Oct. 21, 1941. L. E. RUSH 2,259,587

VARIABLE STROKE METER

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FIG. 2

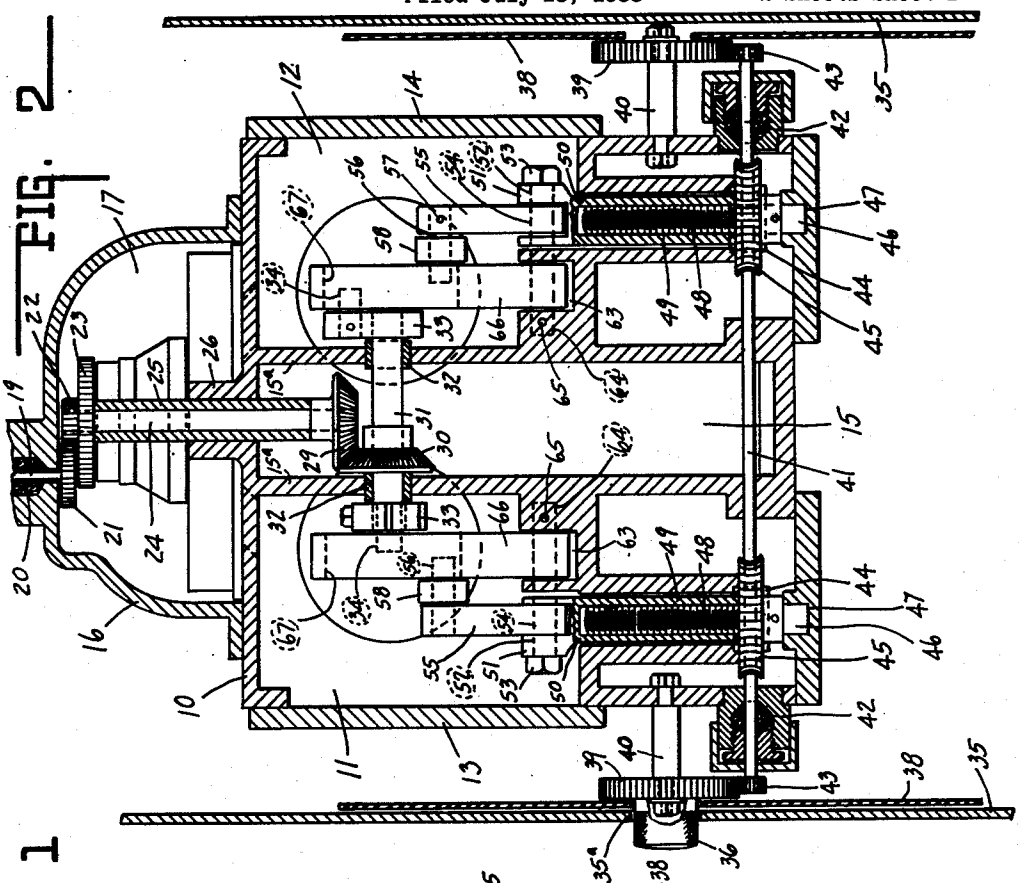
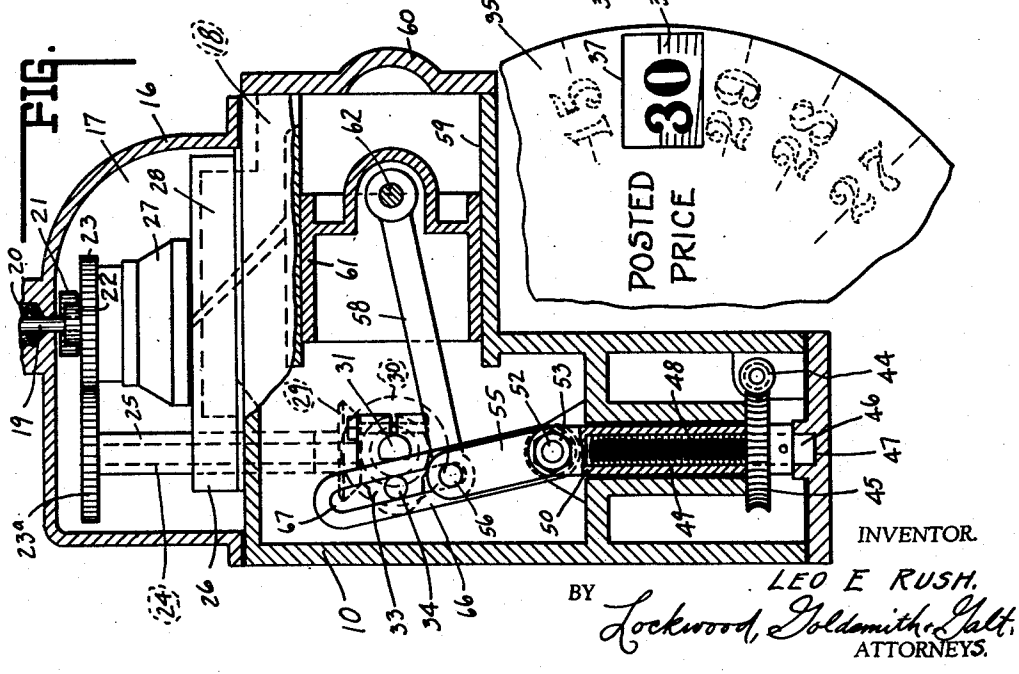


