Aug. 15, 1961 A. L. GRISÉ 2,996,221

DISPENSING APPARATUS FOR BLENDED LIQUIDS

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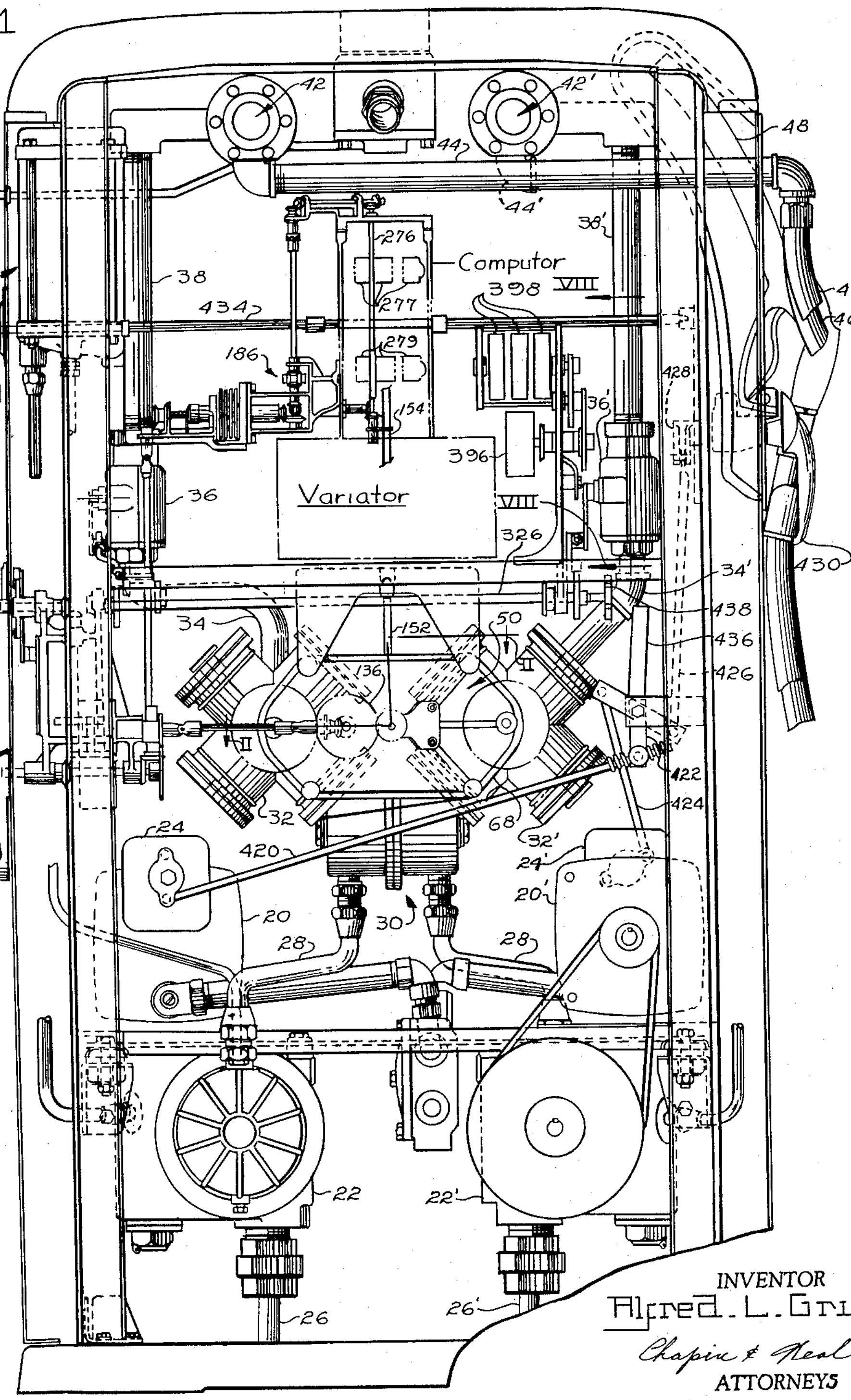
FIG. 1



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DISPENSING APPARATUS FOR BLENDED LIQUIDS

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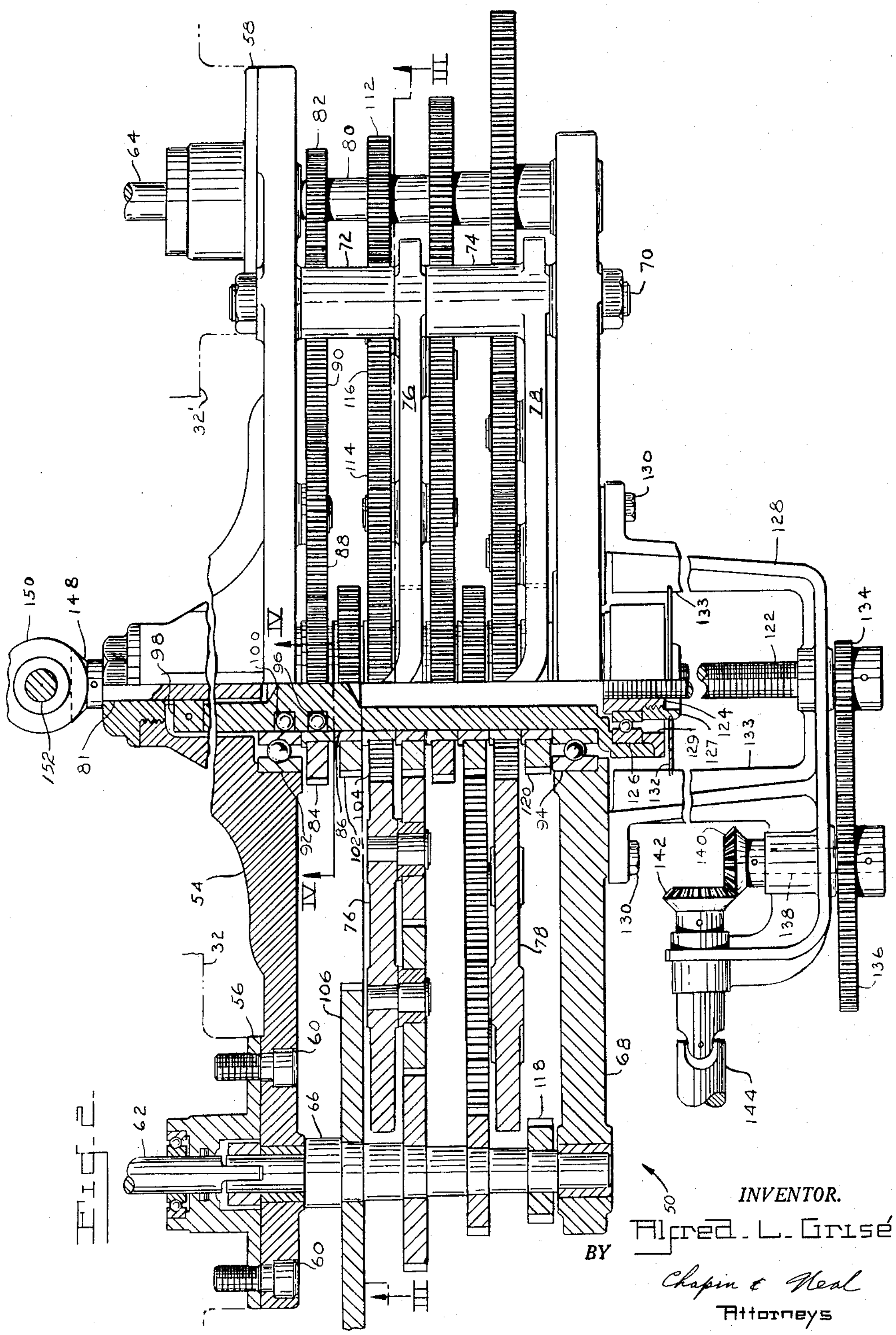

