

G. D. POGUE.
VARIABLE FEED PUMP.
APPLICATION FILED JAN. 7, 1915.

1,203,259.

Patented Oct. 31, 1916.

Fig. 1.

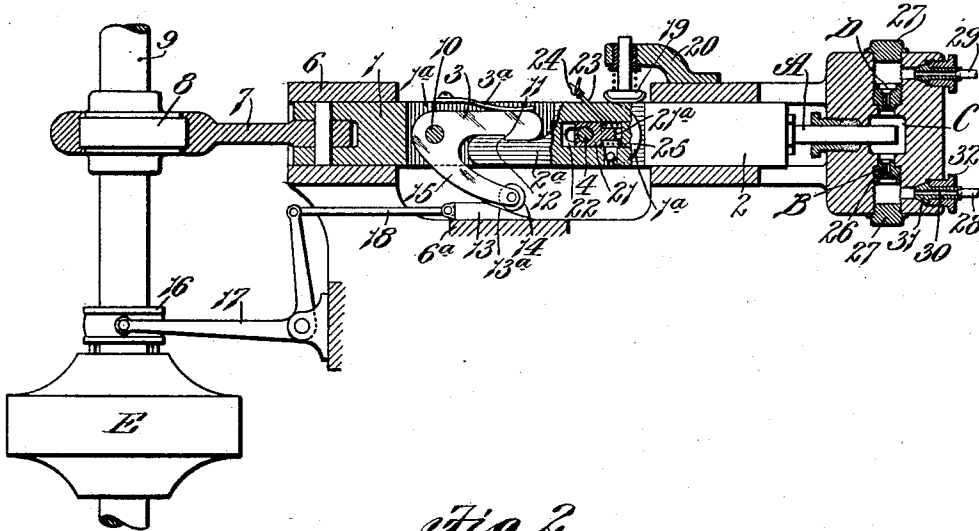


Fig. 2.

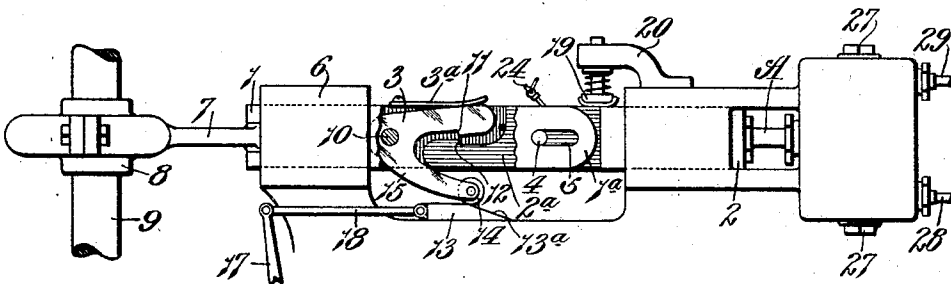
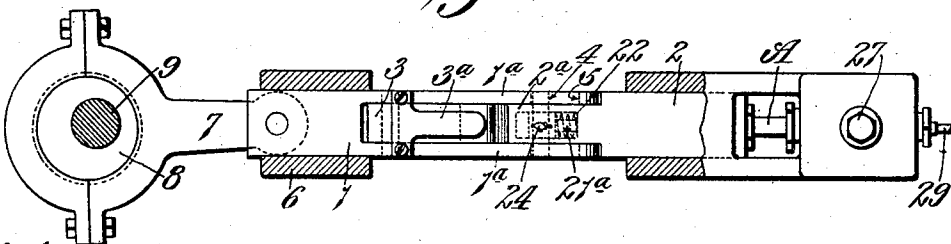


Fig. 3.



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UNITED STATES PATENT OFFICE.

GEORGE D. POGUE, OF ST. LOUIS, MISSOURI.

VARIABLE-FEED PUMP.

1,203,259.

Specification of Letters Patent.

Patented Oct. 31, 1916.

Application filed January 7, 1915. Serial No. 967.