FIG. 1



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FIG. 3

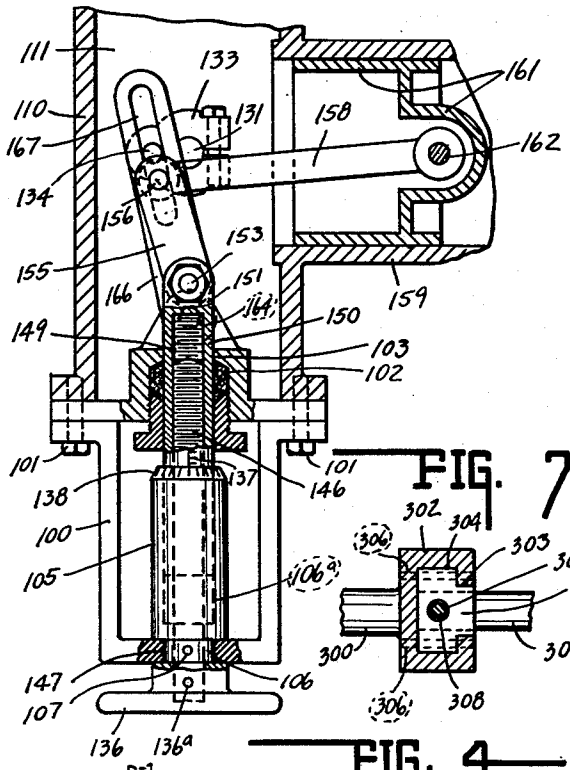


FIG. 6

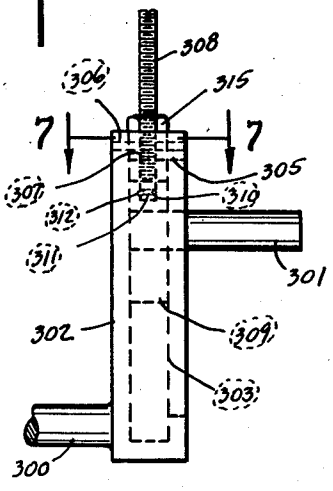


FIG. 7

FIG. 5

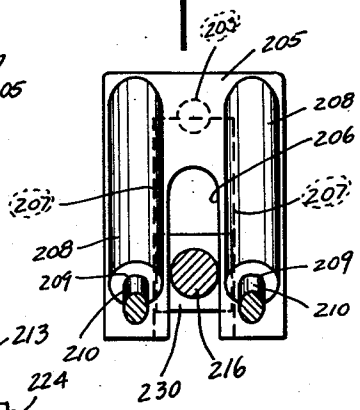
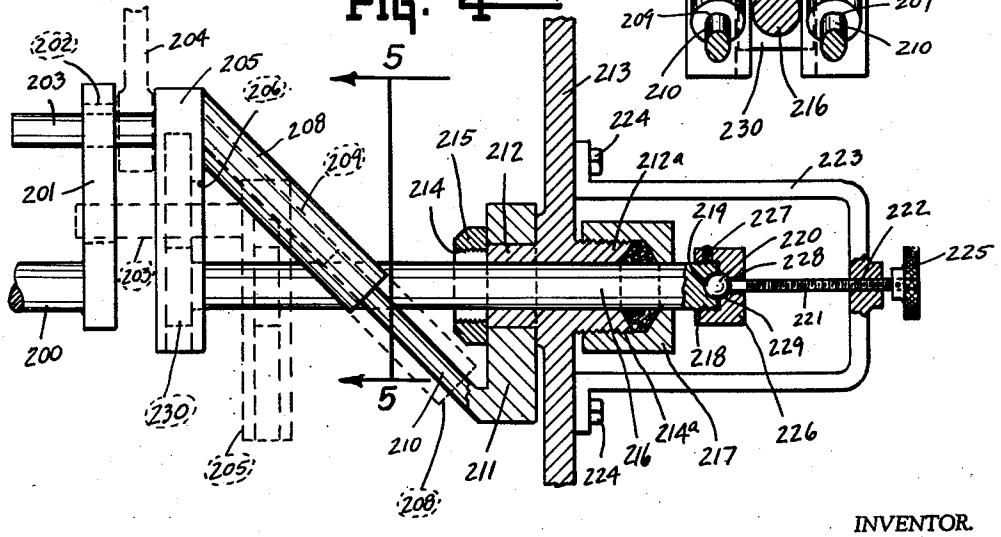


FIG. 4



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UNITED STATES PATENT OFFICE

2,259,587

VARIABLE STROKE METER

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Application July 13, 1938, Serial No. 219,028

2 Claims. (Cl. 103—38)

This invention relates to a device for controlling the length of the stroke of a piston, incorporated in a meter structure for example, which piston is enclosed within a housing and the control for varying the length of stroke has a portion external of the housing for adjustment purposes.

In apparatus of this general character, including an enclosed meter structure, said meter structure has a metering arrangement which includes a source of power rotatable at a predetermined rate for operating piston means operable by said power and valve means operable in timed relation to piston operation.

The present invention is directed to a structure of the aforesaid character and is so arranged that while the source of power rotates at the predetermined fixed rate, the volume of the material handled may be varied without disturbing the valve to piston relationship so that the volume handled by the structure will vary in accordance with the adjustment. Such adjustment is of an external operable type character.

Such adjustment is specifically associated with the operating piston so as to effect a variation in the length of its stroke and to obtain the volumetric change desired but which change does not effect the timed relationship previously mentioned.

The chief object of the invention is to provide a structure which will accomplish the foregoing purposes and the chief feature of the invention consists in a construction whereby the aforesaid object is accomplished.

The full nature of the invention will be understood from the accompanying drawings and the following description and claims.

In the drawings,

Fig. 1 is a sectional view through one embodiment of the invention, parts being broken away for clearness.

Fig. 2 is a similar view taken in a plane at right angles to the plane of the section shown in Fig. 1.

Fig. 3 is a view similar to Fig. 1 and of a modified form of the invention.

Fig. 4 is a diagrammatic plan view of another modified form of the invention.

Fig. 5 is a sectional view taken on line 5—5 of Fig. 4 and in the direction of the arrows.

