July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 1

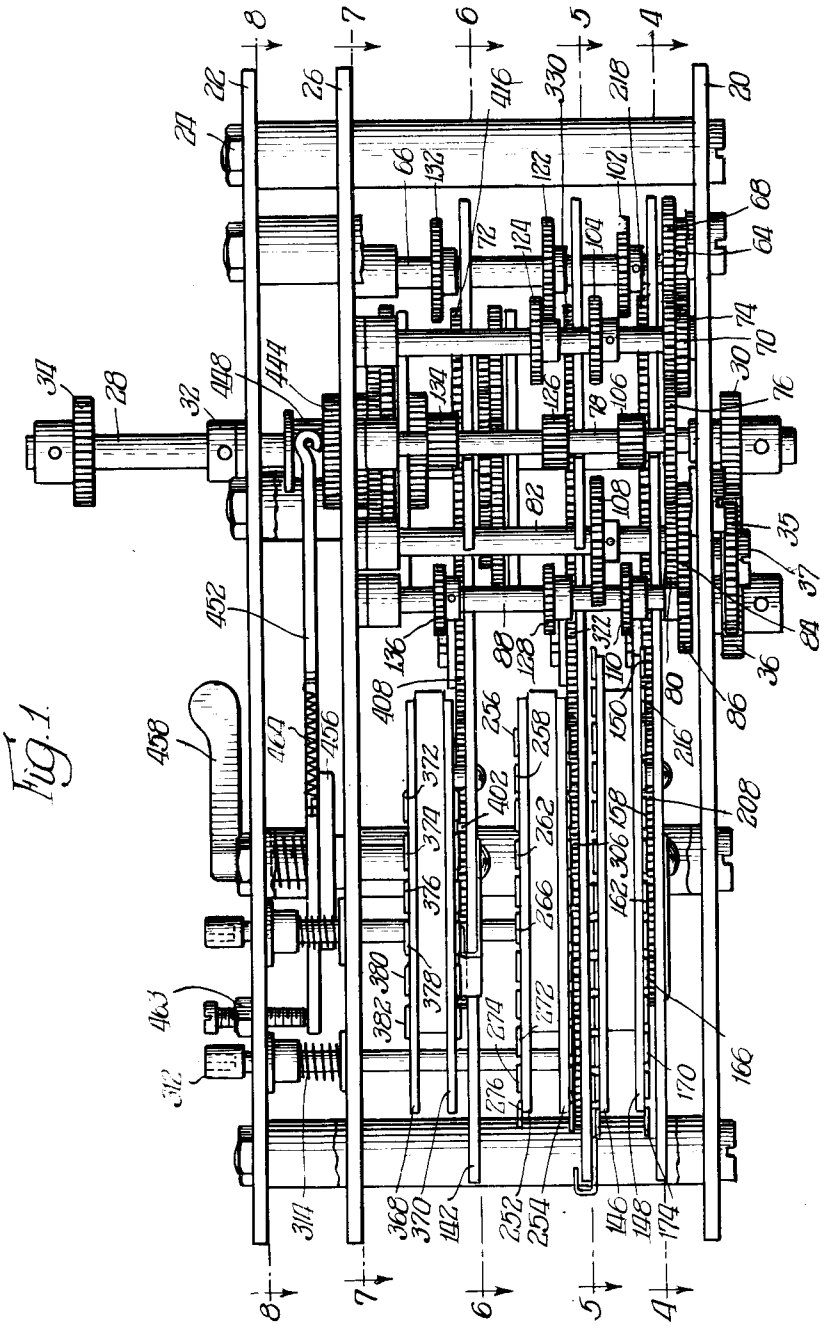


Fig. 1.

Inventor:
Kendy C. Bugg
By Dickinson, Humphrey, Byron & Knight Attys

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 2

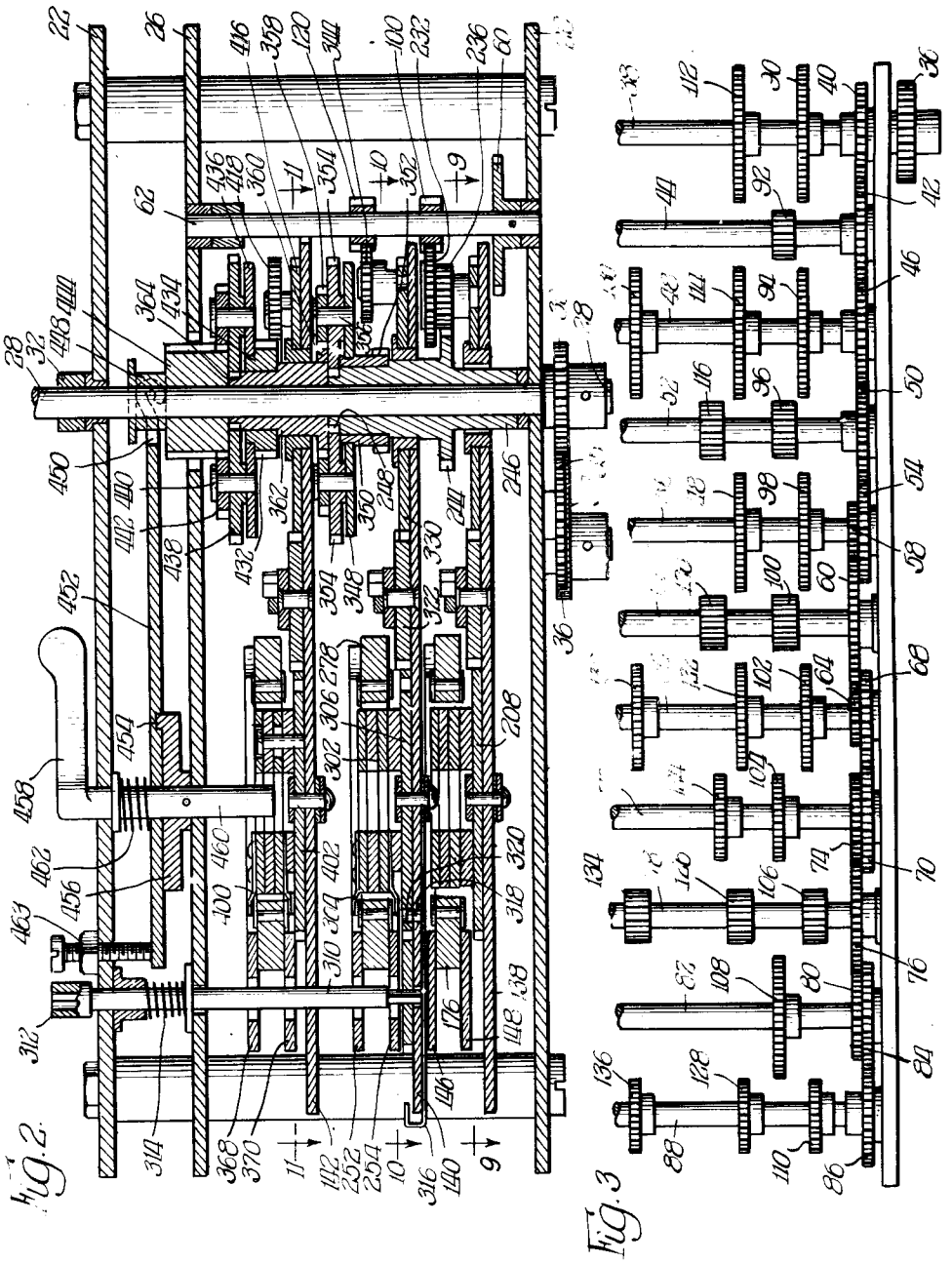


Fig. 2.



Fig. 3

INVENTOR.

Kerly C. Bugg,

BY

Atkinson, Murphy, Byron & Knight

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 3

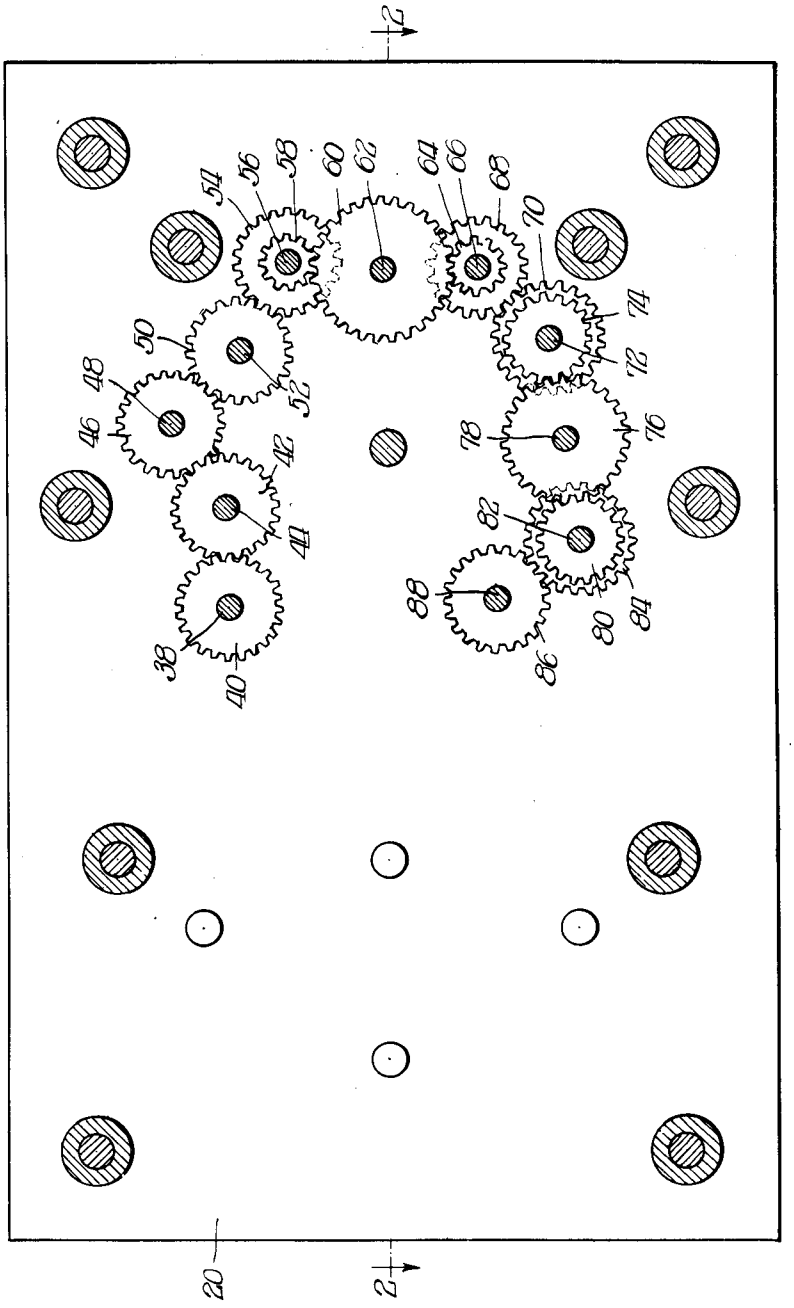



Fig. 4

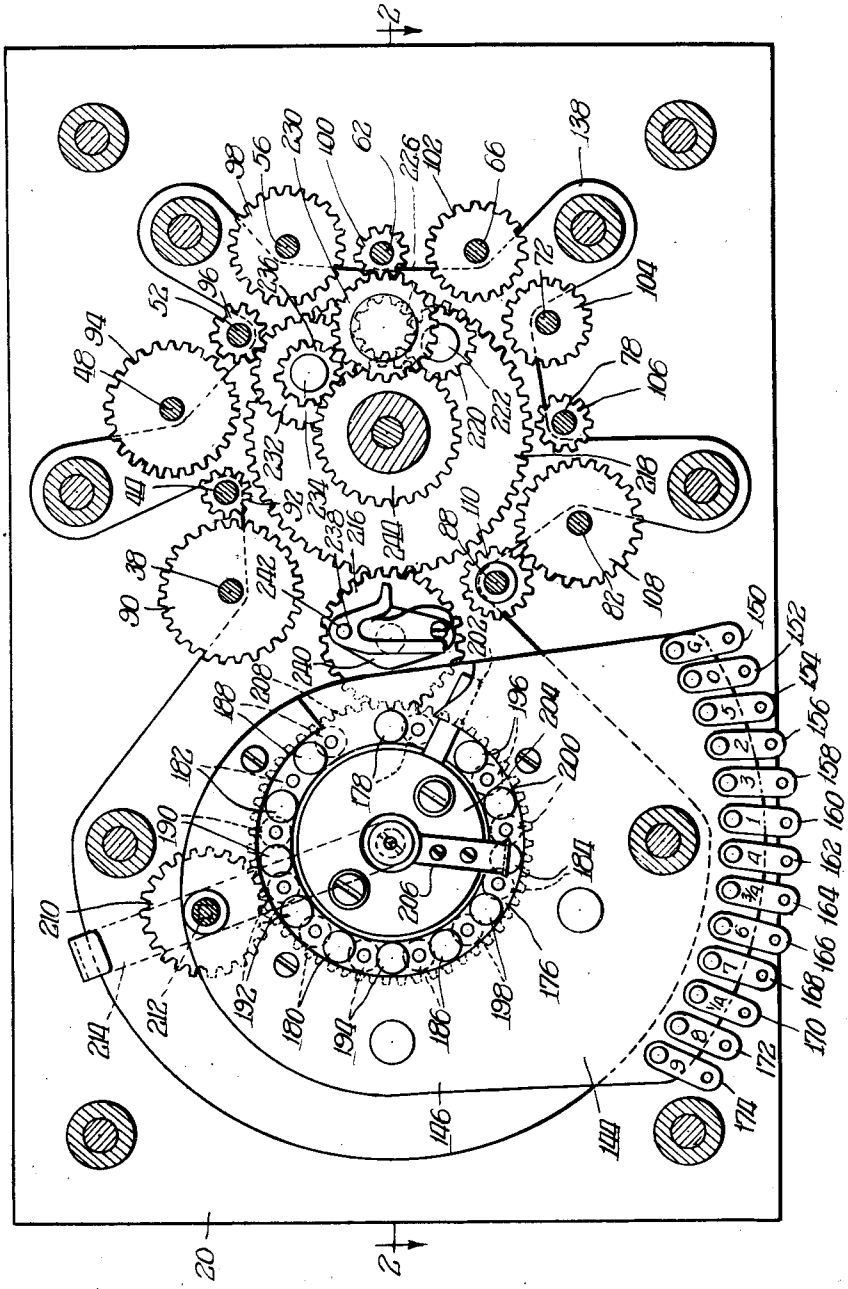
Inventor:
Kenly C. Bugg,
By Dickinson, Hurley, Byron & Knight
Attys

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 4

Fig. 5




Inventor.
Kenly C. Bugg,
By Dickinson, Hurley, Byron & Knight
Attys.

