Jan. 15, 1957 U. ALDINGER 2,777,434

INJECTION PUMP FOR MULTI-CYLINDER ENGINES

Filed Aug. 23, 1954 3 Sheets-Sheet 1

FIG. 1

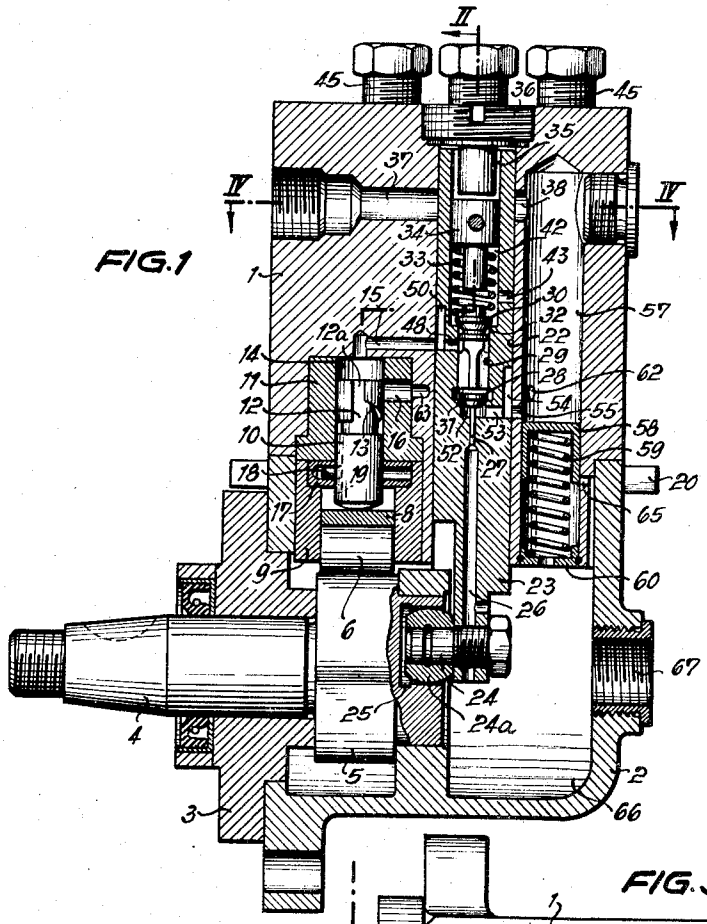
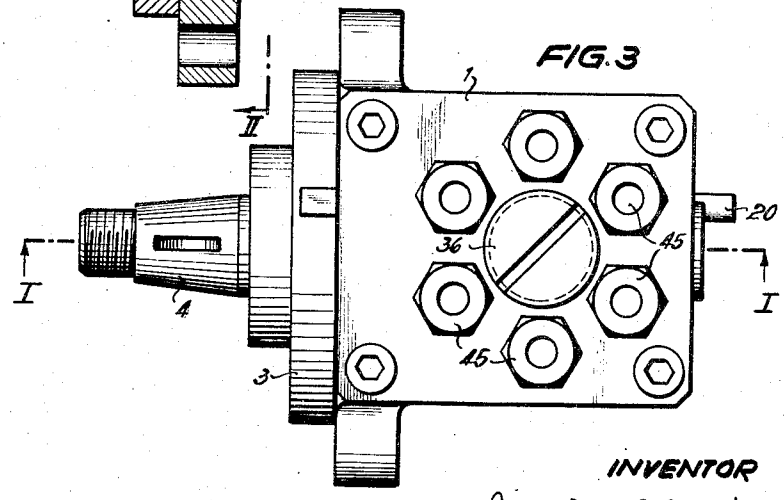


FIG. 3



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Jan. 15, 1957 U. ALDINGER 2,777,434