FIG. 2

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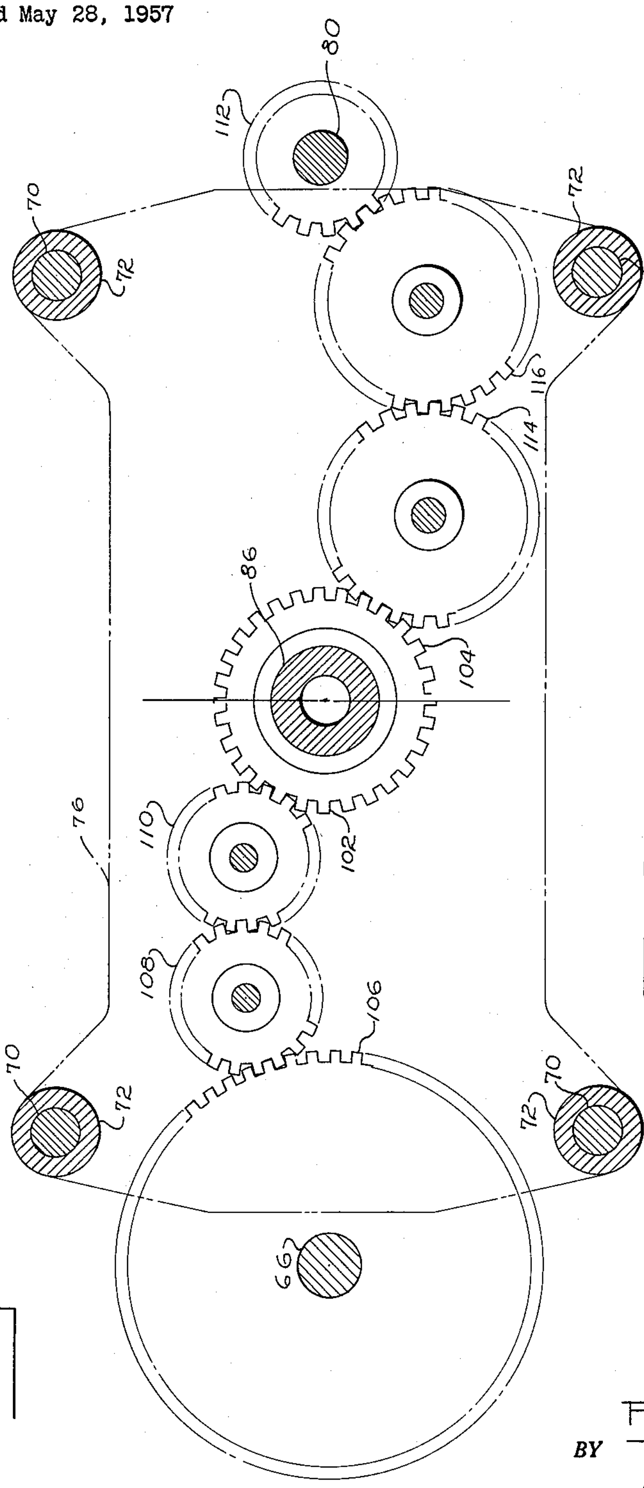

Fig. 3

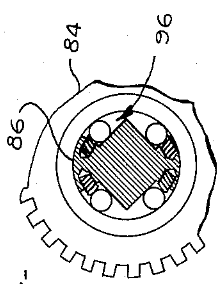

Fig. 4

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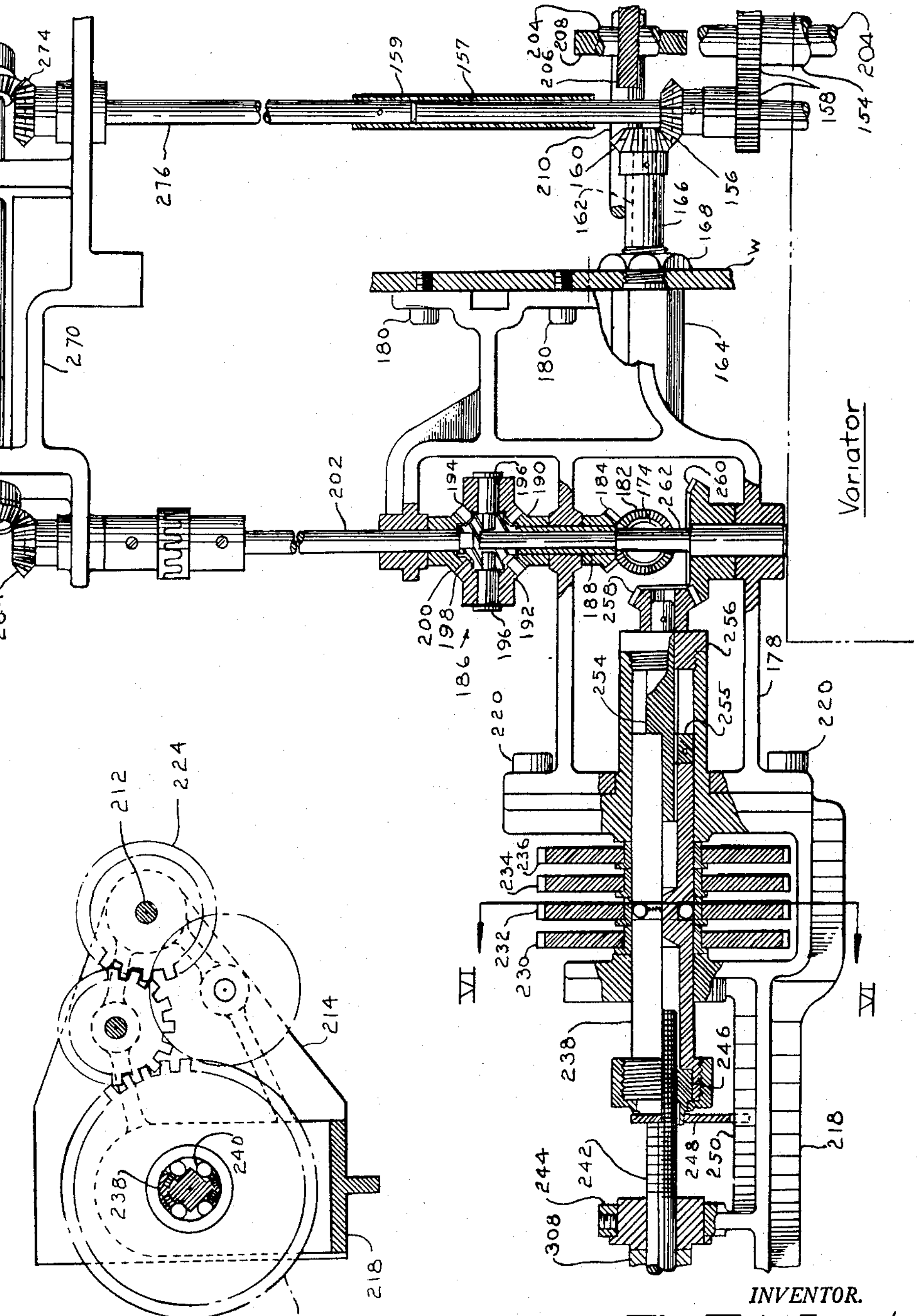
FIG. 5



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DISPENSING APPARATUS FOR BLENDED LIQUIDS

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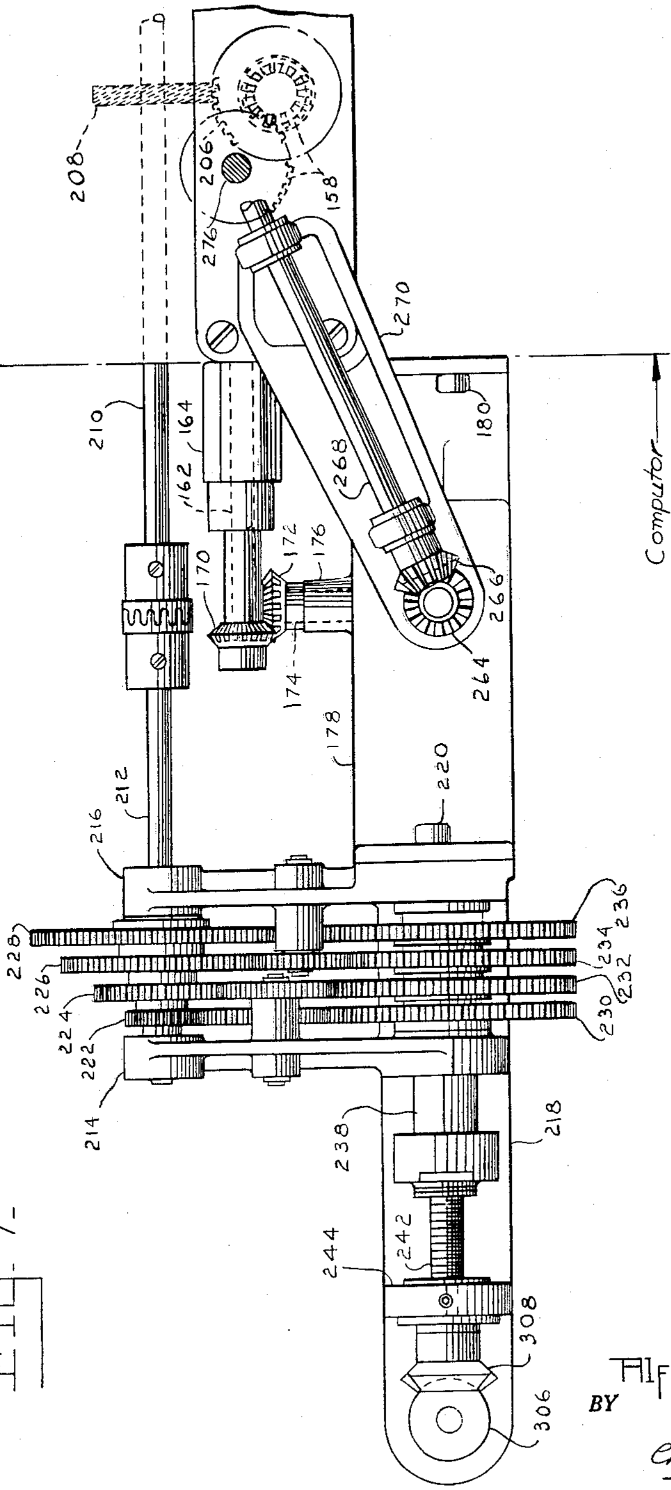