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 5

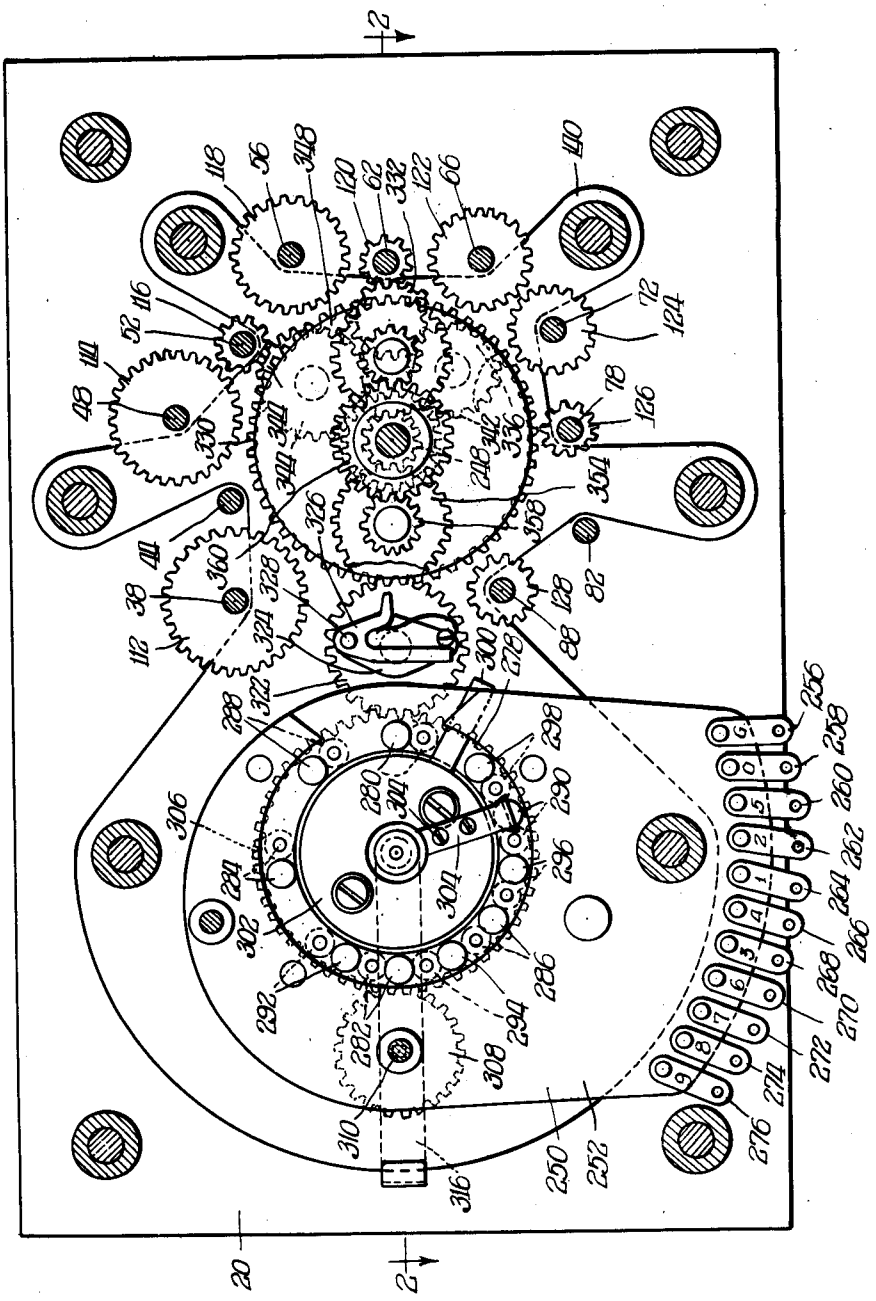



Fig. 6.

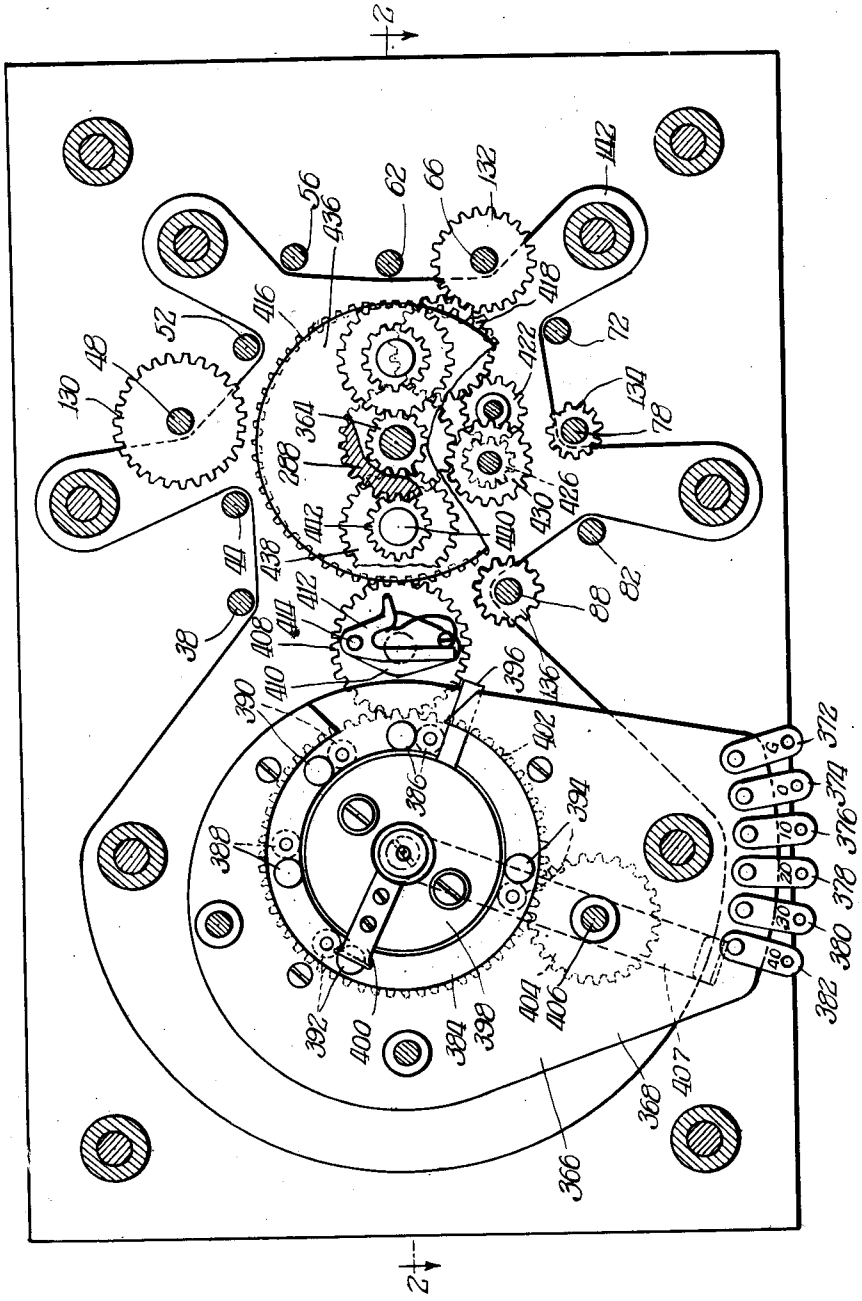
Inventor:
Kenly C. Bugg,
By Williamson, Hartley, Byron & Knight
Attys.

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 6

Fig. 2




Inventor
Kenly C. Bugg
By Williamson, Hartley, Byron & Knight Attys

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

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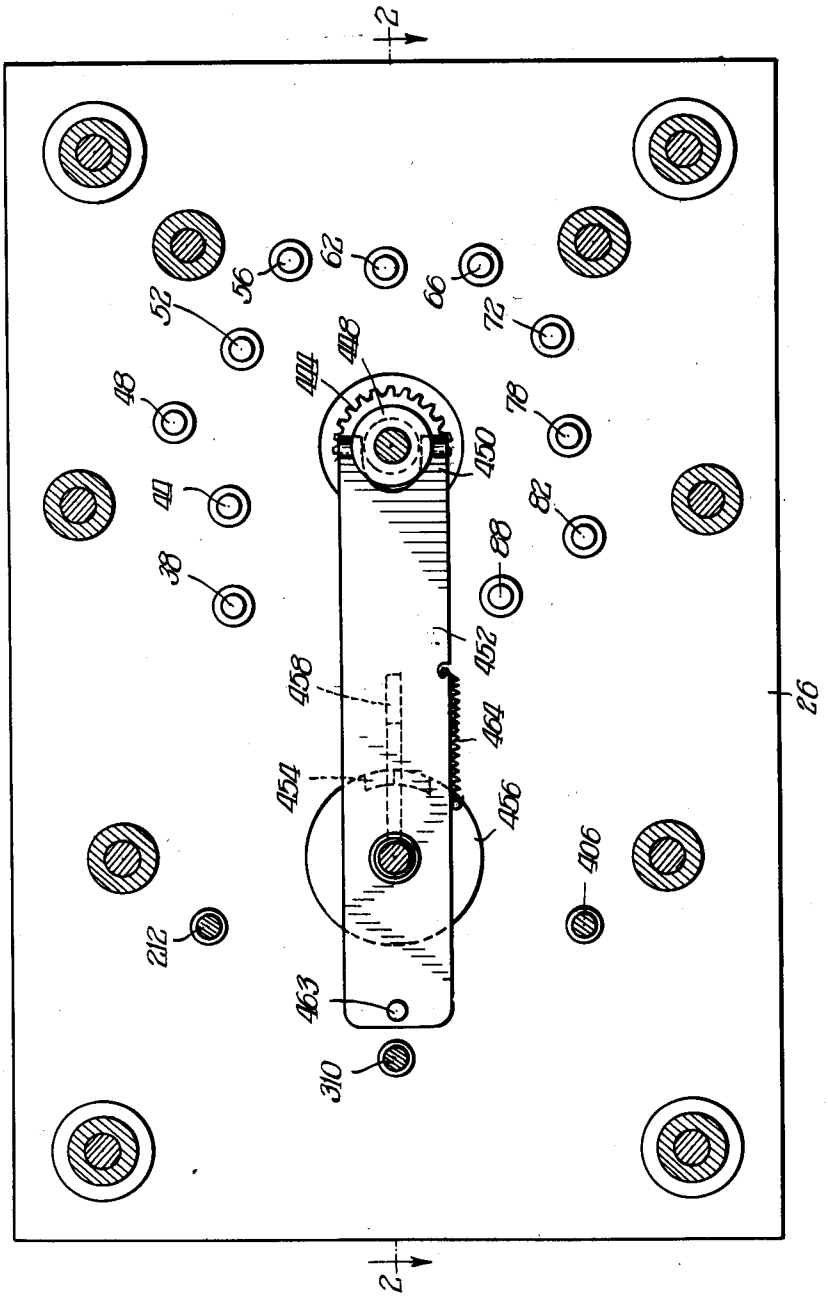


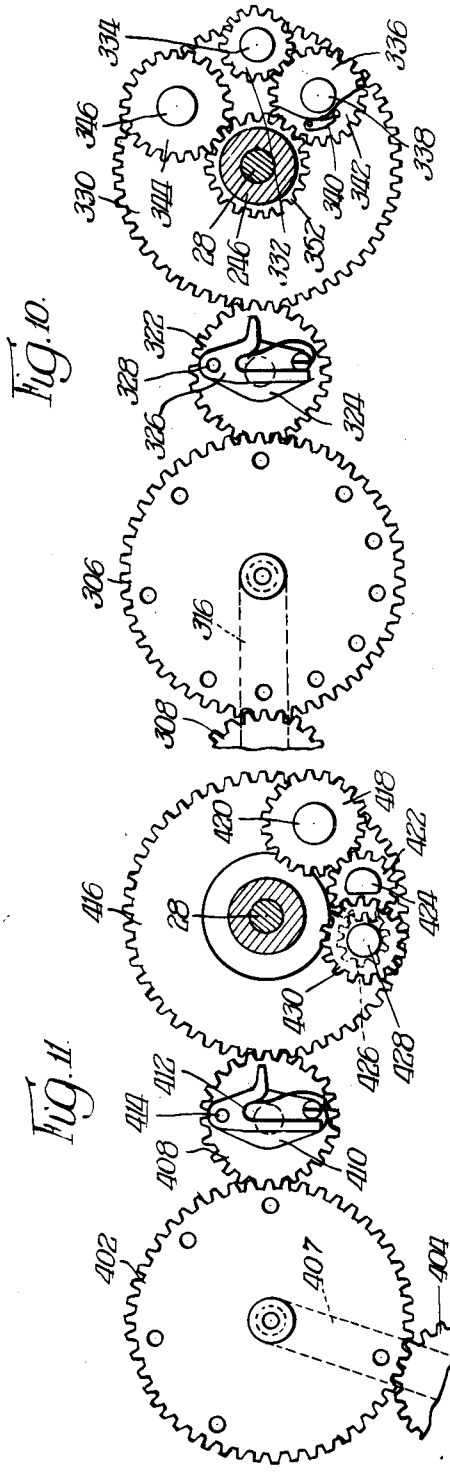

Fig. 8.

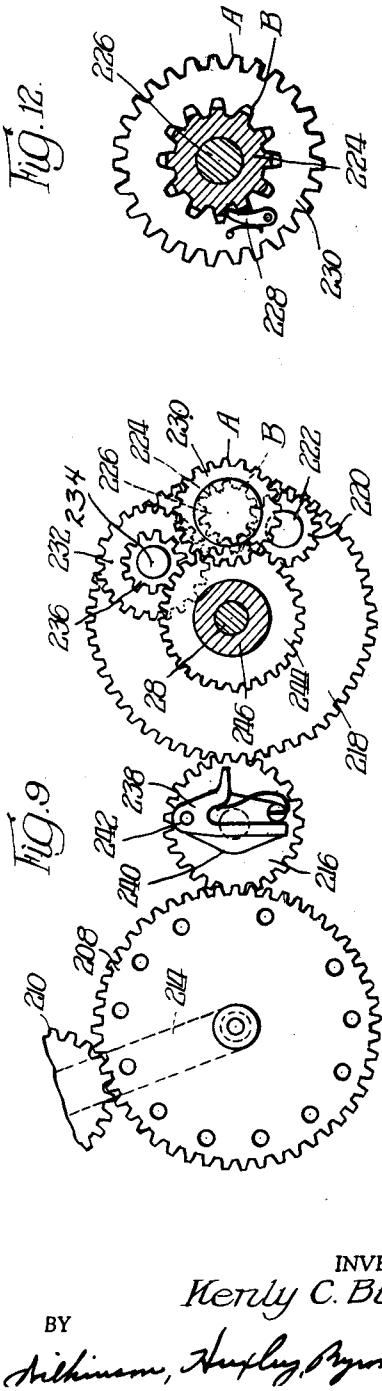
Inventor:
Kenly C. Bugg,
By Dickinson, Thurley, Byron & Knight
Attys.

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 8




INVENTOR.
Kenly C. Bugg.

BY
Wilkinson, Huxley, Byron & Knight
Attys

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

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Fig. 12.

