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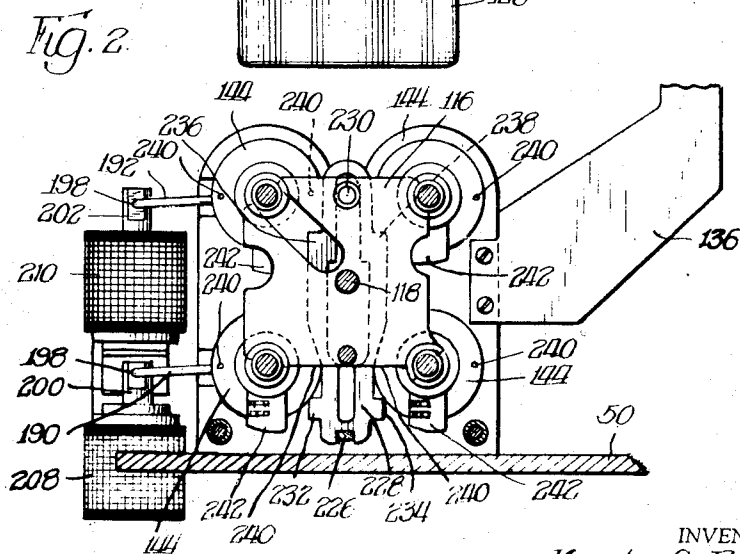
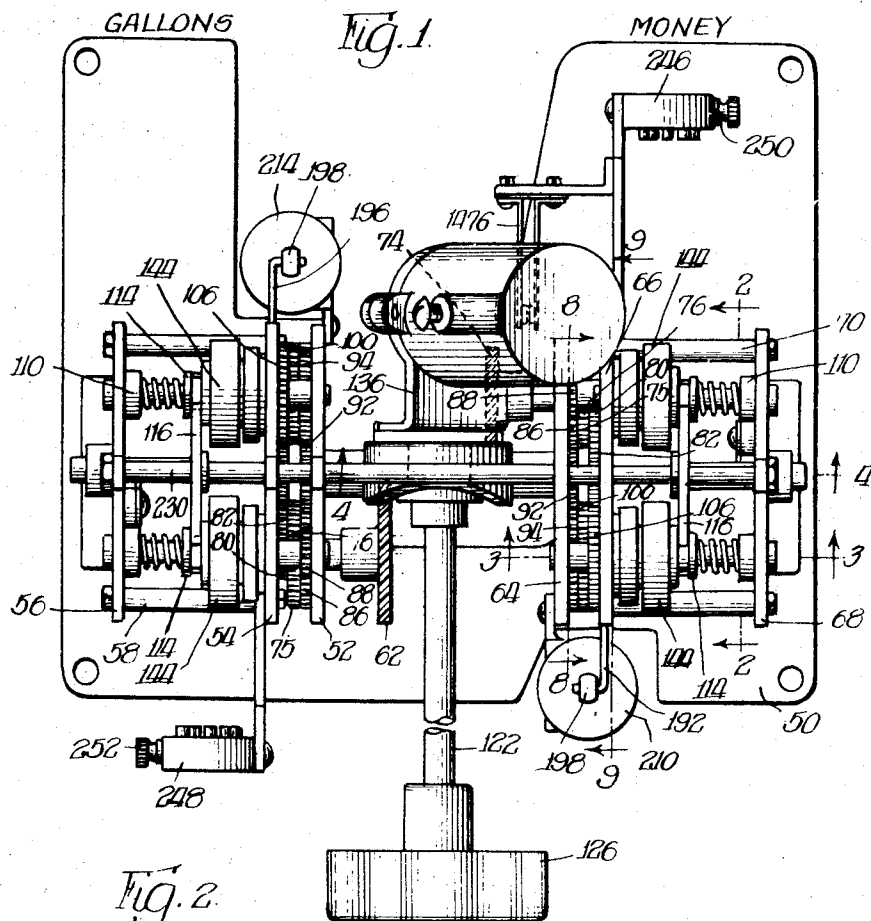
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2,429,259

REGISTERING MECHANISM AND COMPUTING DEVICE

Filed Oct. 25, 1943

21 Sheets-Sheet 1



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REGISTERING MECHANISM AND COMPUTING DEVICE

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Fig. 3

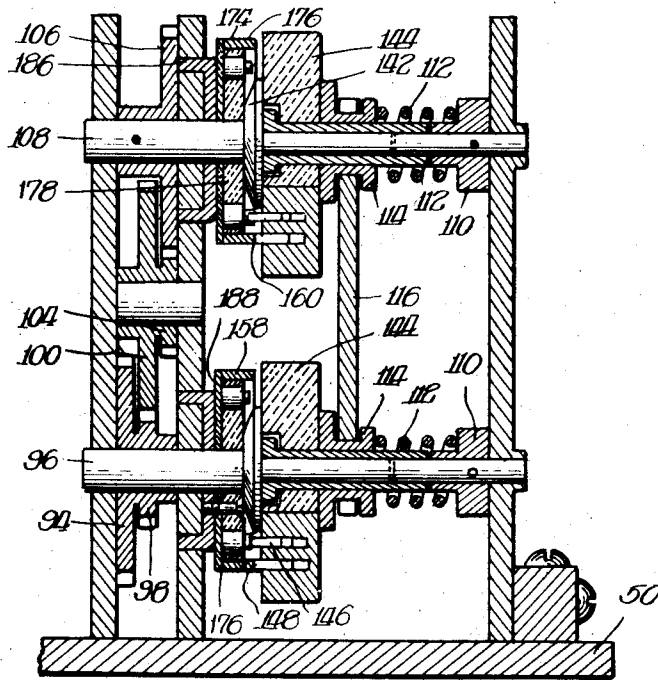
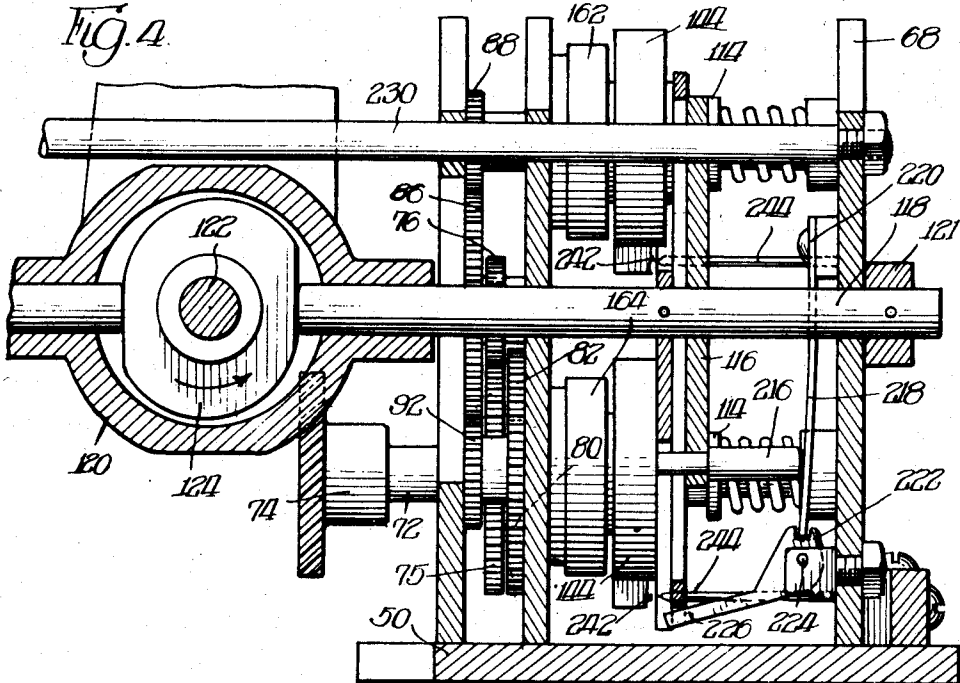


Fig. 4



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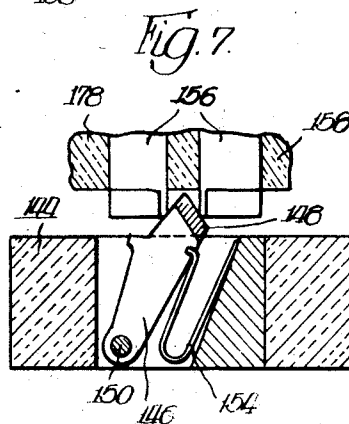
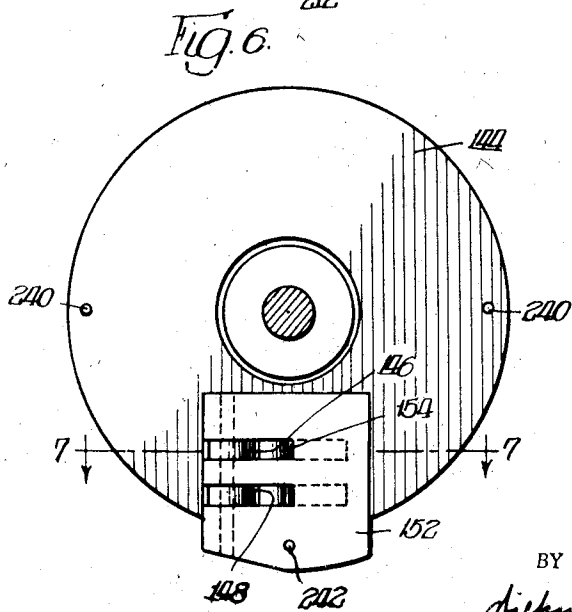
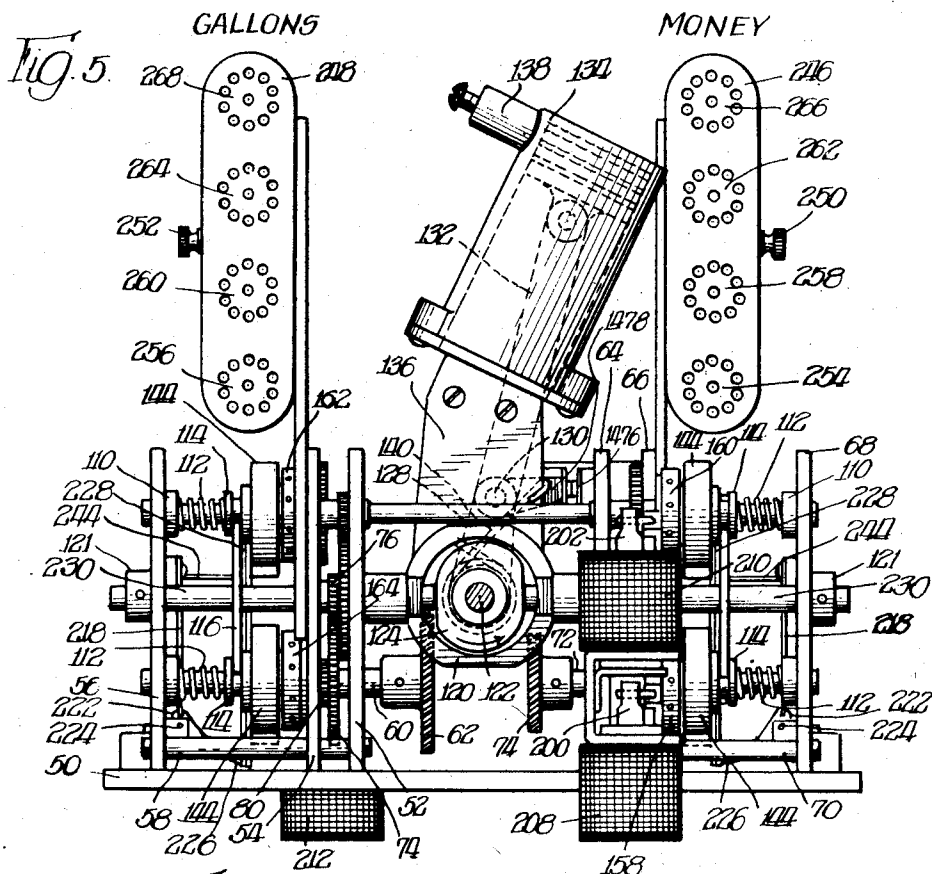
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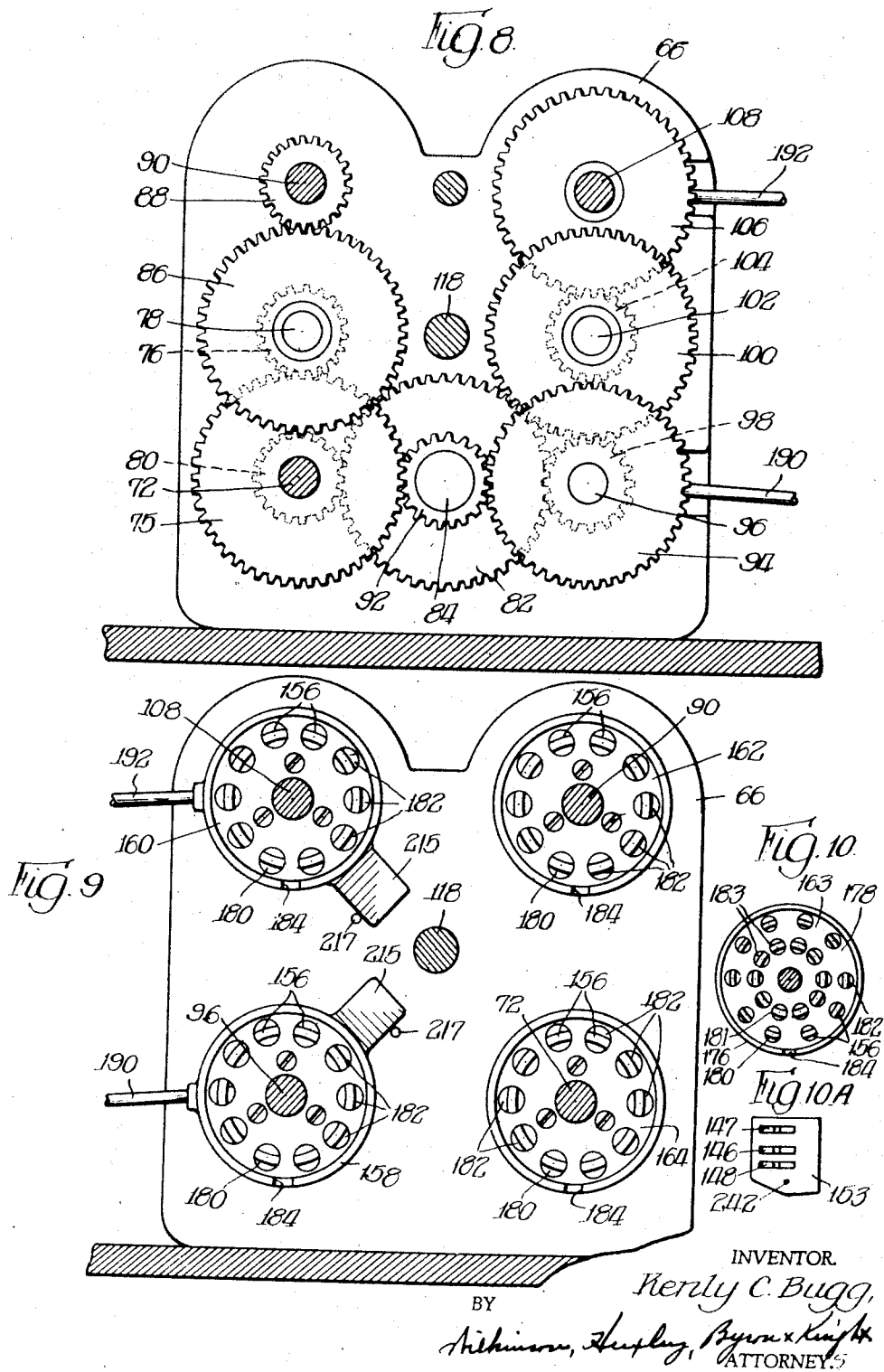
21 Sheets-Sheet 3



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2,429,259

21 Sheets-Sheet 4



Oct. 21, 1947.

