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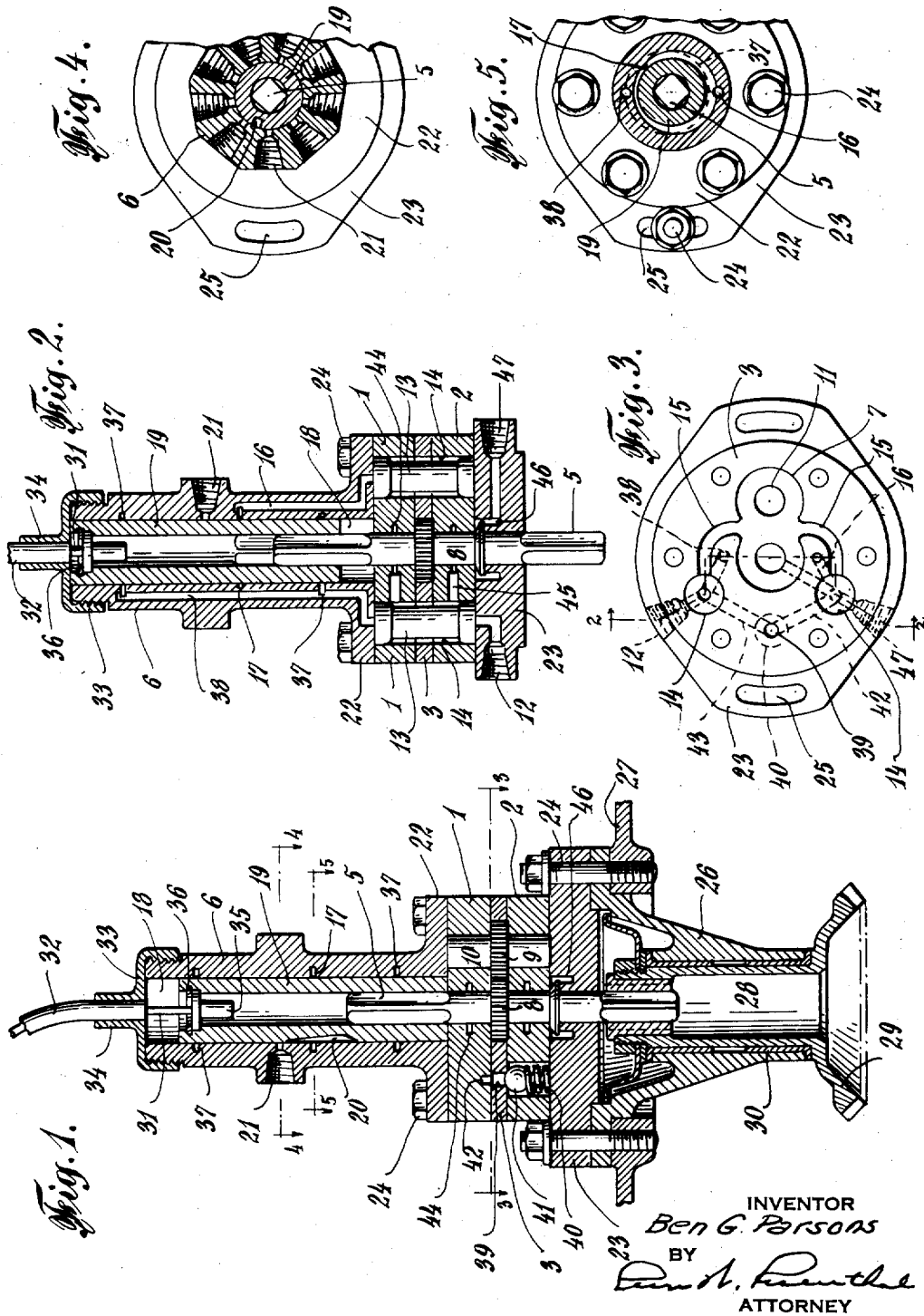
B. G. PARSONS

