J. SMITH

BY
Laurence M. Goodridge
ATTORNEY

1

3,013,778

MULTI-BARREL CARBURETOR

Harold A. Carlson, Brentwood, Olin J. Eickmann, Normandy, and Robert J. Smith, St. Ann's, Mo., assignors to ACF Industries, Incorporated, New York, N.Y., a corporation of New Jersey

Filed May 27, 1959, Ser. No. 816,163

6 Claims. (Cl. 261-23)

This invention relates to carburetors for internal combustion engines, and more particularly to multi-stage carburetors especially for automotive engines.

It will be understood that a multi-stage carburetor comprises a primary section and a secondary section, each adapted to be supplied with fuel for admixture with air flowing therethrough to the engine on which the carburetor is used. In a typical multi-stage carburetor, the primary section comprises two primary mixture conduits or barrels, and the secondary section comprises two secondary mixture conduits or barrels, this type of carburetor accordingly being referred to as a four-barrel carburetor. The primary section is operative throughout the entire power range of the engine. The secondary section is operable only in the upper part of the power range to supplement the primary section. Among the several objects of this invention may be noted the provision of a compact multi-stage carburetor having a higher capacity in the upper power range than the typical four-barrel carburetor. This is attained in a construction having six mixture conduits or barrels, of which two are primary barrels and four are secondary barrels, and which, while having six such barrels, is of relatively compact construction. An important feature of the invention is the arrangement of the barrels relative to a fuel bowl of the carburetor, this arrangement involving the provision of a pair of primary mixture conduits or barrels, one on one side and the other on the other side of a vertical plane through the fuel bowl, a first pair of secondary mixture conduits or barrels, one on one side and the other on the other side of said plane, and a second pair of secondary mixture conduits or barrels, one on one side and the other on the other side of said plane. Other objects and features will be in part apparent and in part pointed out hereinafter.

The invention accordingly comprises the constructions hereinafter described, the scope of the invention being indicated in the following claims.

In the accompanying drawings, in which one of various possible embodiments of the invention is illustrated,

FIG. 1 is a plan view of the six-barrel carburetor, with parts broken away and shown in section;

FIG. 2 is a left side elevation of the six-barrel carburetor;

FIG. 3 is a right side elevation of the six-barrel carburetor, with parts broken away and shown in section;

FIGS. 4, 5, 6, 7 and 8 are cross sections taken on lines 4-4, 5-5, 6-6, 7-7 and 8-8, respectively, of FIG. 1;

FIG. 9 is a horizontal section taken on line 9-9 of FIG. 4 and

FIG. 10 is an enlarged fragment of FIG. 8, with parts further broken away and shown in section.

The carburetor 5 comprises a main body casting 21 which is referred to as the float bowl section, an upper section 23 which is referred to as the air horn section, and a lower section 25 which is referred to as the throttle body section. The float bowl section 21 is generally rectangular in plan, having front and back walls designated 27 and 29, and left and right side walls designated 31 and 33, with rounded corners. It is formed to provide a single elongate central fuel bowl 35 which extends generally centrally thereof in forward-to-rearward direction, two vertical primary mixture conduits or barrels 37L and 37R

2

and four secondary mixture conduits or barrels 39L, 39R, 41L, 41R. Primary barrel 37L is located on the left side of the bowl 35. Primary barrel 37R is located on the right side of the bowl. The two primary barrels 37L and 37R have their vertical axes generally in the central vertical transverse plane of the float bowl section 21. Secondary barrel 39L is located on the left side of the bowl forward of the left primary barrel 37L. Secondary barrel 39R is located on the right side of the bowl forward of the right primary barrel 37R. The forward secondary barrels 39L and 39R have their vertical axes in a vertical transverse plane forward of the central vertical transverse plane. Secondary barrel 41L is located on the left side of the bowl rearward of the left primary barrel 37L. Secondary barrel 41R is located on the right side of the bowl rearward of the right primary barrel 37R. The rearward secondary barrels 41L and 41R have their vertical axes in a vertical transverse plane. Thus, the barrels 39L, 37L and 41L are located in a row on the left side of the bowl 35, and barrels 39R, 37R and 41R are located in a row on the right side of the bowl.