Fig. 7

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DISPENSING APPARATUS FOR BLENDED LIQUIDS

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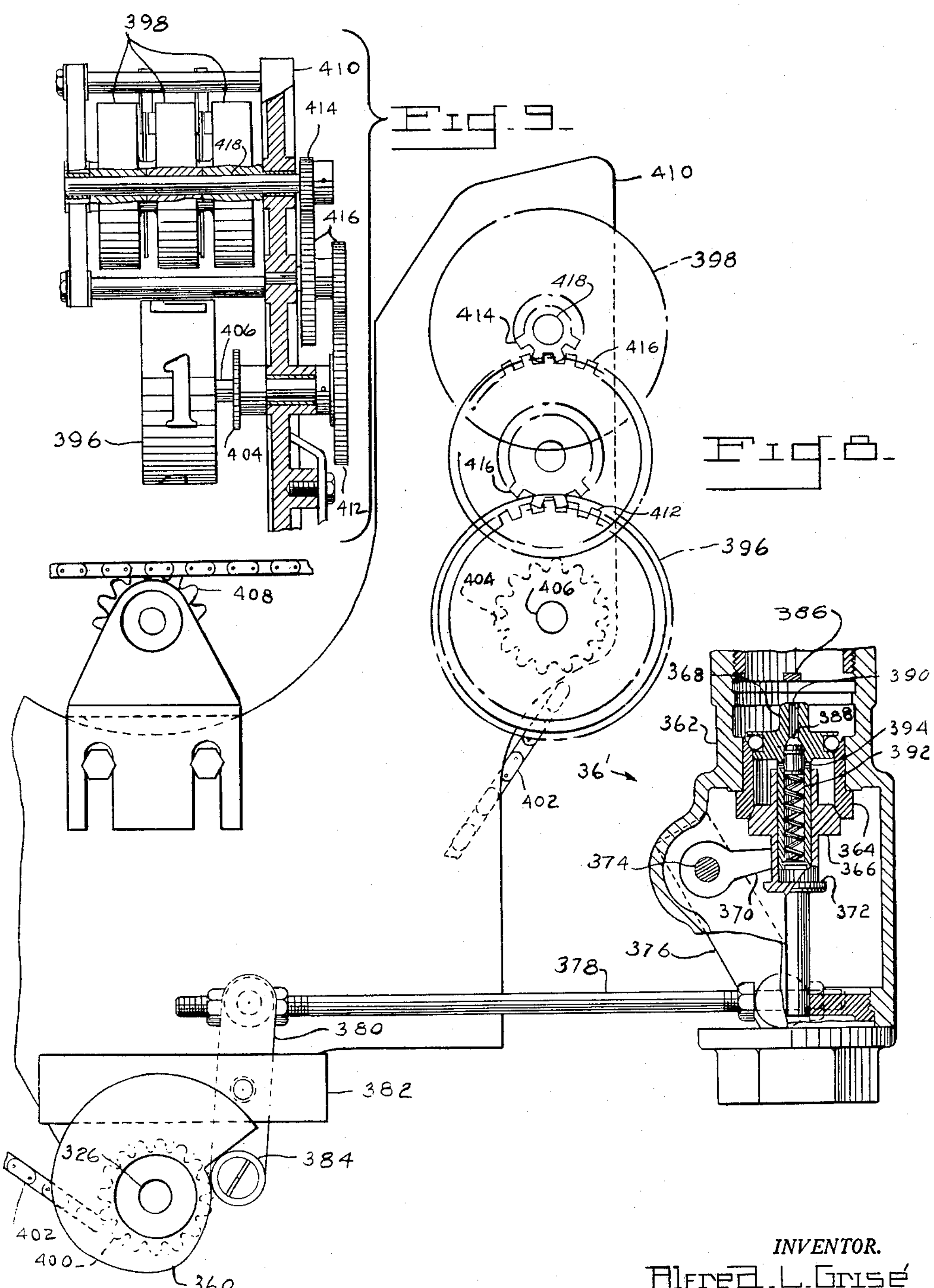

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DISPENSING APPARATUS FOR BLENDED LIQUIDS

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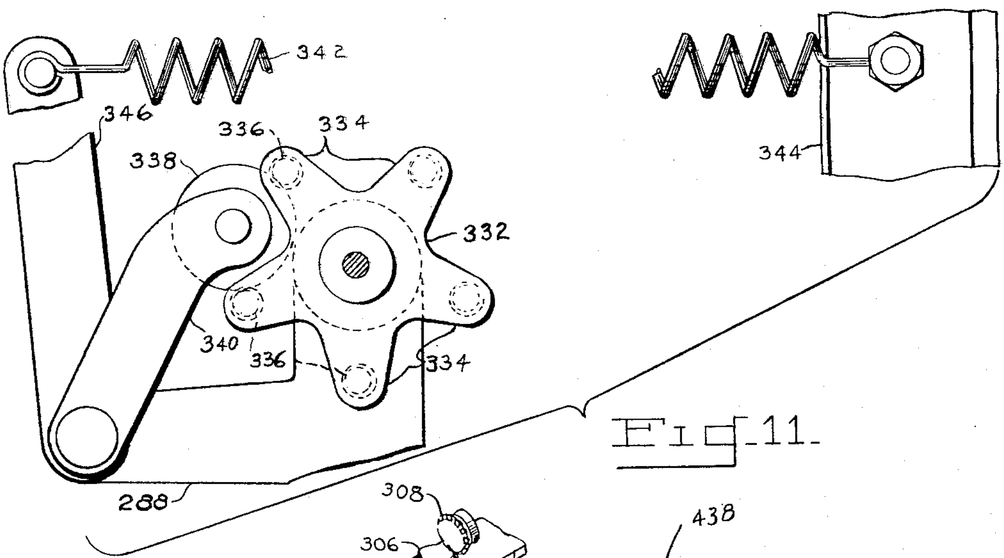

Fig. 11.

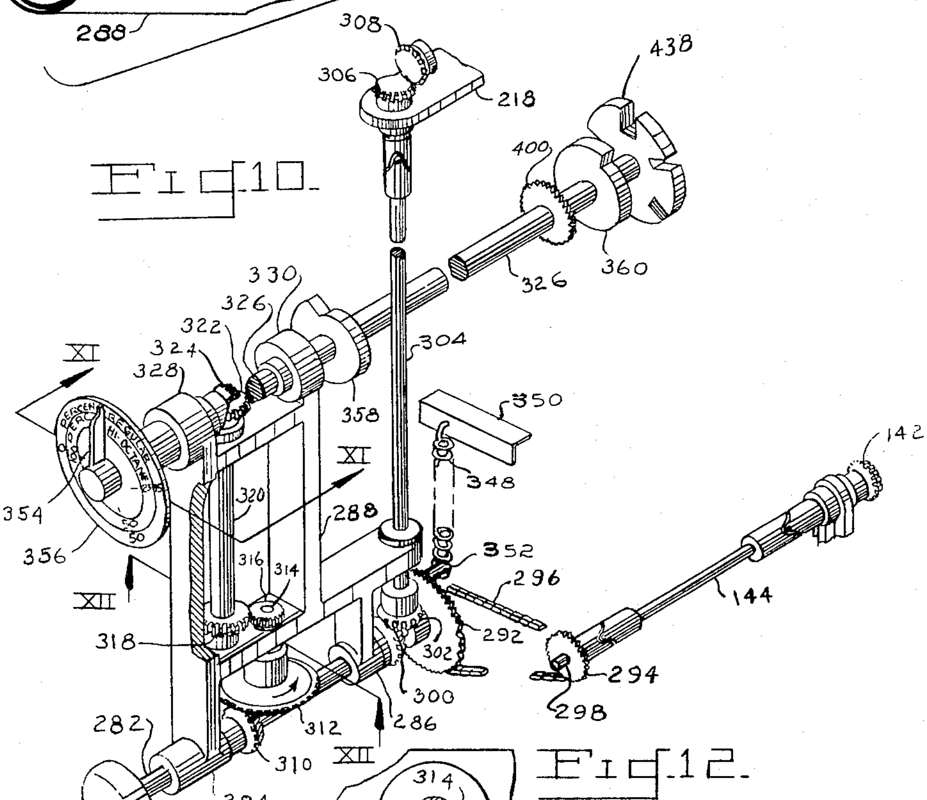

Fig. 10.