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FUEL FEEDING DEVICE

Filed Jan. 31, 1933

2 Sheets-Sheet 1



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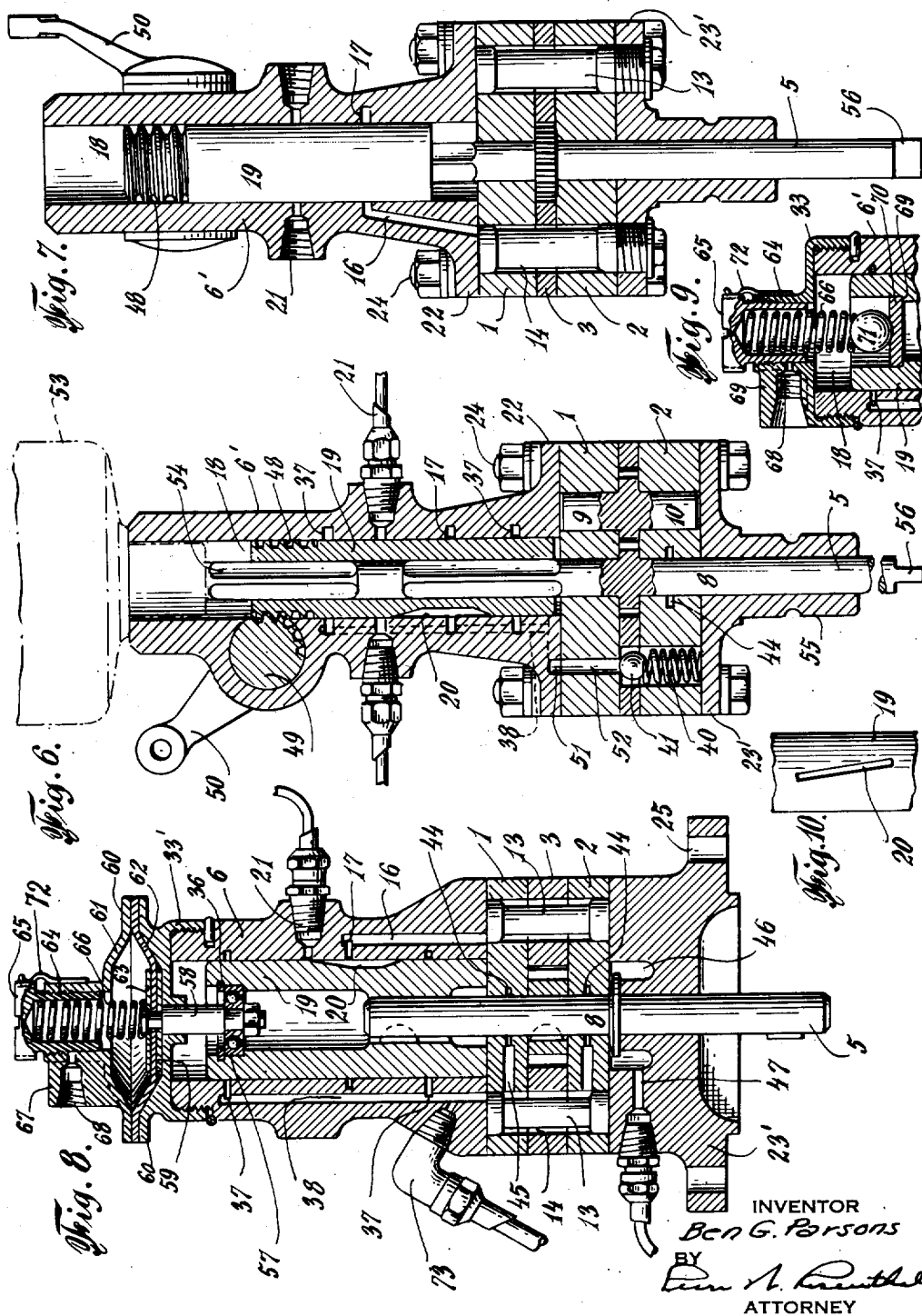
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FUEL FEEDING DEVICE

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Application January 31, 1933, Serial No. 654,394

2 Claims. (Cl. 251—92)

This invention relates to fuel feeding devices, and particularly fuel feeding devices for internal combustion engines.

An object of the invention is to provide a fuel feeding device by which the liquid fuel can be metered and distributed to each of the cylinders of an internal combustion engine in turn, and by which the operation of the engine can be regulated and rendered most satisfactory for the entire range of working speed.