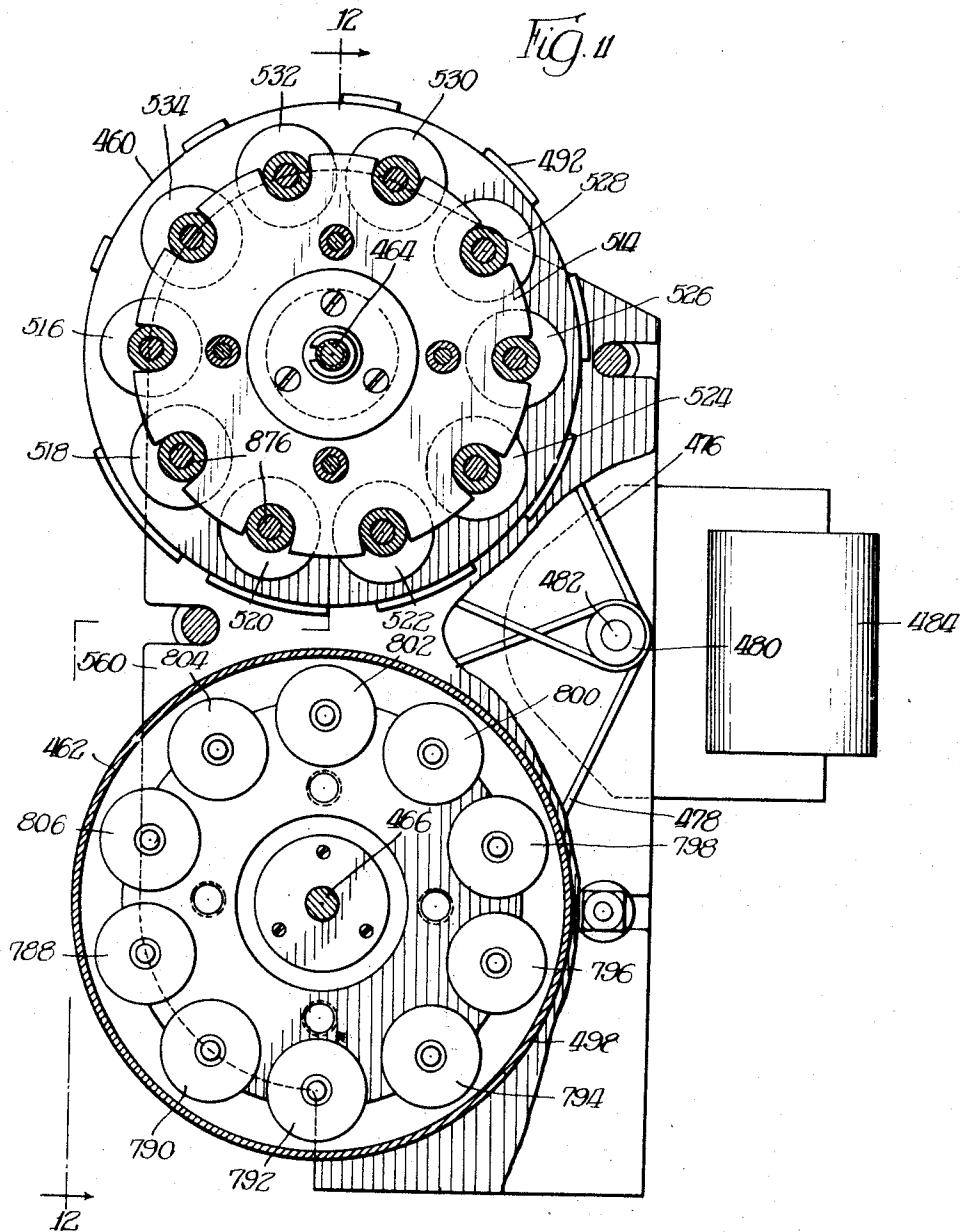
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21 Sheets-Sheet 5



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REGISTERING MECHANISM AND COMPUTING DEVICE

Filed Oct. 25, 1943

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Fig. 12

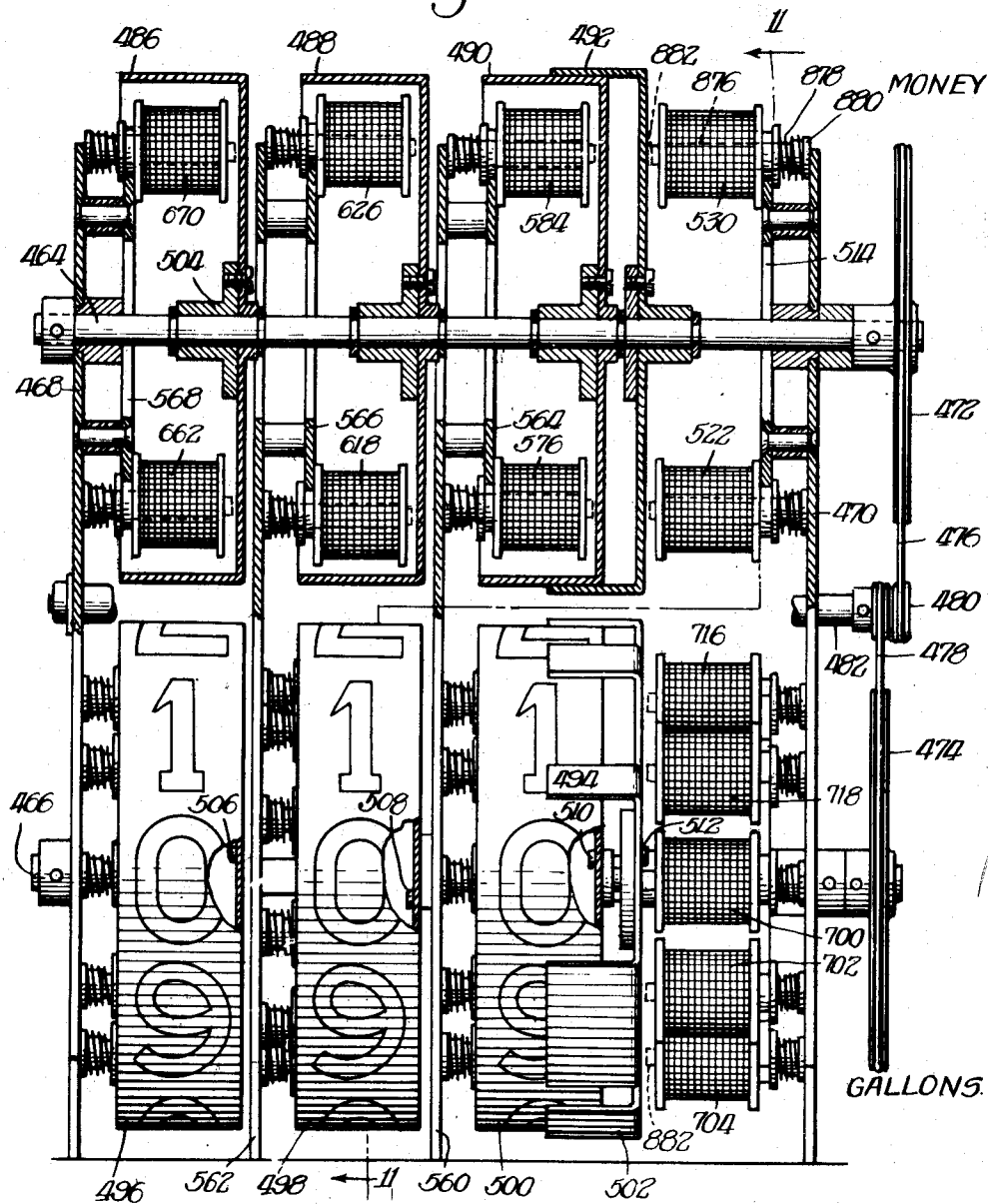
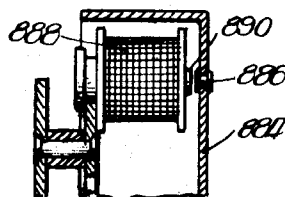


Fig. 13



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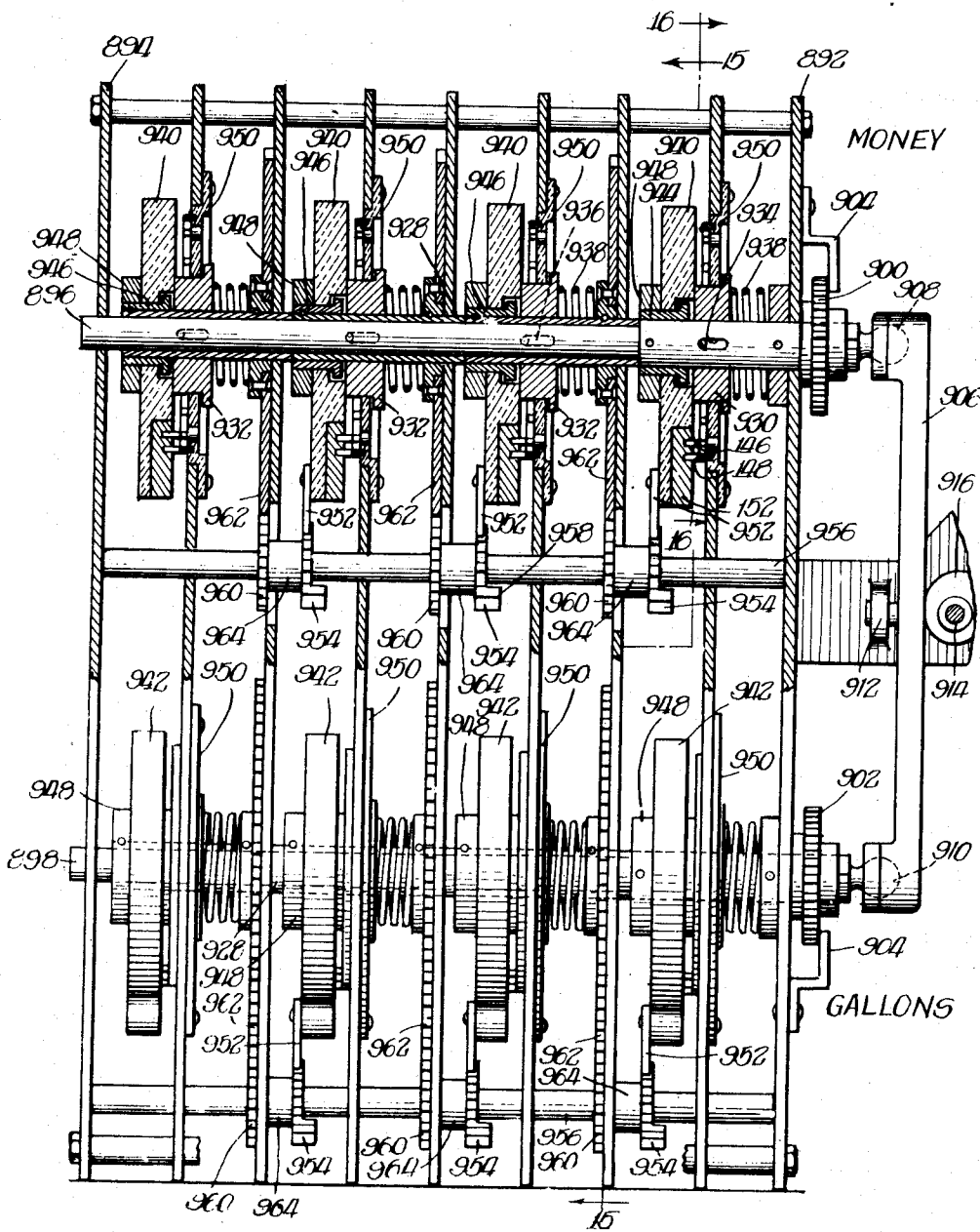
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Fig. 11.



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Fig. 15

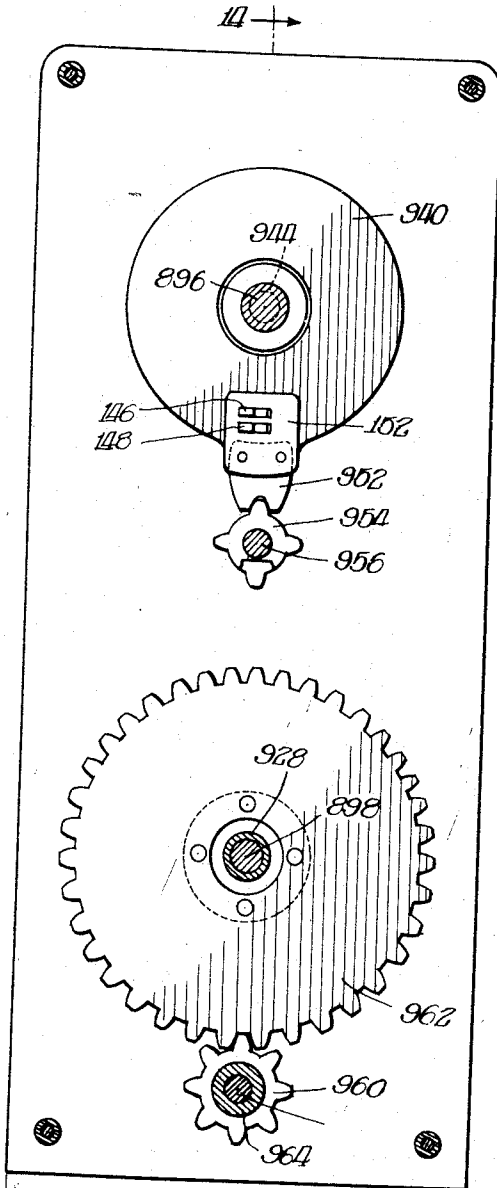


Fig. 16

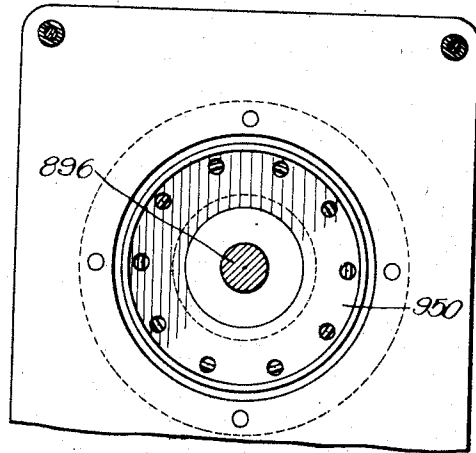
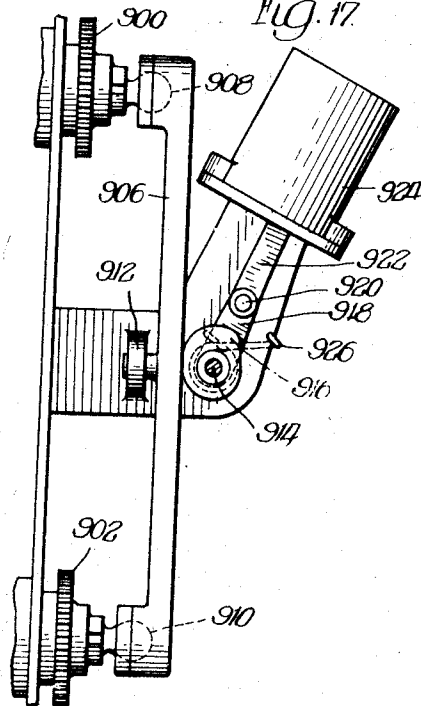


Fig. 17



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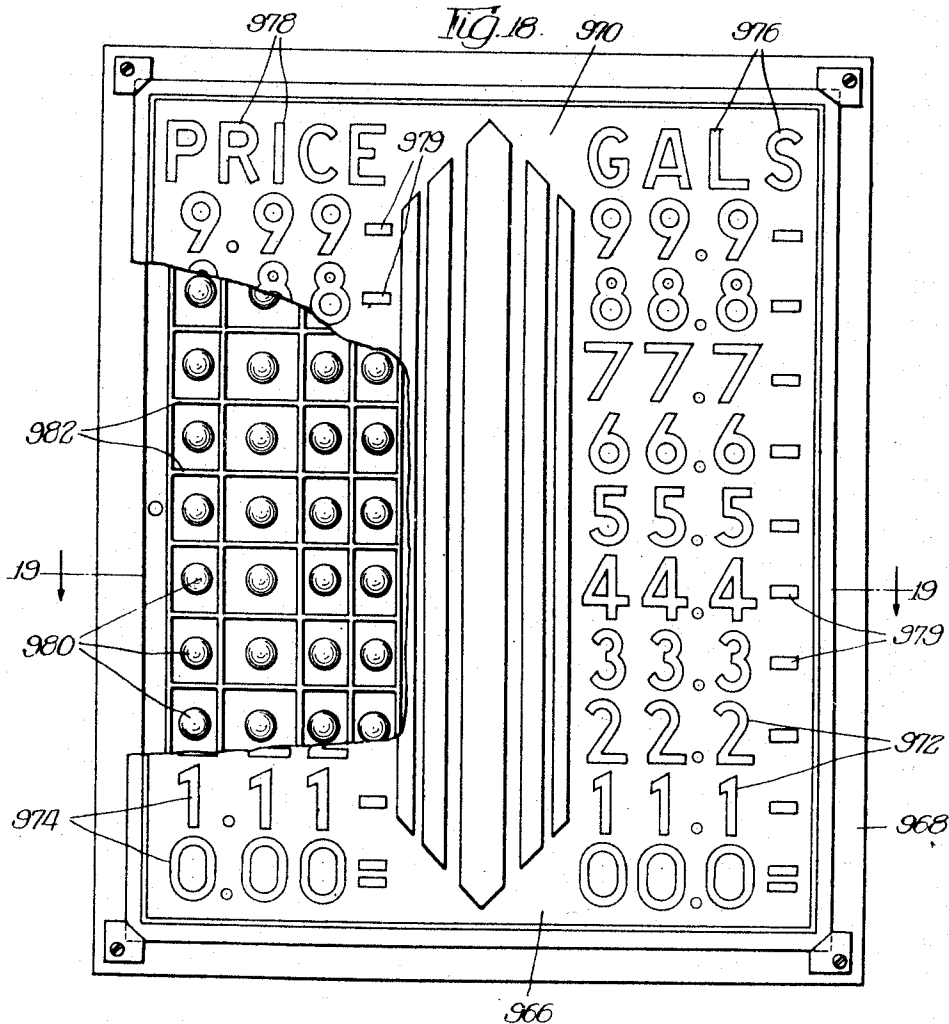
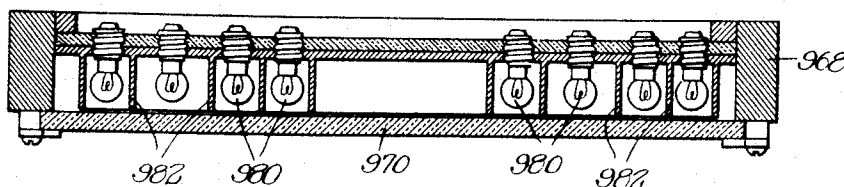


Fig. 19.