To all whom it may concern:

Be it known that I, GEORGE D. POGUE, a citizen of the United States, residing at St. Louis, Missouri, have invented a certain new and useful Improvement in Variable-Feed Pumps, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to variable feed pumps, and has for its main object to provide a pump that has the principal good features and characteristics of the pump described in my United States Patent No. 1,154,723, dated September 28, 1915, but which is so designed that the connecting element interposed between the constant-stroke actuating member and the variable-stroke member of the plunger-operating mechanism is tripped or displaced sooner or later on the suction stroke of the piston, so as to vary the degree of movement imparted to the piston on its displacement stroke, and thus regulate the supply from the pump, the advantage of such a construction being that there is less stress on the connecting element at the time it is tripped or rendered inoperative.

Another object is to provide a practicable variable feed pump of simple construction that will operate smoothly and quietly without liability of reacting on or interfering with the automatic governing device, and which is so designed that the coöperating parts of the plunger-operating mechanism are not apt to wear out quickly.

Other objects and desirable features of my present invention will be hereinafter pointed out.

While I have illustrated only one type of connecting element for establishing connection between the constant-stroke member and the variable-stroke member of the plunger-operating mechanism and have illustrated only one form of device for tripping said connecting element or rendering it inoperative, I wish it to be understood that it is immaterial, so far as my present invention is concerned, what particular kind of connecting device is employed for connecting the constant-stroke member and variable stroke member together and for tripping said connecting device, so long as said co-operating parts are so designed and arranged that the variable-stroke member will be automatically disconnected from the con-

stant-stroke member on the suction stroke of the piston.

Figure 1 of the drawings is a side elevational view partly in vertical section of a variable feed pump constructed in accordance with my present invention. Fig. 2 is a similar view, showing the parts in a different position; and Fig. 3 is a top plan view of the pump illustrated in Fig. 1.

Referring to the drawings which illustrate the preferred form of my invention, A designates the piston or plunger of the pump, B designates the suction valve that controls the inlet port through which the fluid is drawn into the chamber C of the pump on the section stroke of the piston, and D designates the discharge valve that controls the port through which the fluid is forced out of the chamber C on the discharge stroke of the piston. The mechanism for operating the plunger C consists of a constant-stroke primary actuating member 1, which is preferably moved positively in both directions, a variable-stroke member 2 that carries the plunger A and a connecting element 3 interposed between the members 1 and 2 so as to cause the variable-stroke member 2 to move with the primary actuating member 1 on the suction stroke of the piston, said actuating member and variable-stroke member being arranged either in a horizontal or a vertical position. A means separate and distinct from the connecting element 3 is preferably employed for transmitting movement from the primary actuating member 1 to the variable-stroke member 2 on the discharge stroke or displacement stroke of the piston, and in the form of my invention herein illustrated said means consists of a cross pin 4 in the variable-stroke member 2 that projects laterally into elongated slots formed in portions 1^a of the member 1 that embrace the member 2, as shown in Fig. 3, and thus hold said members in longitudinal alinement with each other. It is immaterial, so far as my present invention is concerned, what the primary actuating member 1 consists of or how it is operated, but I prefer to use a reciprocating cross head to form the primary actuating member, which cross head is moved positively back and forth in a stationary guideway 6 by any suitable means, such, for example, as an eccentric link 7 pivotally connecting at one end to the primary actuating member 1 and provided at its opposite end

with a strap that surrounds an eccentric 8 on a constantly rotating shaft 9, the variable-stroke member 2 also consisting of a reciprocating element that moves back and forth in a stationary guide-way.