A further object of the invention is to provide a fuel distributing apparatus which can be advantageously connected to be actuated by the same shaft of the engine as the ignition timer thereof and which is simple in construction and easily installed and connected in operative relation.

Another object of the invention is to provide a fuel feeding device comprising a distributor sleeve which is rotatable to enable liquid fuel to be delivered to each cylinder of the engine in succession and which has a novel groove or passage in its surface; the sleeve being shiftable to alter the effective length of said groove or passage and vary the quantity of fuel passing therethrough according to working conditions and requirements.

These and other objects and advantages of the invention are fully set forth in the ensuing description; however, I do not wish to be confined to the exact details of construction herein set forth, but reserve the right to make any changes that are embraced within the principle and scope of the invention.

On said drawings:

Fig. 1 is a longitudinal sectional view of a fuel feeding pump and distributor to be employed in a fuel feeding system according to my invention;

Fig. 2 is a section at right angles to that of Fig. 1 showing most of the construction that appears in Fig. 1; the section being on line 2—2 of Fig. 3;

Fig. 3 is a horizontal section on the line 3—3 of Fig. 1;

Fig. 4 is a horizontal section on the line 4—4 of Fig. 1;

Fig. 5 is a horizontal section substantially on the line 5—5 of Fig. 1;

Fig. 6 is a view similar to Fig. 1 of a modification;

Fig. 7 is a longitudinal sectional view of the same modification taken at right angles to the section shown in Fig. 6;

Fig. 8 is a longitudinal section of a further modification; and

Figs. 9 and 10 show other modifications.

On the drawings the same numerals identify the same parts throughout.

Referring first to Figs. 1 to 5 inclusive, I show a combined pump and distributor construction comprising a pair of heads 1 and 2 between which is a center or spacing plate 3. These parts have a central opening to receive a shaft 5. On the upper head 1 is supported or mounted a suitable casing or housing 6. The spacing plate 3 has a cavity 7 to receive a pair of gears 8 and 9 forming the movable members of the pump. The gear 8 is affixed to the shaft 5 and the gear 9 is mounted on a shaft 10 supported in bearing openings 11 in the heads 1 and 2; this gear rotating idly and receiving power from the shaft 5. As indicated in Figs. 2 and 3 the inlet 12 is provided through which the liquid fuel passes into the pump. It first reaches a filter 13 in a cavity 14 provided by aligned openings in the heads 1 and 2 and plate 3 and then it passes through a duct 15 to the cavity 7 from which it is urged by the pump gears 8 and 9 through a similar duct 15 to another filter 13 in a similar cavity 14, provided in the heads 1 and 2 and plate 3. From the filter 13 it arrives at a duct or passage 16 which conveys it to a circular groove 17 which is open throughout its entire extent to the space 18 enclosed by the housing 6. Within this housing, however, is disposed a rotatable and axially shiftable distributor sleeve or member 19 and this sleeve has a longitudinal or axially extending groove 20 in its outside surface which registers with the groove 17. Adjacent the groove 17 are outlets 21 which are connected by suitable conduits to the various engine cylinders. Whenever the groove 20 registers with the ports leading to the outlet openings 21, fuel can flow from the groove 17 through the groove or passage 20 to the outlet leading to the cylinder which requires fuel to be injected into same.

The passages 15 may be in the plate 3 or they may be partly in the heads 1 and 2 and plate 3 so as to lead from the end of one filter to the end of the other through the pump comprising the gears 8 and 9.

The housing or casing 6 has a flange 22 at its lower end with bolt holes therein and the housing and pump construction together are supported upon a base plate 23. In this base plate is formed the inlet passage 12 leading to the first filter 13. The bolts for securing the housing, the heads 1

and 2 and plate 3 to the base member are indicated at 24. At the opposite end of this base member are slots 25 through which pass similar bolts securing the combined pump and distributor to a mounting or support 26 which is made fast by the same bolts to a portion of the engine framework shown at 21. The mounting 26 is hollow to receive a hollow shaft 28 having on its lower end a drive gear 29, and between the mounting 26 and shaft 28 is a bushing or jacket 30. The one end of the shaft 5 has a suitable connection with the shaft 28 so that it can be rotated thereby. The slots 25 of course permit adjustment of the pump and distributor on the mounting 26 to give timing of the injection of the fuel into the engine.