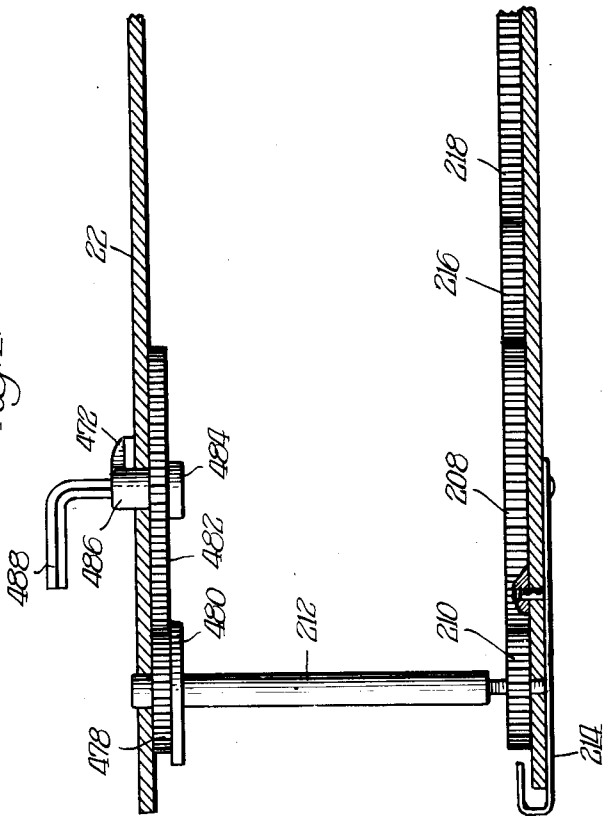
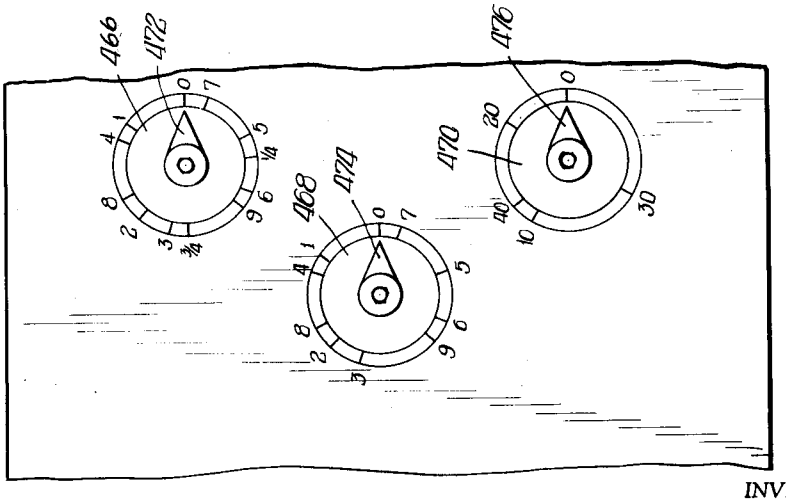



Fig. 13.




INVENTOR.
Kenly C. Bugg,
BY
Dickinson, Hurley, Byron & Knight

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

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Fig. 15

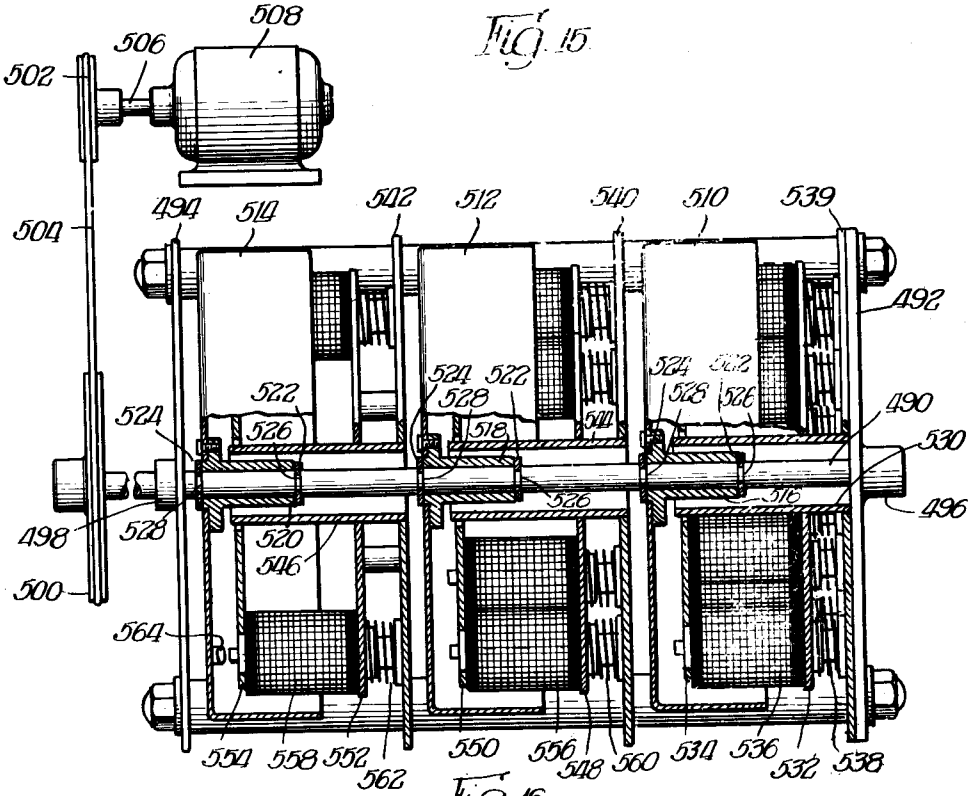
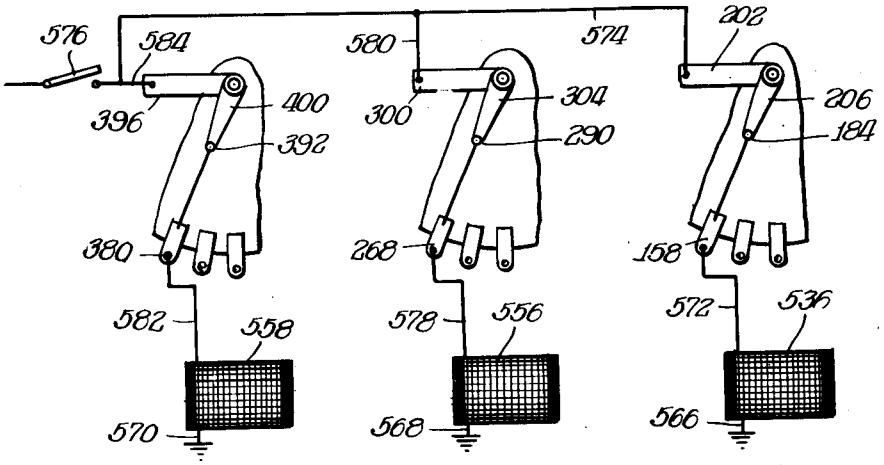



Fig. 16




INVENTOR.

Henry C. Bugg,

BY

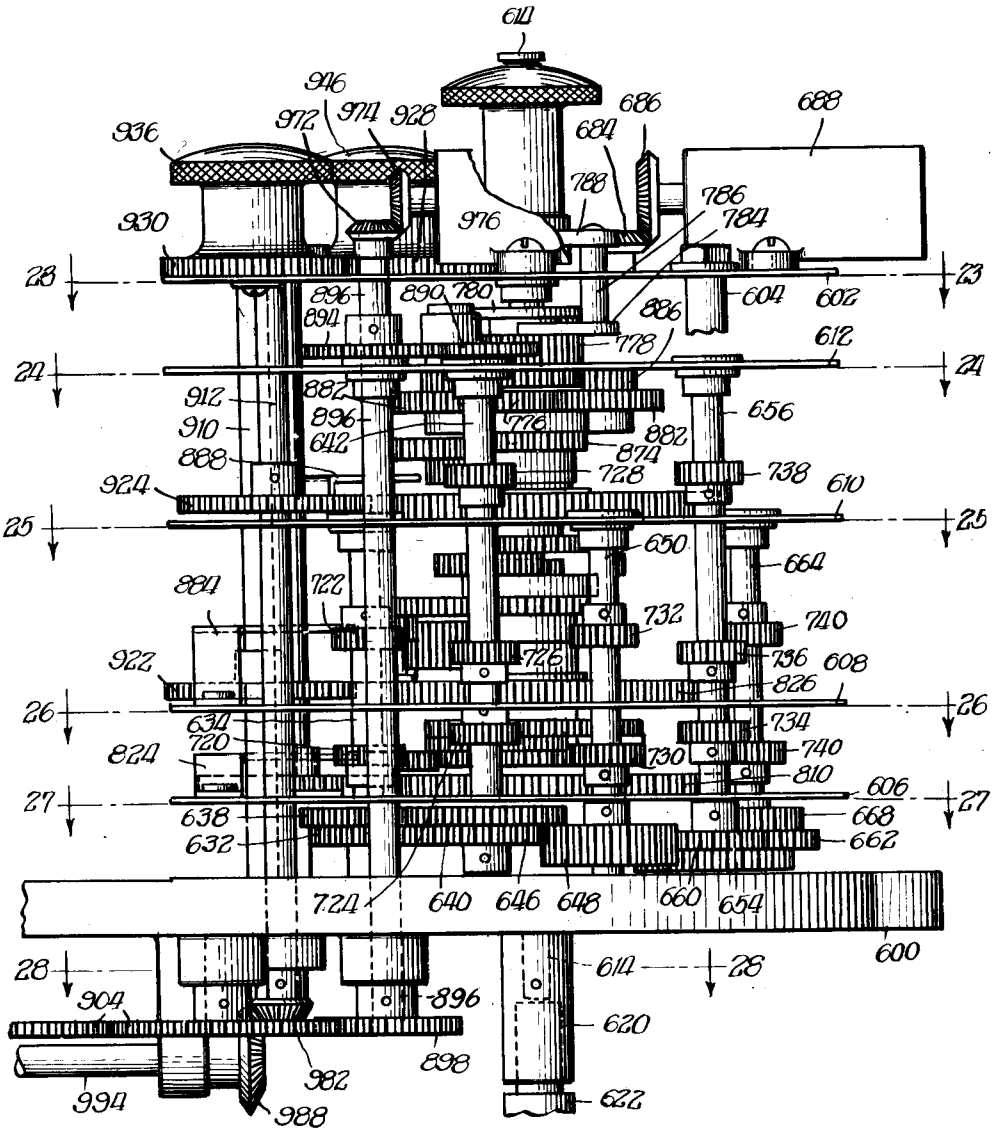
Atkinson, Huntley, Byron & Knight Attys

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 11

Fig. 17.




INVENTOR.
Kenly C. Bugg.

BY
Atkinson, Hurley, Byron & Knight
Attys

July 6, 1943. K. C. BUGG 2,323,373

REGISTERING MECHANISM AND COMPUTING DEVICE

Filed Nov. 24, 1939 15 Sheets-Sheet 12

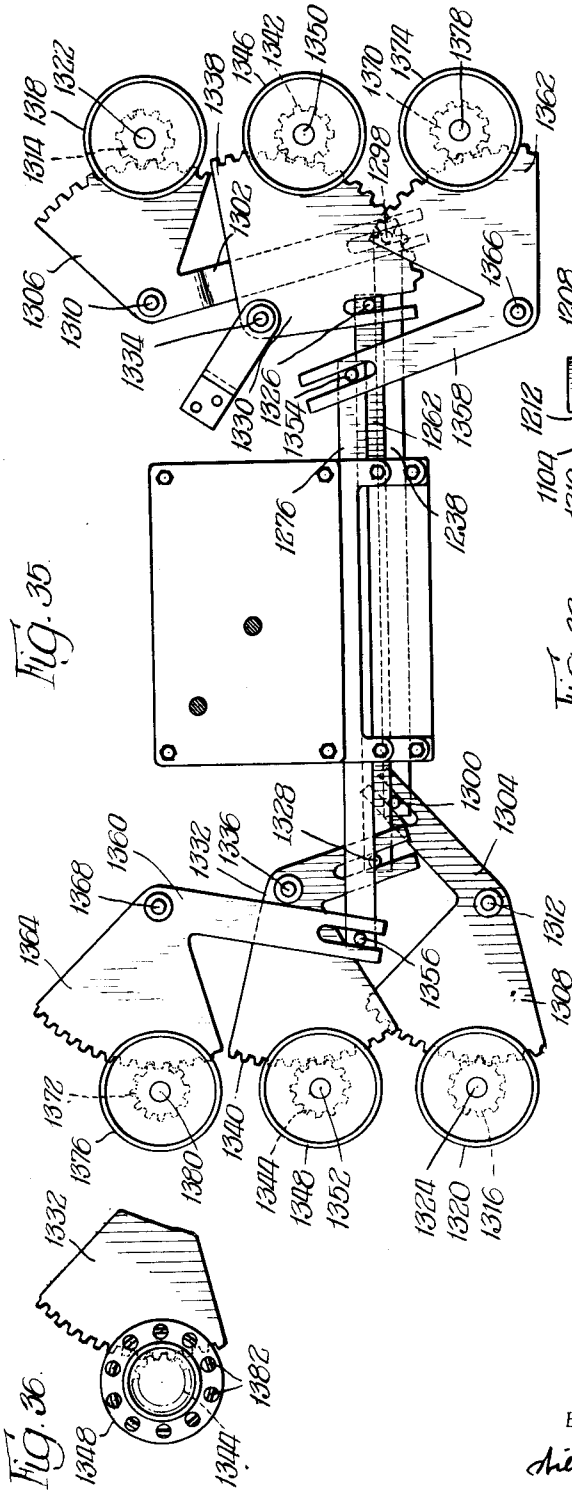


Fig. 35

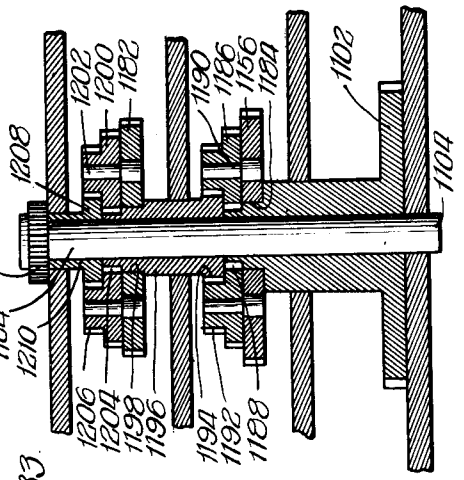


Fig. 33

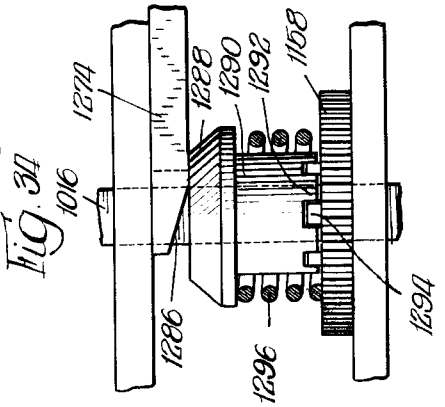


Fig. 34



Fig. 36

INVENTOR.
Kenly C. Bugg,
BY
Atchinson, Hughey, Byron & Knight
ATTORNEYS.