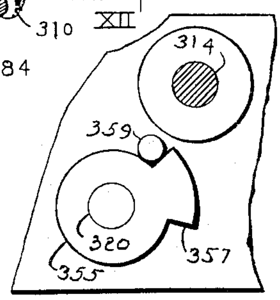

Fig. 12.

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United States Patent Office 2,996,221
Patented Aug. 15, 1961

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2,996,221
DISPENSING APPARATUS FOR BLENDED LIQUIDS

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Filed May 23, 1957, Ser. No. 662,247
20 Claims. (Cl. 222—26)

The present invention relates to fluid dispensing apparatus and more particularly to improvements in apparatus for selectively delivering a desired mixture or "grade" of fluid from a plurality of supplies of different fluids.

Liquid dispensing apparatus or pumps, of the type dealt with in the present invention, find their major utility in the retail sale of gasoline. Thus while the invention has general utility in dispensing all pumpable fluids, many of its unique features will be better appreciated from a description thereof with respect to a retail gasoline dispensing pump.

The progressively higher octane requirements of many of today's automobile engines are being successfully met by the oil industry with the result that a considerable spread exists between the highest octane "premium" gasolines and the lowest octane "regular" gasolines. This spread has become so great that a third intermediate has also been provided on the market in attempting to make available a proper octane grade gasoline for all cars now on the road. At service stations where three grades of gasoline are available, it is a usual practice to have three different storage tanks and separate pumps for each tank. In other words, separate tanks and pumps are provided for each grade of gasoline, which in turn is a deterrent to any great number of intermediate grades which would more fully meet the octane requirements of all cars.

An object of this invention is to provide a single dispensing apparatus which is connected to a source of "regular" relatively low octane gasoline and a source of "premium" high octane gasoline and which will selectively deliver "regular" gasoline, "premium" gasoline or one or more different blends of both. With this object achieved, numerous advantages may be realized such as reducing the number of pumping units and storage tanks required to dispense a plurality of grades of gasoline as well as enabling a retail station to sell such a plurality of grades without increasing its size or physical facilities.

Another object of the invention is to provide a simplified blending pump which automatically and accurately computes the total price of any blend or grade of gasoline being delivered.

Yet another object is to provide a single lever for controlling the grade of gasoline to be delivered, for adjusting the price computing means accordingly, and for registering price and grade indicators to show the grade of gasoline being delivered and its unit price.

Still another object of the invention is to provide improved detent indexing means for said control lever which will enable an operator to "feel" or "sense" when the control lever has been rotated sufficiently to properly register the apparatus to deliver a given grade of gasoline.

Yet a further object of the invention is to prevent the grade of gasoline from being changed once delivery has been started, thus protecting the purchaser.

The above and other related objects as well as the various novel features of the invention will be apparent from a reading of the following description of the disclosure found in the accompanying drawings and the particular novelty thereof pointed out in the appended claims.

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In the drawings,

FIG. 1 is a front elevation of a dispensing apparatus with certain parts omitted and constructed in accordance with the present invention, in which two gasoline delivery lines are shown and wherein certain panel covers have been omitted for clarity;

FIG. 2 is a view taken generally on line II—II of FIG. 1 showing means for integrating the volume of fluid flowing through the two delivery lines seen in FIG. 1;

FIG. 3 is a section taken on line III—III of FIG. 2;

FIG. 4 is a fragmentary section taken on line IV—IV of FIG. 2;

FIG. 5 is a view partly in section and on an enlarged scale of the price calculating means seen in FIG. 1;

FIG. 6 is a section taken on line VI—VI of FIG. 5;

FIG. 7 is a plan view of the price calculating apparatus seen in FIG. 5;

FIG. 8 is a fragmentary view taken generally on line VIII—VIII of FIG. 1;

FIG. 9 is a view on an enlarged scale and partly in section of the "grade" and unit price indicators seen in FIG. 1;

FIG. 10 is a perspective view of control mechanism seen in FIG. 1;

FIG. 11 is a section taken on line XI—XI of FIG. 10 and on an enlarged scale; and

FIG. 12 is a section taken on the line XII—XII in FIG. 10 on an enlarged scale.

The liquid dispensing apparatus or gasoline pump seen in FIG. 1 comprises two identical pumping units having delivery lines joined at a common discharge nozzle. One unit is connected to a tank of regular gasoline having a relatively low octane rating while the other unit is connected to a tank of premium gasoline having a relatively high octane rating. Means are provided for selecting any one of five grades of gasoline from the single nozzle. These grades include 100% regular, 100% premium and various proportionate blends of premium and regular. At the time of selecting the grade means are also provided to automatically and simultaneously set the price calculating means, so that the computor will indicate the price of fluid being delivered. The price, of course, increases as the proportion of premium gasoline being delivered is increased.

Each pumping unit comprises equivalent elements and therefore a description of the regular gasoline unit alone will be given. Corresponding elements in the premium gasoline unit are designated by primed reference characters.

An electric motor **20** is connected to drive a pump **22** upon actuation of a starter switch **24**. The suction side of pump **22** is connected to a source or tank of regular gasoline by a pipe **26**. The pump **22'** is connected through the pipe **26'** to a tank of premium gasoline. The discharge or pressure side of the pump **22** is connected to a composite delivery line which includes a pipe **28** connected at its other end to a pressure equalizing valve **30** of the type and functioning in a manner fully disclosed in the De Lancey U.S. Patent No. 1,985,918, granted January 1, 1935. Gasoline flows from the equalizing valve **30** to a positive displacement type metering valve **32** of standard construction through which it passes and then, through a pipe **34**, to and through a closure valve **36**. From the closure valve **36** the gasoline passes upwardly through a pipe **38** at the upper end of which connection is made with a vapor release apparatus **40** of common and well-known construction. Gasoline then flows through a visual flow indicating gauge **42** to a pipe **44** which extends to the exterior of the pump frame, and connects with a flexible hose **46**. The two flexible hoses **46** and **46'** are connected at their outer ends to a common discharge nozzle 48 which may be of any well-known type.

As mentioned, the illustrated apparatus is adapted to deliver gasoline solely from the premium delivery unit or solely from the regular delivery unit or to deliver a blend of the two gasolines. This means that neither metering valve 32 or 32' will necessarily reflect the total volume of gasoline being delivered. Also, where a blend of the two gasolines is being delivered, it is necessary for the volume of gasoline flowing through one unit to have a fixed ratio to the volume of gasoline flowing through the other unit. This is accomplished through integrating means indicated generally by the reference character 50 in FIG. 1 and best seen in FIGS. 2, 3 and 4.

The integrating means comprises a plate 54 (FIG. 2) which is connected to metering valve plugs 56, 58 by screws, as at 60, threaded into the valve housing. Flow indicating shafts 62, 64 of metering valves 32, 32' are journaled in plugs 56, 58. The shafts 62, 64, it will be noted, rotate in fixed ratio to the volume of fluid flowing through the metering valves 32, 32' respectively. The metering valve shaft 62 is coupled to a gear shaft 66 which is journaled at one end in the plate 54 and at the other end in a plate 68. The plates 54 and 68 are interconnected by through bolts as at 70 and are spaced apart by bosses 72, 74 formed on gear plates 76, 78, respectively. A gear shaft 80 similar to shaft 66 is journaled in the opposite ends of plates 54 and 68 and is coupled to the metering valve shaft 64.

Intermediate the gear shafts 66 and 80 is an integrator shaft 81 which (through a ball clutch shaft 86) may be connected to the shafts 66 and/or 80 in five different ways corresponding to the five grades of gasoline which the pump is designed to dispense. Where gasoline is delivered solely through the premium unit (as would be the case in the position of parts shown by FIG. 2) and thus only the metering valve 32' is operative, the metering valve shaft 64 only will then be coupled to the integrator shaft 81 and through the following means. A gear 82, secured to shaft 80, drives a gear 84, rotatably mounted on a shaft 86, through idlers 88, 90, the idlers being mounted on stud shafts extending from plate 54. Shaft 86 is rotatably and slidably mounted in plates 54 and 68 and carried by the inner races of ball bearings 92 and 94 of the plates. Gear 84 is coupled to shaft 86 by a ball clutch arrangement 96 (see also FIG. 4) and the shaft 86 is in turn coupled to the integrator shaft 81 by a spline key 98. The remaining gears on shaft 86 are free to rotate as on bushings 87.