The axially extending groove or passage 20 is preferably of the same width throughout but it varies in depth from its upper to its lower end. Hence the higher the distributing sleeve is lifted, the more fuel can be delivered from the groove 20 to each outlet 21 every time this groove registers with one of said outlets. When the engine is carrying a heavier load, for example, and the distributor sleeve is adjusted accordingly more fuel can be conveyed to the engine in the same angular interval of rotation of the sleeve 19. To enable this sleeve to be shifted, I connect to the upper end thereof a flexible shaft 31 which is enveloped in a sleeve or casing 32 and extends to a point where the necessary force can be applied to this flexible cable to move the sleeve 19 up and down. The cable 31 may be actuated by hand or connected to a centrifugal governor as in Figs. 6 and 7 or to a suitable unit which is actuated by the suction of the engine pistons on the intake stroke and thus cause automatic adjustment of the sleeve 19 according to load; as in Figs. 8 and 9. The upper end of the housing or casing 6 has a screw cap 33 with a hollow boss 34 which receives one end of the sleeve 32 and the end of the flexible cable 31 has a head 35 thereon which is disposed within the sleeve 19 at the upper end and rotatably connected thereto. This sleeve is held in place by a locking washer 36 which engages a flange of the head and fits into a suitable recess in the sleeve. Hence the connection between the sleeve 19 and cable 31 permits the sleeve 19 to rotate without necessarily rotating the head 35 and cable 31, but permits longitudinal shifting of the distributor member 19 so that the desired portion of the groove or passage 20 extends between the circular groove 17 and outlets 21.

The housing or casing 6 has two other inside grooves 37 connected by a duct 38 to the inlet filter 13. Hence any leakage of the fuel between the housing 6 and sleeve 19 at the ends of the passage 20 is returned to this filter.

The plate 3 also has a small port 39 which communicates with a cavity 40 in the lower head 2; this cavity containing a spring-pressed ball 41 which normally closes the port 39. Above the port 39 in the upper head 1 and communicating with this port is a duct 42 which connects one filter cavity 14 to the port 39. A similar passage 43 will connect the bottom of the other filter cavity and the bottom of the cavity 40 to the intake 12 so that whenever the pressure of the fuel becomes too great the ball valve 41 will be forced open. Hence any excess fuel is returned to the inlet port 12.

The heads or plates 1 and 2 also have inside grooves 44 in the openings 4 surrounding the shaft 5 and these grooves communicate through

passages 45 with one of the filters 13. The grooves 44 collect leakage and return it to inlet 12. The base member 23 also has a groove 46 which communicates with a drain duct 47 to collect fuel escaping from grooves 44 when the pump is stopped. This is to keep fuel out of the crank case on which the distributor is mounted.

From the description it can be seen that the engine can be supplied with fuel in the most satisfactory manner and the fuel properly varied according to the working requirements.

Figs. 6 and 7 show a similar construction in which the pump and distributor housing 6' are supported upon a base 23'; but the distributor member 19 has threads 48 to mesh with gear teeth on a rotatable element 49 in a bearing on the housing 6'. The end of this element has an external arm 50 to turn the element and this arm 50 may be actuated by hand or by automatic means as before. The cavity 40 is again connected to the intake 12, as shown in Fig. 3, and a passage or duct 51 is arranged at the lower end of the housing 6' to communicate with the lower end of the passage 16. This duct 51 leads to a duct 52 in the upper head 1 which is normally closed by the ball valve 41. Therefore, when the pressure becomes too high the excess fuel is returned by way of passages 51 and 52 and cavity 40 to the fuel intake, as in Fig. 3.

This construction can be clearly understood by bearing in mind that Fig. 7 is a section through the middle of Fig. 6, seen from the right. The duct or passage 38 shown on Fig. 6 in dotted lines may be placed at any convenient point to connect grooves 37 with the filter near the intake as shown on Fig. 2.

Figs. 6 and 7 show the timer casing 53 supported on the housing 6' and having a shaft 54 that projects into the sleeve 19. This shaft 54 is caused to rotate by the sleeve 19 but permits the sleeve 19 to slide with respect to same. The sleeve 19 is similarly connected to the shaft 5 which extends outward through a boss 55 on the base member 23' and has a key 56 at one end to connect it to the engine drive shaft. Shafts 5 and 54 may have squared ends to give them a sliding-key fit in a similar bore of the member 19.