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANI

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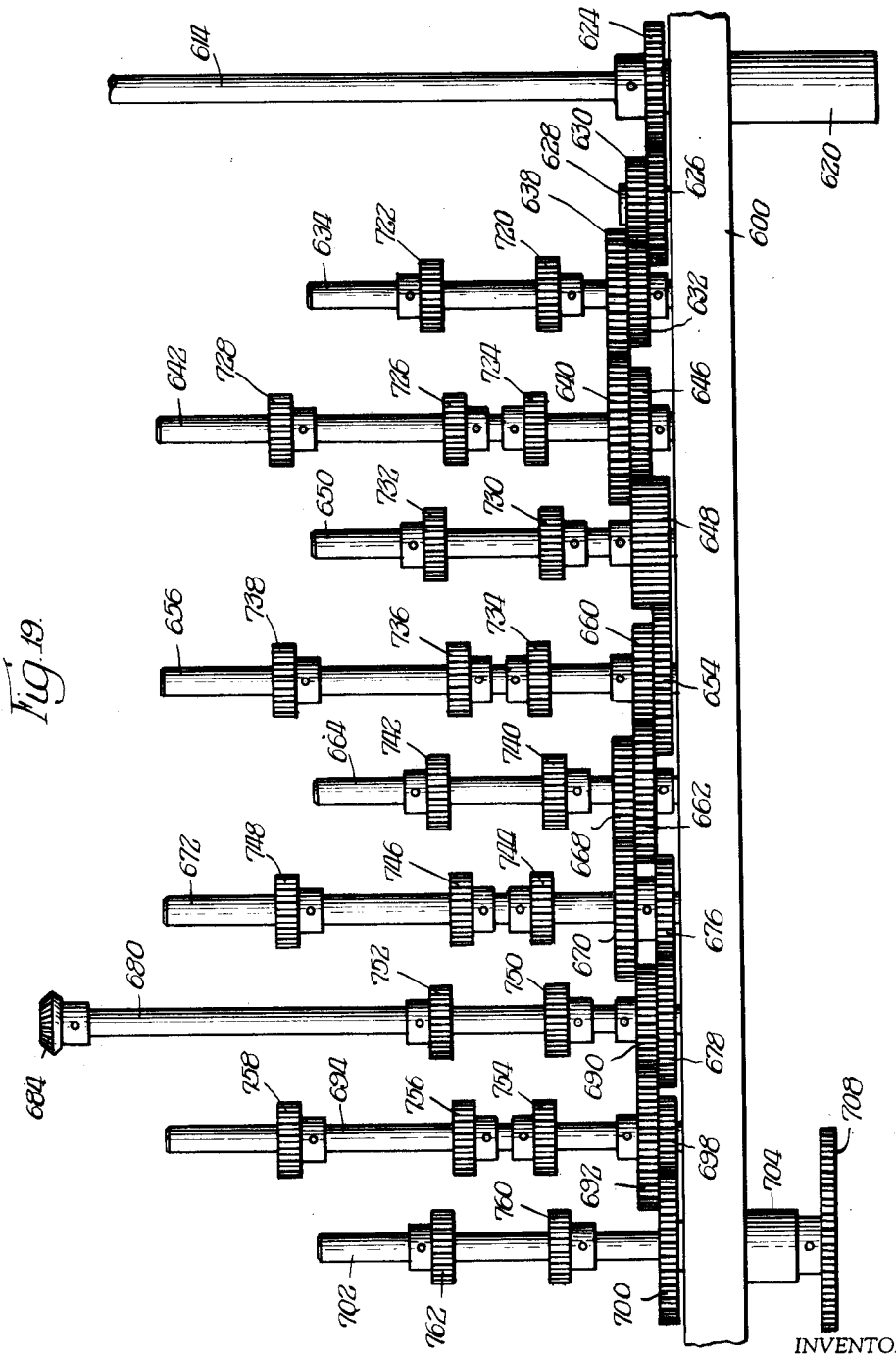



Fig. 19.

INVENTOR.
Kenly C. Bugg.

BY

Dickinson, Thackeray, Byron & King

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 14

Fig. 20

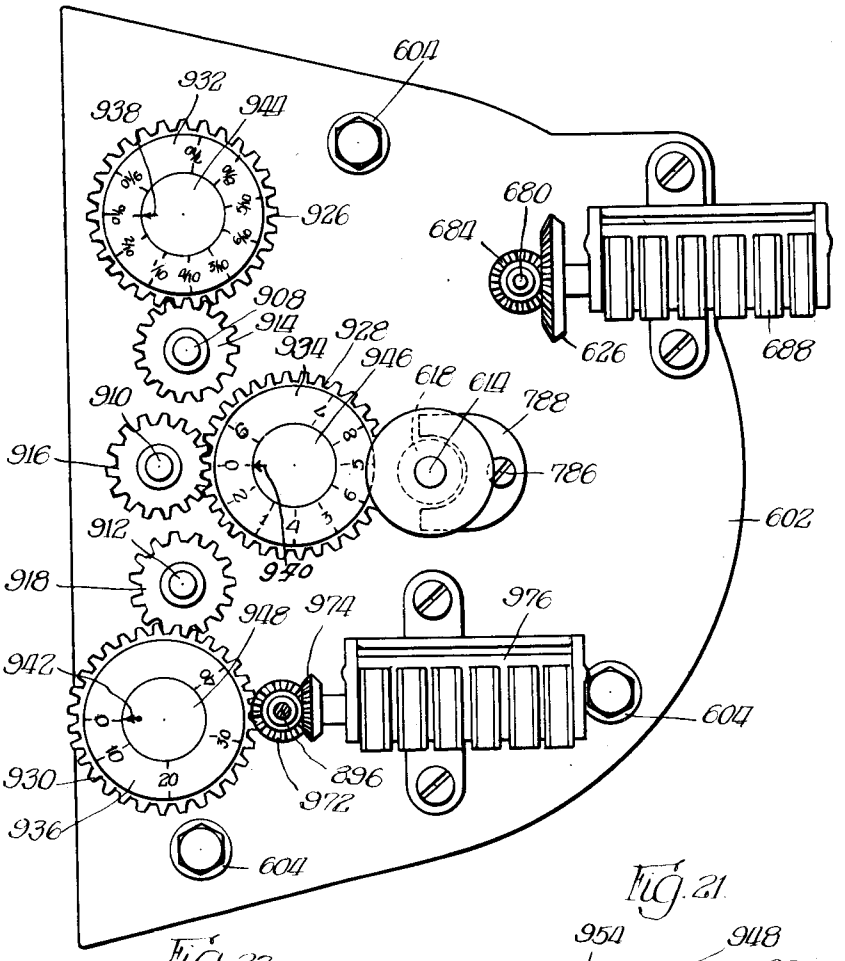



Fig. 22

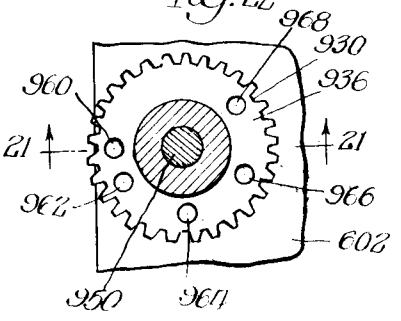
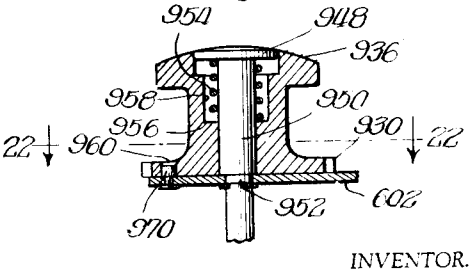



Fig. 21




INVENTOR.
Kenly C. Bugg.

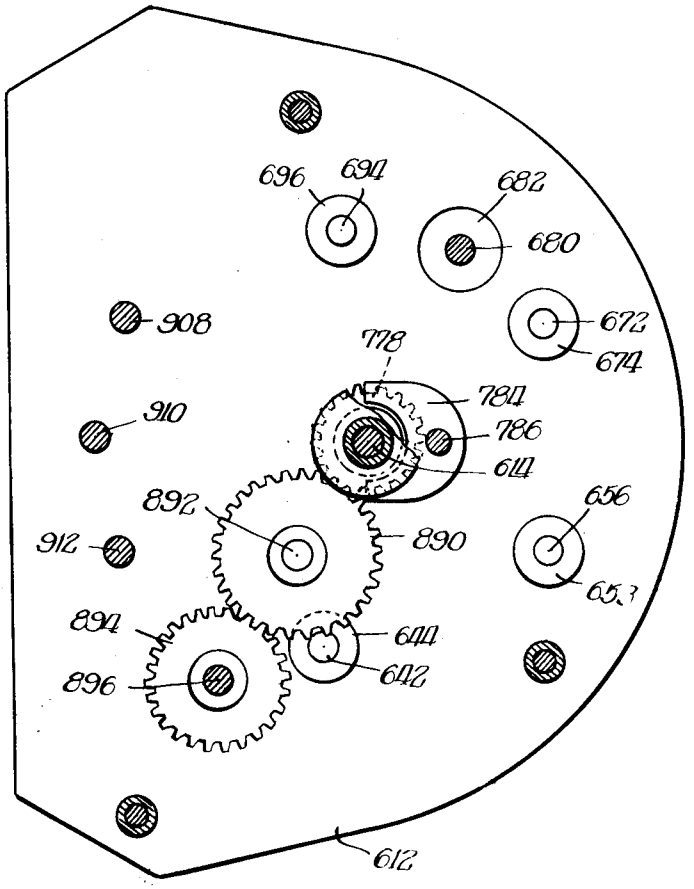
BY
Atkinson, Kenly, Byron & Knight

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

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Fig. 23.



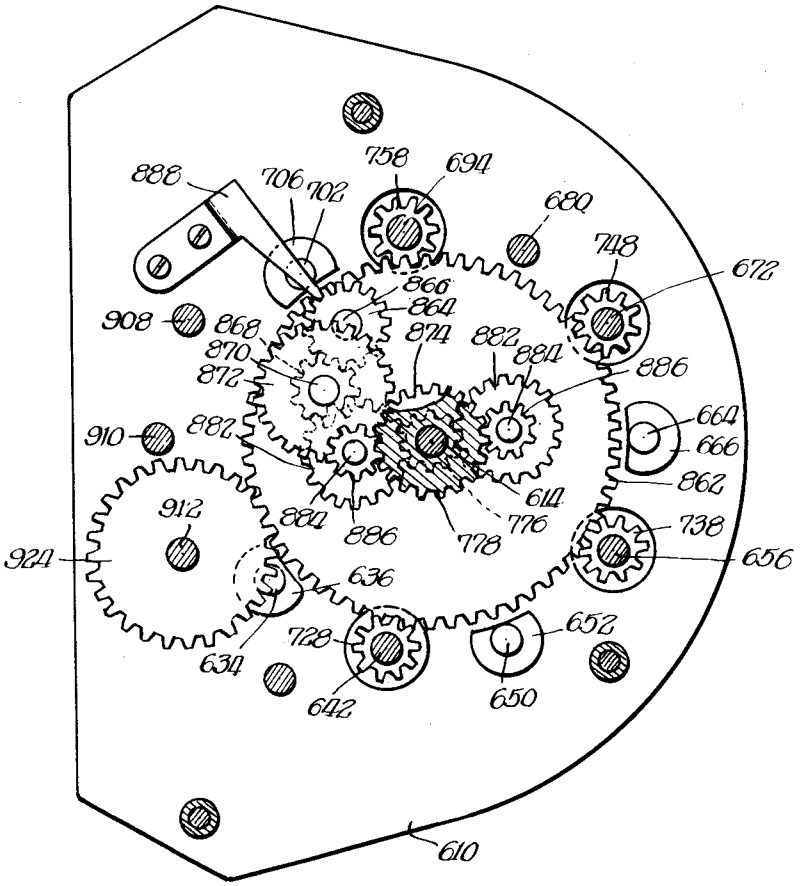

INVENTOR.
Kenly C. Bugg,
BY
Atkinson, Huxley, Byron & Knight

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 16

Fig. 24




INVENTOR.

Kerly C. Bugg.

BY

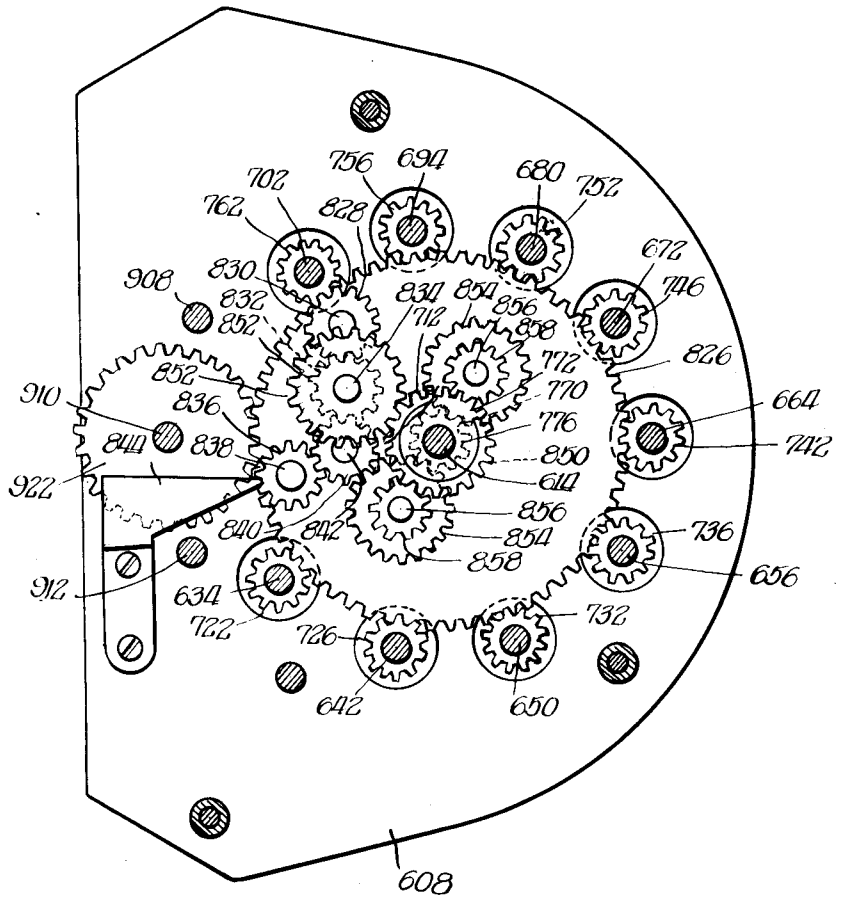
Atkinson, Hurley, Byron & Kirkpatrick

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 17

Fig. 25




INVENTOR.
Kenly C. Bugg.

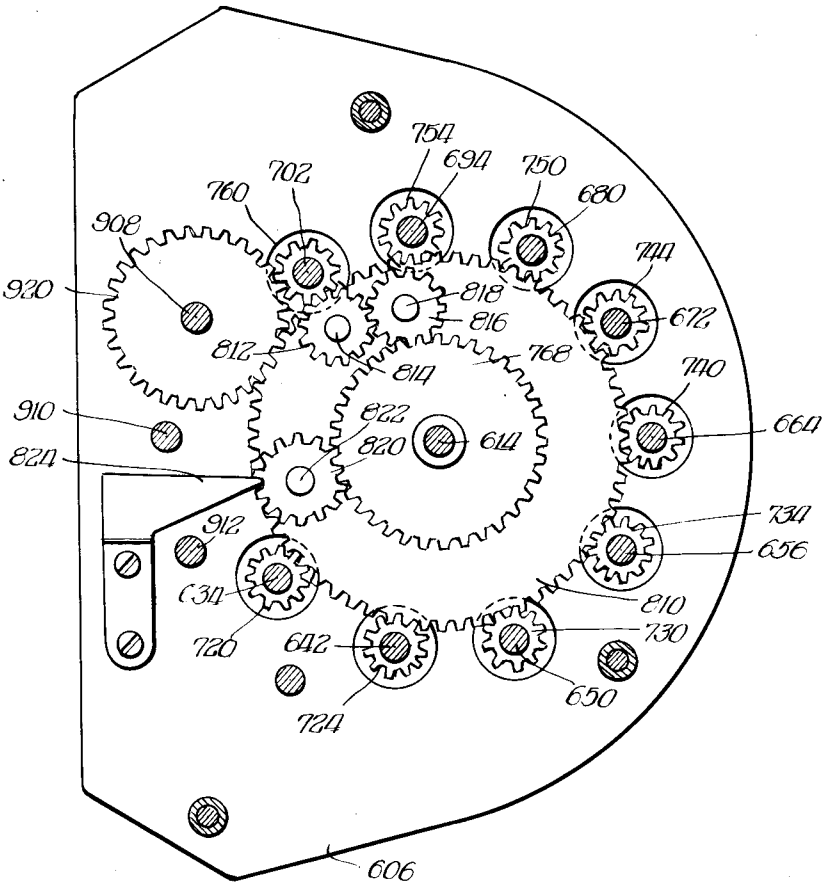
BY
Atkinson, Hurley, Byron & Knight
Attys.