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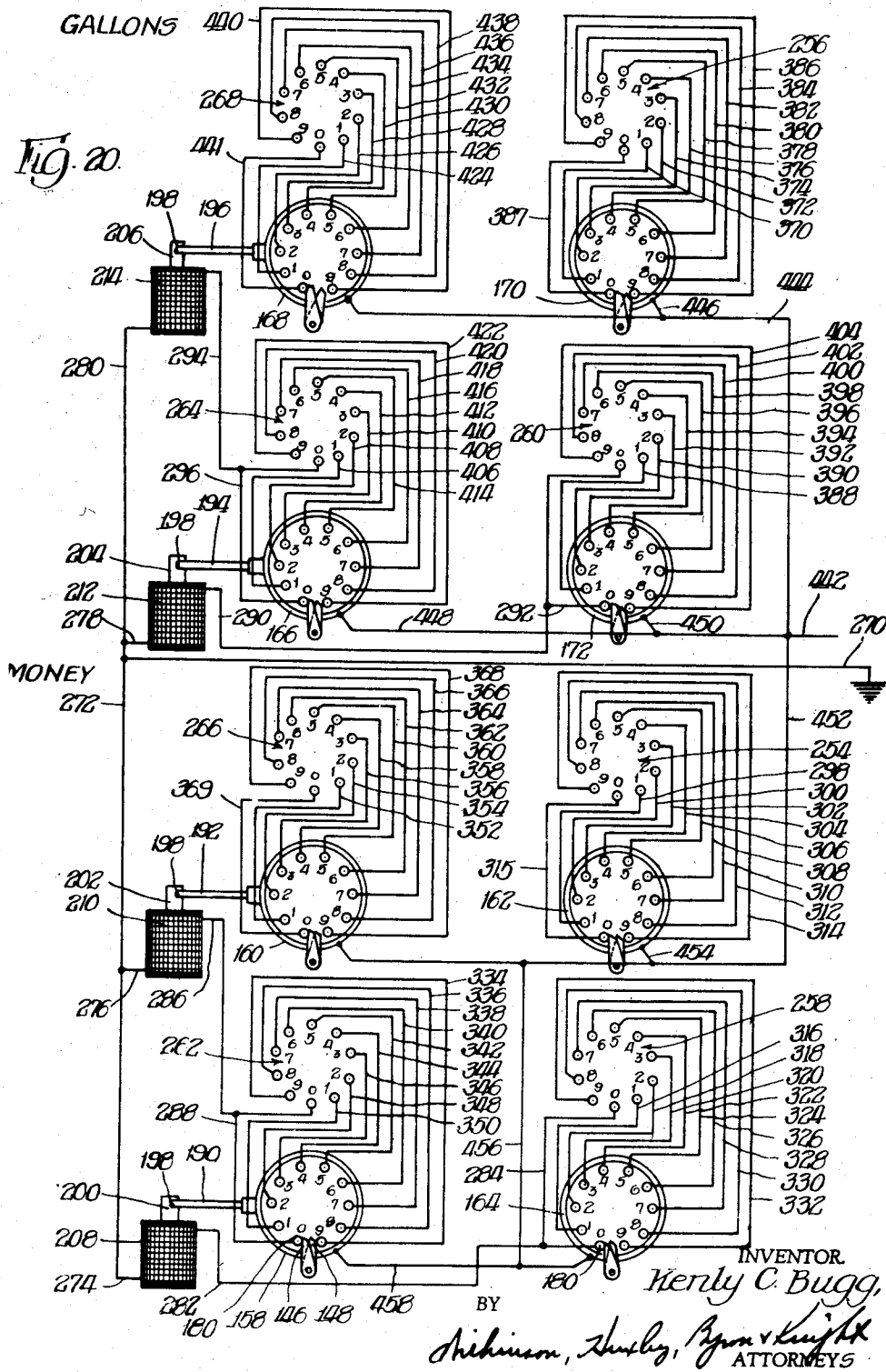
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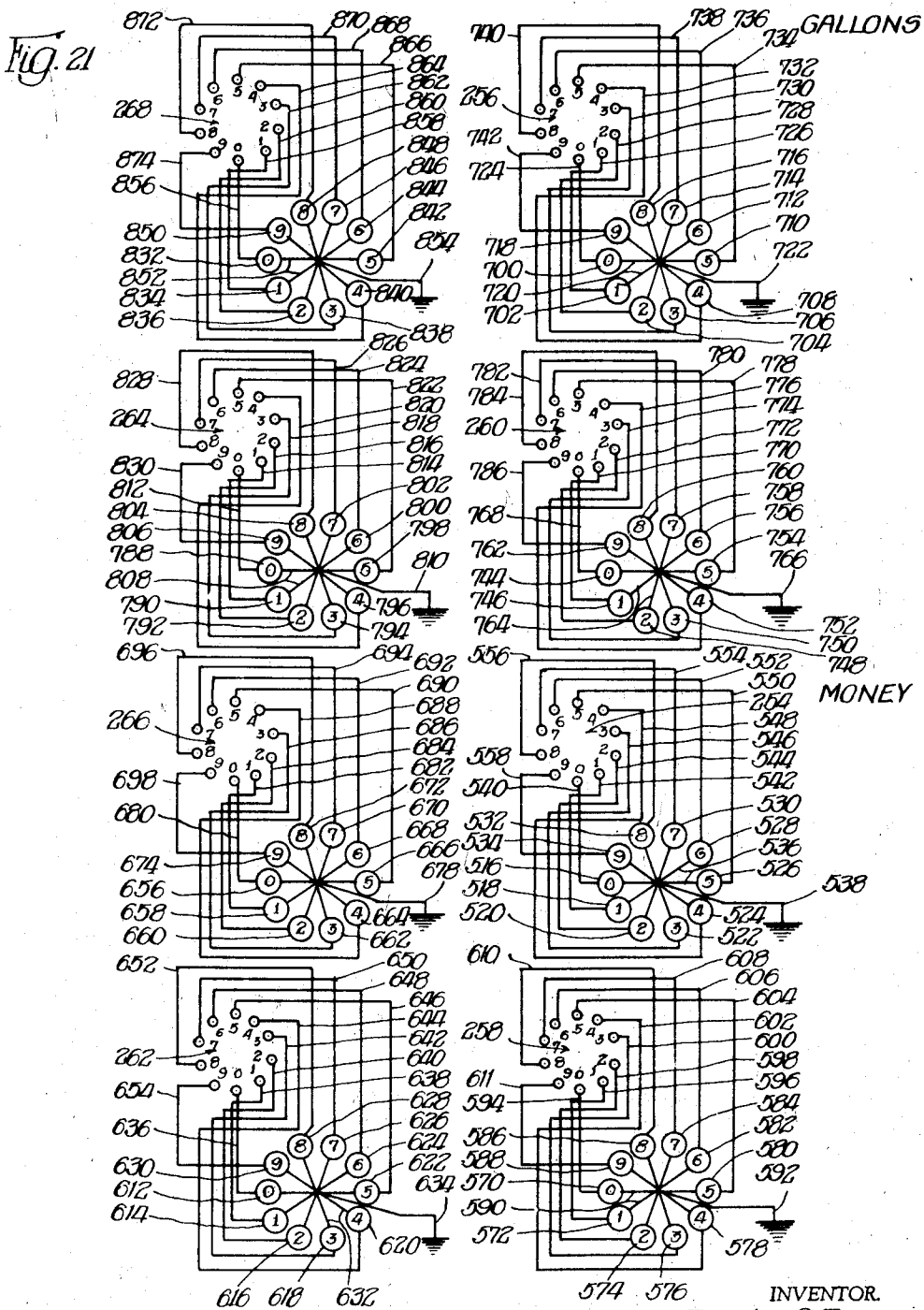
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REGISTERING MECHANISM AND COMPUTING DEVICE

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21 Sheets-Sheet 11



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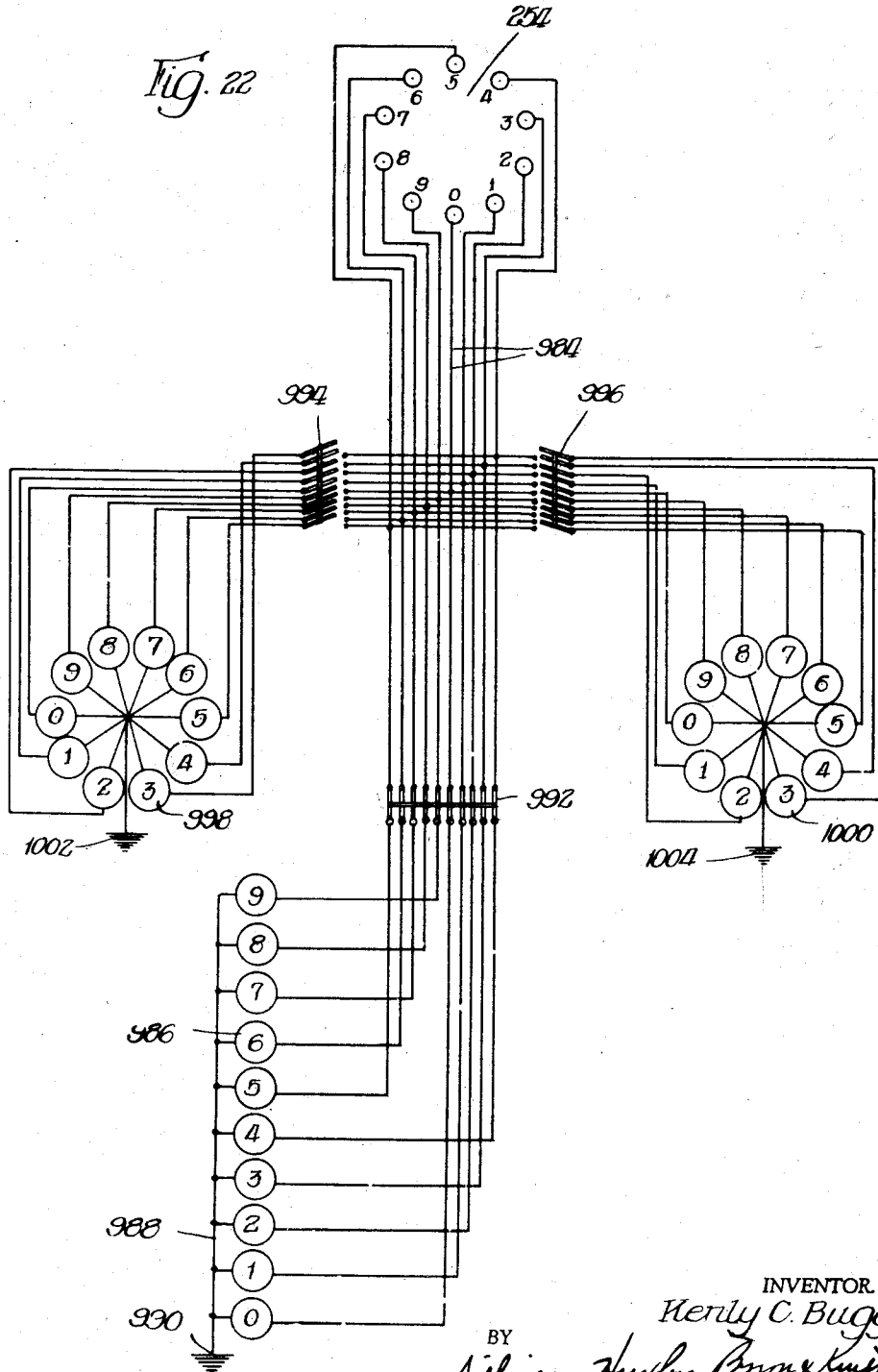
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REGISTERING MECHANISM AND COMPUTING DEVICE

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Fig. 22



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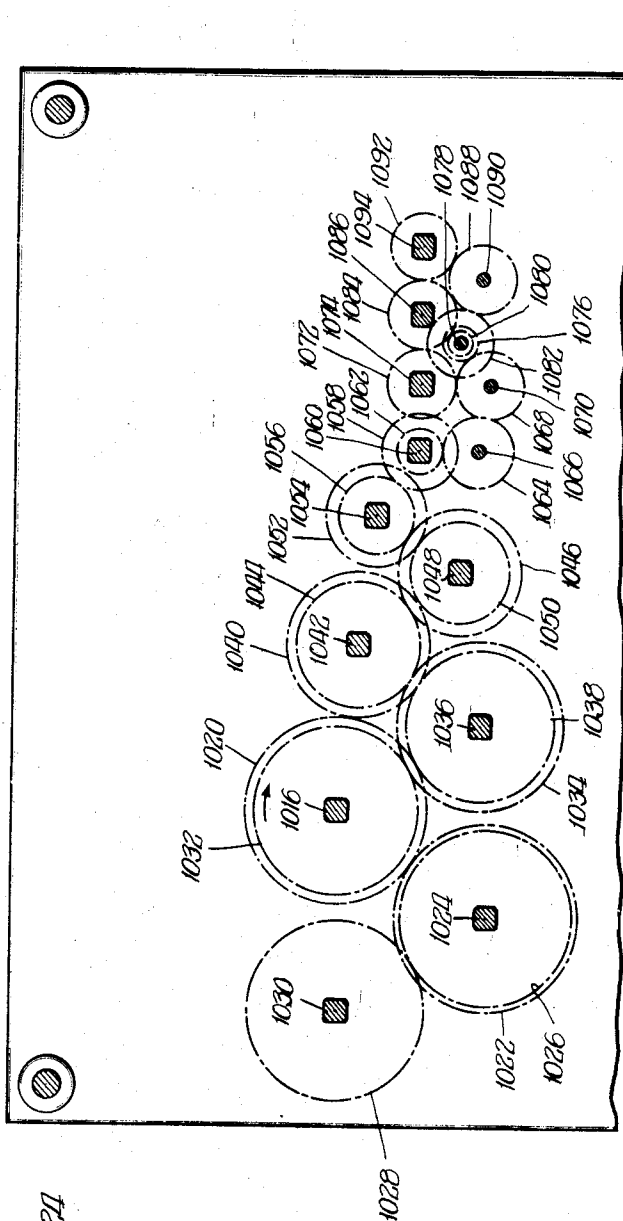
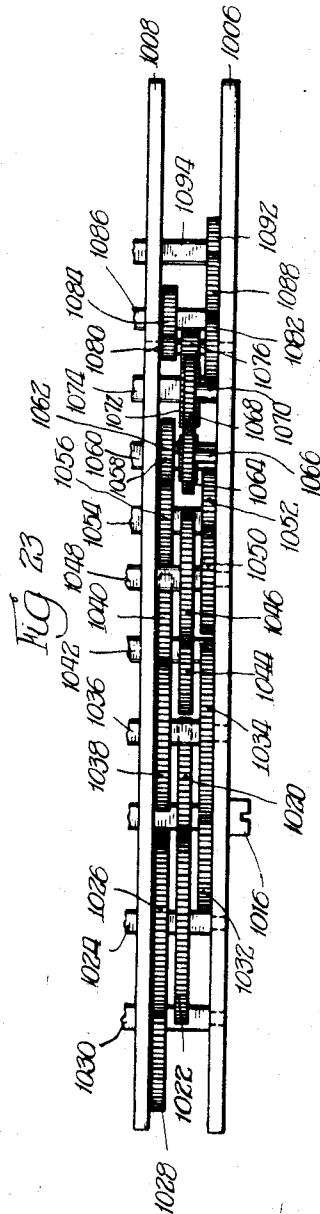


Fig. 27



23
HQA

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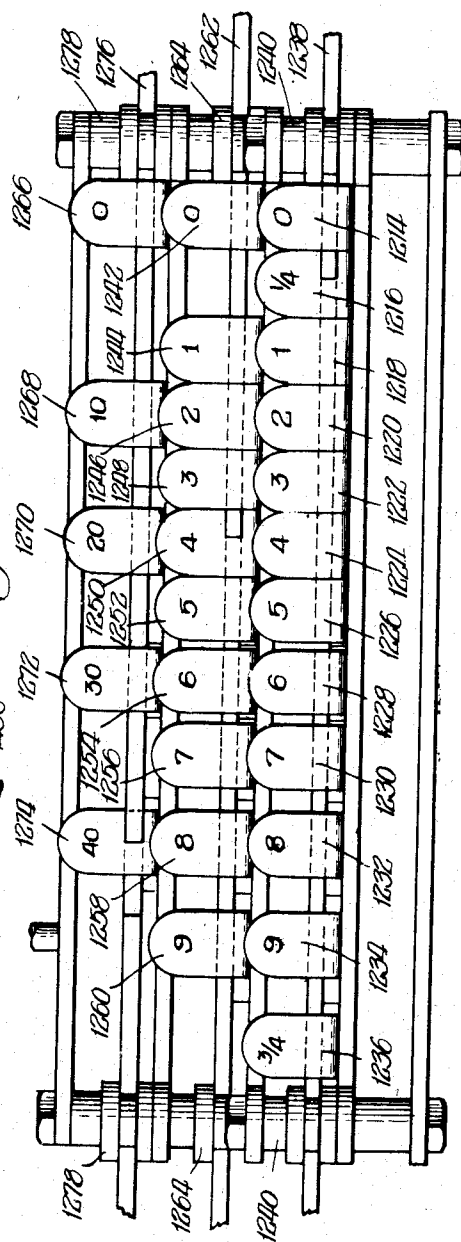
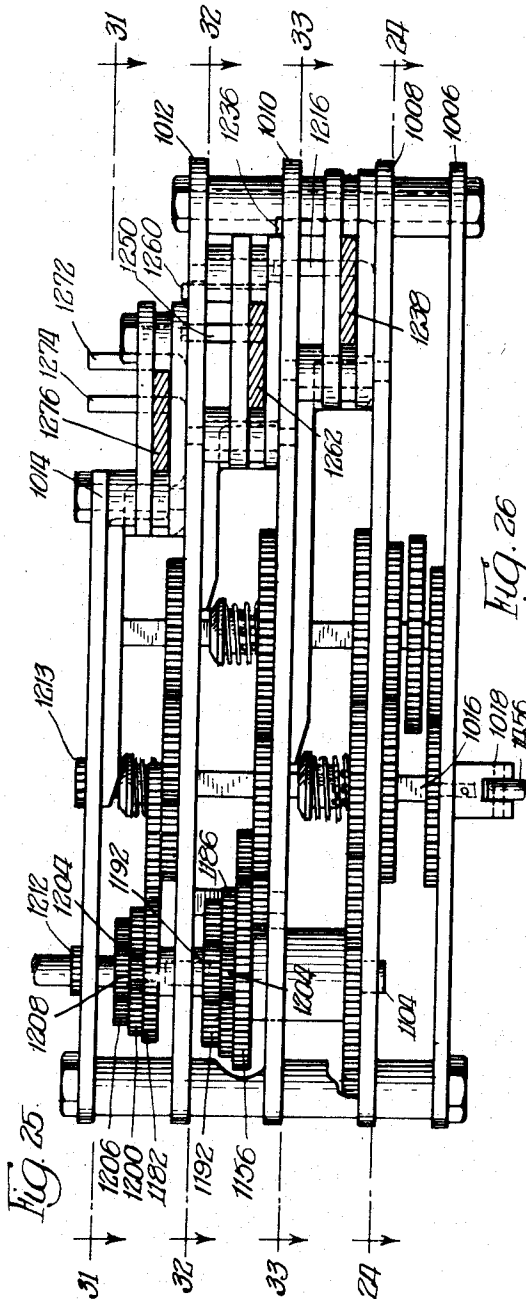
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REGISTERING MECHANISM AND COMPUTING DEVICE