Fig. 6 is an elevational view of a modified form of stroke adjusting mechanism.

Fig. 7 is a sectional view thereof taken on line 7—7 and in the direction of the arrows.

In Figs. 1 and 2 of the drawings, the embodiment selected for illustration is taken from a meter manufactured by the Pittsburgh Equitable Meter Company and certain portions of the same are illustrated herein and with the invention applied thereto.

One purpose of the invention, applied to the dispensing of liquids, is to vary the amount dispensed in accordance with the variation in the base price level so that if the meter registers cost, then the meter will always register actual total cost proportional to the volume dispensed even though the unit volume cost vary. This permits the employment of relatively simple metering mechanisms for cost computing purposes and is particularly applicable to the dispensing of gasoline, kerosene and lubricating oils and more especially the first mentioned liquid.

In Figs. 1 and 2, 10 indicates a housing which includes two chambers 11 and 12 closed as at 13 and 14, respectively. A chamber 15 is provided therebetween. A cap 16 is suitably secured to the housing 10 and forms a chamber 17 therein. The chamber 17 discharges by way of the passage 18. A shaft 19 is rotatable at a constant R. P. M. It extends through the housing 16 and the latter connection is suitably sealed by a packing structure 20.

Mounted on the end of the shaft 19, within chamber 17, is a gear 21 which meshes with a pinion 22 rigid with a gear 23. Gear 23 meshes with a gear 23a carried by shaft 24 enclosed in a sleeve 25 mounted in a bearing 26 extending from the housing 10 into chamber 17. The gear 23 and its supporting shaft arrangement are arranged to rotate elements 27 and 28 and this constitutes a valve arrangement. The same has a predetermined timed cycle with reference to the rotation of the bevel gear 29 mounted at the lower end of the sleeve 25. In other words elements 27 and 28 have the same rate of rotation as the gear 29. This gear is a miter gear and meshes with another miter gear 30 carried by shaft 31, mounted in bearings 32 in the opposed walls 15a of the chamber 15.

The oppositely extending ends of the shaft 31 each mount a crank arm structure 33, the same being of the adjustable clamp character and each including an eccentric pin 34. As shown in Fig. 2, the two arms 33 have 90° positioning.

Reference will now be had to the lower portion of Fig. 2. The numeral 35 indicates two spaced walls of an outer casing structure and the same are apertured as at 35a to expose a knurled screw 36. The wall 35 includes an aperture 37—see Fig. 1—and through the same is visible a dial 38. The dial 38 is suitably secured to the face of a

gear 38 rotatably mounted on a stationary shaft 40. Also to the gear is secured knurled finger piece 36 so that as the finger piece is rotated, the dial 38 is also rotated. The opposite wall 35 is similarly apertured and adjacent thereto is mounted a similar dial 38 carried by a similar gear 39 similarly mounted upon another stationary shaft 40.

Beneath the shaft 40 and extending through the device is a shaft 41 and each projecting end extends through a packing or stuffing box arrangement 42 and mounts a pinion 43. The pinion 43 at each end meshes with the adjacent gear 39. The shaft 41 mounts a pair of worms 44, each of which meshes with a worm wheel 45. Since the following described construction is of dual character and the parts are substantially identical, the remaining description will be set forth with reference to one of the controls operable by its associated worm wheel.

The worm wheel is rigid with a shaft structure 46 rotatably supported as at 47 in the bearing. The shaft 46 is threaded as at 48 and is received by the threaded socket 49 of a tubular member 50. Tubular member 50 terminates in a bifurcated portion 51 and is apertured as at 52 to receive a bolt structure 53, the latter constituting a pivotal support, as at 54, for a link 55. The link 55 supports a pin structure 56 secured thereto as at 57. Pivotally supported on this pin 56 is one end of a connecting rod 58.