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 18

Fig. 26




INVENTOR.
Kenly C. Bugg.

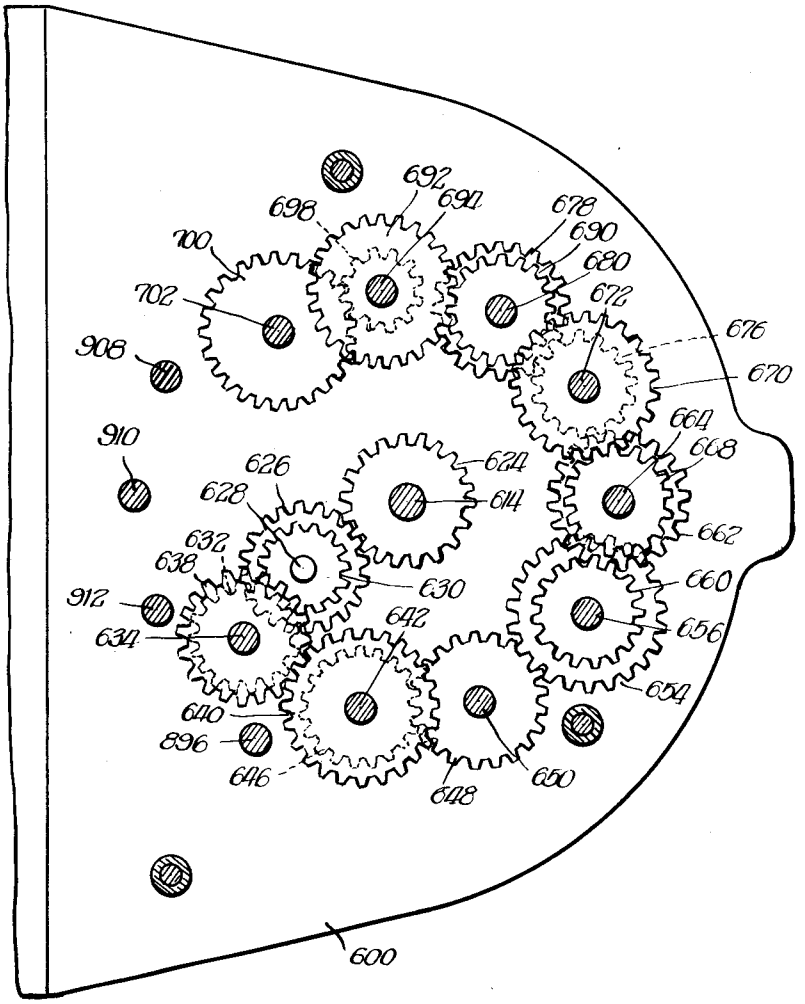
BY
Atkinson, Huxley, Byron & Knight
Attys

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

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Fig. 27




INVENTOR.
Kerby C. Bugg,
BY
Atkinson, Huxley, Byron & Knight
Attys

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

Filed Sept. 4, 1941 21 Sheets-Sheet 20

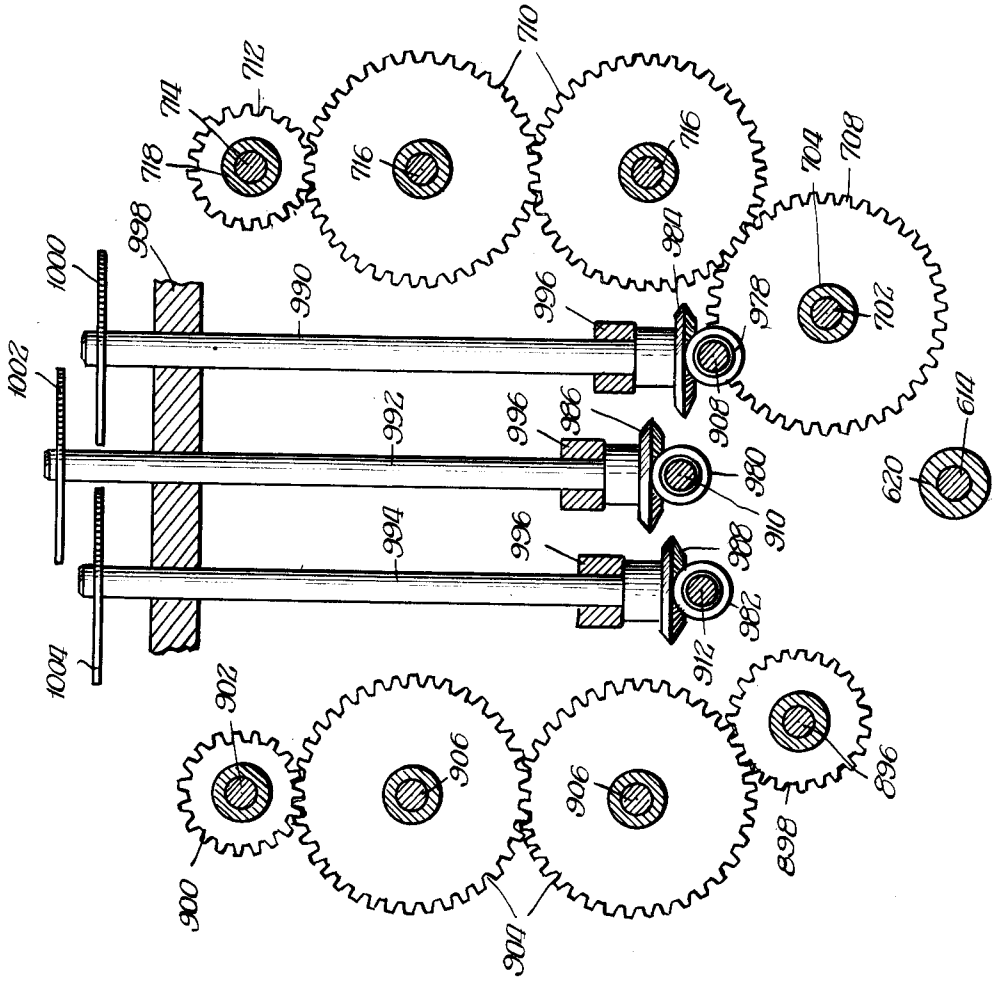



Fig. 28

INVENTOR.
Kerly C. Bugg,

BY

Wilkinson, Huxley, Byron & Knight

July 6, 1943. K. C. BUGG 2,323,374

COMPUTING MECHANISM

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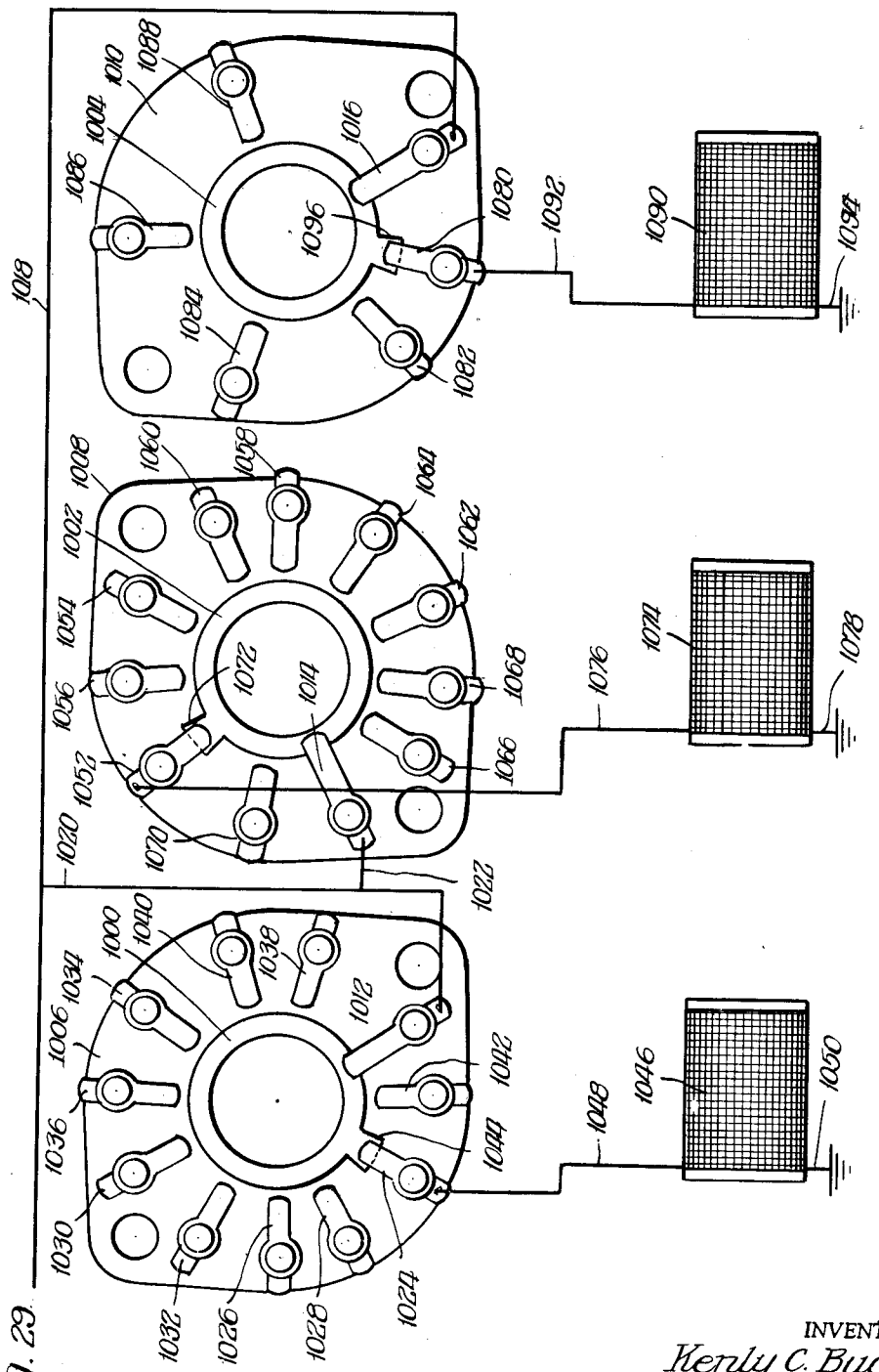



Fig. 29.

INVENTOR.
Kenly C. Bugg.

BY

Dithmar, Huxley, Byron & Knight

Patented July 6, 1943

2,323,374

# UNITED STATES PATENT OFFICE

2,323,374

## COMPUTING MECHANISM

Kenly C. Bugg, Fort Wayne, Ind.

Application September 4, 1941, Serial No. 409,569

25 Claims. (Cl. 74—283)

This invention pertains to variating mechanism and price synchronizing mechanism therefor, and more particularly to selective calculating mechanism as for liquid dispensing apparatus and the like.

It is an object of this invention to provide variating mechanism for a computing head of a liquid dispensing apparatus wherein the selective setting is accomplished at one panel.

Another object of the invention is to provide variating mechanism for a computing head wherein the selective gear shafts constantly rotate.

Still another object of the invention is to provide a computing head which can be set by reference to the register instead of attempting to read a small scale at the variator, but if desired is also adapted to be set by reference to a readily readable scale at said variator.

Yet another object of the invention is to provide variating mechanism and indicating means therefor controlled electrically.

A different object is to provide variating mechanism for an electrical computing device which can be disposed in an explosion proof case, but wherein the mechanism is so arranged that it can be readily set externally of the case.

A still different object is to provide variating mechanism for an electrical computing system which is adapted for use with multiple registering means.

Yet a different object is to provide variating mechanism which is cheap and compact, and wherein the assembly can readily be made through sub-assemblies, and wherein the drive for the variator can be had from a plurality of points on the variator and without the use of bevel gears.

Still another different object is to provide variating mechanism which can be set without interference with associated mechanism such as the registering mechanism by virtue of disconnecting means between the variator and registering mechanism.

Yet another different object is to provide one form of variating mechanism wherein the drive gearing is so arranged that a majority of said gearing is adapted to give an effective one-to-one ratio, i. e., drive at the same speed.

Another object is to provide a variator wherein all undue wear on the gear faces is eliminated as all of the gears rotate except for zero selection, the gears other than the selected gears operating as idlers.

Another object is to provide a variator wherein the position of the price driving members can be had at a plurality of points.

Another object is to provide a variator wherein the selecting gears are arranged in tiers, making it possible to place the shafting substantially in a circle common to all tiers, thereby providing ready setting means.

Another object is to provide variating means which will compute only at the figures at which it is set.

Another object is to provide variator mechanism having the operating shafts arranged substantially circularly about a centrally disposed differential permitting the use of selecting means operating circularly, this being made possible by carrying the shafts through the tiers of the mechanism and providing gearing in such a way as to properly compound certain of the gearing.

Another object is to provide a variator which is compact and strong, and is so constructed and arranged as to be easily assembled, permitting the use of simple tools and fixtures necessary for assembly.

Another object is to provide variating mechanism wherein the setting means includes rotatable selecting members and locking means therefor, the latter being operable by bodily movement of the setting means.

Another object is to provide variating means which can be set only in accordance with the visible indications on the electrically operating variator setting indicator or price synchronizing means.

Another object of the invention is to provide a modified form of variating mechanism in which the selecting gears are all of the same diameter and so disposed that the center lines of the shafts thereof are on the same periphery so as to provide rapid selective gear change in order that the price setting of said variator may be readily varied.

Another object of the invention is to provide variating mechanism wherein the differential mechanism thereof may be declutched at a single point from the driven gears for any setting of any of the stages of the said variating mechanism.

Another object of the invention is to provide variating mechanism which may be set selectively from a single board by rotation in either direction of setting means such as knobs, and wherein said setting means is self-locking in the selected position.

Another object of the invention is to provide variator mechanism having a multiple drive, i. e., where the price selecting gears are driven at dif-

ferent speeds, which mechanism is susceptible of design for either a low or high speed variator for any predetermined price range, but wherein the price selection may be readily and positively made as by either manual or mechanical means.

Another object of the invention is to provide selecting gears of the same diameter mounted on driving shafts, the axes of which are on a common periphery, connecting means for the selecting gears being through differential means whereby the summation of the movements of the selected of said selecting gears is delivered to a common shaft, the shifting gears between the differential mechanism and the selecting gears being movable by rotative setting of setting means for predetermined price ranges to engage the selected of said selecting gears for said ranges, and the zero setting of any of said predetermined price ranges being accomplished by the same rotative setting.

Another object of the invention is to provide an arrangement of driving gears, differential gears and drive shafts permitting direct connection between shifting means for selecting the effective driving gear and the switch means for controlling the indicating means which indicates the effective driving gear.

Another object of the invention is to locate the selecting gears of variating means in a substantially circular path concentric with the differential driven gearing to thereby permit compact variating means to be constructed although ample gear strength is maintained and readily procurable gears used.

Another object of the invention is to provide variating means wherein the selecting gears thereof are disposed in a substantially circular path with respect to the differential gear drives enabling the use of simple idler gear positions between the selecting gears and the differential gears rather than the use of conventional more intricate idler positions outside the pitch circle of said selecting gears.

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 in the specification, drawings and claims appended hereto.