Filed Oct. 25, 1943

21 Sheets-Sheet 14



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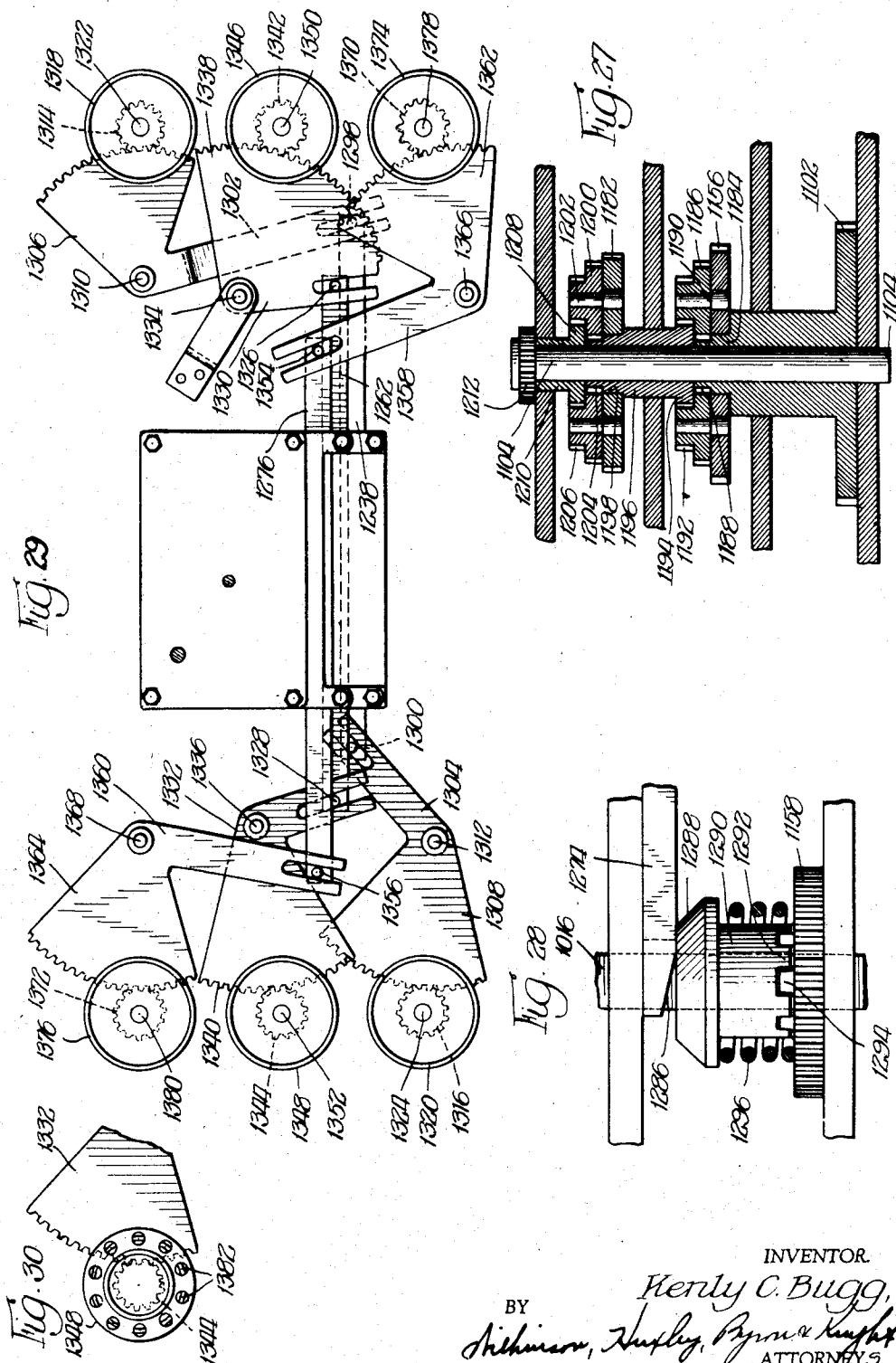
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REGISTERING MECHANISM AND COMPUTING DEVICE

Filed Oct. 25, 1943

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2,429,259

REGISTERING MECHANISM AND COMPUTING DEVICE

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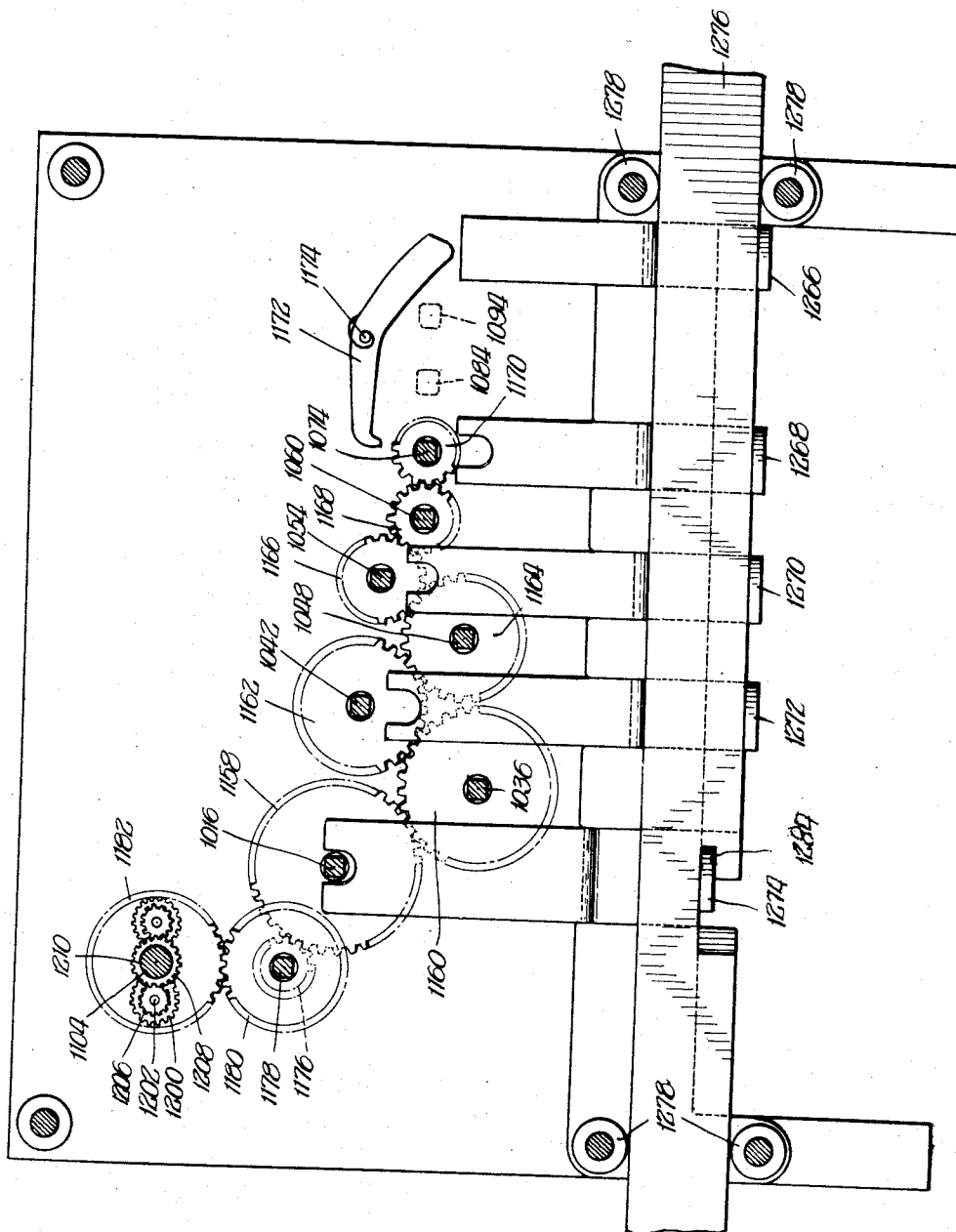


Fig. 31

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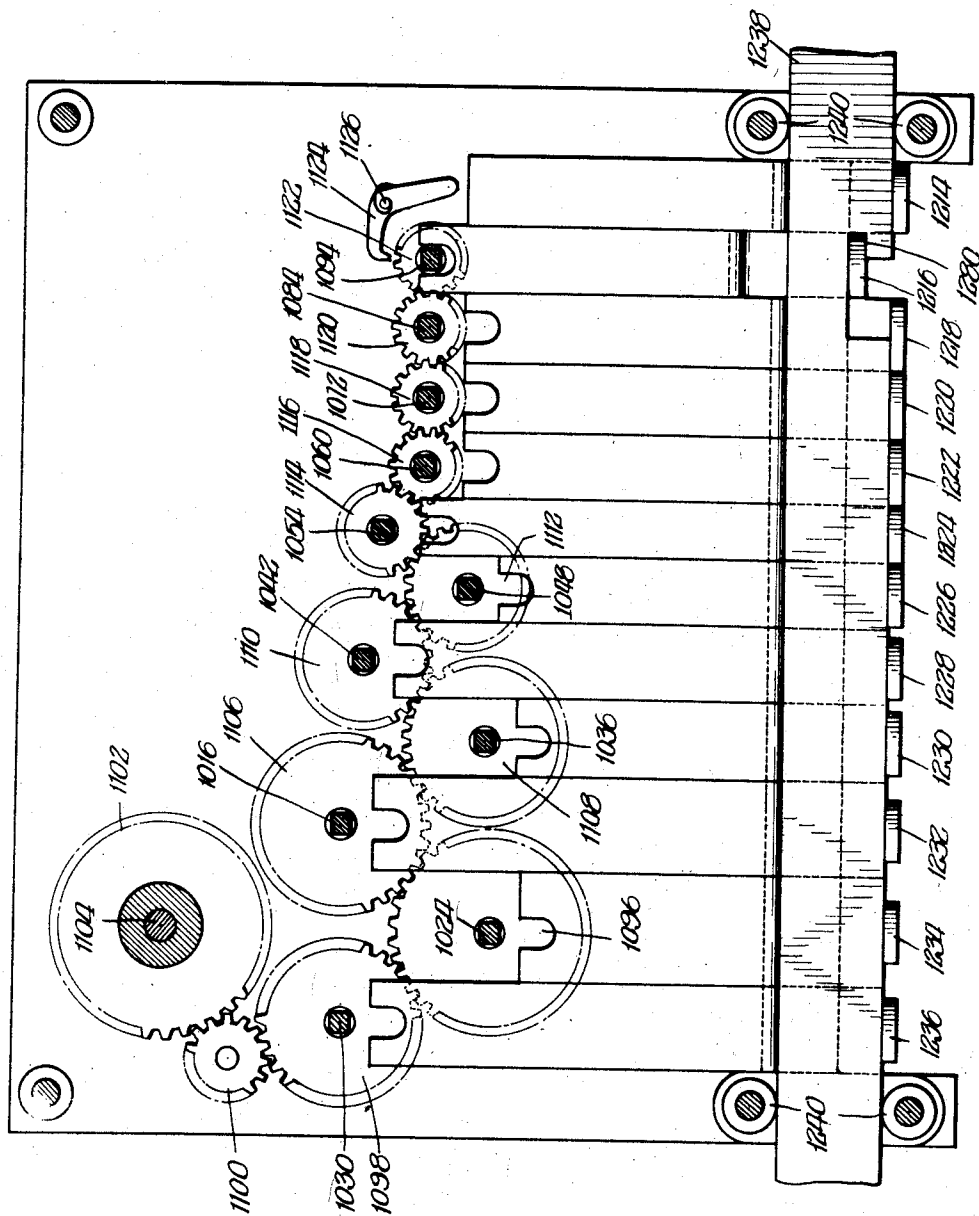
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REGISTERING MECHANISM AND COMPUTING DEVICE

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21 Sheets-Sheet 18



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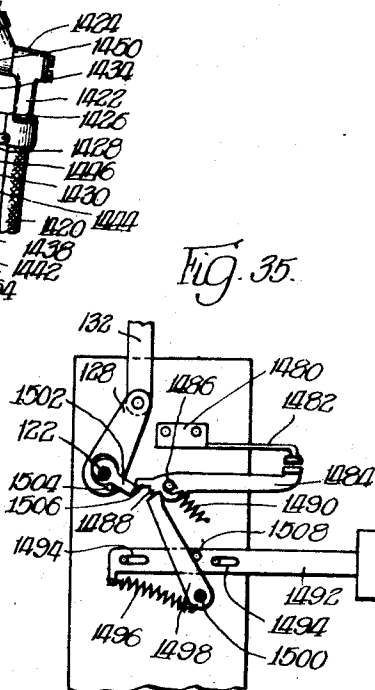
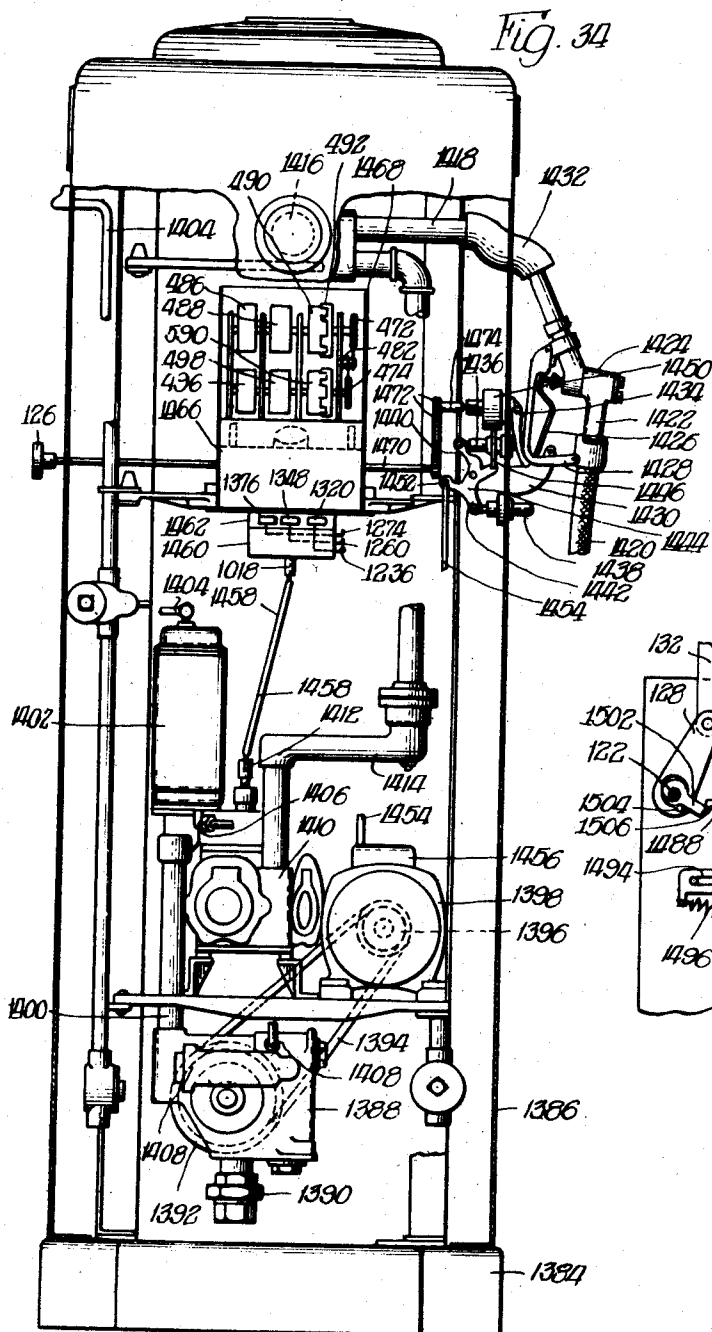
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REGISTERING MECHANISM AND COMPUTING DEVICE