Within the chamber 11 is a cylinder structure 59 closed by a head 60. Mounted in the cylinder is a piston 61 having a wrist pin 62 to which the other end of connecting rod 58 is connected. This piston is double acting. As shown in Fig. 2, there are two piston and cylinder constructions and as shown in Fig. 2 also, the two crank arms having the eccentric pins 34 are positioned 90° to each other.

The walls 15*a* are suitably recessed as at 63 and extending across the same is a pivot member 64 secured thereto as at 65 and the same mounts a lever 66. This lever is provided with an elongated slot 67. The lever extends upwardly and lies in a plane, as it were, parallel to the link 55. It also lies in a plane parallel to the crank arm 33. It lies between the two and the connecting rod 58 lies between the lever 66 and the link 55. The pin 56 which pivotally supports one end of the connecting rod 58 is of a length such that it does not project beyond the median plane of the slot 67 as shown clearly in Fig. 2. Similarly, the length of the associated crank pin 34 is such that it does not project beyond the median plane of said slot, so that both pins may ride in said slot and clear each other.

From the foregoing, therefore, it is evident that as the finger piece 36 is rotated, the threaded member 48 is rotated. Such rotation is in accordance with the variation in the unit volume price, for example purposes only, and will expose the appropriate unit volume price designation through the openings 37 upon opposite sides of the device. Such rotation of the member 48 will cause the member 50 to elevate. This elevates the link 55 as well as its pivot support 53, and, therefore, moves the connecting rod pivotal connection 56 closer to the upper end of the slot 67.

Thus, in one complete revolution of the crank arm, the piston will execute one complete stroke but by this mechanism, the length of the stroke of the piston will be varied to that desired and proportional to the unit base price so that if mechanism operable by shaft 19 or proportional thereto, indicates money value and the valve mechanisms operate in accordance with movement of shaft 19, the variation in piston stroke will vary the actual volume determined per unit of value to accord with the specific selected unit price per unit of volume and as set forth, such variation or adjustment is obtained through the externally exposed member 36 and without requiring access to the interior of the pump metering mechanism or the like, so that the effective relationship between the valve mechanism and the pump structure, represented by the pistons, is never modified.

Reference will now be had to Fig. 3 wherein there is illustrated a modified form of the invention. Numerals of the 100 series herein indicate like or equivalent parts, similar to corresponding parts in Figs. 1 and 2 designated by numerals of the primary series. This form of the invention merely differs from that illustrated in Figs. 1 and 2 in that the adjustment of the pivot for the adjusting link is specifically of a character different from that shown in the bottom portion of Figs. 1 and 2, although of the same general character.

In Fig. 3 the threaded tubular member 150 is slidably supported in bearing 103. A packing structure 102 seals the member in chamber 111. A stirrup 100 is secured to housing 110 as at 101. Member 150 extends into the stirrup. A sleeve or thimble 105 has a reduced nest portion 106 seated in aperture 147 of the stirrup. It carries at its upper end a scale 138. Member 150 is provided with scale 137. It is also bored as at 106*a* to slidably receive member 150. It is pinned or otherwise suitably secured to shaft 146 as at 107.

The exposed hand wheel 136 is suitably secured by pinning or the like as at 136*a* to shaft 146. The shoulder on thimble 105 and hub on hand wheel 136 prevent axial movement of the same and shaft 146. Rotation, however, raises or lowers member 150. The scales 137—138 indicate the adjustment. Scale 137 could indicate the price in penny units and scale 138 could indicate the fractions thereof in tenths or twentieths of a cent for example.

No further description is believed necessary in view of the complete description of operation given for the form of the invention illustrated in Figs. 1 and 2.

In Figs. 4 and 5 a modified form of the invention is illustrated. Herein 200 indicates the power shaft having crank portion 201 provided with an elongated slot 202 in which rides the wrist pin 203 which pivotally mounts one end of connecting rod 204.