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Filed Aug. 23, 1954

3 Sheets-Sheet 2

FIG. 2

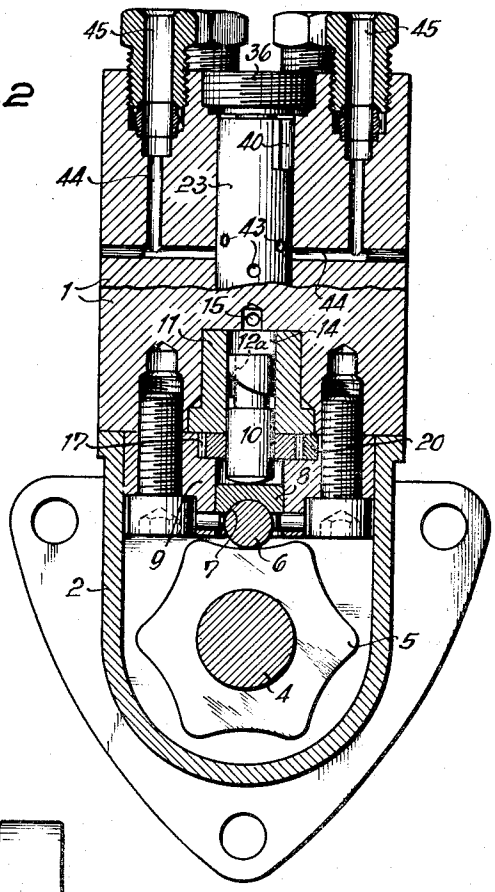
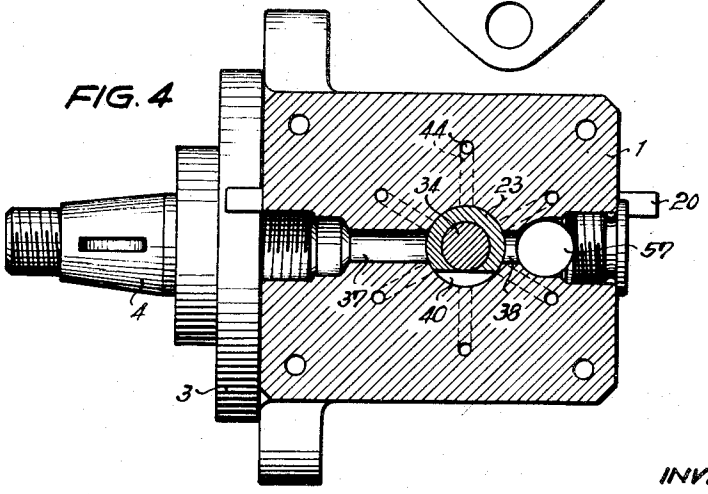


FIG. 4



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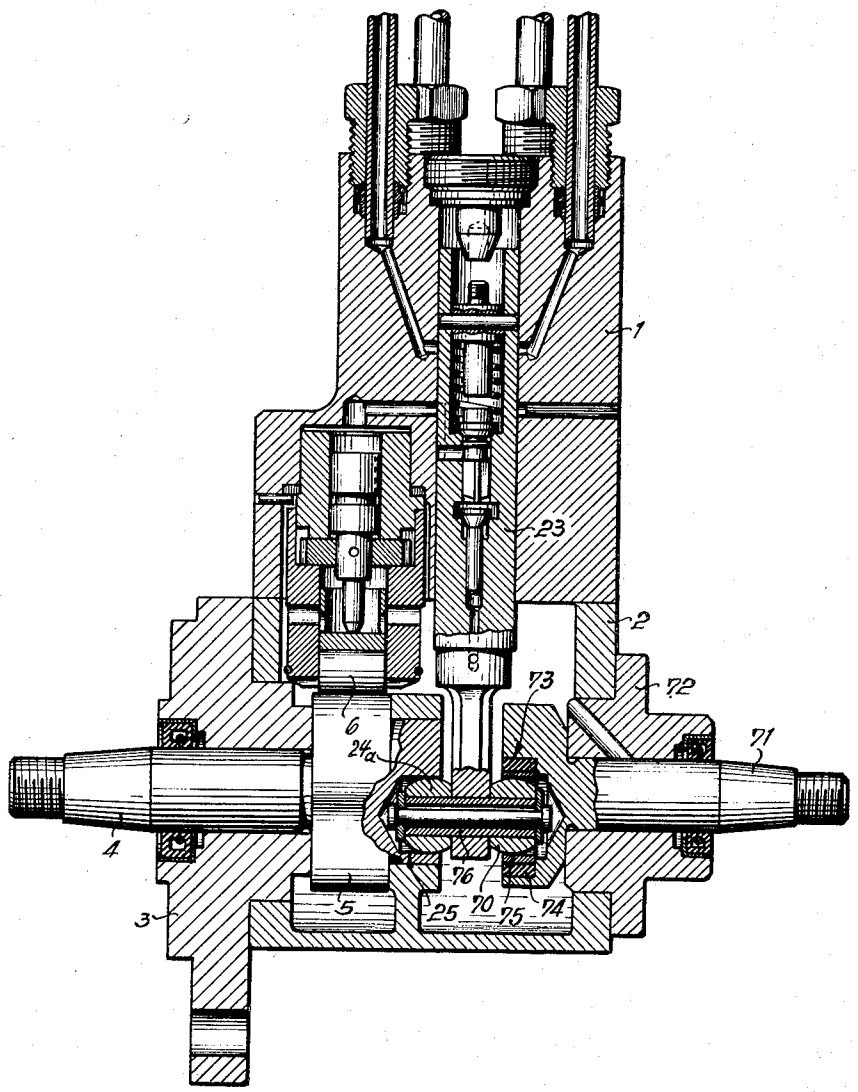
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Jan. 15, 1957 U. ALDINGER 2,777,434