The bowl 35 has a bottom 43 shown by way of illustration as formed integrally with the float bowl section 21, and is closed at the top by the air horn section 23. The float bowl section 21 has left- and right-hand front-to-rear partitions 45L and 45R defining the sides of bowl 35. The three left-hand barrels 39L, 37L and 41L are located between the left-hand partition 45L and the left side wall 31 of the float bowl section, barrel 39L being separated from barrel 37L by a cross-partition 47L, and barrel 37L being separated from barrel 41L by a cross-partition 49L. Similarly, the three right-hand barrels 39R, 37R and 41R are located between the right-hand partition 45R and the right side wall 33 of the float bowl section, barrel 39R being separated from barrel 37R by a cross-partition 47R, and barrel 37R being separated from barrel 41R by a cross-partition 49R.

The front wall 27 of the float bowl section 21 is formed as illustrated in FIG. 5 to have at the forward end of bowl 35 a rearwardly extending intermediate horizontal portion 51 and a portion 53 extending down to the bottom 43 of the bowl 35 from the rear of portion 51. This provides a forwardly open recess 55 in the float bowl section 21 at the forward end of the bowl 35. The rear wall 29 of the float bowl section 21 is formed to have at the rearward end of the bowl 35 a forwardly offset portion 57 providing a rearwardly open recess 59 at the rearward end of the bowl. Recess 55 extends rearward beyond the vertical transverse plane of the axes of the forward secondary barrels 39L and 39R. Recess 59 extends forward beyond the vertical transverse plane of the axes of the rearward secondary barrels 41L and 41R. The two primary barrels 37L and 37R are identical, each being formed as indicated at 61 in FIG. 4 to constitute a main venturi. The four secondary barrels 39L, 39R, 41L and 41R are identical, each being cylindrical with an enlarged upper end portion 63 providing an upwardly facing shoulder 65 (see FIG. 4).

The air horn section 23 is formed to provide a rounded-corner rectangular air horn 67 through which air may enter and flow downward through the six barrels. The air horn 67 has left- and right-hand curved front-to-rear partitions 69L and 69R overlying partitions 45L and 45R, forward cross-partitions 71L and 71R overlying partitions 47L and 47R, and rearward cross-partitions 72L and 72R overlying partitions 49L and 49R. These partitions define individual air inlets for the six barrels, the inlets for the barrels 37L, 39L and 41L on the left side being designated 73, 75 and 77, and the inlets for the barrels 37R, 39R and 41R on the right side being designated 79, 81 and 83. The air horn section is formed at its bottom be-

tween partitions 69L and 69R with a solid cover portion 85 for the bowl 35.

At the forward end of the air horn section 23 and on the float bowl cover portion 85 thereof there is formed a boss 87 (see FIG. 5) which is provided with a horizontal fuel inlet passage 89. This passage opens at the forward end of the air horn section 23, where it is tapped as indicated at 91 for connection of fuel line 15. Extending down into the bowl 35 from the inner end of passage 89 is a needle valve guide 93 in which is vertically slidable a needle valve 95. A float arm 97 carrying a float 99 is pivoted at 101 on a bracket 103 carried by the air horn section 23. The lower end of the needle valve 95 engages the float arm 97. The arrangement is such that, with a predetermined level of fuel in bowl 35, valve 95 is raised and closed. When the level falls below this predetermined level, float 99 and float arm 97 swing downward, valve 95 moves downward and opens, and fuel is delivered from passage 89 into the bowl 35 until the predetermined level is restored, at which point float 99 and float arm 97 will have swung back upward to the point where valve 95 closes.