Pin 203 is carried by block 205 having a slot 206 therein undercut as at 207. It also has secured thereto, as by welding or the like, the parallel tubes 208 having bores 209 therein adapted to slidably receive rod members 210 carried by member 211. This is supported on a hub 212 of the housing 213. The hub end is threaded as at 214 and mounts nut 215 which retains the member 211 against axial movement.

A shaft 216 is slidably, and in some instances rotatably, supported in bearing 212 and its extension 212*a* externally threaded at 214*a* to mount a packing cap 217. The shaft 216 extends therethrough and has a threaded end 218 and the extreme end is socketed as at 219 to seat a ball 220 having an elongated threaded stem 221 having threaded connection at 222 with stirrup 223 se-

cured as at 224 to housing 213. Knurled dish 225 is carried by the stirrup exposed end of member 221.

A complementary socket type nut 226 is secured as at 227 to shaft 216. It is apertured at 228 adjacent seat 229 for reception of member 221. When wheel 225 is rotated, the shaft 216 is caused to move axially in bearing 212—212a. Rotation of shaft 216, if same occurs, does not affect this adjustment.

Shaft 216 at is opposite end includes a head portion 230 which seats in the undercut slot 206—207 in member 205. As shaft 216 is moved axially, as aforesaid, the rod and tube connection causes member 205 to approach or recede from member 211. In this movement pin 203 is caused to approach the axis of power shaft 200 or recede therefrom, thus shortening or lengthening the stroke of the connecting rod 204 and its connected piston not shown.

If the head 230 on shaft 216 is square or rectangular as shown, shaft 216 will rotate with members 205 and 211. If, however, it is circular, shaft 216 need not rotate.

In Figs. 6 and 7 there is illustrated a modified form of the invention. 300 indicates the power shaft, 301 the wrist pin and 302 the crank arm including the elongated slot 303 undercut at 302 (see Fig. 7). The end of said slot is closed by a T-shaped member 305 pinned at 306 to crank arm 302. Member 305 is apertured as at 307 and threaded to receive threaded member 308.

Member 308 is rotatably mounted at one end in member 309 carried by wrist pin 301. Member 309 includes socket 310 and member 308 therein is grooved as at 311 and pin 312 so positioned therein and carried by member 309. Rotation of member 308 moves member 309 toward and away from the axis of shaft 300 and within pin 301 so that the length of stroke of the connecting rod and connected piston (not shown) is similarly varied. The adjustment is locked by lock nut 315.

In this form of the basic invention the manually adjustable portion rotates with the power mechanism. In the form shown in Figs. 4 and 5 it, referring to shaft 216, may or may not rotate therewith as desired; while in the forms shown in Figs. 1 to 3, inclusive, the manual adjustment never rotates with the power.

While the invention has been illustrated and described in great detail in the drawings and foregoing description, the same is to be considered as illustrative and not restrictive in character.

The several modifications described herein as well as others which will readily suggest themselves to persons skilled in this art, all are considered to be within the broad scope of the invention, reference being had to the appended claims.

The invention claimed is:

1. In combination a source of power having a predetermined speed of rotation, valve mechanism operable cyclically thereby, a piston reciprocable by said power and in timed relation to valve mechanism operation, a housing enclosing the piston, manually operable means external of the housing for piston stroke adjustment, and means within the housing and operable by the manually operable mechanism and operable by said power and interposed between the piston and power for varying power application for stroke application including a connecting rod for the piston, a crank operable by the power, a lever member having a fixed pivot and a pin and slot connection with the crank, a link having a movable pivot adjustable by external means and connected to the connecting rod, and a pin and slot connection between the link connected rod and the lever member and coincident with the connection between rod and link.

2. A structure as defined by claim 1 characterized by the connection between the link and rod including a pin projecting toward the lever member, the first mentioned pin and slot connection including a slot in the lever member and pin carried by the crank, both pins seating in the slot of the lever member from opposite sides and of such length that each may have free longitudinal movement therein.

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