The longitudinal position of shaft 86 between the plates 54 and 68 determines the manner in which the integrator shaft 81 will be rotated to indicate the total volume of fluid delivered and, at least in part, establishes the ratio between fluids being delivered by the respective premium and regular units. While means could be directly associated with the shaft 86 to prevent rotation of either the metering valve shafts 62 or 64 when gasoline is being delivered through to the nozzle solely by the other unit, the closure valves 36, 36' as will be described below have been found preferable. It should be noted that when the shaft 86 is in the position illustrated in FIG. 2 valve 36 (see FIG. 1) will be fully closed. No gasoline flows through the "regular" unit (motor 32) and thus the integrator shaft, coupled only to metering valve 32' indicates the total volume of premium gasoline only being delivered.

When a mixture of the two grades of gasoline is desired the ratio between fluids being delivered is determined by shifting the position of shaft 86. The various gears illustrated provide three such blends and a description of the particular gears utilized in delivering a blend of 75% premium and 25% regular will now be given. Shaft 86 is shifted to bring a second ball clutch 100 into engagement with a gear 102 which is rotatably mounted on shaft 86. At the same time ball clutch 96 is brought into engagement with a gear 104 which is immediately below gear 102 and likewise rotatably mounted. A predetermined ratio between the metering valve shafts 62 and 64 is thus established by these further gears. Gear 102 is driven by a gear 106 secured to shaft 66 and through idler gears 108 and 110 as shown by FIG. 3. Gear 104 is driven by gear 112, secured to shaft 80, and through idler gears 114, 116. The idler gears 108, 110, 114 and 116 are mounted on stub shafts extending from plate 76. With shaft 86 adjusted so that ball clutch 100 engages gear 102 a fixed ratio is established between meter shaft 62 and meter shaft 64. The integrator shaft 81 thus reflects the total rotation of both shafts 62, 64.

When it is desired to establish other intermediate ratios between the metering valve shafts 62, 64, the shaft 86 is shifted axially to clutchingly engage other sets of gears to obtain the desired blends. Such other ratios may for example be 50—50 and 25—75. When it is desired to deliver gasoline solely through the "regular" gasoline pumping unit, the ball clutch 100 by engaging a gear 120 will drive a gear 118 secured on shaft 66 by means of idler gears lying above the section line of FIG. 2. In this latter setting of shaft 86 the other ball clutch 96 will engage the inner face of bearing 94, closure valve 36' being actuated to prevent delivery of premium gas at this time.

Axial movement of shaft 86 to position the ball clutches and establish a desired integrating ratio between the metering valve shafts 62, 64 is obtained as follows. A jack screw 122 (FIG. 2) is rotatably received by a nut 124 which is clamped against the inner race of a bearing 126 by a nut 127, the outer race of the bearing 126 being clamped to the enlarged outer end of the shaft 86 by a collar 129. The other end of the jack screw 122 is rotatably carried in a bracket 128 which is secured to the plate 68 by screws 130. Rotative movement of the nut 124 is prevented by a plate 132 secured thereto and having notches which receive and slide along ribs 133 extending from the stationary bracket 128. The jack screw 122 has a gear 134 secured to its outer end which meshes with a gear 136 secured to a jack shaft 138 journaled in the bracket 128. To the other end of the shaft 138 is secured a bevel gear 140 meshing with a second bevel gear 142 secured to a shaft 144 journaled in an extension of the bracket 128. Thus rotation of the shaft 144 will impart rotation to the jack screw 122 and cause the shaft 86 to slide axially of the various central gears so that different gears may be selectively clutched thereto and cause rotation of the integrator shaft 81 from either or both of the shafts 62 and 64. The manner in which the shaft 144 is rotated to selectively bring the ball clutches 100 and 96 into engagement with the various central gears will be described in detail below.

The integrating means above described, and particularly shaft 81 is connected to a variator through bevel gears 148, 150 and shaft 152 (FIGS. 1 and 2). The variator may be of well-known design as shown in U.S. Patent No. 2,111,996, Slye, granted March 22, 1938, and includes gear means driven by the shaft 152 and preset to rotate a price indicating output shaft or hollow money shaft 154 (FIG. 5) at a rate which is governed by the unit price of the gasoline being delivered. Although the arrangement to be described could be based on the price of any grade of gasoline, it has been found convenient for the money shaft 154 to rotate or be set to rotate at a rate which would reflect the unit price of "regular" gasoline. Thereafter means are provided for adding price increments dependent upon the amounts of the higher priced premium gasoline actually being delivered.

Such means include a second integrator arranged in the following fashion. The money shaft 154 drives a bevel gear 156 through a pair of spur gears 158, said bevel gear meshing with a bevel gear 160 which is secured at one end of a shaft 162. Shaft 162 is journaled in an elongated sleeve formed of a piece of hexagonal stock 164 which has a reduced diameter 166 passing through the wall W of a standard computer, (see also FIG. 1) and a threaded portion which receives a nut 168 to secure the sleeve on the computer wall. A bevel gear 170 (FIG. 7) is secured to the other end of the shaft 162 adjacent further reduced sections of the sleeve 164. The gear 170 meshes with a gear 172 and drives a shaft 174 journaled in a box 176 extending from a bracket 178. Bracket 178 is secured to the computer side wall W by screws 180. A further bevel gear 182 (FIG. 5) is secured to the other end of the shaft 174 and meshes with a bevel gear 184 to provide one input to a differential integrator 186. More particularly, the gear 184 is secured to a sleeve 188 which carries at its upper end a further bevel gear 190. The gear 190 meshes with differential gears 192, 194 which are rotatably mounted on pins 196 extending from a spider 198. If the spider 198 remains stationary, rotation of the bevel gear 190 will cause the output bevel gear 200 meshing with the gears 192, 194 to rotate at the same rate as the gear 190 and this rotation is imparted to an output shaft 202 to which the gear 200 is secured.

A second input to the differential integrator 186 is provided in the following manner. Referring back to the variator it will be seen that a gallon indicating shaft 204 (FIG. 5) extends coaxially of the money shaft 154. This shaft 204 rotates in fixed ratio to the total volume of fluid being delivered regardless of the setting of the variator. The shaft 204 carries a spiral gear 206 (see also FIG. 7) which meshes with an appropriate gear 208 and rotates a shaft 210. The shaft 210 is commonly known in this type of computer as a totalizer shaft and drives means which totalize the volume of fluid delivered by successive deliveries. The use of this shaft for driving the second input to the differential has been found preferable since it is not affected by the reset mechanism which is actuated after each delivery of gasoline.

The shaft 210 (FIG. 7) extends beyond the side wall W of the computer and is coupled to a gear drive shaft 212. The shaft 212 is journaled in plates 214, 216 which extend from a bracket 218 secured by screws 220 to the bracket 178. Gears 222, 224, 226 and 228 are secured to the shaft 212 and through appropriate idler gears drive gears 230, 232, 234, and 236, respectively. The last-named gears are rotatably mounted on a shaft 238 and may be selectively coupled thereto by a ball clutch 240 (FIG. 6) similar to the ball clutches 96 and 100 previously described. The shaft 238 is slidably mounted in the bracket 218 and may be reciprocated by the following means. A jack screw 242 (FIG. 7) is journaled in a flange 244 extending from the bracket 218. The jack screw 242 is threadably received by nut 246 (FIG. 5) captured in the outer end of the shaft 238. A plate 248 which is notched to receive a bracket rib 250 prevents rotation of the nut 246 and thus upon rotation of the jack screw 242 axial movement can be imparted to the shaft 238 to selectively position the ball clutch 240 with respect to gears 230, 232, 234 and 236 or to withdraw it from clutching engagement with any of these gears. The jack screw 242 is rotated to accomplish these ends by means described in detail below.

The shaft 238 is coupled to a non-slidable shaft 254 by spline key 255, the shaft being rotatably mounted in a journal 256 threaded into the bracket 218. A bevel gear 258 is pinned to the outer end of shaft 254 and provides a second input to the differential integrator 186 as it engages a bevel gear 260 which is secured to a vertical shaft 262. The vertical shaft 262 carries secured to it at its upper end the spider 198 which carries the bevel gears 192 and 194. It will be seen that if both the bevel gear 190 and spider 198 are rotated that the rotation of the output gear 200 and shaft 202 will reflect the total of these rotations.