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

Figure 1 is a side elevation of one form of variating or integrating mechanism embodying the invention;

Figure 2 is a sectional elevation through the variating or integrating mechanism and the setting means thereof shown in Figure 1, the same being taken substantially in the plane as indicated by the line 2—2 of Figure 4;

Figure 3 is a fragmentary developed elevation showing the price selecting and driving gear shafts of the variating mechanism shown in Figure 1;

Figure 4 is a sectional plan view taken substantially in the plane as indicated by the line 4—4 of Figure 1;

Figure 5 is a sectional plan view taken substantially in the plane as indicated by the line 5—5 of Figure 1, the same showing a portion of the setting and driving means for the fractions (tenths and quarters) indications;

Figure 6 is a sectional plan view taken substantially in the plane as indicated by the line 6—6 of Figure 1, the same showing a portion of the setting and driving means for the units or cents indications;

Figure 7 is a sectional plan view taken substantially in the plane as indicated by the line 7—7 of Figure 1, the same showing a portion of the setting and driving means for the tens indications;

Figure 8 is a sectional plan view taken substantially in the plane as indicated by the line 8—8 of Figure 1, the same showing a portion of the disconnecting means for use in selectively setting the variator;

Figure 9 is a fragmentary top plan view taken substantially in the plane as indicated by the line 9—9 of Figure 2;

Figure 10 is a fragmentary top plan view taken substantially in the plane as indicated by the line 10—10 of Figure 2;

Figure 11 is a fragmentary top plan view taken substantially in the plane as indicated by the line 11—11 of Figure 2;

Figure 12 is an enlarged sectional top plan view through the intermediate driving gear for the tenths differential, the same being effective for permitting ready setting of the tenths selecting gears;

Figure 13 is a fragmentary top plan view of one of the base plates of the variating mechanism showing the visible setting dials which may be used;

Figure 14 is a fragmentary sectional elevation of a portion of the setting mechanism where visible setting dials are used as shown in Figure 13;

Figure 15 is a fragmentary sectional elevation of a form of electrical price synchronizing mechanism for use with the variating mechanism illustrated in Figures 1 to 14 inclusive;

Figure 16 is a fragmentary diagrammatic view showing electrical connections between the variator switch mechanism shown in Figures 1, 2, 5, 6 and 7, and the solenoid controls for the price synchronizing mechanism shown in Figure 15, the diagram illustrating only one connection from the switch mechanism to one solenoid for each daily price wheel;

Figure 17 is a side elevation of a modified form of variating or integrating mechanism embodying the invention;

Figure 18 is a fragmentary elevation showing the differential mechanism and the reset declutching mechanism of the variating mechanism illustrated in Figure 17;

Figure 19 is a fragmentary developed elevation showing the price selecting and driving gear shafts;

Figure 20 is a top plan view of the variating mechanism illustrated in Figure 17 showing the daily price setting mechanism, the declutching mechanism, and the connections to the gallons and money totalizers;

Figure 21 is a sectional elevation through the tens setting knob for the variator, the same being taken substantially in the plane as indicated by the line 21—21 of Figure 22;

Figure 22 is a plan view of the setting knob illustrated in Figure 21, the same being taken substantially in the plane as indicated by the line 22—22 of Figure 21;

Figure 23 is a sectional plan view taken substantially in the plane as indicated by the line 23—23 of Figure 17;

Figure 24 is a sectional plan view of the tens differential gear mechanism and the driving train and the selecting gears, together with the driving gears to the differential, the same being taken

substantially in the plane as indicated by the line 24—24 of Figure 17;

Figure 25 is a sectional plan view through the units differential gear mechanism and the driving train and selecting gears, together with the driving gears to the differential, the same being taken substantially in the plane between line 25—25 of Figure 17;

Figure 26 is a sectional plan view through the fractions differential gear mechanism and the driving train and the selecting gears, together with the driving gears to the differential, the same being taken substantially in the plane as indicated by the line 26—26 of Figure 17;

Figure 27 is a sectional plan view of the range driving gears, the same being taken substantially in the plane as indicated by the line 27—27 of Figure 17;

Figure 28 is a sectional plan view showing the connection between the setting shafts and the daily price switches, and showing the driving train for the gallons and money distributors, the same being taken substantially in the plane as indicated by the line 28—28 of Figure 17;

Figure 29 is an elevation of the daily price switch mechanisms illustrated in Figure 28 showing the same displaced in a single plane and showing the connection between one of the shoes of each of the switches and the corresponding solenoid for the daily price indicating means.

In the variating mechanism provided herein, it is contemplated that this mechanism may be used with the type of liquid dispensing apparatus shown and described in application Serial No. 305,757, filed November 24, 1939, though it is understood, of course, that this variating mechanism may be used in place of the variating mechanism shown and described in Slye Patent No. 2,151,239, issued March 21, 1939, or Slye Patent No. 2,111,996, issued March 22, 1938. Further, this type of variating mechanism may be used as an integrating means for computing scales, calculating mechanisms, and the like.

*Variating mechanism (Figures 1 to 14 inclusive)*

The variating mechanism shown in Figures 1 to 14 inclusive, comprises the spaced base plates 20 and 22 suitably spaced and secured by the spacing and securing means 24 and an intermediate base plate 26 is provided adjacent the plate 22. The shaft 28 extends through the base plates 20, 22 and 26, being journaled in the plates 20 and 22 and being adapted to be driven, as for example, by the meter of a liquid dispensing apparatus, through the gear 30 non-rotatably mounted on said shaft. Said shaft, at the one end, is provided with positioning means in the form of the collar 32, and also is provided with the gear 34 non-rotatably mounted thereon for operating a distributor or timing means for a register, where used in an electrical system, or for directly operating a register where used in a mechanical system as at present used. The gear 30, which in the embodiment shown is provided with 25 teeth, meshes with and drives a 36 tooth idler gear 35, said idler gear being pivotally mounted as at 37 to the base plate 20.

*Drive shafts and driving gears*

The idler gear 35 in turn meshes with a 25 tooth gear 36 fixedly mounted on the drive shaft 38 which is journaled in the plates 20 and 26, a suitable positioning collar being provided on said shaft adjacent the plate 26. The shaft 38 is provided with the 25 tooth drive gear 40 fixedly mounted on said shaft, said gear meshing with the 25 tooth drive gear 42, said gear 42 being fixedly mounted on the drive shaft 44. The gear 42 meshes with the 25 tooth drive gear 46 fixedly mounted on the drive shaft 48 journaled between the plates 20 and 26, and said gear 46 meshes with the 25 tooth drive gear 50 non-rotatably mounted on the drive shaft 52.

The gear 50 meshes with the 25 tooth drive gear 54 non-rotatably mounted on the drive shaft 56, said drive shaft being provided with the 12 tooth drive gear 58 non-rotatably mounted thereon and meshing with the 36 tooth drive gear 60 non-rotatably mounted on the drive shaft 62. The gear 60 meshes with the 12 tooth drive gear 64 non-rotatably mounted on the drive shaft 66, said drive shaft being provided with the 25 tooth drive gear 68, in turn meshing with the 25 tooth drive gear 70 non-rotatably mounted on the drive shaft 72. Said shaft 72 is provided with the 20 tooth drive gear 74 non-rotatably mounted thereon and meshing with the 30 tooth drive gear 76 non-rotatably mounted on the drive shaft 78.

The gear 76 meshes with the 20 tooth drive gear 80 non-rotatably mounted on the drive shaft 82, said shaft being provided with the 25 tooth drive gear 84 non-rotatably mounted thereon and meshing with the 25 tooth drive gear 86 non-rotatably mounted on the drive shaft 88. The drive shafts are journaled in the plates 20 and 26 in a manner similar to the drive shaft 38 and, while the shaft 38 has been shown as the shaft driven by the meter or other control means, it is apparent that any of said drive shafts may be used.

*Selecting gears*

In order to make the price selections for the fractions or tenths indications, the drive shafts 38, 44, 48, 52, 56, 62, 66, 72, 78, 82 and 88 are respectively provided with the selecting gears 90 (36 teeth); 92 (10 teeth); 94 (32 teeth); 96 (12 teeth; 98 (28 teeth); 100 (12 teeth); 102 (24 teeth); 104 (20 teeth); 106 (12 teeth); 108 (30 teeth); and 110 (16 teeth), said gears being in a position where they do not mesh one with the other as clearly shown in Figures 3 and 5.

As these gears are disposed, the gear 90 is for the nine-tenths cent ($\frac{9}{10}¢$) indication; the gear 92 is for the one-quarter cent ($\frac{1}{4}¢$) indication; the gear 94 is for the eight-tenths cent ($\frac{8}{10}¢$) indication; the gear 96 is for the three-tenths cent ($\frac{3}{10}¢$) indication; the gear 98 is for the seven-tenths cent ($\frac{7}{10}¢$) indication; the gear 100 is for the one-tenth cent ($\frac{1}{10}¢$) indication; the gear 102 is for the six-tenths ($\frac{6}{10}¢$) indication; the gear 104 is for the one-half cent ($\frac{1}{2}¢$) indication; the gear 106 is for the two-tenths cent ($\frac{2}{10}¢$) indication; the gear 108 is for the three-quarters cent ($\frac{3}{4}¢$) indication, and the gear 110 is for the four-tenths cent ($\frac{4}{10}¢$) indication.

Referring to the units or cents gear selection, the drive shafts 38, 48, 52, 56, 62, 66, 72, 78 and 88 are respectively non-rotatably provided with the selecting gears 112 (36 teeth); 114 (32 teeth); 116 (12 teeth); 118 (28 teeth); 120 (12 teeth); 122 (24 teeth); 124 (20 teeth); 126 (12 teeth); and 128 (16 teeth).

The gear 112 is for the nine cent (9¢) indication; the gear 114 is for the eight cent (8¢) indication; the gear 116 is for the three cent (3¢) indication; the gear 118 is for the seven cent (7¢) indication; the gear 120 is for the one cent (1¢) indication; the gear 122 is for the six cent (6¢) indication; the gear 124 is for the five cent (5¢)

indication; the gear **126** is for the two cent (2¢) indication; and the gear **128** is for the four cent (4¢) indication.

In order to obtain the selection for the tens of cents indication, the drive shafts **48**, **66**, **78** and **88** are respectively non-rotatably provided with the selecting gears **130** (32 teeth); **132** (24 teeth); **134** (12 teeth) and **136** (16 teeth). The gear **130** is for the forty cent (40¢) indication; the gear **132** is for the thirty cent (30¢) indication; the gear **134** is for the ten cent (10¢) indication, and the gear **136** is for the twenty cent (20¢) indication.

*Fractions switch mechanism*

The spaced stationary mounting plates **138**, **140** and **142** are fixedly mounted between the plates **20** and **26**, and provide means for mounting the corresponding portions of the differential and selecting mechanism. Where the variating mechanism is to be used in an electrical installation as herein shown, said mounting plates also provide mounting means for the fractions, units and tens selecting switches. The fractions selecting switch **144** consists essentially of the spaced insulating plates or members **146** and **148**. Each of said insulating plates is provided with the terminals **150**, **152**, **154**, **156**, **158**, **160**, **162**, **164**, **166**, **168**, **170**, **172** and **174**, said terminals being respectively for the power connection, zero, five-tenths cent ($\frac{5}{10}$¢), two-tenths cent ($\frac{2}{10}$¢), three-tenths cent ($\frac{3}{10}$¢), one-tenth cent ($\frac{1}{10}$¢), four-tenths cent ($\frac{4}{10}$¢), three-quarters cent (¾¢), six-tenths cent ($\frac{6}{10}$¢), seven-tenths cent ($\frac{7}{10}$¢), one-quarter cent (¼¢), eight-tenths cent ($\frac{8}{10}$¢), and nine-tenths cent ($\frac{9}{10}$¢).

The terminals for the upper and lower insulating plates **146** and **148** are respectively electrically connected to the corresponding contact terminals provided on the selector ring **176** through suitable conductors (not shown). For convenience of manufacture, the upper and lower contacts of the selector ring are not aligned, and no contact terminal is provided for the power terminal **150**. The contact terminals are indicated respectively at **178**, **180**, **182**, **184**, **186**, **188**, **190**, **192**, **194**, **196**, **198** and **200**.

The power terminal **150** is electrically connected to the power conductor **202**, which in turn is slidably and electrically connected to the rotary switch element or member **204**, said switch element carrying the switch arm **206**, adapted to selectively engage the upper contact terminals on the ring **176**. A similar switch arm **206** is provided on the underside of the switch member **204**, adapted to contact the lower contact terminals, it being understood, of course, that said lower switch arm is angularly disposed with respect to the upper switch arm an amount equal to the angular disposition of the corresponding upper and lower contact terminals.

In order to rotate the switch element **204**, said member is non-rotatably provided with the 70 tooth gear **208**, said gear meshing with the 32 tooth operating gear **210**, pivotally mounted on the mounting plate **138** and being provided with the shaft **212**. The shaft **212** extends outwardly of the plate **22** and is provided with suitable operating means for rotation of said shaft. The shaft is spring-pressed upwardly by the spring **214** as will later be described with respect to the shaft **310** of the units setting means, but is adapted to be moved bodily downwardly to deflect said spring **214**. The spring **214** is normally urged upwardly (as will be later described with respect to the spring **316**) of the units setting means, and said spring is provided with a pin (not shown, but similar to the pin **318**), adapted to engage in suitable apertures in the gear **208** to properly position the switch arm **206** in full contact with the selected contact terminals, the position of said apertures corresponding to the positions of the contact members.

*Fractions differential mechanism*

The gear **208** meshes with the 32 tooth gear **216** pivotally mounted on the plate **138**, the gear **216** meshing with the 70 tooth gear **218** likewise pivotally mounted on a plate **138**. The gear **218** is provided with the 16 tooth gear **220** pivotally mounted thereon as at **222** and meshing with the 12 tooth gear **224** pivotally mounted on the gear **218** as at **226**. The gear **224** is connected through the ratchet **228** to the 24 tooth gear **230** also pivotally mounted at **226** on the gear **216**, the gear **230** being adapted to selectively engage the gears **90**, **94**, **98**, **102**, **106** or **110**. The 23 tooth gear **232** is adapted to have selective engagement with the gears **92**, **96**, **100**, **104** and **108**, and is pivotally mounted on the gear **218** as at **234**, and the gear **232** is non-rotatably provided with the 14 tooth gear **236**.

The locking pawl **238** is provided with a base **240** conveniently fixed to the fixed pivot of the gear **216**, said pawl being pivotally mounted on said base as at **242** and being spring-pressed in a counter-clockwise direction whereby it is in a position to engage the gear **232**, locking said gear against rotation when the switch members **206** have been moved to the zero position, whereby they contact the contact terminals **178**. The gear **220** and **236** mesh with the 35 tooth gear **244** provided on the hollow shaft **246** rotatably mounted on the shaft **28**, the shaft **246** extending upwardly between the supports **140** and **142** and being provided with the gear **248**.

*Units switch mechanism*

The stationary mounting plate **140** is similarly provided with a switch assembly **250** similar to the selecting switch **144**. Said selecting switch comprises the upper and lower insulating plates or members **252** and **254**, provided with the terminals **256**, **258**, **260**, **262**, **264**, **266**, **268**, **270**, **272**, **274**, and **276**. Said terminals are respectively for the power connection, zero, five cents (5¢), two cents (2¢), one cent (1¢), four cents (4¢), three cents (3¢), six cents (6¢), seven cents (7¢), eight cents (8¢), and nine cents (9¢). The contact ring **278** is provided with the contact terminals **280**, **282**, **284**, **286**, **288**, **290**, **292**, **294**, **296** and **298**, respectively, electrically connected to the terminals **258** to **276** inclusive, through suitable conductors (not shown).