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21 Sheets-Sheet 19



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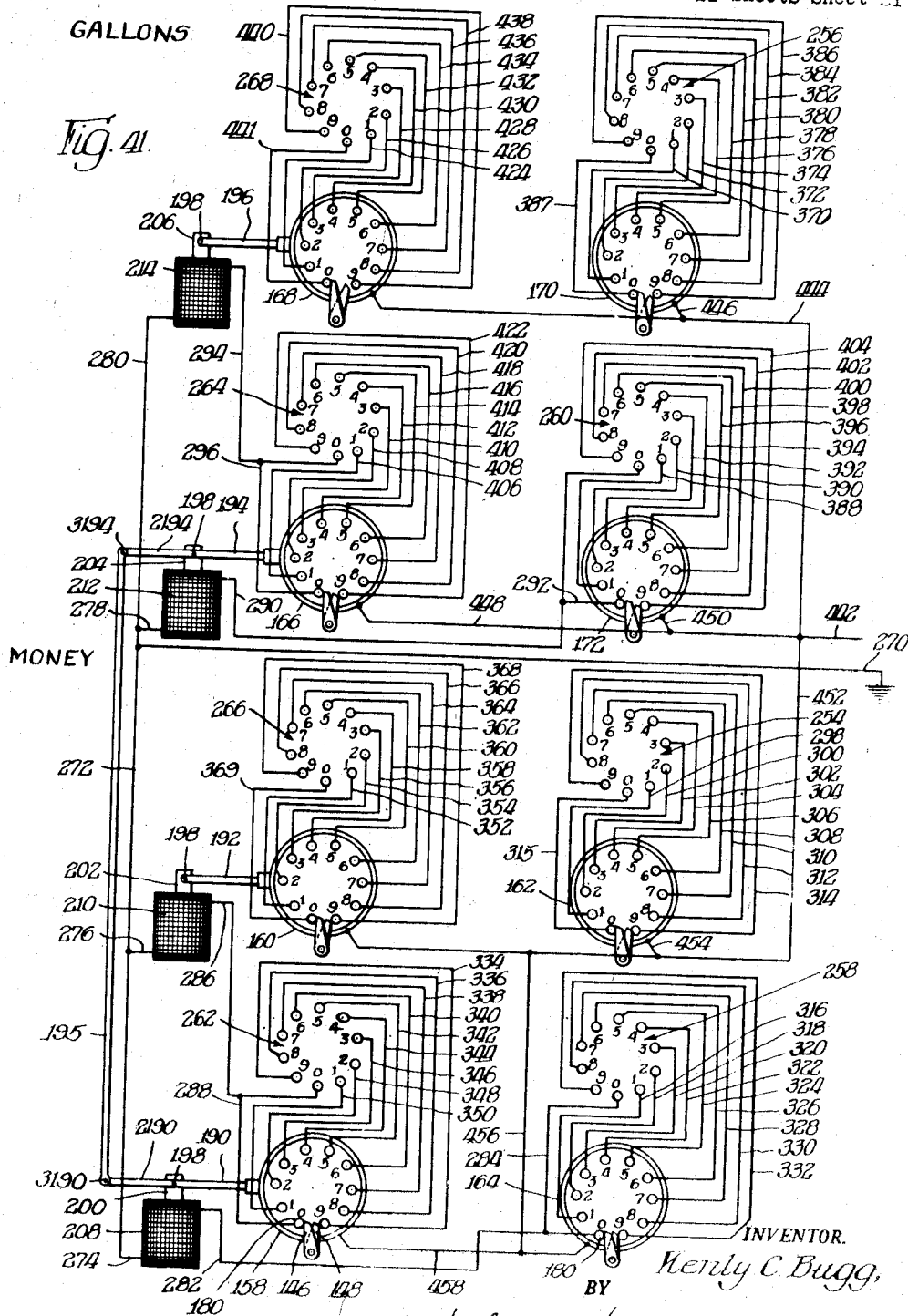
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REGISTERING MECHANISM AND COMPUTING DEVICE

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UNITED STATES PATENT OFFICE

2,429,259

REGISTERING MECHANISM AND
COMPUTING DEVICE

Kenly C. Bugg, Fort Wayne, Ind.

Application October 25, 1943, Serial No. 507,499

2 Claims. (Cl. 177—351)

1

This invention pertains to a registering and computing mechanism and more particularly to a mechanical and/or electrical control mechanism for computing mechanism and registering means therefor.

It is an object of this invention to provide an electrical registering mechanism and computing device.

Another object is to provide a computing head adapted to measure in smaller increments than those at which the variator thereof is set.

Still another object is to provide reset means for a register remotely disposed therefrom.

Yet another object is to provide distributing means for controlling a register provided with mechanism for insuring proper and positive change or compensation in transferring certain indications to higher indications.

A different object is to provide resetting means for a register which is effective to set to a predetermined number as zero without the necessity of operating the set-back means through a full cycle.

Another different object is to provide set-back mechanism for a register wherein no dead center position can be maintained.

Still a different object is to provide a registering system wherein a plurality of registering mechanisms may be selectively operated and controlled from a single control means.

Yet a different object is to provide a registering mechanism wherein the numeral wheels or indicating means therefor are positively operated and controlled by electrical means, and wherein no backlash can be introduced.

Another object is to provide distributor means for an electrical computing head wherein positive transfer mechanism may be used, but one wherein the distributor and transfer mechanism is readily and quickly reset.

A further object is to provide varying means having a plurality of ranges, each being adapted to be set by movable means located substantially in one plane.

Yet another object is to provide varying means which can only be set in accordance with the visible indication on the varying setting indicator.

Another object is to provide a liquid dispensing apparatus having mechanism therein fulfilling all the objects enumerated herein.

With these and various other objects in view, the invention may consist of certain novel features of construction and operation as will be more fully described and particularly pointed out

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in the specification, drawings and claims appended hereto.

In the drawings, which illustrate embodiments of the device, and wherein like reference characters are used to designate like parts—

Figure 1 is a top plan view of a form of distributing mechanism for the registering and computing mechanism embodying the invention;

Figure 2 is a sectional elevation taken substantially in the plane as indicated by the line 2—2 of Figure 1;

Figure 3 is an enlarged sectional elevation taken substantially in the plane as indicated by the line 3—3 of Figure 1;

Figure 4 is an enlarged transverse sectional elevation taken substantially in the plane as indicated by the line 4—4 of Figure 1;

Figure 5 is an elevation of the distributor illustrated in Figure 1, the same looking upwardly

of said figure;

Figure 6 is an enlarged plan view of one of the selecting switch members used in the distributor;

Figure 7 is an enlarged sectional elevation, the same being taken substantially in the plane as indicated by the line 7—7 of Figure 6, and showing the cooperative relation between one of the pawl members of said selecting switch member and certain of the adjacent contacts of the associated distributing ring;

Figure 8 is a sectional elevation taken substantially in the plane as indicated by the line 8—8 of Figure 1, showing a portion of the driving gears for said distributor;

Figure 9 is a sectional elevation taken substantially in the plane as indicated by the line 9—9 of Figure 1, the same showing the contact connections of the distributing rings;

Figure 10 is an elevation of a modified form of distributing ring showing provision for operating multiple registering means;

Figure 10A is an enlarged elevation of a modified form of conductor for the switch member to be used with the distributing ring shown in Figure 10;

Figure 11 is a sectional elevation showing a pair of registering wheels of the registering mechanism, the same being taken substantially in the plane as indicated by the line 11—11 of Figure 12;

Figure 12 is a sectional elevation, partly in section, of the registering mechanism, the same being taken substantially in the plane as indicated by the line 12—12 of Figure 11;

Figure 13 is a fragmentary sectional elevation

showing a modified form of arresting mechanism for the registering mechanism;

Figure 14 is a sectional elevation of a modified form of distributing mechanism embodying the invention, the same being taken substantially in the plane as indicated by the line 14—14 of Figure 15;

Figure 15 is an end elevation, partly in section, of the modified form of distributing mechanism, the same being taken substantially in the plane as indicated by the line 15—15 of Figure 14;

Figure 16 is a fragmentary sectional elevation showing the distributor ring of the modified form of distributing mechanism, the same being taken substantially in the plane as indicated by the line 16—16 of Figure 14;

Figure 17 is a fragmentary elevation of a portion of the mechanism shown in Figure 14, showing the dash pot;

Figure 18 is an elevation showing an electrically operated panel board indicating mechanism;

Figure 19 is a sectional elevation taken substantially in the plane as indicated by the line 19—19 of Figure 18;

Figure 20 is a wiring diagram showing the electrical connections through the distributor ring;

Figure 21 is a wiring diagram illustrating the electrical connections to the registering mechanism control means;

Figure 22 is a wiring diagram illustrating multiple connections for a plurality of indicating means;

Figure 23 is an elevation of the train of driving gears of the varying mechanism;

Figure 24 is a fragmentary top plan view of the gear train illustrated in Figure 23, the same being taken substantially in the plane indicated by the line 24—24 of Figure 25;

Figure 25 is an elevation of one form of varying mechanism embodying the invention;

Figure 26 is an elevation of the manual setting mechanism of the variator;

Figure 27 is an enlarged sectional elevation through the differential mechanism of the variator;

Figure 28 is an enlarged fragmentary elevation showing the clutch engagement mechanism for the price selecting means;

Figure 29 is a top plan view of one form of daily price indicating means;

Figure 30 is a fragmentary sectional elevation of a modified form of daily price numeral wheel adapted for remote indication;

Figure 31 is an enlarged top plan view of the tens price selecting mechanism, the same being taken substantially in the plane as indicated by the line 31—31 of Figure 25;

Figure 32 is an enlarged top plan view of the units price selecting mechanism, the same being taken substantially in the plane as indicated by the line 32—32 of Figure 25;

Figure 33 is an enlarged top plan view of the tenths price selecting mechanism, the same being taken substantially in the plane as indicated by the line 33—33 of Figure 25;

Figure 34 is a sectional elevation of a liquid dispensing apparatus embodying the variator and one form of distributor and registering mechanism embodying the invention;

Figure 35 is an elevation of a modified form of electrical interlock or switch mechanism for maintaining the motor circuit open after resetting of the distributor, said circuit being maintained open until manually closed;

Figure 36 is an illustration, more or less diagrammatic, of a preselecting device adapted for use in connection with distributor and registering mechanism embodying the invention;

Figure 37 is a fragmentary side elevation showing one of the selecting members and the cancelling member of the preselector;

Figure 38 is a side elevation of one of the selector members of the preselector device;

Figure 39 is a fragmentary side elevation showing the cancelling member of the preselecting device;

Figure 40 is a fragmentary top plan view of the cancelling member shown in Figure 39; and,

Figure 41 is a wiring diagram corresponding to Figure 20 but showing means for correcting or compensating from one end of the registering mechanism to the other side.

This application is a continuation-in-part of application Serial No. 305,757, filed November 24, 1939.

Distributing mechanism—Figures 1 to 10 inclusive

Referring first of all more particularly to the distributing mechanism such as shown in Figures 1 to 10 inclusive, the said mechanism shown consists essentially of a support 50, two sets of distributing units being supported thereon, one of said units being provided with the spaced fixed supports 52, 54 and 56 rigidly connected together as at 58, the driving shaft 60 thereof being suitably journaled in said plates, said shaft being provided with the 42 tooth driving gear 62 for connection to driving means such as through a speed variator, to be later described. The distributor is also provided with the spaced plates 64, 66 and 68 rigidly connected together as at 70 and provided with the driving shaft 72, provided with the 25 tooth driving gear 74 adapted to be operated by said speed variator.

It will thus be seen that the distributor is in two parts or units, and the mechanisms in these units are identical. In the embodiment shown, the unit at the left of Figures 1 and 5 is for United States gallon computations, while the unit at the right of said figures and as shown in Figures 2, 3, 4, 8, 9 and 10 is for United States currency, though it is of course understood that the computations may be made in other quantities and currencies using the same inventions as disclosed herein. As has already been pointed out, the two parts of the distributor are identical so that it is only necessary to show sections and other details of one unit.

The shafts 60 and 72 (Figure 5) are provided with the 75 tooth gears 75 (Figure 8) non-rotatably mounted thereon, said gears meshing with the 25 tooth gears 76 provided on the shafts 78, and the gears 75 are provided with the 24 tooth pinions 80 meshing with the 80 tooth gears 82 provided on the shaft 84. The gears 76 are provided with the 80 tooth pinions 86 meshing with the 24 tooth gears 88 non-rotatably mounted on the shafts 90. The gears 82 are provided with the 25 tooth pinions 92 meshing with the 75 tooth gears 94 non-rotatably mounted on the shafts 96. The gears 94 are provided with the 24 tooth pinions 98 meshing with the 80 tooth gear 100 journaled on the shaft 102, the gear 100 being provided with the 25 tooth pinion 104 meshing with the 75 tooth gear 106, said gear being non-rotatably mounted on the shaft 108.

The shafts 60, 72, 90, 96 and 108 are journaled 75 in the members 52, 54, 56, 64, 66 and 68 and are

provided with the stops or collars 110 non-rotatably mounted thereon provided with seats for the springs 112, the other end of said springs being seated on the clutch members 114 slidably mounted with respect to said shafts, the clutch members 114 on adjacent shafts being connected by means of shifting plates 116, said plates being connected to the shifting rods 118, slidably supported by the fixed plates and slidably extending within the housing 120, being limited in its inward motion by the collars 121. The reset shaft 122 extends within said housing, being suitably journaled therein, and is provided with the cam 124 fixedly mounted on said reset shaft, suitable reset means such as the knob 126 being provided adjacent the end of the reset shaft.

Reset mechanism for distributing mechanism

The reset shaft 122 extends outwardly of the housing and is provided with the arm 128 non-rotatably mounted thereon, said arm being pivotally connected as at 130 to the piston rod 132 of the dash pot 134. Said dash pot 134 is supported on the housing 120 by means of the vertical support 136, and said dash pot is provided with suitable adjusting means 138 for regulating the speed of the piston thereof. The spring 140 is provided for the reset shaft 122 for urging said reset shaft toward zero or a predetermined position, one end of said spring engaging the support 136 and the other end of said spring engaging the arm 128 for urging the piston of the dash pot to fully extended position, that is, for urging the cam 124 to the position as illustrated in Figures 4 and 5. In other words, the dash pot always works against the spring in resetting operation to prevent too rapid return of the cam 124 to the position illustrated in said Figures 4 and 5.

Distributing mechanism—Selecting switches

The shafts of the distributor are provided with the members 142 adapted to be engaged by the selecting switch members 144 when the springs 112 are in extended position, that is, when the clutch members 114 are in clutch closed position, whereby said switch members 144 are connected for rotation with said shafts 72, 90, 96 and 108 respectively. The switch members 144 are preferably of a suitable insulating material, being provided with the spaced metallic dogs 146 and 148, said dogs being pivoted as at 150 to the conductor 152, said conductor being preferably so disposed as to provide a weighted portion for the purpose to be later described.

Said dogs are normally urged outwardly of the switch by means of the springs 154 so as to provide positive sliding contact means for the spaced contacts 156 of the adjacent distributing rings 158, 160, 162, 164, 166, 168, 170, 172 and 174, it being seen that the dogs are so shaped that rotation of the switch members can only be in one direction, thereby preventing subtracting movement of the register. The distributing rings consist essentially of a ground ring 176 and an insulating core 178 provided with the spaced contacts indicated generally at 156 in Figure 7, said contacts having the contact 180 representing the zero position, and the contacts 182 representing nine spaced increments, said rings additionally being provided with the notches 184 representing the zero position for the selecting switch members. That is, when the switch members are in zero position the grounding dogs 148 are posi-

tioned in the notches 184. The distributing rings are non-rotatably supported on the fixed supports 54 and 66 and are insulated therefrom. The members 158, 160, 166 and 168 are supported and insulated from the members 54 and 66 by means of the members 186 spaced from the core 178 by means of the insulating member 188, and the units and tens distributing rings 158, 160, 166 and 168 are provided with the outwardly extending arms 190, 192, 194 and 196 pivotally connected as at 198 to the movable plungers 200, 202, 204, 206 of the solenoids 208, 210, 212 and 214, movement of the plungers being adapted to slightly shift the rings in a counterclockwise direction, as viewed in Figures 10 and 20, in order to cause the zero contact 180 to approach the dogs 146, to insure a proper zero registration, as will be hereinafter more fully described. After proper zeroizing, and after the switch members move from the zero contact to the first contact, the solenoids are de-energized to permit the plungers 200, 202, 204 and 206 to return the rings to their initial position, and the stops 215 on said rings contact the stops 217 to properly position said rings.

Reset of selecting switches

In order to cause the selecting switch members to be moved to zero position, it is only necessary to rotate the shaft 122 in a counterclockwise direction through substantially 90°, causing the cam 124 to move the rods 118 outwardly to declutch said distributing rings, as has already been described. The weight of the connector 152 will cause the selecting switch members to move to zero position as the dash pot 134 will sufficiently retard return movement of the cam 124 to permit the required movement of said selecting switch members.

In order to insure immediate movement of the switch members, and in order to prevent them from sticking on dead center, the clutch plates 116 are provided with the members 216, causing said members to engage the springs 218 secured to the plates 56 and 68 as at 220, moving said springs outwardly, i. e., toward the end plates 56 and 68. Each of said springs loosely engages a bell crank 222 pivoted as at 224 to the plates 56 and 68, causing the inwardly extending arm 226 of said bell crank to move upwardly. Upward movement of the arm 226 causes upward movement of the slide 228, said slide being guided as at 230 on the plates 116, the slides being provided with the spaced outwardly extending lower arms 232 and 234, and the outwardly extending upper arms 236 and 238, said arms being adapted to contact pins 240 provided on the selecting switch members in such a position that no dead center position can be retained by the selecting switch members upon movement of the cam 124 to resetting position. After contact by the shoulders, continued movement of the shoulders causes sufficient movement of the pins 240 to move the connector 152 off dead center, which will permit it to move to its lowermost or zero position. The dash pot provides means for permitting the selecting switch members to cease oscillating, but in order to provide a positive stop, the members 152 may be provided with the pins 242 and the fixed studs 244 extend toward said pins but are spaced therefrom until the clutch plates 116 are moved to declutching position, it being noted that the clutch plates are cut out adjacent the upper selecting switch members to permit the studs 244 to be disposed adjacent the pins 242. Movement

of the plates to declutching position causes the selecting switch members to be moved toward the studs, permitting the pins 242 to contact the studs 244 at or adjacent zero position to arrest oscillating movement of the selecting switch members. Although this positive stop is shown, it is of course understood that the dash pot itself will be ample to permit ready and accurate re-setting of the distributor.

As has already been pointed out, the distributing rings 158, 160, 162, 164, 168, 170 and 172 are provided with zero contact 180 and nine (9) spaced contacts 182 (Figures 10 and 20). The contacts of the respective distributing rings are adapted to be connected to corresponding contacts in a registering means, as will be more particularly hereinafter described. To this end the panels 246 and 248 are provided supported on the distributor, said panels being provided with the ground connections 250 and 252, and each of said panels is provided with the hundredths contact assemblies 254 and 256; the tenths contact assemblies 258 and 260; the units contact assemblies 262 and 264; and the tens contact assemblies 266 and 268.