The throttle body section 25 is provided with two primary throttle bores such as indicated at 105 which register with the lower ends of the primary barrels 37L and 37R. The throttle body section 25 is also provided with two forward secondary throttle bores such as indicated at 107 which register with the lower ends of the two forward secondary barrels 39L and 39R, and with two rearward secondary throttle bores such as indicated at 109 which register with the two rearward secondary barrels 41L and 41R. Journalled in the throttle body section 25 and extending laterally across the two primary throttle bores 105 is a primary throttle shaft 111. This primary throttle shaft carries a primary throttle valve 113 in the left-hand primary throttle bore 105, and a similar primary throttle valve 113 in the right-hand primary throttle bore 105. Fixed on the left-hand end of the primary throttle shaft 111 are inner and outer primary throttle arms 115 and 117 (see FIG. 2). Journalled in the throttle body section 25 and extending laterally across the two forward secondary throttle bores 107 is a forward secondary throttle shaft 119. This carries a secondary throttle valve 121 in the left-hand forward secondary throttle bore 107 and a similar secondary throttle valve 121 in the right-hand forward secondary throttle bore 107. Journalled in the throttle body section 25 and extending laterally across the two rearward secondary throttle bores 109 is a rearward secondary throttle shaft 123. This carries a secondary throttle valve 125 in the left-hand rearward secondary throttle bore 109, and a similar secondary throttle valve 125 in the right-hand rearward secondary throttle bore 109.

The bowl 35 is the source of fuel for a left-hand primary high speed system and a left-hand low speed system for supplying fuel to the left-hand primary barrel 37L, and is also the source of fuel for a right-hand primary high speed system and a right-hand low speed system for supplying fuel to the right-hand primary barrel 37R. The left- and right-hand primary high speed systems are identical, and a description of the left-hand primary high speed system will suffice for both. As shown in FIGS. 1 and 7, the float bowl section 21 is formed with a vertical well 127 in the partition 45L between the bowl 35 and the left-hand primary barrel 37L and somewhat forward of the plane of the axes of the two primary barrels. The bottom of the well is closed by a plug 129. In the well above the plug 129 is a primary metering jet 141. A slot 143 is provided in partition 45L for communication between the bowl 35 and the upper portion of the well 127 above the metering jet 141. This slot 143 extends down below the normal level of fuel in the bowl 35 for flow of fuel directly from the bowl into the upper portion of the well 127 above the metering jet 141. Below the level of the metering jet 141 there is a horizontal passage 145 to a

vertical recess 147 (see FIGS. 1 and 6) in the partition 45L which extends up from the bottom of the float bowl section 21 between the bowl 35 and the left-hand primary barrel 37L generally in the central vertical transverse plane of the carburetor. This recess 147 is closed at the bottom by a plug 148.

Flow of fuel through the metering jet 141 to the recess 147 is under control of a step-up rod 149 (see FIG. 7) which extends down into the well 127 through a hole 151 in the air horn section. At its upper end, the step-up rod 149 is attached to a crosshead 153 on a piston 155. This piston is slidable in a vertical cylinder 157 formed on portion 85 of the air horn section and is biased upward by a spring 159. A vacuum passage 161 extends from the lower end of the cylinder 157 to a point below the primary throttle valve 113. The lower end of the step-up rod 147 is formed as illustrated in FIG. 7 so that, upon increase of vacuum below the piston and the rod, the flow of fuel through the jet 141 is restricted, and vice versa. A cover cap for the cylinder 157 is indicated at 169.

At the upper end of each primary barrel is a primary venturi 171 on a primary venturi arm 173. This arm 173 extends into the barrel from the side thereof toward the central bowl 35. The arm has a passage 175 in which is pressed a fuel nozzle 177. This nozzle projects into the primary venturi 171. The passage 175 extends from an opening 179 above the recess 147. A perforated main fuel tube 181 extends down from the opening 179 into the recess 147. During high speed operation (i.e., with the primary throttles 113 open), fuel flows from the bowl 35 to the left-hand primary barrel 37L via slot 143, well 127, jet 141, and passage 145 to recess 147, thence through the main fuel tube 181 and out through nozzle 177 into the primary venturi 171. The high speed system for supplying fuel from bowl 35 to the right-hand primary barrel 37R is identical.