The connecting element 3 herein shown consists of a link arranged between the side guide portions 1^a of the member 1 and pivotally connected at one end to same by means of a pintle or pivot pin 10. Said link 3 is provided at its opposite end with a tooth or abutment 11 that is adapted to engage a cooperating tooth or abutment 12 on an extension 2^a at the inner end of the variable-stroke member 2, and thus cause the member 2 to move with the primary actuating member 1 on the suction stroke of the piston, said connecting element 3 preferably being under the influence of a spring 3^a which tends to force same downwardly toward the extension 2^a at the inner end of the variable-stroke member. When the primary actuating member 1 moves in the opposite direction, namely, to the right, looking at Fig. 1, the cross pin 4 in the variable-stroke member 2 comes into play and transmits movement from the primary actuating member 1 to the variable-stroke member 2.

The supply from the pump is governed by means of a tripping device 13 that trips the connecting element 3 or renders it inoperative sooner or later on the suction stroke of the primary actuating member 1 so as to vary the degree of movement that is imparted to the variable-stroke member 2 by the member 1 during the operation of drawing the fluid into the chamber C of the pump. In other words, the tripping device 13 displaces the link 3 or disconnects it from the variable-stroke member 2 before the primary actuating member 1 reaches the limit of its movement to the left in Fig. 1, the position of said tripping device 13 being changed automatically so as to cause the connecting element to be tripped at different times prior to the completion of the stroke of the primary actuating member 1 when the piston of the pump is moving on its suction stroke.

In the embodiment of my invention herein illustrated the tripping device 13 consists of a member provided with an inclined surface 13^a that is adapted to be engaged by a roll 14 on an arm 15 that depends from one end of the link or connecting element 3, said member 13 being mounted on a stationary support 6^a and arranged in such a manner that the roll 14 will ride upwardly onto the inclined surface on same and thus disengage the link 3 from the variable-stroke member 2 when the primary actuating member 1, moving to the left or in the direction to impart a suction stroke to the piston.

When my improved pump is used in connection with an internal combustion engine

for feeding the oil to the cylinders of the engine the tripping device 13 will be operatively connected with the governor of the engine so as to cause the connecting element 3 of the plunger-operating mechanism to be tripped or rendered inoperative sooner or later on the suction stroke of the piston, according to the speed of the engine, and thus cause varying quantities of fuel oil to be drawn into the chamber C of the pump.

In Fig. 1 I have shown an automatic governor E provided with a collar 16 that moves up and down on the shaft 9 as the speed of the engine varies, and a bell crank lever 17 and link 18 for transmitting movement from said collar to the tripping device 13, the movement of the lever 17 under the influence of the governor collar 16 causing the position of the tripping device 13 to be changed automatically. It will, of course, be obvious that any other suitable means than the bell crank lever and link herein shown could be employed for automatically shifting the tripping device 13 when the speed of the engine varies.

If desired, a brake or similar device 19 can be employed for arresting the movement of the variable-stroke member 2 or causing it to stop immediately when it becomes disconnected from the primary actuating member 1 during the suction stroke of the piston, the brake 19 herein shown consisting of a friction device that is supported in a bracket 20 on the stationary guide-way 6 and arranged in such a manner that it bears upon the variable-stroke member 2. I also prefer to equip the plunger-operating mechanism with means for taking up the shock on the variable-stroke member 2 when it is picked up or engaged by the primary actuating member 1 during the displacement stroke of the piston, or, in other words, when the primary actuating member is moved to the right, looking at Fig. 1. In the embodiment of my invention herein shown the cross pin 4 is carried by the movable element 21 of a dash pot, which movable element consists of a small piston arranged in a chamber or cylinder 22 formed in the variable-stroke member 2, as shown in Fig. 1. When the cross pin 4 is engaged by the side portions 1^a of the primary actuating member during the movement of said actuating member to the right, looking at Fig. 1, the air in the cylinder 22 acts as a cushion to absorb the shock on said cross pin, the air escaping from said cylinder through a port 23 which is preferably provided with a controlling valve 24, as shown in Fig. 1. The piston 21 is provided with a reduced extension 21^a that strikes against the right-hand end wall of the cylinder 22, and thus causes the variable-stroke member 2 to be moved positively by the primary actuating member 1 after the shock on the cross pin 4 has been

absorbed or taken up. The piston 21 is restored to its former position or moved to the left so as to carry the extension 21^a thereon out of engagement with the end wall of the cylinder 22 by means of a coiled compression spring 25 that is arranged between said piston and one end of the cylinder 22.