INJECTION PUMP FOR MULTI-CYLINDER ENGINES

Filed Aug. 23, 1954 3 Sheets-Sheet 3

FIG. 5



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2,777,434

INJECTION PUMP FOR MULTI-CYLINDER ENGINES

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Application August 23, 1954, Serial No. 451,385

Claims priority, application Germany August 29, 1953

11 Claims. (Cl. 123—139)

The present invention relates to injection pumps for multi-cylinder engines.

At the present time known injection pumps are exceedingly complicated devices requiring a considerable amount of space and in addition are quite expensive.

One of the objects of the present invention is to provide an injection pump which is far less expensive than the known pumps, which is far less complicated, and which requires considerably less space than the known injection pumps.

Another object of the present invention is to provide an injection pump with but a single piston for delivering fuel to the means which distributes this fuel to the engine cylinders.

A further object of the present invention is to provide an injection pump with a distributor means which also serves as a means for drawing fuel into the pump and delivering the fuel to a reservoir of the pump.

An additional object of the present invention is to provide a simple and rugged means for oscillating the above distributing means both along and about its axis.

Also, it is an object of the present invention to provide a smoothly operating injection pump having a minimum of vibrations during operation and having all of its parts properly lubricated.

With the above objects in view the present invention mainly consists of a fuel injection pump for a multi-cylinder engine, this pump including a reservoir for holding a supply of fuel and a distributor means for distributing fuel to the engine cylinders in a predetermined sequence during one cycle of operation of the distributor means. A pump cylinder communicates with the reservoir and the distributor means, and a piston is in the pump cylinder. A cam means engages the piston for moving the latter in the pump cylinder through a plurality of pressure strokes equal to the number of engine cylinders during one cycle of the distributor means, the piston being urged toward the cam means to be maintained in operative relationship thereto and being moved in its suction strokes by the pressure of the fuel in the reservoir and pump cylinder. A valve means communicates with the pump cylinder, reservoir, and distributor means for directing fuel from the reservoir to the cylinder during the suction strokes of the piston and from the pump cylinder to the distributor means during the pressure strokes of the piston.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

Fig. 1 is a sectional elevational view along the line I—I of Fig. 3 in the direction of the arrows and shows

an injection pump constructed in accordance with the present invention;

Fig. 2 is a sectional elevational view taken along the line II—II of Fig. 1 in the direction of the arrows;

Fig. 3 is a top plan view of the structure of Fig. 1;

Fig. 4 is a sectional view taken along the line IV—IV of Fig. 1 in the direction of the arrow; and

Fig. 5 is a view corresponding to Fig. 1 of a different embodiment of the invention.

Referring now to the drawings, it will be seen that Figs. 1–4 illustrate an injection pump for a six cylinder engine. This pump includes a housing made up of parts 1, 2, 3 shown in Fig. 1. The parts 1 and 2 respectively form the upper and lower portions of the pump housing, as viewed in Fig. 1, while the part 3 covers an opening in the left wall of housing portion 2, as viewed in Fig. 1, and serves as a bearing for a drive member 4 of the pump.

This drive member 4 has fixed thereto a cam disc 5 which has a plurality of cam portions equal to the number of engine cylinders, as is shown most clearly in Fig. 2. This cam disc cooperates with a follower in the form of a loose cylindrical roller 6 engaging a concave face 7 of a moving member 8, the concave face 7 forming part of a cylinder and mating with the roller 6. The moving member 8 is slidable within a guide means 9 having inner opposite guiding surfaces engaging the end faces of the moving member 8, as shown in Fig. 1, as well as the side faces thereof, as shown in Fig. 2. As is apparent from Fig. 1, the end faces of the roller 6 are also in slidable engagement with the opposite inner surfaces of the guide means 9 shown in Fig. 1, so that this guide means additionally serves to restrain the roller 6 against axial movement. The hollow guide means 9 is fixed in any suitable manner within the housing portion 1.