The left- and right-hand low speed systems are identical, and a description of the left-hand low speed system will suffice for both. As shown in FIG. 6, an idle tube 183 extends down in the recess 147 from a hole 185 which extends down from the top of the float bowl section 21. The upper end of hole 185 registers with a vertical hole 187 in the air horn section 23. From this vertical hole 187 there is a horizontal passage 189 (see FIG. 1) in the air horn section to a vertical hole 191 (see FIG. 4) which extends up from the bottom of the air horn section 23. This latter hole 191 registers with a generally vertical hole 193 extending through the float bowl section. Hole 193 opens at its lower end into a recess 195 in the throttle body section 25, from which there is an idle discharge port 197 opening into the primary throttle bore 105. An idle adjusting screw 199 (see FIG. 9) is threaded in a horizontal hole 201 which leads into the recess 195 below the idle discharge port 197. An idle needle port 203 leads into the primary throttle bore 105 from the hole 201. An air bleed hole 205 (see FIG. 5) leads into the upper end of the vertical hole 191.

An accelerating pump indicated at 207 is provided for discharging fuel into the primary barrels at their upper ends during acceleration from low speeds. As appears in FIGS. 1, 8 and 10, this pump comprises a plunger rod 209 operable in a vertical cylinder 211 formed in the wall 31 between barrels 39L and 37L. This cylinder 211 extends down from the top of the float bowl section 21 and is covered by the air horn section 23. The rod 209 extends down into the pump cylinder 211 from the air horn section 23 through a hole 213 in the bottom of the latter. The rod 209 has spaced heads 215 and 217 at its lower end, head 215 being the upper one of the heads and head 217 being the lower.

The rod has a packing member generally designated 219 retained thereon by the heads 215 and 217. This packing member is made of a flexible resilient elastomeric material in the form of an inverted cup, having a substan-

tially flat circular top wall 221 and an annular skirt portion 223 of downwardly flaring conical form. The top wall 221 is provided with a central hole which may be a square hole, the portion of the rod between the heads (which may be cylindrical) being freely slidably received in this hole. The packing member is preferably formed from sheet material composed of polymerized tetrafluoroethylene such as is sold under the trade designation Teflon, having a thickness less than the spacing of the heads 215 and 217. The packing member is mounted on the portion of the rod between the heads with its annular skirt portion 223 extending downward surrounding the lower head 217. The dimensions of the packing member are initially such that the skirt as received in the cylinder is radially compressed so as to have a sliding sealing fit in the cylinder 211.

The top wall 221 of the packing member 219 is provided with holes such as indicated at 225, these holes being located radially outward from the center hole. The top wall 221 of the packing member is slidable on the rod between the relatively lowered position in which it is shown in FIG. 10 in flatwise engagement with the lower head 217 and a relatively raised position in flatwise engagement with the upper head 215. In the raised position, holes 225 are closed by the upper head 215. The lower head 217 is provided with an annular series of holes such as indicated at 227 (which may be arcuate slots) with which the holes 225 register when the top wall 221 of the packing member is in the lowered position. The rod 209 has an axial passage 229 extending up from its lower end and transverse holes such as indicated at 231 traversing the portion thereof between the heads 215 and 217 and intersecting passage 229 providing lateral ports opening from passage 229 to the space between the heads 215 and 217.

The rod 209 is biased downward by a coil compression spring 233 reacting from the bottom of the air horn section 23 against the upper head 215. The rod 209 is linked to the primary throttle shaft 111 to be pulled up against the bias of the spring 233 when the primary throttle valves 113 are opened by means of a linkage such as shown in FIG. 2 including a link 235 connecting the outer primary throttle arm 117 to a pump rocker 237 pivoted at 239 on the air horn section 23, and a link 239 connecting rocker 237 to the upper end of the rod 209. Fuel is supplied to the pump cylinder 211 above the packing member 219 from the bowl 35 via a passage 239 in the float bowl section 21 (see FIG. 1). Fuel is discharged from the pump cylinder on downward movement of the rod 209 through a discharge passage 241 leading from the lower end of the cylinder to pump jets 243 for discharging pumped fuel into the two primary barrels. When the rod 209 is driven downward upon opening of the primary throttle valves, the packing member 219 occupies the raised position in which its top wall 221 engages the upper head 215 and holes 225 are closed. When the rod 209 moves upward on opening the primary throttle valves, the packing member slides down relative to the rod to its lowered position in which holes 225 are opened for flow of fuel from above the packing member to below the packing member to prime the pump. A discharge check valve 244 may be incorporated in passage 241.