Electrical connections from distributor—Figures 20 and 41

Referring to the wiring of the distributor to the panels (Figs. 20 and 41), the ground conductor 270 is grounded at one end, the other end being connected to the conductor 272, said conductor 272 being connected as at 274, 276, 278 and 280 to the solenoids 208, 210, 212 and 214. The solenoid 208 is electrically connected to the conductor 282, which in turn is connected to the zero contact 180 of the tenths money distributing ring 164, and is electrically connected through the conductor 284 to the zero contact of the tenths money contact assembly 258. The solenoid 210 is connected through the conductor 286 to the zero contact of the units money contact assembly 262, and through the conductor 288 is connected to the zero contact 180 of the units money distributing ring 158. The solenoid 212 is connected through the conductor 290 to the zero contact of the tenths gallons (amount) contact assembly 260 and is electrically connected through the conductor 292 of the zero contact of the tenths gallons distributing ring 172. The solenoid 214 is electrically connected as at 294 to the zero contact of the units gallons contact assembly 264, and is electrically connected through the conductor 296 to the zero contact of the units gallons distributing ring 166. It will thus be seen that all of the zero contacts are grounded. This makes it possible for the proper operation of the correcting magnets of the gallons (money) side of the indicating mechanism when transfer takes place on the money (gallons) side of said indicating mechanism, as will be more particularly hereinafter described. The contact assemblies 254, 258, 262, 266, and 260, 264, 268 have the same number of contacts as the contacts of the respective distributing rings 162, 164, 158, 160, and 170, 172, 166 and 168.

The contacts 1 to 9 inclusive, and zero (0) of the hundredths money contact assembly 254 are electrically connected to the corresponding contacts of the distributing hundredths money ring 162 by means of the conductors 298, 300, 302, 304, 306, 308, 310, 312, 314 and 315.

The contacts 1 to 9 inclusive, of the tenths money contact assembly 258 are similarly con-

nected to the corresponding contacts of the tenths money distributing ring 164 by means of the conductors 316, 318, 320, 322, 324, 326, 328, 330 and 332.

5 The contacts 1 to 9 inclusive, of the units money contact assembly 262 are electrically connected to the corresponding contacts of the units money distributing ring 158, through the conductors 334, 336, 338, 340, 342, 344, 346, 348 and 350.

10 The contacts 1 to 9 inclusive, and zero (0) of the tens money contact assembly 266 are electrically connected to the corresponding contacts of the distributing ring 160 by means of the electrical conductors 352, 354, 356, 358, 360, 362, 364, 366, 368 and 369.

15 The contacts 1 to 9 inclusive, and zero (0) of the hundredths gallons contact assembly 256 are electrically connected to the corresponding contacts of the hundredths gallons distributing ring 170 by means of the conductors 370, 372, 374, 376, 378, 380, 382, 384, 386 and 387.

The contacts 1 to 9 inclusive, of the tenths gallons contact assembly 260 are electrically connected to the corresponding contacts of the tenths gallons distributing ring 172 by means of the conductors 388, 390, 392, 394, 396, 398, 400, 402 and 404.

The contacts 1 to 9 inclusive, of the units gallons contact assembly 264 are electrically connected to the corresponding contacts of the units gallons distributing ring 168 by means of the conductors 406, 408, 410, 412, 414, 416, 418, 420 and 422.

35 The contacts 1 to 9 inclusive, and zero (0) of the tens gallons contact 268 are electrically connected to the corresponding contacts of the tens gallons distributing ring 168 by means of the conductors 424, 426, 428, 430, 432, 434, 436, 438, 440 and 441.

40 The source of current 442 is electrically connected to the distributing ring 168 by means of the conductor 444, and said conductor is connected to the distributing ring 170 by means of the conductor 446. Similarly said source of current supply is connected to the distributing ring 166 by means of the conductor 448 which is connected to the distributing ring 172 by the conductor 450. The source of current supply also is connected through the conductor 452 to the distributing ring 160, and said conductor is connected as at 454 to the distributing ring 162. The conductor 452 is connected to the conductor 456, which in turn is connected to the conductor 458 electrically connected to the distributing rings 158 and 164.

55 It will thus be seen that rotation of the selecting switch members causes electrical connection between the source of current supply, through the distributing rings, to the various contacts; zero (0) and 1 through 9 inclusive, of said distributing rings; through the members 146, 152 and 148, to the corresponding contacts of the contact assemblies 254, 258, 262, 266, 260, 264 and 268, said contacts in turn being adapted to be connected, in a manner to be later described, to operating means of the registering mechanism.

In the event it is desired to connect the distributing rings to multiple contact assemblies, the distributing rings 163 (Figure 10), may be used. In this case the ring is similar to the rings 160, 162, etc., having the spaced contacts 156, the ground ring 176, and the insulating core 178, said ground ring having the zero notch 184. The zero contact 180 is provided, and also the contacts 182 representing the 1 to 9 positions. In addition the

inner zero contact 181 is provided and also the inner contacts 183 representing the 1 to 9 positions. These inner contacts 181 and 183 are then electrically connected to contact assemblies similar to those already described for connection to suitable registering means as described herein. In using this type of distributing ring it is necessary to modify the conductor of the switch member as shown in Figure 10A. In this case the conductor 153 is provided with the ground dog 148 and the contact dog 146 for the contacts 180 and 182, and in addition is provided with the contact dog 147 for the contacts 181 and 183, said dog 147 being similar to the dogs 146 and 148. The operation, of course, is similar to that already described with respect to the rings 160, 162, etc.

Registering mechanism—Figures 11, 12 and 13

Referring now to the indicating or registering mechanism illustrated in Figures 11 and 12, said indicating mechanism is shown as including two banks 460 and 462 of numeral wheels, the upper bank of wheels 460 being adapted to register money values or cost, the lower bank of numeral wheels 462 being adapted to register amount or, in the embodiment shown, gallons. The banks of wheels 460 and 462 are rotatably mounted on the shafts 464 and 466, said shafts being journaled in the spaced frame members 468 and 470, and being provided with the pulleys 472 and 474, said pulleys being suitably connected as by the belts 476 and 478 to the pulley 480 mounted on the motor shaft 482 of the motor 484, said motor being suitably supported on the frame members. In the case of a liquid dispensing apparatus, it is of course understood that the shafts 464 and 466 may be driven by the pump operating motor rather than by a separate motor. The mounting of the numeral wheels of each bank of wheels on the shafts 464 and 466 is identical.

In the upper bank of numeral wheels 460 there is provided a hundreds numeral wheel 486 (to indicate dollars in United States currency), the tens numeral wheel 488, the units numeral wheel 490, and a fractional indicating wheel 492 which may be conveniently made, having fingers 494 overlapping a portion of the numeral wheel 490, the fingers being of graduated width from 1 to 9, so disposed that when the register is set to zero, the first finger is below the window. The lower bank of numeral wheels includes the tens numeral wheel 496, the units numeral wheel 498, the tenths numeral wheel 500, and the hundredths disc 502 provided with the fingers 494 similar to those provided on the disc 492. The numeral wheels of both banks of wheels are rotatably mounted on the shafts 464 and 466, but are frictionally mounted thereon as at 504, or they may be driven in some other manner which will permit them to stop, it being noted that it is not necessary that they be driven with any relation between their speed of rotation and that of their respective shafts; they may be either faster or slower, yet the final registration will always be accurate.

The numeral wheels and the discs are provided, respectively with the stops 506, 508, 510 and 512, the stops 506, 510 and 512 being substantially in horizontal alignment when the numeral wheels and discs are set to zero and slightly off center from the axis of the zero numeral, so that in registration the zero numeral will appear in full registration in the window of the dials. The stop 508 is disposed out of line of the other stops, but in proper position with respect to the zero numeral

of the numeral wheels 488 and 498, the position being determined by the position of the solenoid operating means for said numeral wheels 488 and 498. A support 514 is disposed adjacent the support 470 and is provided with ten (10) solenoids corresponding to positions of zero (0) and 1 to 9 inclusive, such as shown at 516, 518, 520, 522, 524, 526, 528, 530, 532, 534 of Figure 21, corresponding to the positions from 0 to 9 on the disc 492, which positions correspond to the 0 to 9 positions on the contact assembly 254 (Figures 20 and 21).

In the mechanism illustrated in Figure 41, the arm 194 is provided with the extension 2194 pivoted at 3194 to the rod 195, said rod being pivoted at 3190 to the extension 2190 of arm 190. Thus when solenoid 212 is energized to compensate or correct by moving the associated fixed switch member in a direction opposite to the direction of rotation of the associated rotatable switch member, it also causes a similar movement of the fixed switch member of arm 190. Of course, a similar connection to connection 195 may be made between arms 196 and 192, or all arms of each switch may be connected to be moved every time one is corrected and also any of the above connections may be used with solenoids used with rings 170, 172, 162 and 164. Additionally, there may be corrections for every contact (from 0 to 9) of every switch member.

Electrical connections to registering mechanism—Figure 21

The solenoids are connected through the conductors 536 to the ground as at 538, and said solenoids are connected to the corresponding contacts of the contact assembly 254 through conductors 540, 542, 544, 546, 548, 550, 552, 554, 556 and 558.

The support for the numeral wheels is provided with supporting members 560 and 562 disposed between the tenths and unit wheels, and said members in turn support the plates 564 and 566 for supporting the solenoids of the numeral wheels 490, 488, 500, 498, and a solenoid support 568 is provided for the numeral wheels 486 and 496 for supporting the solenoids of said wheels.

The respective contacts of the tenths contact assembly 258 are connected to the respective solenoids of the 0 to 9 positions of the numeral wheel 490, said solenoids being indicated at 570, 572, 574, 576, 578, 580, 582, 584, 586 and 588, and being grounded through the conductors 590 as at 592.

The connections between the solenoids to their respective contacts are shown by the conductors 594, 596, 598, 600, 602, 604, 606, 608, 610 and 611.

The respective contacts of the units contact assembly 262 is connected to the 0 to 9 solenoids for the numeral wheels 488, the solenoids of said numeral wheel being shown at 612, 614, 616, 618, 620, 622, 624, 626, 628 and 630, said solenoids being grounded by means of the conductors 632 as at 634, and connected to the respective contacts of said contact assembly by means of the conductors 636, 638, 640, 642, 644, 646, 648, 650, 652 and 654.

The plates 568 for the hundreds money wheel 486 is provided with the 0 to 9 solenoids 656, 658, 660, 662, 664, 666, 668, 670, 672 and 674 connected through the conductors 676 to the ground as at 678, and the respective solenoids are connected to the respective 0 to 9 contacts of the contact assembly 266 as at 680, 682, 684, 686, 688, 690, 692, 694, 696 and 698.

The plate 514 of the gallon fractional numeral wheel or disc 502 is provided with the 0 to 9 solenoids 700, 702, 704, 706, 708, 710, 712, 714, 716

and 713, connected through suitable conductors 720 to the ground as at 722, and said solenoids are connected to their respective contacts of the contact assembly 256 as at 724, 726, 728, 730, 732, 734, 736, 738, 740 and 742.

The plate 554 of the tenths gallon wheel 500 is provided with the 0 to 9 solenoids 744, 746, 748, 750, 752, 754, 756, 758, 760 and 762 connected through suitable conductors 764 to the ground as at 766, and said solenoids are connected to the respective contacts of the contact assembly 260 through the conductors 768, 770, 772, 774, 776, 778, 780, 782, 784 and 786.

The plate 888 of the units gallon wheel 498 is provided with the 0 to 9 solenoids 788, 790, 792, 794, 796, 798, 800, 802, 804 and 806 connected through suitable conductors 808 to the ground as at 810, and said solenoids are connected to the respective contacts of the contact assembly 264 through the conductors 812, 814, 816, 818, 820, 822, 824, 826, 828 and 830.

The plate 460 of the tens gallon wheel 496 is provided with the 0 to 9 solenoids 832, 834, 836, 838, 840, 842, 844, 846, 848 and 850 connected through the conductors 852 to the ground as at 854. The said solenoids are connected to the respective contacts of the contact assembly 268 as through the conductors 856, 858, 860, 862, 864, 866, 868, 870, 872 and 874.

It will thus be seen that the respective solenoids are connected to and controlled by the respective switch and contact members of the distributor.

Solenoids of registering mechanism

The solenoids are provided with the plungers 876 normally urged away from their respective numeral wheels by means of the springs 878, that is, they are urged toward the plates 470, 560, 562 and 566 which serve as stops for the plungers.

When the solenoids are not energized the plungers 876 are in fully retracted position with the members 880 of the plungers contacting said plates, and the other ends do not protrude beyond the faces of the solenoids. When, however, the solenoids are energized by operation of the distributor, the plungers move outwardly against the springs 878 to the dotted line positions such as shown at 882, where they are disposed in a position to be successively contacted by the stops 512, 510, 508 and 506 of the numeral wheels.

It is to be noted that the solenoids supported on the plates 514 and the solenoids supported on the plates 564 operate in opposite directions. They, therefore, may be placed in horizontal alignment, and also the solenoids supported on the plates 568 can likewise be placed in horizontal alignment. However, due to the fact that the solenoids supported on the plate 566 are so closely adjacent the solenoids supported on the plates 564 and 568, they are disposed out of alignment to prevent a continuous magnetic field being set up which might prevent proper operation of the solenoids.

As has already been explained, the stop 508 is correspondingly placed so that the proper numbers of numeral wheels 488 and 498 will appear in the windows of the adjacent tens indication.

Modification of solenoids—Figure 13

A modification of the form of solenoids illustrated in Figure 12 may be used such as shown in Figure 13. In this case the numeral wheel, indicated generally at 894, is provided with the stop 896 of conductive material, such as a soft iron core, the stop 896 being disposed in a similar

position on the numeral wheel as the stops 506, 508, 510 or 512, and insulated from the wheel, or said wheel may be made of non-conductive material. The solenoids 888 are adapted to be energized and to magnetically stop the wheel 884 when the stop 886 is disposed opposite the core 890 of the solenoid then energized.

Summary of operation—Figures 1-13, 18-21

In the operation of the distributor mechanism and registering mechanism described above, it will be appreciated that when current is supplied to the distributor as through the conductor 442, it is supplied simultaneously to the motor 484, causing rotation of the motor drive shaft, which in turn causes rotation of the shafts on which the numeral wheels are mounted, such as the shafts 464 and 466 (Figures 11 and 12). Assuming the distributors to be at zero, the switch members or dogs 146 and 148 are in engagement or contact with the zero contacts 180, and of course the respective distributor contact rings. Thus current is supplied through the conductor 442 to the respective contact rings, and through the dogs to the respective zero contacts. Current passes through the said contacts to the respective zero solenoids (Figure 21).

Actuation of these solenoids, of course, will prevent rotation of the respective numeral wheels, as said solenoids will arrest movement of the numeral wheels at the zero indication. The shafts 464 and 466, however, will continue to be rotated, tending to urge the numeral wheels in a registering direction. Operation of the distributor to move the dogs 146 and 148 in a registering direction to successively contact the 1 to 9 contacts will permit rotation of the numeral wheels in the predetermined manner, that is, rotation of the hundredths distributors, or the lowest denominational portion of the distributors, causes current to be supplied to the corresponding solenoids of the lowest denominational numeral wheels, and in a similar manner the other corresponding numeral wheels are actuated. However, when the tenths distributor is actuated so that the dogs pass from the 9 contact to the 0 contact, current will be supplied to the solenoid 208 (or 212), so that at the moment of transfer the contact containing portion of the units distributor will be moved slightly toward the dogs of its rotatable distributor portion, thus insuring that the dogs of the units distributor will positively contact the next succeeding contact. This also is true in transferring from the 9 contact to the 0 contact of the units portion of the distributor, which causes actuation of the solenoid 210 (or 214) of the tens portions of the distributor.

More specifically, it may be said that both the money and gallons parts of the distributor, and consequently the indicator mechanisms are made to operate with perfect accuracy through the use of the solenoids or magnets 208, 210, 212 and 214. In a liquid dispensing system extreme accuracy must be maintained at all times, particularly where gasoline or other fuel is being dispensed. It is not possible at all times to make a machine which is perfect and one which functions completely accurately and without variation, particularly where such machines are made in commercial quantities and are relatively high speed machines. Thus, for example, there is a danger that at the moment that the tenths money (gallons) distributor transfers from 9 to 0, the dogs of the units money (gallons) distributors and/or the dogs of tens money (gallons) distributors

might be a little late so if the machine were stopped the proper indication might not appear. In order to obviate this, it will be seen that, with the herein disclosed invention, when the tenths money distributor transfers from 9 to 0 current will pass from the source 442 through conductors 452, 456 and 458 to the ring 164, through the dogs to the 0 contact, then through conductors 282 and 284 to conductor 594 (Figure 21) and the 0 solenoid on the indicator and thence to the ground. It also energizes solenoid 208, as this solenoid is grounded as has already been described, and where the units money distributor transfers from 9 to 0 solenoid 210 is energized. The solenoids being energized causes a slight movement of the stationary part of the associated distributors toward the direction of movement of the rotating parts thereof, thus causing the proper contacts to move to meet their dogs whereby a proper positioning (contacting) of the dogs and contacts takes place to give the proper registration at the exact instance of transfer. Similarly solenoids 212 and 214 are energized upon transfer from 9 to 0 of the gallons tenths distributor, and upon transfer from 9 to 0 of the gallons units distributor.

By this mechanism it is insured that there will be a positive registration at the time of transfer of the lower denominational wheel from 9 to 0, that is, after making a complete count or rotation. This, therefore, will insure proper registration of the registering mechanism.

In a similar manner, when the shaft 122 of the distributor is rotated for resetting, causing the cam to move the rods 230 to declutch the rotatable distributor members, permitting the counter-weighted conductors to move to their lowest, or zero positions, when the zero position is attained, of the units distributor for example, actuation of the solenoid 210 (or 214) occurs, insuring actuation of the zero solenoid of the tens register whereby positive reset to zero of the register is insured.