The housing portion 1 also has built into the same, just above guide means 9, as viewed in Fig. 1, a pump cylinder 11 in which a piston 10 is located, one end portion of the piston 10 extending outwardly beyond the cylinder 11 into engagement with the moving member 8 so that during rotation of cam disc 5 motion will be transmitted from the latter to the piston 10 through elements 6 and 8, which thus form a motion transmitting means between cam disc 5 and piston 10.

The piston 10 is provided intermediate its ends with an annular groove 12 one side face of which is inclined at 13 with respect to the opposite side face of the annular groove. This groove communicates with a second groove 12*a* extending axially along the outer surface of piston 10 to the end face thereof distant from moving member 8, so that the annular groove 12 communicates through groove 12*a* with the working chamber 14 of cylinder 11 located at the head end of piston 10. The groove 12 cooperates with a bore 16 of cylinder 11 which forms part of a return-flow passage as will be discussed below. An annular ring 17 extends freely about the piston 10 so that the latter may reciprocate through ring 17, and this ring has a pin 18 fixed thereto and extending into an axial groove 19 of the piston 10 so that the latter may reciprocate axially with respect to ring 17 but is constrained to turn angularly therewith. The ring 17 is provided at a portion of its outer periphery with teeth meshing with a rack 20 (Figs. 2 and 3) which is guided in any suitable way for reciprocating horizontal movement in the pump housing, as viewed in Fig. 1, and which extends through suitable sealing glands to the exterior of the pump where it may be engaged by the operator to be moved into or out of the pump housing for adjusting the angular position of the piston 10 about its axis. It is evident that by manipulating the rack 20 the

operator controls the moment at which the inclined surface 13 crosses over the return-flow passage portion 16 so that in this way the amount of fuel delivered by piston 10 during its pressure stroke may be regulated, as will be further apparent from the description below. Any suitable graduations may be provided on the rack 20.

The housing 1 is formed with an elongated bore 22 whose axis is located in a plane which includes the axis of rotation of shaft 4 and the axis of piston 10. A distributor means 23 is slidably located within the bore 22, this distributor 23 carrying at its lower end portion, as viewed in Fig. 1, a pin 24. The pin 24 has a roller 24a freely turnable thereon, and the roller 24a has a spherical outer surface. The elements 24 and 24a extend into an eccentric opening 25 formed in the right end portion of driving member 4, as viewed in Fig. 1. As a result of this operative relationship between the distributor 23 and cam shaft 4, the latter during its rotation not only reciprocates distributor 23 axially along the bore 22 but in addition oscillates distributor 23 angularly about the axis of the bore 22.

The distributor 23 is formed along its interior with a stepped axially extending bore 26 having a portion 27 for guiding the stem of a valve member 28 and a portion 29 for guiding a valve member 30. Distributor 23 provides the valve seats for the valve members 28 and 30. Thus, valve member 28 cooperates with valve seat 31 of distributor 23 while valve member 30 cooperates with seat 32 of distributor 23. A spring 33 abuts at its bottom end, as viewed in Fig. 1, against the valve 30 to press the latter on its seat 32. The spring 33 abuts with its top end, as viewed in Fig. 1, against a plug 34 which is fixed in the interior of distributor 23 as by being pressed into the same, for example, and this plug 34 has an extension surrounded by coil spring 33 and located adjacent valve member 30 to limit the movement of the latter. The space 35 above the plug 34 within the distributor 23 serves as the working space of a fuel supply pump formed in part by distributor 23, which acts in the nature of a piston of a fuel supply pump for supplying the fuel to the injection pump. This working space 35 is closed by a plug 36 provided at its bottom face with an extension extending into the space 35, as is evident from Fig. 1.

The housing portion 1 is formed with a fuel reservoir 57 and with a passage having an inlet passage portion 37 and a discharge passage portion 38, the bore 22 extending across this passage between the portions 37 and 38 thereof. Furthermore, as is evident from Figs. 2 and 4, the distributor 23 is formed at its top end portion between passage portions 37 and 38 with a cutout 40. During reciprocation of distributor 23 along its axis and oscillation about its axis, the cutout 40 communicates with the passage portion 37 while distributor 23 moves downwardly so as to draw fuel, from any suitable source communicating with inlet passage portion 37, through the latter into the bore 22 at the cutout 40 of the distributor and into the space 35. During the continued movement of distributor 23, the cutout 40 moves out of communication with passage portion 37 which is then closed by the distributor and the cutout 40 moves into communication with the discharge passage portion 38 while the distributor 23 moves upwardly, as viewed in Fig. 1, to move fuel from the working space 35 through discharge passage portion 38 into the reservoir 57.