Journalled in the air horn section 23 and extending laterally across the air inlets 73 and 79 for the two primary barrels 37L and 37R is a choke valve shaft 247. This carries two choke valves 249, one in each inlet 73 and 79. There are no choke valves for the secondary barrels. Secured on the right end of the choke shaft 247 is an arm 251 (see FIG. 3). Mounted on the right side of the float bowl section 21 is an automatic choke control housing 253. This contains thermostatic coil 255 controlling a lever 257 on a shaft 259. At 261 is indicated a choke piston slidable in a choke cylinder 263. Link 265 connects the choke piston 261 and lever 257.

The vacuum port for choke cylinder 263 is indicated at 267. The hot air inlet for the housing is indicated at 269.

At the upper end of each secondary barrel 39L, 39R, 41L and 41R is a secondary venturi cluster designated in its entirety by the reference character 275 (see FIG. 8). This includes a ring 277 which seats on the shoulder 65 and which is formed to provide a main venturi, and an upwardly angled arm 279 extending toward the center of the ring and carrying a boost venturi 281. Each cluster 275 includes a block 283 seated in a recess 285 therefor in the float bowl section 21. For each secondary barrel there is a secondary fuel system including a vertical hole 287 in the float bowl section 21 extending up to the bottom of the block 283. Hole 287 is closed at the bottom by the throttle body section 25. The block 283 has a vertical hole 289. A fuel tube 291 extends down from hole 289 into the hole 287. Each cluster has a hole 293 extending through its arm 279 to the hole 289, with a fuel nozzle 295 pressed in the hole 293 and projecting into the boost venturi 281. As to each secondary barrel, fuel is supplied to the lower end of the respective hole 287 from the bowl 35 through a secondary system passage 297. In the hole 287 above this passage 297 is a metering jet 299.

Journalled in the float bowl section 21 and extending laterally across the two forward secondary barrels 39L and 39R is a forward velocity valve shaft 301. This extends across the recess 55 and carries a velocity valve 303 in the left-hand forward secondary barrel 39L and a similar velocity valve 303 in the right-hand forward secondary 39R. Journalled in the float bowl section 21 and extending laterally across the two rearward secondary barrels 41L and 41R is a rearward velocity valve shaft 305. This extends across the recess 59 and carries a velocity valve 307 in the left-hand rearward secondary barrel 41L and a similar velocity valve 307 in the right-hand rearward secondary barrel 41R. The forward velocity valve shaft 301 has arms 309 on its ends and the rearward velocity valve shaft 305 has arms 311 on its ends. Arms 309 and 311 are connected by links 313. Arms 311 are weighted as indicated at 315 in such manner that the forward and rearward velocity valves are biased to rotate in closing direction.

Referring to FIGS. 1 and 2, the outer primary throttle arm 117 is shown to carry a fast adjusting screw 317 engageable with a fast idle cam 319 pivoted at 321 on the left side wall 31 of the float bowl section 21. Cam 319 is overbalanced to tend to rotate clockwise as viewed in FIG. 2. The choke shaft 247 has an arm 323 fixed on its left end. A link 325 connects arm 323 to the fast idle cam 319. As the choke valve opens, arm 323 swings counterclockwise as viewed in FIG. 2, and the fast idle cam 319 thereupon rotates clockwise away from its initial position. Cam 319 has a laterally extending lug 329. A secondary lockout lever 337 is also pivoted on 321 on the left side wall of the float bowl section 21. Lever 337 is gravity-biased toward latching engagement with lug 329 on the rearward secondary throttle shaft 123 which fits into slot 340. Lever 337 is engageable at 342 by the lug 329 to be swung out of latching engagement with lug 339 when the cam 319 swings clockwise on opening of the choke valve. When the primary throttle valves are fully opened, a laterally extending lug 341 on the end of the inner throttle arm 115 engages cam 319 at 344 to rotate the cam clockwise, thereby partially to open the choke valve for unloading purposes. An idle speed screw 343 is threaded in a lug 345 on the left side wall 31 of the float bowl section 21. This is engageable by a stop 347 on the inner primary throttle arm 115.