The construction in Fig. 8 has an anti-friction bearing 57 at the upper end of the sleeve 19 for rotatably connecting the sleeve to a short shaft 58 so that while this shaft can rotate with respect to the sleeve 19 it cannot move longitudinally independently of the sleeve. The bearing 57 is held in place by a washer 36. The top of the housing 6 is closed by a cap 33' which has in its top a recess surrounded by a radially extending flange 60. This cap has a cover 61 with a similar flange 60; the flanges enabling the cap and cover to be secured together. This cover is cone-shaped adjacent its flange 60 so as to provide therein a similar recess and a diaphragm 62 gripped between the flanges 60 is made fast to the shaft 58 by means of central discs or washers 63. The cover has a central upward extending boss 64 into which is threaded a hollow sleeve nut 65. This sleeve nut receives a spring 66 which bears down on the diaphragm 62. The boss 64 has a lateral projection 67 through which extends a passage 68 that can be connected by a pipe to the intake manifold. Hence when the device is in use the suction of the engine taking effect through the connection leading to the passage 68 tends to exhaust the air above the

diaphragm 62 and lift the distributor member 19.

Fig. 9 shows a modified construction wherein the cap 33' has a boss 64 closed by a sleeve nut 65, with the projection 67 containing passage 5 68 at one side of this boss 64. The sleeve 19 has an inside shoulder 69 on which rests a washer 70 which is recessed slightly to form a seat for a ball 71. This ball is engaged by one end of the spring 66. The suction of the engine takes 10 effect on the space 18 above the sleeve 19 and tends to draw the sleeve 19 upward against the force of this spring.

A catch 72 at the side of the boss 64 in Figs. 8 and 9 engages recesses in the circumference of 15 the nut 65 to hold this nut in adjusted position.

In Fig. 8 a connection 73 communicates with the duct 38 to return any fuel in this duct back to the first filter, or the inlet 12.

In Fig. 8, further, the idler which meshes with 20 the gear 8 is preferably flat with no integral shaft 10 as shown in Figs. 1 and 6.

The longitudinal slot or passage 20 may be parallel to the axis of the sleeve 19 or slightly inclined thereto as indicated in Fig. 10. This 25 construction is for the purpose of permitting the instant of the beginning or end of the injection of the fuel to be regulated.

Having described my invention, what I claim is:

1. A casing, fuel delivery conduits in said casing, a member mounted for rotation and reciprocation in the casing, the latter having a supply duct, the member having a longitudinally extending groove in continuous communication with said supply duct and adapted, as the member rotates, to register with each of the delivery conduits in turn, said longitudinal groove being of varying depth, and means for shifting the member to change the point at which the groove communicates with the delivery conduits and regulate the amount of fuel delivered thereto.

2. A casing, fuel delivery conduits in said casing, a member mounted for rotation and reciprocation in the casing, said member having a longitudinally extending groove, said groove being of constant width but varying delivery capacity, said fuel delivery conduits being adapted to register with the groove in said member as the latter rotates, said casing having passages for supplying fuel to said groove and means supported by the casing and engaging the member for shifting the latter in an axial direction to change the point of communication of the groove in said member with said delivery conduits and vary the amount of fuel discharge into said conduits.

BEN G. PARSONS.

CERTIFICATE OF CORRECTION.

Patent No. 2,087,296.

July 20, 1937.

BEN G. PARSONS.

It is hereby certified that the address of the assignee in the above numbered patent was erroneously described and specified as "Springfield, Ohio" whereas said address should have been described and specified as Springfield, Massachusetts; as shown by the records of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 31st day of August, A. D. 1937.

Leslie Frazer

(Seal)

Acting Commissioner of Patents.

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2. A casing, fuel delivery conduits in said casing, a member mounted for rotation and reciprocation in the casing, said member having a longitudinally extending groove, said groove being of constant width but varying delivery capacity, said fuel delivery conduits being adapted to register with the groove in said member as the latter rotates, said casing having passages for supplying fuel to said groove and means supported by the casing and engaging the member for shifting the latter in an axial direction to change the point of communication of the groove in said member with said delivery conduits and vary the amount of fuel discharge into said conduits.

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