The space 42 of distributor 23, located below the plug 34 and above valve member 30, communicates with six bores 43 passing through the wall of the distributor. These bores 43 cooperate with passages 44 (Figs. 2 and 4) in such a way that during one rotation of cam shaft 4, and thus during one cycle of distributor 23, the passages 44 respectively leading to the engine cylinders successively come into communication with the chamber 42 through the bores 43. The passages 44 lead to the pump outlets 45, respectively, connected through suitable tubes or the like to the several cylinders of the engine.

The chamber 29 between the non-return valve members 28 and 30 communicates through a bore 48 with a recess 50 in the outer surface of the distributor 23, this recess 50 being of such a shape and size that it remains in constant communication with the passage 15 of housing portion 1 during movement of the distributor 23, this passage 15 leading from the recess 50 into the working space 14 of cylinder 11.

Beneath the seat 31 of valve member 28 the distributor 23 is formed with a bore 53 communicating on the one hand, with the space 52 beneath valve member 28 and, on the other hand, with a recess 54 in the outer surface of distributor 23, this recess 54 being of such a size and shape that it remains in constant communication with the bore 55 formed in the housing portion 1.

This bore 55 provides communication between recess 54 and the elongated cylindrical reservoir 57 formed in the housing 1 and having its axis parallel to that of bore 22 and located in the same plane which includes the axes of cam shaft 4, piston 10, and bore 22. A piston 58 is slidably located within the cylindrical reservoir 57, and a spring 59 bears at its top end against the piston 58 and at its bottom end against a disc 60 fixed to the housing portion 1 at the bottom end of reservoir 57. A passage means in the form of a bore 65 of housing portion 1 provides communication between reesrvoir 57 and enclosure 66 of housing portion 2 in which the cam shaft is located. After sufficient fuel has been discharged through passage portion 38 into reservoir 57 to compress spring 59 sufficiently to lower the piston 58 to the point where bore 65 is uncovered and located above piston 58, as viewed in Fig. 1, fuel will flow from the reservoir 57 through bore 65 into the enclosure 66. This fuel can flow from the device through the opening 67. In this way fuel has access to the enclosure 66 for properly lubricating and cooling the device.

During one revolution of cam shaft 4, the distributor 23 moves through one cycle of operation, as was pointed out above, and during the same period the piston 10 moves through six pressure strokes. During its movement, the distributor 23 sucks fuel through inlet passage portion 37 into the pump and discharges this fuel through passage portion 38 into the reservoir 57. Thus, the distributor forms with housing portion 1 a supply pump for the device.

When there is sufficient fuel in the reservoir 57 to lower the piston 58 to a point where bore 55 is uncovered, the fuel flows through this bore 55 into the recess 54 and through bore 53 into the space 52 beneath the inlet valve 28. When the latter moves upwardly the fuel flows into chamber 29 and from the latter through the bore 48 and recess 50 and passage 15 into the working chamber 14 of the cylinder 11. The pressure of the fuel which is maintained in the reservoir 57 serves to hold the piston 10 in engagement with the moving member 8 and the latter in engagement with roller 9 which is in turn held in engagement with cam disc 5, this pressure of the fuel itself moving the piston 10 along its suction strokes.

Assuming that the piston 10 is moving upwardly along its pressure stroke, as viewed in Fig. 1, from a position below that of Fig. 1, it is evident that the actual working stroke of the piston begins as soon as the return-flow passage portion 16 is closed by the piston 10. This return-flow passage portion 16 communicates with a passage 63 emptying at 62 into the reservoir 57 and forming together with portion 16 a return-flow passage. As soon as the passage 16 is thus closed, the fuel is compelled to flow from space 14 along passage 15 to the chamber 29 by way of recess 50 and bore 48. The pressure in the fuel in chamber 20 due to movement of piston 10 along its pressure stroke and due to closing of passage 16 is sufficiently high to raise the valve 30 to cause fuel to

move into the chamber **42** from where the fuel moves along one of the passages **43** and **44**. The pressure stroke of the piston **10** ends as soon as the inclined side face **13** of annular groove **12** uncovers return-flow passage **16, 63**. The fuel in chamber **14** then moves back to the reservoir through passage **16, 63**.