Referring to FIGS. 1 and 3, the primary throttle shaft 111 is shown to have an inner arm 349, a dog 351 and an outer arm 353 at its right end. The inner arm 349 and the dog 351 are rotatable relative to the shaft 111 and to one another. The outer arm 353 is fixed to the shaft 111. The dog has a first lateral lug 355 engageable

with the outer arm 353 and a second lateral lug 359 engageable with the inner arm 349. A coil spring 361 biases the dog to rotate in the direction for engagement of its lug 355 with the outer arm 353. A link 363 connects the inner arm 349 and an arm 365 fixed on the right end of the rearward secondary throttle shaft 123. A coil spring 367 is provided for biasing the rearward secondary throttle valve 307 closed. A link 369 connects arm 365 to an arm 371 fixed on the right end of the forward secondary throttle shaft 119, so that the latter operates in unison with the rearward secondary throttle shaft 123. When the primary throttle valves 113 are opened, the outer arm 353 rotates counterclockwise as viewed in FIG. 3 along with the primary throttle shaft 111. Dog 351 (having lugs 357 and 355) thereon follows the arm 353 around under the bias of spring 361. When the primary throttle valves have been opened a predetermined amount (50°, for example), lug 359 comes into engagement with the inner arm 349 and rotates it counterclockwise. This results in opening of the forward and rearward secondary throttle valves 121 and 125. The secondary throttle linkage is so proportioned that the secondary throttle valves operate in unison and in phase and arrive at their wide open position at the same time as the primary throttle valves. A shoe 373 on arm 365 is engageable with a shoe 375 on arm 353 to preclude opening of the secondary throttle valves until the primary throttle valves have been opened approximately the stated predetermined amount.

Operation is as follows:

The primary throttle shaft 111 is operated by the vehicle pedal, connection being made from the pedal to the inner primary throttle arm 115 below the shaft 111. The primary throttle shaft 111 is biased in primary throttle valve closing direction (which is counterclockwise as viewed in FIGS. 2 and 4) by a pedal return spring. When the pedal is depressed, the primary arms 115 and 117 and the primary throttle shaft 111 are rotated clockwise as viewed in FIG. 2 to open the primary throttle valves 113.

When the primary throttle valves 113 are opened a predetermined amount (50°, for example), the forward and rearward secondary throttle valves 121 and 125 are opened. This is accomplished by means of the link 363 connecting the inner arm 349 on the primary throttle shaft 111 at the right side of the carburetor to the arm 365 on the rearward secondary throttle shaft 122, and by the link 369 connecting the arm 365 to the arm 371 on the right-hand end of the forward secondary throttle shaft 119. Thus, the forward and rearward secondary throttle valves 121 and 125 are operated in unison and in phase.

At idle, the arms 115 and 117 occupy the position shown in FIG. 2, and the primary throttle valves 113 occupy the position shown in FIG. 4. The secondary throttle valves 121 and 125 are then closed. Fuel is supplied from the bowl 35 to the idle discharge ports 197 of the two primary barrels 37L and 37R via the left- and right-hand low speed systems above described, each of which includes an idle tube 183 (see FIG. 6) and passages 189 and 193 (see FIGS. 6 and 7).

When the primary throttle valves 113 are opened, fuel is supplied from the bowl 35 to the primary barrels 37L and 37R via the left- and right-hand high speed systems above described, each of which includes a well 127, a metering jet 141 under control of a step-up rod 149 (see FIG. 7), and a main fuel tube 181 (see FIG. 6). When the secondary throttle valves 121 and 125 are opened, fuel is supplied from the bowl 35 to the secondary barrels via the secondary fuel systems above described, each including a metering jet 299 and a fuel tube 291 (see FIG. 8). It will be understood that the velocity valves 303 and 305 are unbalanced in such manner as to open against the closing bias of weights 315 in response to air flow. All four secondary throttle

valves 121 and 125 are locked closed by the lockout lever 337 until the fast idle cam 319 has swung clockwise from its FIG. 2 position a predetermined amount. On acceleration, the pump rod 209 is driven downward by means of arm 117, link 235 and rocker 237 thereby to pump fuel from the bowl 35 to the pump jets 243 in the primary barrels 37L and 37R.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As various changes could be made in the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

We claim:

1. In a carburetor for an internal combustion engine, a main body section comprising side and end walls defining a single elongated fuel chamber, primary mixture conduits provided on said section extending vertically on opposite sides of said side walls intermediate the ends thereof, a different pair of secondary mixture conduits extending vertically along each side wall with the two secondary mixture conduits positioned on opposite sides of each primary mixture conduit, individual main fuel systems leading from the fuel bowl upwardly through said side walls to each of said mixture conduits, and throttle valves mounted in each of said mixture conduits.