The power conductor **300** is electrically connected to the power terminals **256** and to the rotatable switch element **302**. The rotatable switch element is provided with the angularly disposed switch arms **304** adapted to be moved to selectively contact the contact terminals **280** to **298** respectively. As before, the upper and lower terminals **280** to **298** are staggered for convenience of manufacture, and the upper and lower switch arms **304** are correspondingly angularly disposed for proper electric contact.

The rotatable switch element **302** is adapted to be rotated by the 70 tooth gear **306** pivotally mounted on the mounting plate **140**. The gear **306** meshes with the 32 tooth gear **308** pivotally mounted on said mounting plate, the gear **308**

being provided with the operating shaft **310** which extends upwardly through the plate **22**, being provided with the means **312** for rotating said shaft. The shaft **310** is spring pressed upwardly as viewed in Figure 2, by means of the spring **314**, and when said shaft is depressed against the spring, it flexes the plate spring **316** downwardly, releasing the locking pin **318** from the respective aperture **320** in which it is engaged, depending upon the position of the switch arm **304**, it being understood that there is an aperture corresponding to each of the positions of the switch arm **304** with respect to the contact terminals.

*Units differential mechanism*

The gear **306** meshes with the 32 tooth gear **322** pivotally mounted on the mounting plate **140**, the fixed pivot of said gear being provided with the pawl support **324** to which the locking pawl **326** is pivoted as at **328**. The pawl is resiliently urged in a counter-clockwise direction about said pivot. The gear **322** meshes with the 70 tooth gear **330**, and said gear is provided with the 16 tooth gear **332**, pivotally mounted thereon as at **334**, meshing with the 24 tooth idler gear **336** pivotally mounted as at **338** on the gear **330**. The idler gear **336** is connected through the ratchet **340** to the 24 tooth gear **342**, also rotatably mounted as at **338**, the gear **336** being adapted to drive the gear **342** in a clockwise direction.

The gear **330** is also provided with a 28 tooth gear **344** pivotally mounted thereon as at **346**, the gear **344** being adapted to selectively engage the gears **116**, **120** or **124**, while the gear **332** is adapted to selectively engage the gears **112**, **114**, **118**, **122**, **126** or **128**, or the pawl **326**. The mounting plate **348** is non-rotatably provided with the journal **350** rotatably mounted on the rotatable shaft **246**, said journal being provided with the 21 tooth gear **352**, which in turn is driven by either the gear **342** or **344**, depending upon the selected position of the switch member. The mounting plate **348** is provided with the 28 tooth gears **354** pivotally mounted thereon as at **356** and meshing with the 14 tooth gear **248**.

The gear **354** is non-rotatably provided with the 14 tooth gear **358** meshing with the 28 tooth gear **360** of the journal **352**, said journal being rotatably mounted on the shaft **28**, the journal being provided adjacent its upper end with the 14 tooth gear **364**.

*Tens switch mechanism*

The mounting plate **142** for the tens selection is provided with the selecting switch assembly **366**. As before, this selecting switch comprises the spaced upper and lower insulating plates or members **368** and **370** provided with the terminals **372**, **374**, **376**, **378**, **380** and **382**. The terminals **372** to **382**, respectively, are for the power connection, zero, ten cents (10¢), twenty cents (20¢), thirty cents (30¢), and forty cents (40¢). The contact ring **384** is provided with the upper and lower offset or angularly disposed terminals **386**, **388**, **390**, **392** and **394** respectively, for the zero, ten cents (10¢), twenty cents (20¢), thirty cents (30¢) and forty cents (40¢) positions.

The power terminal **372** is electrically connected to the power conductor through suitable conductors (not shown), and said power conductor **396** in turn is electrically connected to the rotatable switch member **398**. The switch member **398** is provided with the upper and lower switch arms **400**, angularly disposed to correspond to the position of the upper and lower contact terminals, and being adapted to be moved to selectively contact the said contact terminals.

The member **398** is provided with the 70 tooth gear **402** adapted to be rotated by the 32 tooth gear **404**, the gear **404** being provided with an operating shaft **406** slidably but non-rotatably connected thereto, said shaft being provided with means outwardly of the plate **22** to rotate said gear. As before, the shaft **406** must be depressed to flex the spring **407** to release the locking pin (similar to the pin **318**) from the respective aperture in the switch member **398**, the aperture being placed to correspond to the position of the contact terminals whereby when said pin enters said apertures, the switch arms **400** are locked to operative relation with respect to the corresponding terminals.

*Tens differential mechanism*

The gear **402** meshes with the 32 tooth gear **408**, pivotally mounted on the mounting plate **142**, the fixed pivot of said gear being provided with the pawl base **410** to which a locking pawl **412** is pivotally mounted as at **414**. The pawl is resiliently urged in a counterclockwise direction about the pivot **414**. The gear **408** meshes with the 70 tooth gear **416** rotatably mounted on the mounting plate **142**, and the gear **416** is provided with the 24 tooth gear **418** pivotally mounted thereon as at **420**, the gear **418** being adapted to be moved to selectively engage the gears **130**, **132**, **134** or **136**, or the pawl **412**.

In the embodiment shown, in order to put into the differential the proper selected speed, the gear train must be used. The gear **418** therefore meshes with the 16 tooth idler gear **422** pivotally mounted on the gear **416** as at **424**, said gear **422** meshing with the 12 tooth gear **426** pivotally mounted on the gear **416** as at **428** and being non-rotatably provided with the 20 tooth gear **430**.

The gear **430** meshes with the 28 tooth gear **432** rotatably provided on the journal **434** rotatably mounted on the journal **362**. The journal **434** is non-rotatably provided with the mounting plate **436** to which the 28 tooth gears **438** are pivotally mounted as at **440**. The gears **438** are non-rotatably provided with the 14 tooth gears **442**, which in turn mesh with the 28 tooth gear **444** slidably and rotatably mounted on the shaft **28**. The gear **444** is adapted to drive the money distributor or money portion of the register, whereas the shaft **28** is adapted to drive the gallons or amount distributor or portion of the register.

*Setting release mechanism*

In order to permit a ready setting of the switch members through their shafts **212**, **310** and **406**, and to properly select the setting of the variator desired without affecting any registering mechanism, the gear **444** is adapted to be moved out of engagement with the gears **442**. To accomplish this result the gear **444** is provided with the collar **448** adapted to be engaged within the bifurcated end **450** of the lever **452**. The lever **452** is adapted to be tilted by means of the cam **454** of the cam member **456**. The member **456** is adapted to be rotated to cause the cam **454** to move the lever **452** upwardly, as viewed in Figure 2, by means of the lever **458** mounted outwardly of the plate **22**, said lever **458** being pro-

vided with the shaft **460** on which the member **456** is non-rotatably mounted. The spring **462** is interposed between the plate **22** and the lever **452** to urge the gear **444** toward engagement with the gears **442**, and the adjusting set screw **463** is provided to level the lever **452**, in which position the cam is inoperative. A spring **464** is connected to said cam member **456** and the lever **452** to urge said cam member toward position where the gear **444** is in mesh with the gears **442**.

*Price synchronizing mechanism (Figs. 13 and 14)*

In order that the setting of the variator may be readily observed, price synchronizing means is provided. In Figures 13 and 14 this price synchronizing mechanism is shown at the variator, and, as shown, comprises the dials **466**, **468** and **470** disposed on the plate **22**, the dials indicating respectively fractions, units and tens. The pointers **472**, **474** and **476** are provided which are movable when the shafts **212**, **310** and **406** are rotated in a manner already described where applied directly to the shafts.

In the modification illustrated in Figure 14, the setting means for the shaft **212** is indicated, it being understood that similar means is provided for the shafts **310** and **406**. In this modification, it is understood that dials are provided as at **466**, **468** and **470**, and instead of having the shaft **212** (**310** and **406**) project through the plate **22** and being provided with the socket, the shaft extends upwardly and is non-rotatably provided with the gear **478**, said gear having a collar **480** underlying the gear **482** which meshes with the gear **478**. The gear **482** is non-rotatably provided with the shaft **484** extending through the plate **22** and provided with the socket **486** for receiving the wrench **488** whereby the gears **482** and **478** may be rotated. The socket **486** is provided with the pointer **472** which passes over the dial **466**. It of course is understood that the same mechanism is provided for each of the shafts. In order to rotate the shaft **212** the wrench **488** is disposed in the socket **486** and depressed, causing the shaft **212** to be depressed to move the spring **214** downwardly to unlock the train of gears **210**, **208**, **216** and **218**, as already described, to permit rotation of the wrench and consequently the setting of the variator.

*Price synchronizing mechanism (Figs. 15 and 16)*

In order to indicate the setting of the variator remotely, that is, for example, at the registering means the daily price indicator illustrated in Figure 15 may be used, said register being particularly shown in application Serial No. 409,570, filed September 4, 1941. In this form of daily price register the shaft **490** is journaled in the frames **492** and **494** as at **496** and **498**, and said shaft is provided with the pulley **500** connected to the pulley **502** as by the belt **504**. The pulley **502** is disposed on the motor shaft **506** of the motor **508** which, in a liquid dispensing apparatus, is operated when the pump motor is operated. The numeral wheels **510**, **512** and **514** for indicating respectively fractions, units and tens, are frictionally mounted on the shaft **490** to be rotated thereby. The frictional mounting may be accomplished by providing the numeral wheels with the hubs **516**, **518** and **520** positioned on the shaft by means of the split collars **522** and **524**, said collars being disposed in suitable grooves **526** and **528** provided on said shaft.

A sleeve **530** extends from the plate **492** toward the hub **516** and solenoid plates **532** and **534** are supported thereon. The fractions solenoids **536** are supported between the solenoid plates **532** and **534**. The number of solenoids corresponds to the number of calibrations on the numeral wheel **510**, that is, in the case of the fractions numeral wheels there will be twelve solenoids. The solenoids are provided with the spring-pressed plungers **538** which are retracted when the solenoids are deenergized and abut the stop plate **539**. When, however, any solenoid is energized, the plunger thereof will be projected toward the radial web of the numeral wheel **510**, where it will engage a stop (not shown) to arrest the movement of the numeral wheel so that the proper numeral will appear through the usual window in the dial.

The radial stop plates **540** and **542** are disposed between the numeral wheels **510** and **512**, and **512** and **514**, and said plates **540** and **542** are provided with the sleeves **544** and **546** extending toward the respective numeral wheels **512** and **514**. The units and tens solenoid supporting plates **548** and **550**, and **552** and **554** are respectively supported on the plates **540** and **542**, and the unit solenoids **556** are supported between the plates **548** and **550**, and the tens solenoids **558** are supported by the plates **552** and **554**. These solenoids are similar to the solenoids **536**, being provided with the spring-pressed plungers **560** and **562** which are retracted when the solenoids are deenergized, abutting the stop plates **540** and **542** respectively. However, when any of such solenoids are energized the plungers are projected toward the webs of the numeral wheels **512** and **514** where they may abut suitable stops, such as shown at **564** for the tens numeral wheel **514**, to arrest the movement of said numeral wheels where a reading may be effected through the dial window.

In order to illustrate the operation, a fraction solenoid **536**, and a unit solenoid **556**, and a ten solenoid **558** are illustrated in Figure 16, one side of these solenoids being grounded as at **566**, **568** and **570**. Assuming that these solenoids are for 33.3¢ respectively, the solenoid **536** for the $\frac{3}{10}$¢ indication is electrically connected through the conductor **572** to the terminal **158** (Figure 5). The switch **206** has been moved to the contact **184**, and the conductor **202** is connected through the conductor **574** to the switch **576** electrically connected to a suitable source of power. The solenoid **556** of the 3¢ calibration for the units numeral wheel **512** is connected through the conductor **578** to the terminal **268** (Figure 6). The switch arm **304** has been moved to engage the contact **290**, and the conductor bar **300** is connected through the conductor **580** to the conductor **574**. The 30¢ solenoid **558** of the tens numeral wheel **514** is connected through the conductor **582** to the terminal **380**. The switch arm **400** has been moved to engage the contact **392**, and the conductor bar **396** is connected through the conductor **584** to the conductor **574**. It will thus be seen that by operation of the switches **206**, **304** and **400**, the daily price synchronizing means illustrated in Figure 15 is set at the proper reading.

*Operation of variator*

In operation of a variator of this type, assuming that it is set at zero, at which time the switch arms **206**, **304** and **400** are respectively in engagement with the contacts **178**, **280** and **386**, and the pawls **238**, **326** and **412** engage the teeth of the adjacent gears **230**, **332** and **418**, preventing rota-

tion of the differential gears. Thus, in the event driving is effected, the shaft **28** would rotate to show the amount of commodity dispensed but no computation would be made thereof as the gear **444** would be stationary.

Should the price of the commodity, as for example gasoline, be at the rate of 33.3¢, and it is desired to set the variator at this price, the lever **458** is rotated to cause the cam **456** to raise the gear **444**, disconnecting said gear from the differential. Subsequent setting will not then affect the registering mechanism or totalizers. The shaft **212** is depressed or moved downwardly against the spring **214**, releasing the locking pin on said spring from the gear **208**. The shaft **212** can then be rotated, causing the gear **210** to rotate the train of gears **208**, **216** and **218**, until such time as the switch arm **206** engages the contact **184**. In this position the gear **96** is engaged by the gear **232**.

The shaft **310** is then depressed, moving the spring **316** to a position to remove the pin **318** from the aperture **320** of the gear **306**. Rotation of the shaft **310** will then cause the gear train **308**, **306** and **322** to rotate the gear **330** to a position where the switch arm **304** engages the contact **290**. When the switch arm is in this position, the gear **344** is in engagement with the gear **116**. In order to effect a setting of the tens, i. e., 30¢ in this illustration, the shaft **406** is depressed to move the spring **407** to a position where the locking pin thereof is released from locking position with respect to the gear **402**. Rotation of the shaft **406** causes the gear train **404**, **402** and **408** to rotate the gear **416** to a position where the gear **418** engages the gear **132**, and in this position the switch arm **400** engages the contacts **392**.

Setting of the variator as above described, of course, is indicated on the dials **466**, **468** and **470** by the pointers **472**, **474** and **476**, and this setting is also indicated remotely where the remote price setting mechanism such as shown in Figures 15 and 16 is used. Movement of the switch arm **206** to engage the contact **184** (Figures 5 and 16) causes the $\frac{3}{10}$¢ solenoid **536** to be energized. Energizing said solenoid causes the plunger thereof to be projected to engage the stop on the fractions numeral wheel **510**, which arrests movement of said numeral wheel at the $\frac{3}{10}$¢ indication, although the motor **508** continues to rotate the shaft **490**. Similarly, engagement between the switch arm **304** and the contact **290** (Figures 6 and 16) energizes the 3¢ solenoid **556**, causing the plunger thereof to be projected to engage the stop of the units numeral wheel **512**, whereby the 3¢ indication is exposed. Movement of the switch arm **400** to engage the contact **392** (Figures 7 and 16) causes the 30¢ solenoid **558** to be energized, projecting the plunger thereof, causing said plunger to engage the stop **564** to arrest movement of the tens numeral wheel **514** at the 30¢ indication.