The reservoir **57** with its spring loaded piston **58** serves to equalize the changing pressure of the supply pump so that at every suction stroke of piston **10** fuel moves at a substantially constant pressure to the chamber **14** of cylinder **11**.

The second embodiment of the invention which is illustrated in Fig. 5 differs from that described above only in that the pin at the bottom end of the distributor extends in opposite directions from the latter. Thus, as may be seen from Fig. 5, the bottom end of distributor **23** is bored to receive a pin **76** in the form of a sleeve and shaft extending therethrough, a roller **70** having an outer spherical surface being located on pin **76** at one side thereof for free turning movement while the roller **24***a* is located on the opposite side of distributor **23** on the pin and extends into the eccentric opening **25** of cam shaft **4**, in the manner described above.

Roller **70** is of the same size as roller **24***a* and is located within an opening **73** of a shaft **71** turnably carried by a bearing **72** covering an additional opening in the housing portion **2**. The shaft **71** is coaxial with shaft **4** and the opening **73** is eccentric with respect to the common axis of shafts **4** and **71**, the eccentricity of openings **25** and **73** being equal. However, opening **73** is of a greater diameter than opening **25**. The annular space in opening **73** about the roller **70** is filled by an at least partly elastomeric means **74, 75** in the form of a ring **74** of rubber or the like and a steel ring **75** engaging the roller **70**. The inner diameter of ring **75** is the same as that of opening **25**. This annular elastomeric means permits inaccuracies in the construction to be compensated for. The second shaft **71** may, for example, be used to drive a centrifugal governor. In this case, the rubber ring also serves as a vibration absorber which prevents vibrations of shaft **4** from being transferred fully to the shaft **71**.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of injection pumps differing from the types described above.

While the invention has been illustrated and described as embodied in injection pumps for multi-cylinder engines, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be secured by Letters Patent is:

1. In a fuel injection pump for a multi-cylinder engine, in combination, a reservoir for holding a supply of fuel; distributor means for distributing fuel to the engine cylinders in a predetermined sequence during one cycle of operation of said distributor means; a pump cylinder communicating with said reservoir and said distributor means; a piston in said pump cylinder; cam means engaging said piston for moving the latter in said pump cylinder through a plurality of pressure strokes equal to the number of engine cylinders during one cycle of said distributor means, said piston being urged toward said cam means to be maintained in operative relationship thereto and being moved in its suction strokes by the pressure of the fuel in said reservoir and pump cylinder; and valve means communicating with said pump cylinder, reservoir and distributor means for directing fuel from said reservoir to said pump cylinder during the suction strokes of said piston and from said pump cylinder to said distributor means during pressure strokes of said piston, said valve means being in the form of a pair of non-return valves carried by said distributor means, the latter having between said non-return valves a chamber in constant communication with said pump cylinder.

2. An injection pump for a multi-cylinder engine, comprising, in combination, a housing formed in its interior with a fuel reservoir, with a pump cylinder, and with a return-flow passage leading from said pump cylinder to said reservoir; distributor means for distributing fuel to the several engine cylinders, said distributor means being mounted in said housing for movement therein and being formed in its interior with a chamber communicating with said reservoir and with said pump cylinder; a piston located in said pump cylinder, having one end portion extending beyond the latter, and being formed in its outer face at an opposite end portion within said pump cylinder with a first axially extending groove and with a second annular groove located intermediate the ends of said piston and having one side face which is inclined with respect to its opposite side face and which passes over said return-flow passage during reciprocation of said piston; cam means engaging said one end portion of said piston for moving the same in its pressure stroke in said pump cylinder; first non-return valve means located in said chamber of said distributor means at the part thereof which communicates with said reservoir for preventing fuel from flowing from said chamber back to said reservoir during the pressure stroke of said piston and for opening said chamber to said reservoir during the suction stroke of said piston; second non-return valve means located in said chamber for preventing flow of fuel from the engine back to said chamber of said distributor means during the suction stroke of said piston and for opening said distributor means to said chamber thereof during the pressure stroke of said piston, the pressure of the fuel in said reservoir and chamber maintaining said piston in engagement with said cam means and moving said piston along its suction stroke; and adjusting means operatively connected to said piston for adjusting the angular position thereof with respect to its axis so as to thereby control the moment when said inclined side face of said annular groove communicates with said return flow passage during the pressure stroke of said piston to thereby control the amount of fuel supplied to said distributor means during the pressure stroke of said piston.