Shaft 202 is coupled to a bevel gear 264 which meshes with the bevel gear 266 secured to a shaft 268. Shaft

268 is journaled in a bracket 270 secured to the upper surface of the computer and carries at its other end a bevel gear 272, which meshes with a bevel gear 274 secured to a vertical shaft 276. From the shaft 276 the price indicating dials 277 (FIG. 1) of the computer are actuated by well-known means (not shown) to register the total price of fluid delivered on each delivery, the number of revolutions of the shaft 276 being indicative of the price of gasoline delivered. It is also common in this type of computer for means to be operated from the gallon indicating shaft 204 (FIG. 5) to rotate dials 279 (FIG. 1) to indicate the total volume of gasoline for each delivery.

The above explanation can perhaps be amplified by a concrete example. Assuming that one revolution of the money shaft 154 is equivalent to 6 cents and that four revolutions of the gallon indicating shaft 204 equal one gallon of gasoline delivered and if the variator is set for a unit price of 30 cents per gallon, the money shaft will rotate five times for every gallon delivered. Thus one input to the differential integrator 186 is actuated and, assuming that only regular gasoline is being delivered, there would be no rotation of the spider 198 (the shaft 238 would be displaced to a position wherein the ball clutch 240 would not engage any of the gears 230, 232, 234 and 236). The output of the differential, namely the shaft 202 would therefore be rotated five times for every gallon of gasoline delivered and thus the shaft 276 which drives the price registering means of the computer would likewise be rotated five times by every gallon of gasoline delivered and the price would be calculated at 30 cents a gallon.

There are five different grades of gasoline which may be delivered, and each grade comprising a greater proportion of premium gasoline in the examples given is to be sold at an incremental increase of 1½ cents a gallon. A grade of 50% premium gasoline and 50% "regular" would represent two increments above straight "regular" gasoline and would thus be sold at 33 cents a gallon. In order to have the computer drive shaft 276 reflect this increase in the cost of the more expensive grade of blended gasoline the shaft 238 is shifted, in accordance with an adjustment of the integrating means 50, to engage the gear 232 through ball clutch 240 by means yet to be described. The gear ratios are such that the shaft 254 will rotate the cage 198, i.e. the second input to the differential 186, at the rate of one-half revolution for every gallon of gasoline delivered, such half revolution equaling 3 cents or two increments of 1½ cents. Therefore, if a 50—50 mixture of gasoline is being delivered there will be two inputs to the differential 186. The first input through the gear 190 will rotate at the rate of five revolutions for every gallon delivered while the cage 198 will rotate at the rate of one-half revolution for every gallon delivered. The output of the differential, namely the shaft 202 will rotate at the rate of 5½ revolutions for every gallon delivered as will the shaft 276. Thus the computer will reflect the price of gasoline delivered at the rate of 33 cents a gallon. It will be noted that the shaft 157 to which bevel gear 156 is fixed would normally constitute the computer drive shaft of the standard computer. In the present arrangement shaft 276 functions as the drive shaft and has pinned at its lower end a sleeve 159 in which the upper end of shaft 157 is free to rotate.

The means for shifting the ball clutch shafts 86 (FIG. 2) and 238 (FIG. 5) are simultaneously actuated by a single control level 280 shown by FIG. 10 and to assure that the price calculating means are set in accordance with the grade of gasoline being delivered. At this point mention should be made that the positions of shafts 86 and 238, as illustrated in FIGS. 2 and 5, do not correspond. In other words shaft 86 is shown in the position it would assume when 100% premium gas is being delivered and shaft 238 is in the position it would assume when a blend of 50% "regular" and 50% premium gasoline is being delivered.

The control lever 280 is located at one side of the pump frame (FIG. 1) and is secured to a shaft 282 (FIG. 10) extending interiorly of the pump frame. Shaft 282 is journaled in legs 284, 286 depending from a fixed bracket 288. At the outer end of shaft 282 is secured a sprocket 292 which rotates a sprocket 294 through a roller chain 296. The sprocket 294 has a stub shaft 298 journaled in a fixed frame member (not shown) and is coupled to shaft 144 which is arranged to rotate jack screw 122 (see FIG. 2) and shift the ball clutch shaft 86 as previously explained. A bevel gear 300 is secured to the shaft 282 adjacent the sprocket 292 and meshes with a bevel gear 302 fast upon the lower end of a shaft 304. The shaft 304 is coupled to a bevel gear 306 journaled in the bracket 218 which in turn meshes with a bevel gear 308 (see FIGS. 7 and 5) secured to the outer end of jack screw 242. Through the arrangement above described the jack screw may be rotated to selectively position the ball clutch shaft 238.

The various gear ratios and thread pitches are such that the shafts 86 and 238 will be shifted the incremental distance necessary to go from one grade of gasoline to another upon each complete rotation of the shaft 282. The following arrangement provides detent means for providing a sense of feel and facilitating such a shifting to the desired increments. A second bevel gear 310 is secured to the shaft 282 and meshes with a bevel gear 312 which, through a shaft 314, drives a spur gear 316. The gear 316 meshes with a gear 318 fast upon a vertical shaft 320 which is journaled in the bracket 288. At the upper end of shaft 320 a bevel gear 322 meshes with a matching bevel gear 324 fast upon a horizontal shaft 326 which is journaled in upstanding portions 328, 330 of the bracket 288. Toward the left and hidden from view in FIG. 10 a spider 332 (FIG. 11) is secured to shaft 326. The spider 332 has five arcuately spaced arms 334 the spaces between which correspond to the five incremental positions of the ball clutch shafts 86 and 238 to selectively determine the grade of gasoline to be delivered. Rollers 336 are mounted on the ends of the spider arms 334 and selectively contact a spring urged roll 338. Roll 338 is carried on the end of an arm 340 which is pivotally mounted on the bracket 228. Also roll 338 is urged into engagement with the rollers 336 by a spring 342 which extends between a rigid frame member 344 and a lever arm 346. When the control lever 280 is rotated the roll 338 is pivoted outwardly against the action of spring 342, reaching its outermost point when the shaft 282 has been rotated half of a revolution. Thereafter the spring urges roll 338 toward the space between a pair of spider arms 334. When the roll 338 contacts a pair of rollers 336 one full revolution of the shaft will have been made. It will be noted that the illustrated inclusive angle of contact of approximately 125° has been found preferable in facilitating this detent action. Further detent means may advantageously be provided in the form of a spring 348 extending between a rigid frame member 350 and a stud 352 on the outboard side of the sprocket 292. The arrangement is such that the stud is in its upper position when the shaft 282 is in a given incremental position.

The shaft 326 extends to the outside of the pump frame where a pointer 354 is secured in matching relation to a dial 356 on which indicia indicate the grade of gasoline which will be delivered for a given setting of the shaft 326.

Since the ball clutch shafts 86 and 238 have definite limits to their reciprocable movements it is necessary that the direction of rotation of the control lever 280 be reversed upon reaching either of these extreme limits which are for 100% "regular" and 100% premium gasoline respectively. A stop plate 355 (FIG. 12) is therefore secured to the shaft 320 beneath the bracket 288. This plate has a projection 357 which engages a fixed pin 359 to limit rotation of the lever 280 to the above-described extremes.

Rotation of the control lever 280 also adjusts other mechanism in fixed relation to the grade of gasoline to be delivered. It is thus that the closure valves 36, 36′ are controlled, by cams 358, 360 (Fig. 10) secured to shaft 326 (see also Figs. 8 and 10). The valves 36, 36′ are controlled in a like but opposite manner which will be understood from a detailed description of the valve 36′ illustrated in FIG. 8.

Valve 36′ comprises a housing 362 in which is provided a valve seat insert 364. Delivery of premium gasoline may be prevented by a valve plug 366 seating against the lower end of insert 364, while reverse flow of gasoline is prevented by a check valve 368 seating against the upper end of insert 364. The valve 36′ is illustrated in the self-closing position it assumes when only regular gasoline is to be delivered. As the pump is adjusted to deliver proportionately more premium gasoline the valve plug 366 is progressively unseated by an arm 370 bearing against a flange 372. The arm 370 is secured to a shaft 374 journaled in the housing 362 and extending outwardly thereof to reecive a lever 376. A rod 378 connects the lever 376 and a lever 380 which is pivotally mounted on a stationary frame member 382 and which has a follower roll 384 at its lower end bearing against the cam 360. When the shaft 326 is rotated in a counterclockwise direction (FIG. 8) as the control lever 280 is rotated to adjust the pump for delivery of greater proportions of premium gasoline, the rise of cam 360 swings rod 378 towards the left and thus causes the valve plug 366 to be progressively lowered by increments corresponding to the proportion of premium gasoline to be delivered. Thus a throttling action is obtained which aids the pressure equalizing valve 30 (FIG. 1) in reducing the effective pressure on the metering valve 32′. When the valve plug is unseated and the nozzle 48 is opened, gasoline flow will unseat the check valve 368 (FIG. 8), its movement being limited by a crosspiece 386.