2. For an internal combustion engine, a carburetor comprising a body section including an elongated fuel bowl, means forming three mixture conduits positioned on one side of said fuel bowl with the axes thereof substantially parallel and with one of said mixture conduits between the other two, said body section including a plurality of fuel passages connecting said mixture conduits to said fuel bowl, a throttle valve movably mounted within said one mixture conduit, a different velocity valve movably mounted within each one of said other two mixture conduits for movement between open and closed positions, means biasing one of said velocity valves toward a closed position independently of movement of said throttle valve, and an operative connection between said velocity valves to provide simultaneous movement thereof.

3. For an internal combustion engine, a carburetor comprising a body section including an elongated fuel bowl, means forming three mixture conduits positioned on one side of said fuel bowl with the axes thereof substantially parallel and with one of said mixture conduits between the other two, said body section including a plurality of fuel passages connecting said mixture conduits to said fuel bowl, a throttle valve movably mounted within said one mixture conduit, a different velocity valve movably mounted within each one of said other two mixture conduits for movement between open and closed positions, and means connecting said velocity valves for simultaneous movement thereof independently of movement of said throttle valve, said connecting means including structure biasing said velocity valves toward closed positions.

4. For an internal combustion engine, a carburetor comprising a body section including an elongated fuel bowl, means forming three mixture conduits positioned on one side of said fuel bowl with the axes thereof substantially parallel and with one of said mixture conduits between the other two, said body section including a plurality of fuel passages connecting said mixture conduits to said fuel bowl, a throttle valve movably mounted within said one mixture conduit, a different velocity valve within each one of said other two mixture conduits, a different valve shaft within each one of said other two mixture conduits mounting one of said velocity valves for pivotal movement between open and closed positions, said valve shafts being substantially parallel, and means simultane-

ously biasing said velocity valves toward closed positions independently of movement of said throttle valve.

5. For an internal combustion engine, a carburetor comprising a body section including an elongated fuel bowl, means forming two secondary and one primary mixture conduits positioned on one side of said fuel bowl with the axes thereof substantially parallel and with said primary mixture conduit between said secondary mixture conduits, said body section including a plurality of fuel passages connecting said mixture conduits to said fuel bowl, a throttle valve movably mounted within said primary mixture conduit, a different velocity valve within each one of said two secondary mixture conduits, a different valve shaft within each one of said two secondary mixture conduits mounting one of said velocity valves for pivotal movement between open and closed positions, said valve shafts being substantially parallel, and means connecting said velocity valves for simultaneous movement thereof independently of movement of said throttle valve, said connecting means including structure biasing said velocity valves toward closed positions.

6. For an internal combustion engine, a carburetor comprising a body section including an elongated fuel bowl, means forming two secondary and one primary

mixture conduits positioned on one side of said fuel bowl with the axes thereof substantially parallel and with said primary mixture conduit between said secondary mixture conduits, said body section including a plurality of fuel passages connecting said mixture conduits to said fuel bowl, a throttle valve movably mounted within said primary mixture conduit, a different velocity valve within each one of said two secondary mixture conduits, a different valve shaft within each one of said two secondary mixture conduits mounting one of said velocity valves for pivotal movement between open and closed positions, said valve shafts being substantially parallel, and a linkage connecting said velocity valves for simultaneous movement thereof independently of movement of said throttle valve, said connecting linkage including a weighted lever biasing said velocity valves toward closed positions.

References Cited in the file of this patent

UNITED STATES PATENTS

1,620,827	Mock et al.	Mar. 15, 1927
2,703,229	Henning	Mar. 1, 1955
2,771,282	Olson et al.	Nov. 20, 1956