It is immaterial, so far as my present invention is concerned, what kind of valves the pump chamber C is provided with, but in the pump herein shown the suction and discharge valves are each mounted in a cage 26 that is screwed into the member in which the chamber C of the pump is formed, and removable caps 27 are provided for closing the openings in said member in which said valve cages are arranged, thereby enabling the valves to be removed easily when it becomes necessary to repair or renew same. The suction and discharge pipes 28 and 29, respectively, are connected to the member of the pump in which the valve chamber C is formed in a novel manner, each of said pipes being secured to a nipple 30 provided with a tapered inner end or head 31 that is forced snugly into a tapered seat by means of a removable nut 32 that is screwed into the member in which the pump chamber C is formed.

A pump of the construction above described will supply variable quantities of fuel to the engine, according to the speed of the engine, in view of the fact that the degree of movement of the piston A of the pump on its suction stroke is directly controlled by the governor E of the engine. In one extreme position of the governor collar 16 the connecting element 3 will be tripped shortly after the primary actuating member 1 has started to move to the left, thus causing a very slight suction stroke to be imparted to the piston, and, consequently, causing a relatively small quantity of fuel to be sucked into the chamber C of the pump. The variable-stroke member 2 comes to rest as soon as the connecting element 3 is tripped, but the actuating member 1 continues to move to the left to the end of its stroke. On the reverse stroke of the actuating member 1 the variable-stroke member 2 is picked up after the end of the small piston 21 has come in contact with the end wall of the cylinder 22 of the dash pot and thereafter moved positively by the actuating member 1, so as to force out the charge of fuel which was drawn into the chamber C of the pump on the previous suction stroke of the piston. In the other extreme position of the governor collar 16 the variable-stroke member 2 will move with the actuating member 1 to the left nearly to the end of the stroke of said actuating member before the connecting element 3 is tripped, thus causing a

relatively great quantity of fuel to be sucked into the pump chamber C, said charge of fuel being forced out of the pump and into the cylinder of the engine on the reverse stroke or displacement stroke of the primary actuating member 1. In the intermediate positions of the governor collar 16 the supply from the pump will vary automatically as the position of the governor collar changes, and, consequently, cause the proper quantity of fuel to be supplied to the engine at each cycle of operations.

While I prefer to arrange the tripping device 13 in such a manner that the connecting element 3 is tripped or rendered inoperative prior to the completion of each stroke of the primary actuating member when the piston of the pump is moving on its suction stroke, it will, of course, be obvious that said tripping device could be so arranged that it would trip the connecting element 3 only under certain conditions; for example, the tripping device 13 could be so arranged that the variable-stroke member 2 to which the piston of the pump is connected would normally have the same degree of movement as the primary actuating member 1, thus causing the maximum quantity of fuel to be supplied to the engine at each cycle of operations of the pump and be disconnected from the primary actuating member on the suction stroke of the piston only when a less quantity than the maximum quantity is required. Therefore, I wish it to be understood that my present invention contemplates tripping the connecting element 3 or disconnecting the variable-stroke member 2 from the primary actuating member 1 either at each stroke of the primary actuating member or only on such strokes when less than the maximum quantity of fuel is required.