Valve 36 is controlled in identical fashion except that the rise of cam 358 (FIG. 10) is disposed in opposite fashion so that the valve 36 is fully opened when the valve 36′ is closed and closed when the valve 36′ is fully open.

When the closure valve 36′ is fully closed it is possible for excessive pressures to build up in that portion of the delivery line between said valve and the nozzle 48. A pressure relief valve 388 (FIG. 8) is therefore provided within the check valve 368, said relief valve being exposed to the nozzle side of the delivery line by an axial bore 390. Normally the relief valve 388 is maintained closed by a spring 392 bearing against the valve plug 366. When pressure on the relief valve becomes excessive gasoline flows through the bore 390 and then through radial openings 394 into the space between the check valve 368 and the valve plug 366. The pressure within this space may build up sufficiently to unseat the valve plug 366 so that the excess pressure will be transmitted back to the pump 22′ where by-pass means are provided for finally relieving such excess pressure.

Indicator means are also provided adjacent the computer for indicating the grade of gasoline being delivered and its unit price (FIGS. 1, 8 and 9). These means take the form of a wheel 396 having five markings corresponding to the number of grades of gasoline which may be delivered by the pump and other wheels 398 which indicate the unit price of each grade, that is the unit price of the total amount of gasoline for a given delivery. These cylinders are registered with appropriate openings in a computer panel (not shown) by the following means. A sprocket 400 is secured to shaft 326 (FIG. 8) and through a chain 402 connects with a sprocket 404 secured to a shaft 406 on which the wheel 396 is also mounted. The chain 402 passes over an idler 408 to a second sprocket 404 associated with identical indicia means at the other side of the pump. The shaft 406 is journaled in a frame member 410 and carries a gear 412 at its outer end. A gear 414 is driven by the gear 412 through step-up gears 416. The gear 414 is secured to a shaft 418 which in turn drives the wheels 398 through computer type mechanism to register the unit price of the grade of gasoline being delivered. Rotation of the control lever 280 (and shaft 326) will thus rotate the wheels 396 and 398 to indicate the grade of gasoline being delivered and its unit price.

Referring now to FIG. 1 the motor switch 24 for actuating the pump 20 is connected, through a link 420 with one arm of a bell crank 422 pivotally mounted on a fixed frame member. The motor switch 24′ is connected, through a link 424 to another arm of said bell crank. The bell crank has a third arm to which one end of a link 426 is connected, the other end of link 426 being connected to a lever 428. A starting lever 430 is provided on the exterior of the pump to rock the lever 428 and turn the switches 24, 24′ on and off. The pump is also provided with conventional zero reset means including a handle 432 at one side of the pump and a horizontal shaft 434 which may be rotated thereby. Rotation of the shaft 432 zeroes the computer and at the same time releases conventional latch means which prevents actuation of the motor switches prior to such zeroing.

Associated in fixed relation to the bell crank 422 is a lever arm 436 disposed adjacent a slotted member 438 (FIGS. 1 and 10) secured to the right hand end of shaft 326. The member 438 is provided with five radial slots which correspond to five grades of gasoline which may be selected. The member 438 is arranged so that a slot will be positioned to receive the lever arm 436 only when the control lever 280 has been rotated to complete revolution to bring all of the linkages and mechanism to a given incremental position corresponding to the grade of gasoline desired. The motor switches 24, 24′ thus cannot be actuated unless the control lever 280 has been correctly positioned since the lever arm 436 would strike the member 438. Further, when the control lever 280 is correctly positioned the lever arm 436 will enter one of the slots of the member 438 and prevent the handle 280 from being turned during the delivery of a given grade of gasoline.

It will be appreciated that many variations or alternate arrangement of parts can be made within the spirit of this invention, particularly in providing for delivery of a greater or lesser number of grades of gasoline. Also it will be evident that the motors 20, 20′ and pumps 22, 22′ are not essential to all aspects of the invention but could be replaced by some other means for supplying gasoline under pressure.

Having thus described my invention, what I claim as novel and desire to secure by Letters Patent of the United States is:

1. A fluid dispensing apparatus comprising means for delivering different fluids through a pair of delivery lines connected to a single discharge nozzle and means for varying the proportionate amount of fluid flowing through each delivery line; a metering valve in each delivery line, each valve having a volume indicating shaft which rotates in fixed ratio to the volume of fluid flowing through the delivery line in which the valve is incorporated, an integrator shaft connectable to both volume indicating shafts to rotate in fixed ratio to the total volume of fluid flowing through both delivery lines, a price computing variator drivably connected to said integrator shaft and having a money shaft which rotates in a fixed ratio to total volume of fluid flowing through both delivery lines, a second integrator having a drivable input connection with said money shaft, said second integrator having a second drivable input connection in fixed ratio to the first integrator shaft and means for varying the said fixed ratio of said second input in accordance with the relative speeds of said metering valve indicating shafts.

2. A fluid dispensing apparatus comprising a variator driven by one or another or all of a plurality of metering valves and including a price indicating means having a fixed ratio to the total volume of fluid being delivered, a differential integrator having an input connection with the price indicating means of said variator and a second input directly related to the total volume of fluid passing through all of the metering valves, means for varying the amount of fluid flowing through the individual valves, means for inactivating said second input when the variator is driven by one of the metering valves alone and means for progressively increasing said second input as the amount of fluid passing through said one valve becomes a smaller proportion of the total fluid flowing through all the valves.

3. A fluid dispensing apparatus comprising a plurality of delivery lines arranged to deliver fluid from a common nozzle, means for varying the amount of fluid flowing through each line, and a metering valve in each delivery line, each metering valve having a shaft which rotates in fixed ratio to the volume of fluid delivered through the line in which it is incorporated, a variator driven by one or all of the meter shafts, said variator comprising price indicating means having a fixed ratio to the total volume of fluid being delivered, a differential integrator having an input connection with said price indicating means, a second input connection to said integrator having a fixed ratio to the total volume of fluid being delivered, and means for inactivating said second input when all fluid is delivered through one line and for also varying said second input in accordance with lesser proportionate amounts of fluid being delivered through said one line.

4. A fluid dispensing apparatus comprising a plurality of delivery lines, means for varying the proportionate amount of fluid flowing through each line, means for integrating the total volume of fluid delivered through all delivery lines, a variator driven by said integrating means, the price indicating means of said variator being preset to indicate the price of fluid flowing through all the lines at a given price rate, a second integrator having one input connected to the price indicating means of the variator, said second integrator having a second input driven in direct relation to the total volume of fluid delivered, means for varying said second input in accordance with the proportion of the total volume of fluid being delivered to that delivered through a given delivery line and price computing means driven by said second integrator.

5. A fluid dispensing apparatus comprising means for delivering fluid through a plurality of delivery lines connected to a single discharge nozzle, means for varying the proportionate amount of fluid delivered through each line, means for calculating and indicating the price of fluid delivered at a given unit price dependent on the proportion of fluid delivered through each line, indicator means indicating the proportion of fluid being delivered in each line, other indicator means indicating the unit price for total fluid being delivered, and means for simultaneously and selectively and incrementally varying the proportion varying means, the price calculating and indicating means and both indicator means.

6. A fluid dispensing apparatus as set forth in claim 5 including means for preventing operation of said varying means as fluid is being delivered.

7. A fluid dispensing apparatus comprising means for delivering fluid through a plurality of delivery lines connected to a single discharge nozzle and means for visually indicating the total volume and price of fluid being delivered, means for varying the proportionate amount of fluid flowing through each line, means connected to said visual indicating means for calculating and indicating the price of fluid delivered at a given unit price dependent upon the proportion of fluid delivered through each line,

means for selectively and incrementally varying the proportion varying means, and means preventing actuation of said apparatus except when said selective varying means is moved to a given increment.

8. A fluid dispensing apparatus comprising means for delivery of fluid through a plurality of delivery lines connected to a single discharge nozzle, means for visually indicating the total volume and price of fluid being delivered, means for varying the proportionate amount of fluid delivered through each line, means for calculating the price of fluid delivered at a given unit price dependent upon the proportion of fluid delivered through each line, said calculating means being drivingly connected to the visual indicating means, indicator means indicating the proportion of fluid beng delivered through each line, other indicator means indicating the unit price of the fluid being delivered, means for simultaneously and selectively and incrementally varying the proportion varying means, the price calculating means and both indicator means, and means for preventing actuation of said apparatus except when said selective varying means is moved to a given increment.