Modification of distributing mechanism—Figures 14 to 17 inclusive

Referring now to the form of distributor illustrated in Figures 14 to 17 inclusive, a modification is shown wherein positive intermittent transfer means is provided for moving the successive selecting switch members when the preceding switch member moves from the 9 to the 0 position, and wherein the switch members of the distributor are arranged in substantially the same manner as the numeral wheels of the register, permitting the reset to be arranged at one side of the distributor.

In this construction the supports 892 and 894 are rigidly secured together, and the shafts 896 and 898 are suitably journaled therethrough, but so mounted that a limited slidable movement is permitted during setting or zeroizing operation. The shaft 896 is provided with the operating gear 900 keyed thereto, but non-rotatably mounted thereon, whereby the predetermined movement of translation is permitted between the shaft 896 and the gear 900.

The shaft 898 is also provided with the operating gear 902, non-rotatably mounted thereon, but keyed thereto for permitting slight movement of translation with respect to said shaft. The gears 900 and 902 are retained in fixed position by means of the retaining plate 904, and the gear 900 is adapted to be connected to the money drive of the variator, while the gear 902 is adapted to

be connected to the gallons or amount drive of the variator.

Movement of the shafts is caused by the yoke 906 engaging said shafts as at the ball and socket joints 908 and 910, suitable guide means 912 being provided for said yoke. Movement of the yoke is effected by rotation of the reset shaft 914, said reset shaft being provided with the cam 916 and the lever 918 pivoted as at 920 to the piston rod 922 of the dash pot 924, the spring 926 being provided for urging said cam and dash pot to a predetermined position, all as described with respect to the dash pot 134.

The shafts 896 and 898 are each provided with the sleeves 928, the number of sleeves being determined by the number of switch members to be used. In the present case there are four switch members, and consequently four sleeves are used. The clutch members 930 and 932, preferably of insulating material, are mounted on said sleeves, the clutch members 930 being secured to the shaft 896 through the pin and slot connection 934, and the clutch members 932 are secured to the sleeves by means of the pin and slot connection 936, the members 930 and 932 being urged toward the left as viewed in Figure 14 by means of the springs 938.

The selecting switch members 940 and 942 are provided, preferably of insulating material, corresponding to the money and gallons selecting switch members described in Figures 1 to 6 inclusive, and 20, and similar thereto, said switch members being retained on the members 944 and 946 by the securing members 948. The members 944 are non-rotatably mounted on the shaft 896, and the members 946 are non-rotatably mounted on the sleeves 928. The distributing rings 950, the bodies of which are of insulating material similar to the distributing rings described in Figures 1 to 7 and 20, are provided having contacts similar to those already described in said figures, said contacts being adapted to be contacted by the switch members 148 and 146 mounted in the weighted portions 152 of the switch members 940 and 942. Said weighted portions of the switch members are additionally provided with the depending tooth members 952 disposed in alignment with the weighted portions 152 of said members 940 and 942, the toothed portion 952 being adapted to be engaged by the usual Geneva transfer mechanism 954 rotatably mounted on the transfer shafts 956, the Geneva member 954 being provided with the weighted portion 958 for the purpose to be later described.

The transfer shafts 956 are additionally provided with the gears 960 rotatably mounted thereon and meshing with the gears 962 non-rotatably mounted on the sleeves 928. The gears 960 and the gear members 954 are connected by means of the sleeves 964 whereby the Geneva members 954 and the gears 960 rotate together and are rotatably mounted on the transfer shafts 956.

It will thus be seen that rotation of the shafts 896 and 898 as by the variator causes rotation of the smallest denominational selecting switch members 940 and 942 (i. e., the first ones to the right of Figure 14) in a manner similar to that already described. Thus, operation of the distributor through the variator will cause rotation of the shaft 896 and the shaft 898 through the gears 900 and 902, which will rotate the hundredth distributor rings 940 and 942, which will cause operation of the corresponding numeral wheel (in the case shown in Figure 12, the discs

492 and 502) of the register through the contacts with the various contact members on the distributing rings 950.

Passing from 9 to 0, the member 952 of the hundredths switch member will move the first Geneva member 954, rotating the sleeve 964 and the adjacent gear 960 to cause movement of the next or tenths gear 962, which will likewise cause movement of the tenths selecting switch member 940 or 942 through one contact position to cause a corresponding movement of the register in a manner already described. Continued movement of the distributor will operate the successive switch members through the successive Geneva mechanism in a well known manner. In order to reset to zero, the reset shaft 914 is rotated, causing movement of the yoke 906 toward the left as viewed in Figure 14.

Movement of the yoke 906 will cause bodily movement of the shafts 896 and 898, which will bodily move the switch members 940 and 942, as well as the gears 932, permitting immediate zeroizing of the members 940 and 942 as the weighted portions 152 of said members will immediately assume their lowermost positions, and similarly the Geneva member 954 will rotate to zero position due to their weighted portions 958, causing the gear 960 likewise to assume its zero position where it can mesh with the gear 962. The dash pot, of course, will insure proper zeroizing, as a predetermined time must elapse before the clutches are again engaged.

Registering mechanism—Figures 18 and 19

In the form of register illustrated in Figures 18 and 19 an opaque panel 966 is provided disposed in a suitable frame 968, the panel being provided with the plate 970, in which the transparent numerals 972 and 974 are disposed, together with their proper legends or designations 976 and 978. In the embodiment shown, the hundreds are indicated by the lines 979, though it is understood that other indicia such as numerals may be used. In the embodiment shown, the legend 976 indicates gallons dispensed, whereas the legend 978 indicates the cost of said gallons.

Mounted behind the numerals 972 and 974 are suitable lights 980 disposed in pockets formed by the opaque partitions 982, said pockets being separated from each other and in horizontal alignment with the adjacent numerals. The lights are adapted to be connected to the corresponding terminals of the various contact assemblies 254 (256, etc.) to 268, and will be lighted or energized in accordance with the movement of the selecting switch member to indicate the gallons dispensed and the price.

Electrical connections for a plurality of registering mechanisms—Figure 22

In the wiring diagram illustrated in Figure 22, means is shown whereby a plurality of registers or indicating means can be selectively operated from the distributor, as for example, different indicating means may be placed at different places in a plant or filling station, or some of the indicating means may be resettable and some may not. For the purpose of this illustration only one contact assembly 254 is shown, it being understood, of course, that all of said contact assemblies may be similarly treated.

In this form of device, the 0 to 9 contacts are electrically connected to the respective conductors 984, which are electrically connected to the respective registering or indicating means shown

generally at 986, which indicating means may be in the form of a panel, as illustrated in Figures 18 and 19, the opposite sides of said indicating means being grounded through the conductor 988 as at 990.

The switch 992 is provided for simultaneously connecting or disconnecting the indicating means 986 from the conductors 984. The conductors 984 are electrically connected through the switches 994 and 996 to the indicating means 998 and 1000, the connections being such that the 0 to 9 respective contacts are electrically connected to the corresponding 0 to 9 indications of the registering means 998 and 1000, and said switches 994 and 996 are movable to selectively disconnect the conductors 984 from said registering means. The opposite side of the registering means 998 and 1000 are grounded as at 1002 and 1004. It will thus be seen that by selective operation of the switches 992 and 994, and 996, any combination of registering means may be used.

Variating mechanism—Figures 24 to 33 inclusive—Driving gears

In the variating mechanism illustrated in Figures 24 to 33 inclusive, the supports 1006, 1008, 1010, 1012 and 1014 are rigidly secured together and the drive shaft 1016 is provided which may be connected as at 1018 to suitable driving means such as a meter shaft in the case of a liquid dispensing apparatus. The shaft 1016 is substantially square in section and is provided with the gear 1020 non-rotatably mounted thereon which, in the embodiment shown, has 68 teeth. The gear 1020 meshes with the gear 1022, also having 68 teeth and non-rotatably mounted on the substantially square sectioned shaft 1024. The gear 1026, shown as having 66 teeth, is non-rotatably mounted on the shaft 1024 and meshes with gear 1028, shown as having 66 teeth and non-rotatably mounted on the square shaft 1030.

The shaft 1016 is provided with the 60 tooth gear 1032 non-rotatably mounted thereon, meshing with the 60 tooth gear 1034 non-rotatably mounted on the square shaft 1036, the shaft 1036 being provided with the 52 tooth gear 1038 non-rotatably mounted thereon, meshing with the 52 tooth gear 1040 non-rotatably mounted on the square shaft 1042. The 44 tooth gear 1044 is non-rotatably mounted on the shaft 1042 and meshes with the 44 tooth gear 1046 non-rotatably mounted on the square shaft 1048. The shaft 1048 is provided with the 36 tooth gear 1050 non-rotatably mounted on said shaft and meshing with the 36 tooth gear 1052 non-rotatably mounted on the square shaft 1054. The shaft 1054 is provided with the 28 tooth gear 1056 non-rotatably mounted thereon and meshing with the 28 tooth gear 1058 non-rotatably mounted on the square shaft 1060. The shaft 1060 is provided with the 16 tooth gear 1062 non-rotatably mounted thereon and meshing with the 24 tooth gear 1064 pivoted as at 1066 between the plates 1066 and 1068. The 24 tooth gear 1064 meshes with the 24 tooth gear 1068 pivotally mounted as at 1070, said gear 1068 meshing with the 24 tooth gear 1072 non-rotatably mounted on the square shaft 1074. The gear 1068 meshes with the 16 tooth gear 1076 non-rotatably mounted on the shaft 1078, said shaft being provided with the 8 tooth gear 1080 and the 20 tooth gear 1082. The gear 1080 meshes with the 24 tooth gear 1084 non-rotatably mounted on the square shaft 1086. The gear 1082 meshes with the 24 tooth gear

1088 non-rotatably mounted on the shaft 1090, and the gear 1088 meshes with the 24 tooth gear 1092 non-rotatably mounted on the square shaft 1094. The shaft 1016 extends upwardly through the plates 1008, 1010, 1012 and is journaled in the plate 1014, as are the shafts 1036, 1042, 1048, 1054, 1060 and 1074. Said shafts and the shafts 1024 and 1084 extend through the plates 1008 and 1010, and are journaled in the plate 1012. The shafts 1030, 1024, 1016, 1036, 1042, 1048, 1054, 1060, 1072, 1084 and 1094 extend through the plate 1008, and the shafts 1030 and 1094 are journaled in the plate 1010.

Fraction selecting mechanism

In the fractions or tenths bank of wheels shown in Figure 33, the shaft 1024 is provided with the 72 tooth gear 1096 meshing with the 60 tooth gear 1098 rotatably mounted on the shaft 1030 and meshing with the 32 tooth idler gear 1100, which in turn meshes with the 80 tooth gear 1102 rotatably mounted on the shaft 1104. The gear 1096 meshes with the 64 tooth gear 1106 rotatably mounted on the shaft 1016, and said gear 1106 meshes with the 56 tooth gear 1108 rotatably mounted on the shaft 1036.

The gear 1108 meshes with the 48 tooth gear 1110 rotatably mounted on the shaft 1042, and said gear meshes with the 40 tooth gear 1112 rotatably mounted on the shaft 1048. The gear 1112 meshes with the 32 tooth gear 1114 rotatably mounted on the shaft 1054, and said gear meshes with the 24 tooth gear 1116 rotatably mounted on the shaft 1060. The gear 1116 meshes with the 24 tooth gear 1118, and said gear meshes with the 24 tooth gear 1120, which meshes with the gear 1122, said gears being rotatably mounted on the shafts 1072, 1084 and 1094. The spring-pressed pawl 1124 is pivoted as at 1126 and is normally urged toward disengaging position with respect to the gear 1122.

Units selecting mechanism

In the units bank of wheels (shown in Figure 32), the 72 tooth gear 1128 is rotatably mounted on the shaft 1024, and meshes with the 64 tooth gear 1130 rotatably mounted on the shaft 1016. The gear 1130 meshes with the 56 tooth gear 1132 rotatably mounted on the shaft 1036, and said gear meshes with the 48 tooth gear 1134 rotatably mounted on the shaft 1042. The gear 1134 meshes with the 40 tooth gear 1136 rotatably mounted on the shaft 1048, and said gear meshes with the 32 tooth gear 1138 rotatably mounted on the shaft 1054.

The gear 1138 meshes with the 24 tooth gear 1140 rotatably mounted on the shaft 1060, and said gear meshes with the 24 tooth gear 1142 rotatably mounted on the shaft 1072. The gear 1142 meshes with the 24 tooth gear 1144, rotatably mounted on the shaft 1084, and the spring-pressed pawl 1146 is pivotally mounted as at 1148 adjacent the gear 1144, being normally urged to disengaged position with respect to said gear. The gear 1130 meshes with the 18 tooth pinion 1150 pivotally mounted on the shaft 1152, and said pinion is non-rotatably provided with the 48 tooth gear 1154. The gear 1154 meshes with the 64 tooth gear 1156 rotatably mounted with respect to the shaft 1104.

Tens selecting mechanism

Referring now to the tens banks of wheels shown in Figure 31, the shaft 1016 is provided with the 64 tooth gear 1158 rotatably mounted

thereon and meshing with the 56 tooth gear 1160 rotatably mounted on the shaft 1036. The gear 1160 meshes with the 48 tooth gear 1162 rotatably mounted on the shaft 1042, and said gear meshes with the 40 tooth gear 1164 rotatably mounted on the shaft 1048. The gear 1164 meshes with the 32 tooth gear 1166 rotatably mounted on the shaft 1054, and said gear meshes with the 24 tooth gear 1168 rotatably mounted on the shaft 1060. The gear 1168 meshes with the 24 tooth gear 1170 rotatably mounted on the shaft 1074, and the spring-pressed pawl 1172 is pivotally mounted as at 1174 and normally urged to disengaging position with respect to the gear 1170. The gear 1158 meshes with the 18 tooth pinion 1176 rotatably mounted on the shaft 1178, and said pinion is non-rotatably provided with the 45 tooth gear 1180 meshing with the 48 tooth gear 1182 rotatably mounted with respect to the shaft 1104.

Differential mechanism

Referring now to the differential illustrated in Figure 27, as has already been described, the 80 tooth gear 1102 is rotatably mounted with respect to the shaft 1104, said gear having an upwardly extending portion provided with the bearing 1184 on which the 64 tooth gear 1156 is rotatably mounted. The gear 1156 is provided with the 20 tooth pinion 1186 meshing with the 10 tooth gear 1188 provided adjacent the bearing 1184. The pinion 1186 is pivotally mounted as at 1190 on the gear 1156 and is provided with the 10 tooth gear 1192 meshing with the 20 tooth gear 1194 rotatably mounted on the shaft 1104. The gear 1194 has an upwardly extending portion 1196 provided with the bearing 1198 on which the 48 tooth gear 1182 is rotatably mounted.

The 20 tooth pinion 1200 is pivotally mounted as at 1202 to the gear 1182, and meshes with the 10 tooth gear 1204 provided on the portion 1196. The pinion 1200 is provided with the 10 tooth gear 1206 meshing with the 20 tooth gear 1208 of the thimble 1210, said thimble being rotatably mounted on the shaft 1104 and being provided with the 10 tooth driving gear 1212 adapted to drive the 25 tooth gears 74 or 900 of the distributors shown in Figures 1 or 14.

In the embodiment shown, the amount or gallons take-off shaft is shown as the shaft 1016 which is provided with the 10 tooth gear 1213 adapted to drive the 40 tooth gears 62 or 902 of the distributors shown in Figures 1 or 14.

Operation

In order to set the variator to compute at a selected unit price, each bank of selecting wheels is provided with selecting means and an interlock therefor. The tenths selecting means, as illustrated in Figures 26 and 33 includes the zero slide or key 1214, the one-fourth ($\frac{1}{4}$) cent key 1216, the one-tenth ($\frac{1}{10}$) to nine-tenths ($\frac{9}{10}$) cent selecting keys 1218, 1220, 1222, 1224, 1226, 1228, 1230, 1232, 1234, and the three-fourths ($\frac{3}{4}$) cent key 1236. An interlocking member 1238 is slidably mounted adjacent the upstanding ends of said keys between the guides 1240.

The units keys 1242 to 1260, respectively (Figures 26 and 32), are ten in number, from 0 to 9, calibrated in increments of one cent, and the locking bar 1262 is slidably mounted adjacent the upturned ends of said keys and guided by means of the spaced members 1264.

The tens keys 1266, 1268, 1270, 1272, 1274 (Figures 26 and 31) are five in number (in the

embodiment shown), being adapted to select amounts of 0, 10¢, 20¢, 30¢ and 40¢, and the locking bar 1276 is slidably mounted adjacent the upturned ends of said keys, being guided by the space guides 1278.

The locking bars 1238, 1262 and 1276 are provided with the bayonet slots 1280, 1282 and 1284 adapted to receive the upturned ends of the keys in the full slot position when the selected keys are moved inwardly a sufficient distance to make the proper selection. In order to make the proper selection, the ends of the keys are offset upwardly in side elevation and are bifurcated in plan, and provided with the beveled portions 1286 (Figure 28) adapted to engage the beveled portion 1288 of the sleeves 1290, said sleeves being non-rotatably mounted on the respective gear shafts and provided with the crown 1292 adapted to engage the corresponding crown 1294 provided on the respective gears such as the gear 1158.

It is understood that every shaft aligned with the respective keys is provided with the sleeves 1290 in order that the loose gears on said shafts in the various positions may be selectively connected to said shafts, it being seen that the single bayonet socket joint in each slide makes it impossible to operate more than one key in a bank to its innermost position where the respective gears are connected to the respective shafts. It will thus be seen that a sleeve is provided for the tenth bank on shafts 1030, 1024, 1016, 1036, 1042, 1048, 1054, 1060, 1072, 1084 and 1094 to selectively connect the gears 1098, 1096, 1116, 1108, 1110, 1112, 1114, 1116, 1118, 1120, 1022 to said shafts. In the units bank the shafts 1024, 1016, 1036, 1042, 1048, 1054, 1060, 1072, 1084 are provided with the sleeve 1290 in order to connect the gears 1128, 1130, 1132, 1134, 1136, 1138, 1140, 1142, 1144 to said shafts. In the tens bank the shafts 1016, 1036, 1042, 1054, 1060, 1074 are provided with the sleeve 1290 to connect the gears 1158, 1160, 1162, 1164, 1166, 1168, 1170, respectively, to said shafts upon operation of the respective keys. The springs 1296 normally urge said crowns 1292 and 1294 out of engagement so that when the key 1274, for example, as shown in Figure 28, is moved outwardly to release engagement between said key and the crown 1298, the spring 1296 will disconnect the crowns to thereby disconnect the gear 1158 from the shaft 1016.