While the pump herein illustrated has the principal good features and characteristics of the pump described in my patent previously referred to, namely, no tendency to react upon or change the normal operation of the governor, owing to the fact that the controlling device 13 is always free and is acted upon by the connecting element 3 for only an instant, said pump also has another very desirable feature, namely, there is so little stress on the connecting element 3 at the time it is tripped that very little pressure is required to trip said connecting element. In other words, the connecting element of the plunger-operating mechanism of the pump herein shown is displaced or rendered inoperative on the suction stroke of said mechanism when the coöperating parts of same are in tension, instead of in compression, thereby requiring less force or power to displace the connecting element than would be necessary if the coöperating parts of the plunger-operating mechanism

were under compression. Furthermore, a pump of the construction above described operates smoothly and quietly and is not apt to wear out quickly, owing to the fact that the plunger-operating mechanism does not comprise parts which come together with a sharp knock or slap during either stroke of said mechanism, the disengagement of the primary actuating member and the variable-stroke member being effected by simply swinging the link 3 upwardly and the shock incident to the subsequent re-engagement of said members being taken up or absorbed by a dash pot or other suitable shock-absorbing device.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is:

1. A variable feed pump provided with a piston, a piston operating mechanism that moves the piston of the pump positively on its suction stroke and on its discharge stroke, said mechanism comprising a connecting element which is adapted to be rendered ineffective under certain conditions prior to the end of the stroke of the prime mover of said mechanism on the suction stroke of the piston so as to interrupt the movement of the piston and thus vary the supply that is drawn into the pump.

2. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating member, a device that transmits movement from said actuating member to the pump piston on its suction stroke, and a movable means for rendering said device inoperative sooner or later on the suction stroke of the piston so as to vary the supply from the pump.

3. A variable feed pump provided with a piston, a piston operating mechanism that comprises a connecting element which imparts a positive movement to the piston on its suction stroke, and an adjustable tripping device arranged in such a manner that said connecting element will be tripped sooner or later on the suction stroke of the primary actuating member of said piston operating mechanism.

4. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a connecting element and a tripping device arranged in such a manner that it will be engaged by said connecting element sooner or later during the suction stroke of the piston and thus cause the piston to come to rest before said piston-operating mechanism completes its stroke in one direction.

5. In a variable feed pump, a primary actuating member, a piston, a connecting element interposed between said primary actuating member and said piston for moving said piston positively on its suction stroke, and means for rendering said ele-

ment inoperative with relation to the piston prior to the completion of the suction stroke of the primary actuating member so as to control the supply from the pump.

6. A variable feed pump provided with a piston, a primary actuating member and a plunger-actuating member, both of which reciprocate in a stationary guide-way, a connecting element interposed between said members, and a movable tripping device arranged in such a manner that it will render said connecting element inoperative on the suction stroke of the piston and thus cause the piston to come to rest before said actuating member completes its suction stroke.

7. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating member, a connecting element cooperating with said actuating member for transmitting movement to the pump piston on its suction stroke, an automatic governing device, and means controlled by said governing device and arranged in such a manner that it will render said connecting element inoperative sooner or later on the suction stroke of the piston so as to regulate the supply from the pump.

8. A variable feed pump comprising a primary actuating member, a piston-operating member, a connecting element interposed between said members for transmitting movement from the actuating member to the piston-operating member on the suction stroke of the piston, a support arranged parallel to the plane in which said members move, and an adjustable tripping element that displaces said connecting element on the suction stroke of the piston, one of said elements having an inclined surface that is engaged by the other element during the suction stroke of said primary actuating member.

9. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating member, a device that transmits movement from said actuating member to the piston on the suction stroke of the piston, and means that is capable of rendering said device inoperative prior to the completion of the suction stroke of the piston so as to govern the supply from the pump.

10. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating member and a cooperating connecting element which moves the piston positively on its suction stroke, and an automatically controlled means that is capable of rendering said connecting element inoperative sooner or later on the suction stroke of the piston-operating mechanism so as to govern the supply from the pump.

11. A variable feed pump provided with

a piston, a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke member to which the piston is secured, a connecting element for
 5 coupling said variable-stroke member to the constant-stroke member during the suction stroke of the piston so as to impart a positive movement to the piston, and means for rendering said connecting element inoperative during the suction stroke of the piston
 10 so as to cause said variable-stroke member to come to rest prior to the completion of the return stroke of said constant-stroke actuating member.

12. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member and a variable-stroke piston member, and means for transmitting movement from said
 20 actuating member to said variable-stroke member during a portion of the suction stroke of the piston member and for causing said variable-stroke member to thereafter remain at rest until after the piston-operating mechanism has started on its displacement stroke.

13. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating member and a variable-stroke member to which the piston is connected, a connecting element which joins said elements together when the
 30 actuating member is moving on its suction stroke, an adjustable controlling device for rendering said connecting element inoperative during the suction stroke of said actuating member, and independent means for transmitting movement from said actuating member to said variable-stroke member
 35 during the displacement stroke of the actuating member.

14. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating member and a variable-stroke member to which the piston is connected, a connecting element which joins said elements together when the actuating member is moving on its
 45 suction stroke, an adjustable controlling device for rendering said connecting element inoperative during the suction stroke of said actuating member, independent means for transmitting movement from said actuating member to said variable-stroke member during the displacement stroke of the actuating member, and means for absorbing the shock produced when said variable-stroke member is engaged by said actuating member during the displacement stroke of same.

15. A variable feed pump provided with a piston-operating mechanism that comprises a primary actuating member having a constant-stroke piston, a variable-stroke member to which the piston is connected, a
 60 link that joins said members together during

the suction stroke of said actuating member, means for displacing said link during the suction stroke of said actuating member, and independent means for causing said members to move in unison during
 70 a portion of the displacement stroke of the actuating member.

16. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a primary actuating member having a constant-stroke, a variable-stroke member to which the piston is connected, a link that joins said members together during the suction stroke of said actuating member, means for rendering said link inoperative
 80 during the suction stroke of said actuating member, and a slot and pin connection between said members for causing said variable-stroke member to move with the actuating member during a portion of the displacement stroke of said actuating member.

17. A variable-feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke member to which the piston is joined, a movable device on one of said members that engages the other member and causes said members to move in unison during the suction stroke of the actuating member, an adjustable controlling device, means on said movable device that coöperates with said controlling device to cause said movable device to be rendered inoperative during the suction stroke of the actuating member, and means for causing
 90 said variable-stroke member to be picked up and moved by said actuating member during the displacement stroke of the latter.

18. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke piston member to which the piston is joined, a movable device on one of said members that engages the other member and causes said members to move in unison during the suction stroke of the actuating member, an adjustable controlling device, means on said movable device that is adapted to engage said controlling device and cause said movable device to be rendered inoperative during the suction stroke of the actuating member, means for causing said variable-stroke member to be picked up and moved by said actuating member during the displacement stroke of the latter, a resilient means which coöperates with said movable device and tends to hold it in operative position with relation to said members, and means for cushioning the shock on said variable stroke member when it is engaged or picked up by the actuating member during the displacement stroke.

19. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a constant-stroke actuating mem-
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ber, a variable-stroke member that imparts movement to the piston, a connecting element for joining said members together, means for shifting said connecting element during the suction stroke of the actuating member, and means which tends to hold said variable-stroke member at rest and prevent it from overthrowing after said connecting member is rendered inoperative.

20. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke piston member, a pin on one of said members that projects into an elongated slot in the other member so as to transmit movement to the variable-stroke member on the displacement stroke of the actuating member, a pivotally mounted link on one member that engages an abutment on the other member and thus transmits movement to the variable-stroke member, and means for tripping said link during the suction stroke of the actuating member.

21. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke piston member, a pin on one of said members that projects into an elongated slot in the other member so as to transmit movement to the variable-stroke member on the displacement stroke of the actuating member, a pivotally mounted link on one member that engages an abutment on the other member and thus transmits movement to the variable-stroke member, an arm on said link provided with a roll, and an adjustable controlling device provided with an inclined surface and arranged in such a manner that said roll will engage said inclined surface and thus cause said link to be rendered inoperative during the suction stroke of the actuating member.

22. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke piston member, a pin on one of said members that projects into an elongated slot in the other member so as to transmit movement to the variable-stroke member on the displacement stroke of the actuating member, a pivotally mounted link on one member that engages an abutment on the other member and thus transmits movement to the variable-stroke member, an arm on said link provided with a roll, an adjustable controlling device provided with an inclined surface and arranged in such a manner that said roll will engage said inclined surface and thus cause said link to be rendered inoperative during the suction stroke of the actuating member, a dash pot whose movable element carries said pin, and a brake that coöperates with said variable-stroke member to prevent the same from overthrowing when it is disconnected from

the actuating member during the suction stroke of same.

23. A variable feed pump provided with a piston, a piston-operating mechanism that comprises a variable-stroke member to which the piston is connected, a constant-stroke actuating member that engages and moves said variable-stroke member during the displacement stroke of the pump piston, a device which transmits movement from said actuating member to said variable-stroke member during the suction stroke of the piston, and means for rendering said device ineffective sooner or later on the suction stroke of the piston so as to vary the supply from the pump.

24. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke piston member, said members having coöperating guiding portions that hold them in longitudinal alinement with each other, and a connecting element on one of said members that is adapted to engage the other member and thus cause the variable-stroke member to move with the actuating member on the suction stroke of the piston, said connecting element being adapted to be rendered ineffective sooner or later on the suction stroke of the piston so as to vary the supply from the pump.

25. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke member, a variable-stroke piston member that is moved in one direction by said constant stroke member, a tripable connecting element for imparting movement to said variable-stroke member when said actuating member moves in the opposite direction, and a portion on one of said members that projects into a guide-way in the other member.

26. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke piston member, and a spring-actuated connecting element for coupling said members together when said actuating member moves in one direction.

27. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke piston member, a movable element on one of said members that is adapted to couple the other member thereto when said actuating member is moving in one direction, and means that tends to normally hold said connecting element in an operative position.

28. A variable feed pump provided with a piston-operating mechanism that comprises a constant-stroke actuating member, a variable-stroke member, and a spring-actuated, pivotally mounted device on one of said members that is adapted to couple the other

member thereto when said actuating member moves in one direction.

29. A variable feed pump provided with a piston-operating mechanism that comprises
5 a constant-stroke actuating member, a variable-stroke member that is moved by said actuating member on the displacement stroke of the pump piston, coöperating guiding
10 portions on said members that hold them in longitudinal alinement with each other, a spring-actuated, pivotally mounted device on said actuating member that is adapted
15 to engage a shoulder on said variable-stroke piston member during the suction stroke of the pump piston, and means for disengaging
20 said device from said shoulder sooner or later on the suction stroke of the piston so as to vary the supply from the pump.

30. In combination with a shaft of an internal combustion engine, a speed gov-

ernor on said shaft, a source of liquid fuel supply, a feed pump provided with a cylinder having a reciprocating plunger therein, a complementary member connectible to the plunger, means interposed between the shaft 25 and said complementary member for imparting to the latter reciprocations of constant stroke, and means controlled by the governor for controlling the intake stroke of the plunger whereby the quantity of fuel 30 fed to the engine is regulated to suit the load conditions imposed on the engine.

In testimony whereof I hereunto affix my signature in the presence of two witnesses, this second day of January, 1915.

GEORGE D. POGUE.

Witnesses:

WELLS L. CHURCH,

GEORGE BAKEWELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."

It is hereby certified that in Letters Patent No. 1,203,259, granted October 31, 1916, upon the application of George D. Pogue, of St. Louis, Missouri, for an improvement in "Variable-Feed Pumps," errors appear in the printed specification requiring correction as follows: Page 1, line 72, for the word "section" read *suction*; page 2, for the reference-numeral "1_s" read *is*; page 5, line 63, claim 15, strike out the word "piston"; same page, line, and claim, after the compound word "variable-stroke" insert the word *piston*; and that the said Letters Patent should be read with these corrections therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 21st day of November, A. D., 1916.

[SEAL.]

Cl. 123—140.

F. W. H. CLAY,
Acting Commissioner of Patents.