9. A fluid dispensing apparatus comprising means for delivering fluid through a plurality of delivery lines connected to a single discharge nozzle, means for visually indicating the total volume and price of fluid being delivered, reset means for zeroing said visual indicating means after each delivery of fluid and means preventing actuation of said apparatus except when said reset means have zeroed the visual indicating means, means for varying the proportionate amount of fluid delivered through each line, means for calculating the price of fluid delivered at a given unit price dependent upon the proportion of fluid delivered through each line, said calculating means being drivingly connected to the visual indicating means, indicator means indicating the proportion of fluid being delivered through each line, other indicator means indicating the unit price of the fluid being delivered, means for simultaneously and selectively and incrementally varying the proportion varying means, the price calculating means and both indicator means, means for preventing actuation of said apparatus except when said selective varying means is moved to a given increment and means for preventing operation of said selective varying means as fluid is being delivered.

10. A fluid dispensing apparatus comprising two pumps, each connected to a bulk supply of a given fluid, a metering valve in the delivery line of each pump, each metering valve having a shaft which rotates in fixed ratio to the volume of fluid passing therethrough, a volume indicating integrator shaft between said valve shafts, a plurality of gears rotatably mounted on said integrator shaft, a plurality of different size gears secured to each valve shaft with each different size gear driveably connected to a separate gear on said integrator shaft, and means for selectively coupling either an integrator shaft gear driven solely from a gear on one meter shaft or an integrator shaft gear driven from a gear on the other meter shaft or to a pair of integrator shaft gears respectively driven by gears on each meter shaft, whereby the indicating shaft may be rotated by either meter shaft or by both meter shafts having a fixed ratio therebetween.

11. A fluid dispensing apparatus as in claim 10 wherein the selective coupling means comprise a pair of ball clutches movable axially of the integrator shaft.

12. A fluid dispensing apparatus comprising a pair of fluid delivery lines connected to a single discharge nozzle, a metering valve interposed in each delivery line, each of said metering valves having a shaft which rotates in fixed ratio to the volume of fluid flowing through the line in which the metering valve is interposed, an integrating shaft disposed between said metering valve shafts, gear means connecting each metering valve shaft independently to the integrating shaft and also both metering valve shafts to said integrating shaft in fixed relative incremental ratios, means for selectively clutching one or the other or both of said metering valve shafts to said integrating shaft through said gear means, a closure valve interposed in each delivery line between the metering valve therein and the discharge nozzle, means interconnecting the clutching means and the closure valves for maintaining one valve in closed position and the other valve in open position when the integrating shaft is driven independently by the metering valve in the other delivery line, said interconnecting means being arranged to reverse the closure valve positions when the integrator shaft is independently driven by the other metering valve and to maintain both closure valves in open position when the clutch means connect both metering valves to the integrator shaft, and means for computing from said integrator shaft the volume and total price of fluid delivered.

13. A fluid dispensing apparatus comprising a pair of fluid delivery lines connected to a single discharge nozzle, a metering valve interposed in each delivery line, each of said metering valves having a shaft which rotates in fixed ratio to the volume of fluid flowing through the line in which the metering valve is interposed, an integrating shaft disposed between said metering valve shafts, gear means connecting each metering valve shaft independently to the integrating shaft and also both metering valve shafts to said integrating shaft in fixed relative incremental ratios, means for selectively clutching one or the other or both of said metering valve shafts to said integrating shaft through said gear means, a closure valve interposed in each delivery line between the metering valve therein and the discharge nozzle, means interconnecting the clutch means and the closure valves for maintaining one valve in closed position and the other valve in open position when the integrating shaft is driven independently by the metering valve in the other delivery line, said interconnecting means being arranged to reverse the closure valve positions when the integrator shaft is independently driven by the other metering valve and to maintain both closure valves in open position when the clutch means connect both metering valves to the integrator shaft, a variator driven from said integrator shaft, said variator having a money shaft which rotates in preset ratio to the volume indicating integrator shaft, a computer having visual indicia driven from the integrator shaft to indicate the volume of fluid for each delivery, said computer having a totalizing shaft for indicating the total volume of fluid for several deliveries, a differential integrator having one input connected to said money shaft, a second input for said differential integrator, a plurality of change gears interposed between said second input and said totalizer shaft, means for selectively clutching one set of change gears to establish a driving connection between the totalizer drive and the second input to the differential integrator whereby the output of said differential integrator will reflect the rotation of the money shaft and said second input, means interconnecting the integrator shaft clutching means and the change gear clutching means to establish different ratios between said second input and said totalizer shaft in accordance with the ratio between said metering valves, and a price indicating computer driven by the output of said differential integrator.

14. A fluid dispensing apparatus as set forth in claim 13 wherein the two selective clutch means comprise axially movable ball clutches.

15. A fluid dispensing apparatus comprising two fluid pumps, a pair of fluid delivery lines respectively connected to said pumps and joined at a single discharge nozzle, a metering valve interposed in each delivery line, each of said metering valves having a shaft which rotates in fixed ratio to the volume of fluid flowing through the line in which the metering valve is interposed, an intergrating shaft disposed between said metering valve shafts, gear means connecting each metering valve shaft independently to the integrating shaft and also both metering valve shafts

to said integrating shaft in fixed relative incremental ratios, means for selectively clutching one or the other or both of said metering valve shafts to said integrating shaft, a closure valve interposed in each delivery line between the metering valve and the discharge nozzle, means interconnecting the clutching means and the closure valves for maintaining one valve in closed position and the other valve in open position when the integrating shaft is driven independently by the metering valve in the other delivery line, said interconnecting means being arranged to reverse the closure valve positions when the integrator shaft is independently driven by the other metering valve and to maintain both closure valves in open position when the clutch means connect both metering valves to the integrator shaft, a variator driven from said integrator shaft, said variator having a money shaft which rotates in preset ratio to the volume indicating integrator shaft, a computer having visual indicia driven from the integrator shaft to indicate the volume of fluid for each delivery, said computer having totalizing shaft for indicating the total volume of fluid for several deliveries, a differential integrator having one input connected to said money shaft, a second input for said differential integrator, a plurality of change gears interposed between said second input and said totalizer shaft, means for selectively clutching one set of change gears to establish a driving connection between the totalizer drive and the second input to the differential integrator whereby the output of said differential integrator will reflect rotation of both the money shaft and said second input, means interconnecting the integrator shaft clutching means and the change gear clutching means to establish different ratios between said second input and said totalizer shaft in accordance with the ratio between said metering valves, a visual price indicating computer driven by the total price indicating output of said differential integrator, visual means indicating the unit price of the fluid being delivered, indicator means for indicating the ratio between said metering valves and thus the grade of fluid being delivered, means for varying said visual means and said indicator means in accordance with the ratio between said metering valves, said varying means being interconnected with the means interconnecting the said two clutch means and a single lever controlling all of said interconnecting means to simultaneously adjust the positions of the closure valves, the incremental ratio between said metering valves, the second input to the differential integrator, the visual unit price indicating means and the indicator indicating the grade of fluid delivered.

16. A fluid dispensing apparatus as set forth in claim 15 wherein is provided pump actuating means including a reset lever having a projection movable therewith between an operative and an inoperative position of the lever and one of said interconnecting means comprises a shaft having multi-slotted members secured thereto, each slot being positioned to receive said projection only when said single lever has moved said interconnecting means sufficiently to establish a predetermined incremental ratio between said metering valves, whereby the metering valves will be driven at a given incremental ratio and that ratio cannot be changed once the pumps have been actuated.

17. A fluid dispensing apparatus as set forth in claim 15 wherein the two selective clutch means comprise axially movable ball clutches.

18. A fluid dispensing apparatus as set forth in claim 15 wherein detent means provide a sense of feel indicating that a given incremental ratio between the metering valves has been established.

19. A fluid dispensing apparatus as set forth in claim 18 wherein the said single lever is rotated a full revolution to effect an incremental change in the ratio between the metering valves and one of said interconnecting means includes a shaft which rotates a fraction of a revolution for each incremental change, and the detent means include a spider having arms arcuately spaced in accordance with said fraction of a revolution, a roll pivotally mounted about an axis parallel to said last-named shaft and spring means urging said roll between and into contact with a pair of adjacent spider arms, the diameter of said roll being such that the inclusive angle of contact with said arms approximates 125°.

20. A fluid dispensing apparatus as set forth in claim 19 wherein additional spring means urge the single lever towards a given position in which any given incremental ratio between the metering valves will be established.

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