3. An injection pump for a multi-cylinder engine, comprising, in combination, a housing formed in its interior with a cylindrical fuel reservoir, with a pump cylinder, and with an enclosure; distributor means for distributing fuel to the several engine cylinders, said distributor means being mounted in said housing for movement therein and being formed in its interior with a chamber communicating with said reservoir and with said pump cylinder; a piston located in said pump cylinder and having an end portion extending beyond the latter; cam means engaging said end portion of said piston for moving the latter in its pressure stroke in said pump cylinder, said cam means being located in said enclosure of said housing; first non-return valve means located in said chamber of said distributor means at the part thereof which communicates with said reservoir for preventing fuel from flowing from said chamber back to said reservoir during the pressure stroke of said piston and for opening said chamber to said reservoir during the suction stroke of said piston; second non-return valve means located in said chamber for preventing flow of fuel from the engine back to said chamber of said distributor means during the suction stroke of said piston and for opening said distributor means to said chamber thereof during the pres-

sure stroke of said piston, the pressure of the fuel in said reservoir and chamber maintaining said piston in engagement with said cam means and moving said piston along its suction stroke; a second piston located in said cylindrical reservoir; spring means engaging said second piston for urging the latter in one direction in said reservoir to equalize the fuel pressure therein; and passage means providing communication between said reservoir and enclosure and having an inlet end located in said reservoir in a position to be uncovered by said second piston when said spring means has been compressed to a predetermined degree to then convey fuel from said reservoir to said enclosure.

4. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a driving member carried by said housing for rotation about an axis located in a plane including the axis of said bore and formed with an opening whose center is spaced from the axis of rotation of said driving member; a pin fixed to said distributor means and extending into said opening of said driving member; and a roller having a substantially spherical outer surface carried by said pin and also located in said opening so that during rotation of said driving member said distributor means is reciprocated along said bore and is oscillated about the axis of said bore to alternately place said cutout in communication with said inlet and discharge portions of said passage, whereby said distributor means also serves to draw fuel through said inlet portion of said passage into said bore and move fuel from the same through said discharge portion of said passage into said reservoir.

5. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a driving member carried by said housing for rotation about an axis located in a plane including the axis of said bore and formed with an opening whose center is spaced from the axis of rotation of said driving member; a pin fixed to said distributor means and extending into said opening of said driving member; a roller having a substantially spherical outer surface carried by said pin and also located in said opening so that during rotation of said driving member said distributor means is reciprocated along said bore and is oscillated about the axis of said bore to alternately place said cutout in communication with said inlet and discharge portions of said passage, whereby said distributor means also serves to draw fuel through said inlet portion of said passage into said bore and move fuel from the same through said discharge portion of said passage into said reservoir; a pump cylinder located in said housing, communicating with said reservoir and distributor means, and having its axis located in said plane; a piston located in said pump cylinder and having an end portion extending therefrom; a cam disc fixed to said driving member for rotation therewith and having a plurality of cam portions equal to the number of engine cylinders; valve means communicating with said reservoir, pump cylinder and distributor means for directing fuel from said reservoir to said pump cylinder during each suction stroke of said piston and from cylinder to said distributor means during each pressure stroke of said piston; and motion transmitting means engaging said cam disc and portion of said piston for transmitting movement of said cam disc to said piston, the pressure of the fuel in said reservoir and cylinder maintain said piston in engagement with said motion transmitting means, whereby said piston moves during each cycle of said distributor means through a number of cycles equal to the number of cylinders and delivers fuel to said distributor means during each pressure stroke of said piston and draws fuel into said cylinder during each suction stroke of said piston.

6. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir extending along a predetermined axis, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a driving member carried by said housing for rotation about an axis located in a plane including the axes of said bore and reservoir and formed with an opening whose center is spaced from the axis of rotation of said driving member; a pin fixed to said distributor means and extending into said opening of said driving member; a roller having a substantially spherical outer surface carried by said pin and also located in said opening so that during rotation of said driving member said distributor means is reciprocated along said bore and is oscillated about the axis of said bore to alternately place said cutout in communication with said inlet and discharge portions of said passage, whereby said distributor means also serves to draw fuel through said inlet portion of said passage into said bore and move fuel from the same through said discharge portion of said passage into said reservoir; a pump cylinder located in said housing, communicating with said reservoir and distributor means, and having its axis located in said plane; a piston located in said pump cylinder and having an end portion extending therefrom; a cam disc fixed to said driving member for rotation therewith and having a plurality of cam portions equal to the number of engine cylinders; valve means communicating with said reservoir, pump cylinder and distributor means for directing fuel from said reservoir to said pump cylinder during each suction stroke of said piston and from cylinder to said distributor means during each pressure stroke of said piston and motion transmitting means engaging said cam disc and said end portion of said piston for transmitting movement of said cam disc to said piston, the pressure of the fuel in said reservoir and cylinder maintaining said piston in engagement with said motion transmitting means, whereby said piston moves during each cycle of said distributor means through a number of cycles equal to the number of cylinders and delivers fuel to said distributor means during each pressure stroke of said piston and draws fuel into said cylinder during each suction stroke of said piston.

7. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a pair of driving members carried by said housing in spaced relation to each other on opposite sides of said distributor means, respectively, for rotation about a common axis located in a plane including the axis of said bore, said driving members respectively being formed

with eccentric openings; a pin connected to said distributor means and extending at opposite end portions thereof respectively into said openings; and a pair of rollers having spherical outer surfaces respectively carried by said end portions of said pin and located in said openings of said driving members, respectively, so that rotation of one driving member will oscillate said distributor means along and about its axis to place said cutout thereof alternately in communication with said inlet and discharge portions of said passage while the other driving member may be used to drive a governor or the like.

8. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a pair of driving members carried by said housing in spaced relation to each other on opposite sides of said distributor means, respectively, for rotation about a common axis located in a plane including the axis of said bore, said driving members respectively being formed with eccentric openings; a pin connected to said distributor means and extending at opposite end portions thereof respectively into said openings; a pair of rollers having spherical outer surfaces respectively carried by said end portions of said pin and located in said openings of said driving members, respectively, one of said rollers engaging one of said driving members; and annular at least partly elastomeric means located about the other of said rollers in engagement therewith and in engagement with the other of said driving members in said opening thereof, so that rotation of said one driving member will oscillate said distributor means along and about its axis to place said cutout thereof alternately in communication with said inlet and discharge portions of said passage while said other driving member may be used to drive a governor or the like, said elastomeric means serving to dampen vibrations.

9. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a driving member carried by said housing for rotation about an axis located in a plane including the axis of said bore and formed with an opening whose center is spaced from the axis of rotation of said driving member; and pin means fixed to said distributor means and extending into said opening of said driving member, said pin means having in said opening of said driving member an outer surface portion forming part of the sphere so that during rotation of said member said distributor means is reciprocated along said bore and is oscillated about the axis of said bore to alternately place said cutout in communication with said inlet and discharge portions of said passage, whereby said distributor means also serves to draw fuel through said inlet portion of said passage into said bore and move fuel from the same through said discharge portion of said passage into said reservoir.

10. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a pair of driving members carried by said housing in spaced relation to each other on opposite sides of said distributor means, respectively, for rotation about a common axis located in a plane including the axis of said bore, said driving members respectively being formed with eccentric openings; and pin means connected to said distributor means, extending at opposite end portions thereof respectively into said openings of said driving means, and having in said openings and at said opposite end portions outer surface portions respectively forming parts of spheres, so that rotation of one driving member will oscillate said distributor means along and about its axis to place said cutout thereof alternately in communication with said inlet and discharge portions of said passage while the other driving member may be used to drive a governor or the like.

11. In an injection pump for a multi-cylinder engine, in combination, a housing formed in its interior with a fuel reservoir, with a passage having an inlet portion leading into said housing and a discharge portion leading into said reservoir, and with an elongated bore extending across said passage between and communicating with said inlet and discharge portions thereof; elongated distributor means slidably located in said bore for distributing fuel to the several cylinders, said distributor means being formed with a cutout located between said passage portions; a pair of driving members carried by said housing in spaced relation to each other on opposite sides of said distributor means, respectively, for rotation about a common axis located in a plane including the axis of said bore, said driving members respectively being formed with eccentric openings; pin means connected to said distributor means, extending at opposite end portions thereof respectively into said openings of said driving means, and having in said openings and at said opposite end portions outer surface portions respectively forming parts of spheres, one of said end portions of said pins engaging one of said driving members; and annular at least partly elastomeric means located about the other of said end portions of said pin means in engagement therewith and in said opening of the other of said driving members in engagement with the latter, so that rotation of said one driving member will oscillate said distributor means along and about its axis to place said cutout thereof alternately in communication with said inlet and discharge portions of said passage while said other driving member may be used to drive a governor or the like, said elastomeric means serving to dampen vibrations.

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