In order, then, to select the proper price, as for example, 44¼¢, as shown in Figures 31, 32 and 33, it is only necessary to move the locking bars 1238, 1262 and 1276 to a position to permit inward movement of the selected keys 1216, 1250 and 1274. Inward movement of said keys causes the members 1288 on the shafts 1094, 1054 and 1016 to be depressed against the respective springs 1096, to engage the crowns 1292 and 1294, making a connection between the selected gears on their shafts, i. e., the gears 1122, 1138 and 1158 will be connected with the shafts 1094, 1054 and 1016, respectively, which will cause the other gears to operate as idlers to the differential, where the motion of the respective gears is added and taken off at 1212 to the distributor. When the keys are in fully inwardly extended position the locking bars can be slid to fully engage the keys and retain them in locked position.

Price synchronizing mechanism

In fully engaged position the posted price is set up, for example, as shown in Figure 29. In this case the locking bar 1238 is pivotally con-

nected at one end as at 1298, and at its opposite end as at 1300 to the arms 1302 and 1304 of the gear segments 1306 and 1308 pivotally mounted as at 1310 and 1312. The gear segments mesh with the gears 1314 and 1316 provided on the fractional daily price indicating wheels 1318 and 1320 pivotally mounted as at 1322 and 1324. The locking bar 1262 is pivotally connected as at 1326 and 1328 to the members 1330 and 1332 pivotally mounted as at 1334 and 1336 and provided with the gear segments 1338 and 1340 meshing with the gears 1342 and 1344 of the units daily price wheels 1346 and 1348 pivoted as at 1350 and 1352. The locking bar 1276 is pivotally connected as at 1354 and 1356 to the arms 1358 and 1360 of the gear segments 1362 and 1364 pivotally mounted as at 1366 and 1368, and meshing with the gears 1370 and 1372 of the tens daily price indicating wheels 1374 and 1376 pivoted as at 1378 and 1380. Thus it will be seen that movement of the locking bars to fully retaining locking position with respect to the selected keys sets up or indicates the selected price.

In order to provide means for indicating the selected price at a remote point, the daily price numeral wheels may be provided with the spaced contacts 1382 such as are shown applied to the daily price wheel 1348 in Figure 30. The contacts are disposed in the proper relative position with respect to the numerals on said wheels and are arranged to operate distant solenoids to remotely set distant numeral wheels, it being understood that the numeral wheel 1348 is set by the gear segment 1332 as has already been described. When the zero positions are selected by any of the keys it will be seen that inward movement of the zero keys 1214, 1242 or 1266 causes movement of the adjacent pawls 1124, 1146 or 1172 to lock the gears 1122, 1144 or 1170, thus locking the gear train to prevent any movement from that gear train being added to the differential.

Liquid dispensing apparatus

Referring now to the liquid dispensing apparatus provided with the varying mechanism and a form of the distributor and registering mechanism embodying the invention, said dispensing apparatus consists essentially of the base 1384 for supporting the casing 1386. Within the casing the pump 1388 is supported, said pump being provided with the inlet connection 1390 adapted to be connected to a suitable source of liquid supply (not shown). The pump is adapted to be operated by means of the pulley 1392 connected by the belt 1394 to the pulley 1396 of the motor 1398. The outlet side of the pump is connected through the pipe 1400 to the inlet side of the air separator 1402, said air separator being provided with a suitable vent 1404 and a suitable return 1406 connected as at 1408 to said pump, the details of the air separator being specifically shown and described in United States Letters Patent No. 2,258,496, granted October 7, 1941, to Robert J. Jauch and Samuel E. Gilmore.

The outlet side of the air separator is connected to the inlet side of the meter 1410 which is shown as of the displacement type, being provided with the meter shaft 1412 rotatable in proportion to the liquid passing through the meter. The outlet side of the meter is connected through the piping 1414 to the sight gauge 1416, which in turn is connected to the outlet pipe 1418 suitably connected to one end of the hose 1420. The

other end of the hose is provided with the dispensing nozzle 1422 provided with the valve 1424 and the operating lever 1426 for said valve disposed within the guard 1428. In operative position, the nozzle is adapted to be supported on the fixed support 1430 provided on the casing, and when in that position the end of the nozzle is disposed within the boot 1432, and the guard 1428 abuts the pivoted lever 1434. Said lever overlies the stopping push button 1436 disposed above the fixed support 1430, the push button, in inoperative position being projected inwardly. The starting push button 1438 is provided below the fixed support, being adapted to be moved inwardly for starting the motor. The push buttons 1436 and 1438 have cooperative engagement with the arms 1440 and 1442, respectively, of the pivoted bell crank 1444. The bell crank is connected as at 1446 to interlock mechanism indicated generally at 1450. The bell crank is also provided with the arm 1452 connected through the link 1454 to the motor control switch 1456. The meter shaft 1412 is connected through the shaft 1458 to the fitting 1018, which in turn is connected to the shaft 1016 of the varying mechanism indicated generally at 1460, said varying mechanism being such as shown in Figures 24 to 33 inclusive, already described.

The varying mechanism is illustrated in side elevation and the daily price synchronizing means, such as shown in Figure 29, is indicated generally at 1462. The varying mechanism is suitably supported on the supports 1464, and above said supports the distributing mechanism, such as shown in Figures 1 to 10 inclusive, is provided, said distributing mechanism being indicated generally as at 1466, said distributor being connected as already described to the variator. Above the distributor there is disposed the registering mechanism illustrated generally at 1468, said registering mechanism being such as shown in Figures 11 and 12.

The reset shaft 122 of the distributor extends outwardly of the casing where the knob 126 can be readily operated. In the embodiment shown, the shaft 122 is extended as at 1470, being connected as at 1472 to the shaft 1474 of the interlock 1450, the interlock being so constructed and arranged that where a dispensing operation has occurred and the push button 1436 has been moved inwardly to open the motor circuit, the motor switch 1456 cannot be closed until the shaft 122 has been operated to reset the distributor 1466, and consequently the register 1468, to a predetermined or zero position.

Operation

In operation of this form of liquid dispensing apparatus, assuming the variator 1466 has been set to set a price for the liquid to be dispensed as described with respect to the Figures 24 to 33 inclusive, and the registering and distributing mechanism is at zero, in order to dispense liquid it is only necessary to remove the nozzle 1422 from the hook 1430 and move the push button 1438 inwardly, causing rotation of the bell crank 1444 in a clockwise direction to start the motor. Liquid can then be dispensed by opening the valve 1424 by operation of the lever 1426. Closing the switch 1456 will cause the motor 1398 to operate the pump 1388 to pump liquid through the meter 1410, and thence outwardly through the piping 1414 and 1416 to the nozzle, it being assumed that the nozzle valve is opened. Liquid passing through the meter 1410 will cause rotation of the meter

shaft 1412, the shaft 1458 and the coupling 1018, which will operate the variator and registering mechanism in a manner already described. When the push button 1436 is moved inwardly to cause rotation of the bell crank 1444 in a counterclockwise direction, the motor switch 1456 will be opened and the interlock 1450 will be conditioned to prevent inward movement of the push button 1438 until the reset shaft 122 has been rotated to reset the distributor. After the distributor has been reset, the interlock will have been moved to inoperative position through the shaft 1470, connections 1472 and shaft 1474 to permit the button 1436 to be moved inwardly.

Interlock mechanism—Figure 1

In Figures 1 and 5 there is shown a normally closed switch 1476 disposed in the motor circuit, and positive means for maintaining the switch in closed position may be provided in the form of the arm 1478 provided on the arm 128 which is on the reset shaft 122 as already described. When the reset shaft 122 is rotated in a counterclockwise direction, as shown in Figure 5, to cause the distributor to be reset to a predetermined position, the arm 1478 will move away from the switch 1476, thus causing the switch to open, preventing liquid from being dispensed during the interval that the distributor is being reset to its zero position, but permitting the motor switch to be reclosed upon resetting to zero.

Interlock mechanism—Figure 35

In Figure 35 there is shown a switch mechanism wherein it is necessary to manually close the interlock switch after the distributor has been reset to zero. In this embodiment the switch, indicated generally at 1480, is adapted to replace the switch 1476, and is likewise disposed in the motor circuit. The switch 1480 consists essentially of the relatively stationary arm 1482 and the movable arm 1484 pivoted as at 1486 and being provided with the locking shoulder 1488, said arm 1484 being urged toward closed position by means of the spring 1490. The slidable plunger 1492 is provided and may be connected to the push button 1436 through a suitable connection (not shown), said plunger being guided for movement of translation as shown at 1494. The plunger 1492 is urged outwardly by means of the spring 1496 connected at one end to the plunger and at the other end to the pivoted locking lever 1498 pivoted as at 1500, and being adapted to engage the shoulder 1488. It is of course appreciated that this switch may be used instead of, or with, the motor switch 1456. The reset shaft 122 of the distributor may be provided with the pivoted spring-pressed lever 1502 urged against the pin 1504, said lever engaging under the projection 1506 provided on the arm 1484.

Thus, when the shaft 122 is rotated counterclockwise to reset the distributor the lever 1502 will engage the shoulder 1506, and will cause the member 1484 to be moved in a clockwise direction about its pivot 1486 to open the motor circuit. Movement of the switch 1480 to open position will cause the locking lever 1498 to engage the shoulder 1488 to maintain the switch in open position until the push button 1438, and consequently the plunger 1492, are moved inwardly to cause the pin 1508 to move the locking lever 1498 in a counterclockwise direction to release the shoulder 1488, permitting the spring 1490 to close the switch, when dispensing operation can again be performed.

Preselector mechanism

In the preselector mechanism illustrated in Figures 36 to 40 inclusive, means is shown adapted to be applied to the liquid dispensing apparatus illustrated in Figure 34 for predetermining either the cost or the amount of the liquid to be dispensed.

Inasmuch as the mechanism for preselecting the amount of liquid to be dispensed is similar to that for the cost preselection, only the cost preselection mechanism is illustrated, and this mechanism is shown only for dollars and cents. In this case the delivery line 1414 is provided with the valve 1510, said valve being provided with the operating lever 1512 pivoted as at 1514 to the plunger 1516 of the solenoid 1518, the plunger being normally urged to valve open position by means of the spring 1520, retraction of the plunger 1516 against the spring being caused by energizing the solenoid in the manner to be later described.

In this embodiment of the invention three switch members 1522, 1524, and 1526 are provided, corresponding to the switch members for the tens, units and fractions money switches illustrated in Figure 20 (that is, dollars and cents), it being understood that a fourth switch corresponding to the hundredth switch may also be provided, though this is not necessary for the purpose of illustrating this form of device.

The switch members 1522, 1524 and 1526 are provided respectively with conductor rings 1528, 1530 and 1532, the conductor ring 1528 being connected to a suitable source of current supply through the conductor 1534. Each of said conductor rings is provided with the spaced contacts corresponding to the 0 to 9 positions of the switch members illustrated in Figure 20, and a rotating switch corresponding to and similar to the respective switches 144 is provided, operated by the respective shafts of said switches and being adapted to be reset in a manner similar to and with said switches, the same reset means preferably being provided for each.

A series of ten push buttons 1536 of suitable insulating material is provided corresponding to the contacts of the switch members 1522, said push buttons preferably being arranged in a circle about the cancelling knob 1538. The buttons 1536 are provided with the conductor contacts 1540, depending below the mounting plate 1542 of the preselector device, and an insulating panel 1544 is provided, said panel having the spaced contacts 1546 corresponding to each of the selecting buttons 1536. One side of the contact members 1546 is connected to a conductor ring 1550 as through the conductors 1551, and the other side 1552 of each of said contact members is adapted to be connected through suitable conductors 1554 to the respective contacts of the switch member 1522. The push buttons 1536 are provided with the springs 1555 urging said buttons to a position where contact is not made between the members 1548 and 1552 through the members 1540, but said members 1548 and 1552 are resilient enough to maintain the members 1540 between the members 1548 and 1552 after contact is once made.

The cancelling button 1538 is provided with the radial disc 1556 notched or cut out as at 1558 in way of the buttons 1536, to be disposed below each of the selecting buttons 1536, and the cancelling button 1538 is provided with the post 1560 extending through the member 1542, the

spring 1562 being provided urging said cancelling button 1538 downwardly.

The ring 1550 is connected through the conductor 1564 to the conductor ring 1530 of the switch member 1524, said switch member being provided with the spaced contacts corresponding with the 0 to 9 positions of the unit switch. As before, the switch member rotated by the units shaft of the distributor successively closes the contacts. The contacts are respectively connected through the conductors 1566 to the corresponding switch members similar to the switch members 1552. The switch member corresponding to the member 1548 is connected to the conductor ring 1568 through the conductors 1569, which in turn are connected through the conductor 1570 to the conductor ring 1532 of the switch 1526 corresponding to the fraction switch of the distributor. Said switch member 1526 is also provided with the 0 to 9 contacts adapted to be closed by the rotating switch member corresponding to the fraction switch, and said 0 to 9 contacts are respectively connected through the conductors 1572 to the corresponding switch member of the selecting switch, similar to the member 1552. The switch member corresponding to the member 1548 is in turn connected to the conductor ring 1574 through the conductors 1576, and said conductor ring is connected through the conductor 1578 to one side of the solenoid 1518, the other side of said solenoid being grounded as through the conductor 1580. It is understood, of course, that the selecting members are the same for the units and fractions switches, as already described with respect to the tens switch, and are operated in the same manner.

Operation of the preselecting mechanism

In operation of this preselector mechanism, assuming that the liquid dispensing apparatus is inoperative and that it has been set to zero position in the manner already described, the solenoid 1518 will be de-energized and the valve 1510 will be in open position. Let it be assumed that it is desired to dispense one dollar and twenty-three cents' (\$1.23) worth of liquid. In this instance the "1" button 1536 of the tens selecting buttons will be depressed, closing the contacts 1552 and 1548 of the switch members 1546. The push buttons "2" and "3" of the units and fractions selecting buttons respectively, will be depressed, causing a closure by said buttons of the corresponding switches 1546.

Inasmuch as it is impossible to close the circuit to the solenoid until the respective rotating switch members have reached the first contact member of the switch member 1522, the second contact member of the switch member 1524, and the third contact member of the switch member 1526, it will be seen that the rotating switch for the contact member 1524 will have to have travelled through 360°, and additionally, move to the second contact before current can pass from the line 1534 through the conductor 1554 connected to the "1" contact to the corresponding "1" contact of the switch member 1546, through the conductor ring 1550, and through the line 1564 to the conductor ring 1530. It can then pass through the rotating switch member when it closes the "2" contact, and through its corresponding conductor 1566 to the corresponding "2" contact of the selecting switch 1546 of the units selecting member.

In order that the rotating switch member for the switch 1524 shall have moved to its "2" contact, the rotating switch member for the fraction switch must have rotated through 720°, and in order to reach the preselected amount it must additionally have moved to the "3" contact. Current can then be supplied through the rotating switch to the "3" contact through its corresponding conductor 1572 to the corresponding "3" switch 1546 of the fractions preselecting switch. It will then pass through the conductor contact 1540 of the "3" push button to the conductor ring 1574, and then through the conductor 1578 to the solenoid. The solenoid being grounded, it will then be energized to cause the plunger 1516 to close the valve 1510 against the action of the spring 1520. If the selected amount of one dollar and twenty-three cents (\$1.23) is cancelled, as by lifting the cancelling knob 1538, which causes upward movement of the selected buttons 1536 to disconnect the contacts of the switches 1546, the solenoid will be de-energized and the valve will open by action of the spring 1520, or when the distributor (and consequently the register) is zeroized by operation of the knob 126, the circuit of course will be broken and the solenoid de-energized to open the valve.

It is to be understood that I do not wish to be limited by the exact embodiments of the device shown, which are merely by way of illustration and not limitation, as various and other forms of the device will, of course, be apparent to those skilled in the art without departing from the spirit of the invention or the scope of the claims.

I claim:

1. In a device of the character described, the combination of distributor mechanism including an operating member, control means operated by said operating member, registering mechanism having indicating means, means for driving said indicating means, means operatively associated with said indicating and control means whereby said indicating means is governed by said control means, reset mechanism connected to the distributor, operation of said reset mechanism returning said distributor to a predetermined position and returning said control means

and indicating means to a predetermined position, a switch for supplying current to said control means, and means operatively connecting said reset mechanism and switch for opening said switch unless it is in open position.

2. In a device of the character described, the combination of distributor mechanism including an operating member, control means operated by said operating member, registering mechanism having indicating means, means for driving said indicating means, means operatively associated with said indicating and control means whereby said indicating means is governed by said control means, reset mechanism connected to the distributor, operation of said reset mechanism returning said distributor to a predetermined position, and returning said control means and indicating means to a predetermined position, a switch for supplying current to said control means, means operatively connecting said reset mechanism and switch for opening said switch unless it is in open position, and means for locking said switch in open position.

KENLY C. BUGG.

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Certificate of Correction

Patent No. 2,429,259.

October 21, 1947.

KENLY C. BUGG

It is hereby certified that errors appear in the printed specification of the above numbered patent requiring correction as follows: Column 16, line 39, for "shaft 1924" read *shaft 1024*; lines 64 and 65, for "plates 1066" read *plates 1006*; 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 6th day of January, A. D. 1948.

[SEAL]

THOMAS F. MURPHY,
Assistant Commissioner of Patents.