In the case of a liquid dispensing apparatus, therefore, when liquid is dispensed, the meter shaft causes rotation of the shaft **28** which in turn causes the gear train **30**, **35** and **36** to rotate the drive shaft **38**. Rotation of the drive shaft **38** causes the drive gears to rotate the other drive shafts. Rotation of the drive shaft **52** causes the selecting gear **96** to rotate the gear **232**. Rotation of the gear **232** causes the gear **236** to rotate the gear **244**, thereby causing the gear **248** to rotate the differential gears **354**. Rotation of the shaft **52** causes rotation of the selecting gear **116**, which in turn rotates the gear **344**. Rotation of the gear **344** causes rotation of the gear **352**, which in turn causes rotation of the plate **348**, and consequently the shafts **356** of the gears **354** around the shaft **28**. The gear **358** provided the gear **354** is therefore adapted to drive the gear **360**, which in turn causes the gear **364** to rotate the differential gears **438**. Rotation of the shaft **66** causes the selecting gear **132** to rotate the gear **418**, which in turn drives the gear **432**, rotating the mounting plate **436** around the shaft **28**. The gears **442** provided on the differential gears **438** cause rotation of the gear **444**, thus driving the money part of the register either electrically or mechanically. Rotation of the shaft **28** of course causes operation of the gear or amount part of the register, either mechanically or electrically.

*Variating mechanism (Figures 17 to 27 inclusive)*

The variating mechanism shown in Figures 17 to 27 inclusive, comprises the spaced base plates **600** and **602** suitably spaced and secured by the spacing and securing means **604**, and intermediate base plates **606**, **608**, **610** and **612**, forming five tiers with said base plates **600** and **602**.

This embodiment of the variating mechanism is adapted particularly for use in liquid dispensing apparatus, and the variating mechanism is provided with a drive shaft **614**, journaled in the supporting plates **600** and **602**, as at **616** and **618**, said shaft being provided with a coupling **620** adapted to be driven by a suitable driving shaft **622**, such as the usual meter drive shaft.

*Drive shafts and driving gears*

The drive shaft **614** is provided with the 24 tooth driving gear **624** meshing with the 24 tooth idler gear **626** pivotally mounted on the base **600** as at **628**. The idler gear **626** is non-rotatably provided with the 15 tooth gear **630** meshing with the 20 tooth drive gear **632**, said gear **632** being non-rotatably provided on the shaft **634**, journaled in the base **600**, and in the base **610**, as at **636** (Figure 24). The gear **632** is non-rotatably provided with the 24 tooth drive gear **638** meshing with the 27 tooth drive gear **640** non-rotatably mounted on the drive shaft **642**, said drive shaft being journaled in the base **600** and in the base **612** as at **644** (Figure 23).

The gear **640** is non-rotatably provided with the 21 tooth drive gear **646** meshing with the 24 tooth drive gear **648** non-rotatably provided on the drive shaft **650**. The drive shaft **650** is journaled in the base **600** and in the base **610** as at **652** (Figure 24). The gear **648** meshes with the 28 tooth drive gear **654**, non-rotatably mounted on the drive shaft **656**, said drive shaft being journaled in the base **600** and in the base **612** as at **658** (Figure 23). The gear **654** is non-rotatably provided with the 20 tooth drive gear **660** meshing with the 24 tooth drive gear **662** non-rotatably provided on the drive shaft **664**, the drive shaft **664** being journaled in the base **600** and in the base **610** as at **666** (Figure 24). The gear **662** is non-rotatably provided with the 20 tooth drive gear **668** meshing with the 25 tooth drive gear **670** non-rotatably mounted on the drive shaft **672**, said drive shaft being journaled in the base **600** and in the base **612** as at **674** (Figure 23).

The gear **670** is non-rotatably provided with the 18 tooth drive gear **676** meshing with the 24 tooth drive gear **678** non-rotatably provided on the drive shaft **680**, said drive shaft being jour-

naled in the base 600 and in the base 612 as at 682 (Figure 23). The shaft 680 is provided with the bevel gear 684 meshing with the bevel gear 686 of the quantity (gallons) totalizer 688 mounted on the base 602. The gear 678 is non-rotatably provided with the 18 tooth drive gear 690 meshing with the 27 tooth drive gear 692 non-rotatably provided on the drive shaft 694, said drive shaft being journaled in the base 600 and in the base 612 as at 696 (Figure 23).

The gear 692 is non-rotatably provided with the 14 tooth drive gear 698 meshing with the 27 tooth drive gear 700 non-rotatably provided on the drive shaft 702 journaled in the base 600 as at 704 and in the base 610 as at 706 (Figure 24). The shaft 702 below the base 600 is provided with the 42 tooth drive gear 708 connected through the 42 tooth idler gears 710 to the 21 tooth driving gear 712 adapted to drive the shaft 714, which in turn is adapted to drive the gallons distributor such as shown in application Serial No. 409,570, filed September 4, 1941; the gears 710 being pivoted to the base 600 as at 716, and the shaft 714 being journaled to the base as at 718.

*Selecting gears*

The axes of the drive shafts 634, 642, 650, 656, 664, 672, 680, 694 and 702 are disposed on a common periphery around the drive shaft 614 for the purpose of permitting rapid and easy setting of the variating mechanism all as more particularly later described. The shaft 634 is non-rotatably provided with the 12 tooth selecting drive gears 720 (9/10¢) and 722 (9¢), a gear 720 being disposed in the fraction tier, that is, between plates 606 and 608, while gear 722 is disposed in the units tier between plates 608 and 610.

Shaft 642 is non-rotatably provided with the 12 tooth selecting drive gears 724 (8/10¢), 726 (8¢), and 728 (40¢), gear 724 being disposed in the fractions tier between plates 606 and 608, gear 726 being disposed in the units tier between plates 608 and 610, and gear 728 being disposed in the tens tier between plates 610 and 612. Shaft 650 is non-rotatably provided with the 12 tooth selecting drive gears 730 (7/10¢) and 732 (7¢), the gear 730 being disposed in the fractions tier, while gear 732 is disposed in the units tier.

Shaft 656 is non-rotatably provided with the 12 tooth selecting drive gears 734 (6/10¢), 736 (6¢), and 738 (30¢) disposed respectively in the fractions, units and tens tiers. Shaft 664 is non-rotatably provided with the 12 tooth selecting drive gears 740 (5/10¢) and 742 (5¢), said gears being disposed respectively in the fractions and units tiers. Shaft 672 is non-rotatably provided with the 12 tooth selective drive gears 744 (4/10¢), 746 (4¢), and 748 (20¢), said gears being disposed respectively in the fractions, units and tens tiers. Shaft 680 is non-rotatably provided with the 12 tooth selective drive gears 750 (3/10¢) and 752 (3¢), said gears being disposed respectively in the fractions and units tiers.

Shaft 694 is non-rotatably provided with the 12 tooth selective drive gears 754 (3/10¢), 756 (2¢), and 758 (10¢), said gears being disposed respectively in the fractions, units and tens tiers. Shaft 702 is non-rotatably provided with the 12 tooth selective drive gears 760 (1/10¢) and 762 (1¢), the same being disposed respectively in the fractions and units tiers. Gears 720, 730, 740, 750 and 760 in the fractions tier are co-planar and are disposed at a lower level than co-planar gears 724, 734, 744 and 754. Gears 726, 736, 746 and 756 in the units tier are co-planar and are disposed at a lower level than co-planar gears 722, 732, 742, 752 and 762.

*Fractions differential mechanism*

Gear 624 is provided with the bearing washer 764 (Figure 18) on which the hub 766 of the 40 tooth fractions differential gear 768 is rotatably mounted, said hub and gear being also rotatably mounted with respect to the shaft 614. The hub 766 extends upwardly through the plate 608 into the units tier, being provided with the 10 tooth gear 770. The 20 tooth units differential gear 772 is rotatably mounted on the shaft 614 and is rotatably mounted with respect to the gear 770, and said gear 772 is provided with the hub 774 extending upwardly through the plate 610 and is provided with the 10 tooth gear 776 within the tens tier.

The declutching gear 778 is rotatably mounted with respect to shaft 614 and with respect to gear 776 and extends from the tens tier through plate 612. The declutching gear 778 is provided with the shoulder 780 forming the slot 782 into which the lower clutch yoke 784 extends. The yoke 784 is provided with the spacer 786 extending through plate 602 and being provided with the upper yoke 788, engageable within the slot 790 formed by the spaced shoulders 792 and 794 provided on the declutching member 796. The declutching member is slotted as at 798 for receiving the pin 800 fixed to shaft 614 limiting the upward movement of the declutching member 796.

The upper end of the shaft 614 is provided with the C-washer 802 forming a seat for the spring 804, said spring extending downwardly from the washer 802 into the recess 806 provided in the declutching member 796, urging said declutching member downwardly as viewed in Figure 18. The bushing 808 is fixed to the plate 606 and forms a bearing for the 68 tooth mounting gear 810 which is rotatably mounted on said bushing. The mounting gear 810 is provided with the 11 tooth upper selector engaging gear 812 (Figures 18 and 26) pivoted thereto as at 814, said upper gear 812 being adapted to be selectively moved to engage gears 724, 734, 744 and 754 of the even fractions, and said selector gear 812 meshes with the 11 tooth idler gear 816 (Figure 26) pivoted to the mounting gear 810, as at 818. The mounting gear 810 is also provided with the 14 tooth lower selector gear 820 adapted to selectively engage the lower selector gears 720, 730, 740, 750 and 760 for the odd fractions, said gear 820 being pivoted as at 822 to said mounting gear. The idler gear 816 and the selector gear 820 mesh with the fractions differential gear 768.

A fixed stop 824 is mounted on the plate 606 and is so arranged that it may be selectively engaged by the lower selector engaging gear 820 in order to arrest movement of said fractions differential gears for the zero fractions setting.

*Units differential mechanism*

The plate 608 is provided with the bushing 825 on which the 68 tooth mounting gear 826 for the units tier is rotatably mounted. The mounting gear 826 is provided with the 11 tooth lower selector engaging gear 828 pivotally mounted thereon as at 830, said gear 828 meshing with the 12 tooth idler gear 832 pivoted to the mounting gear as at 834. The lower selector engaging gear 828 is

adapted to selectively engage gears **726**, **736**, **746** and **756** for the even units. The 11 tooth upper selector engaging gear **836** is pivotally mounted to the mounting gear as at **838** and meshes with the 11 tooth idler gear **840** pivotally mounted as at **842** to said mounting gear, said idler gear **840** meshing with gear **832**. The upper selecting engaging gear **836** is adapted to selectively engage gears **722**, **732**, **742**, **752** and **762** for the odd units.

The plate **608** is provided with the fixed stop **844** so disposed that it may be selectively engaged by the upper selector engaging gear **836** whereby movement of the gear **832** is prevented for the zero unit position. The hub **766** below the gear **770** is provided with the fraction to units differential mounting plate **846** pivoted thereon through the bushing **848**, the plate **846** being provided with the 20 tooth gear **850** adapted to mesh with the 20 tooth gear **852** non-rotatably provided on the gear **832**. The mounting plate **846** is provided with the 20 tooth differential gears **854** pivoted thereto as at **856**, said gears meshing with the gears **770**, and each being provided with the fixed 10 tooth gear **858**. The gears **858** mesh with the gear **772**.

*Tens differential mechanism*

The plate **610** is provided with the bushing **860** on which the 68 tooth mounting gear **862** is rotatably mounted. The 14 tooth selector engaging gear **864** is pivotally mounted on the mounting gear **862** as at **866**, and meshes with the 12 tooth idler gear **868** pivotally mounted as at **870** on said mounting gear **862**. The idler gear **868** is non-rotatably provided with a 25 tooth gear **872** meshing with the 20 tooth gear **874** provided on the hub **876** (Figure 18) of the units to tens differential mounting plate **878**, said mounting plate being pivotally mounted on the member **774** through the bushing **880**. The mounting plate **878** is provided with the 20 tooth differential gears **882** meshing with the gear **776** and being pivotally mounted on said plate as at **884**, and said gears **882** are non-rotatably provided with the 10 tooth gears **886** meshing with the 20 tooth declutching gear **778**. The plate **610** is provided with the fixed stop **888** adapted to be selectively engaged by the selector engaging gear **864** for the zero position of the tens gears whereby movement of the mounting plate **878** is prevented when the gear **864** is in engagement with said stop **888**.

*Money distributor drive*

The declutching gear meshes with the 30 tooth idler **890** (Figure 23) pivoted to the mounting plate **612** as at **892** and meshing with the 25 tooth gear **894** non-rotatably provided on the shaft **896**. The shaft **896** extends downwardly below the plate **600** and is provided with the 25 tooth gear **898** driving the 21 tooth gear **900** non-rotatably provided on the shaft **902** which is adapted to drive the distributor head for the money distributor. The gear **900** is driven through the 42 tooth idler gears **904** pivotally mounted as at **906** to the plate **600**.

*Variator setting mechanism*

In order to effect setting, that is, in order to rotate the mounting gears **810**, **826** and **862**, shafts **908**, **910** and **912** are journaled in the plates **600** and **602** extending through the plate **602** and being provided with the 17 tooth gears **914**, **916** and **918** respectively. Said shafts are provided with the mounting gear operating gears **920**, **922** and **924** respectively, meshing with the mounting gears **810**, **826** and **862** respectively, whereby said mounting gears may be rotated by rotation of the respective shafts. The gears **914**, **916** and **918** mesh with gears **926**, **928** and **930** provided on the setting or dial knobs **932**, **934** and **936** for the fractions, units and tens setting.

Said setting knobs are provided with the calibrations which are adapted to be aligned with the indices **938**, **940** and **942** provided on the fixed knob positioning members **944**, **946** and **948**. The setting dial knobs are all of the same construction, so the mounting thereof need only be described for one of said knobs such as knob **936** (Figures 20, 21 and 22). The knob **936** is shown as pivoted to the positioning member **948**, said member having a shank **950** secured as at **952** to the plate **602**. The knob is urged downwardly by means of the spring **954** disposed between the member **948** and the seat **956** of the spring recess **958**. The gear forming portion of the knob is provided with the spaced apertures **960**, **962**, **964**, **966** and **968** corresponding respectively to the zero, ten cent, twenty cent, thirty cent and forty cent positions. It will of course be understood that the other knobs have apertures corresponding to the respective units and fractions positions. The apertures are adapted to receive the fixed pin **970** secured to the plate **602**, said pin engaging in the respective apertures preventing rotation of the knobs after they have been set.

*Setting operation*

Let it be assumed that each of the setting dial knobs **932**, **934** and **936** are set at their zero positions, such as shown in Figure 20, and it is desired to set the variator for seventeen and three-tenths cents ($17\frac{3}{10}¢$). In the zero position it will be remembered that the stops **824**, **844** and **888** are engaged, respectively, by the gears **820**, **836** and **864** so that the differential gear mechanism is inoperative, and in the event the shaft **622** is rotated, only the amount or gallons distributor would be rotated. It will be necessary to raise the declutching member **796** to cause the yoke **784** to raise the declutching gear **778** out of engagement with the differential gears **886**. The order of setting the tens, units, or fractions is immaterial but for the sake of the illustration the order will be given from low to high. The fractions setting dial knob **932** can then be raised so that the zero aperture is disengaged from the stop pin, corresponding to pin **970**, and the dial knob can then be rotated in either direction until the three-tenths cents ($\frac{3}{10}¢$) indication is opposite the index **938**. Rotation of said dial knob causes the gear **926** (Figure 20) to rotate the gear **914**, thereby rotating shaft **908**, causing the gear **920** (Figure 26) to rotate the mounting gear **810** to a position where the lower selecting engaging gear **820** engages the selector gear **750**. At that time the knob **936** is released, causing locking engagement between the aperture of the knob and the locking pin. The units setting dial knob **934** may then be raised to free the aperture from the locking pin, and this dial may be rotated in either direction until the numeral "7" is in alignment with the index **940**, at which time the upper selector engaging gear **836** is in engagement with the gear **732**, and the knob **934** may be released for locking engagement between the aperture and the locking pin. Rotation of the knob **934** causes rotation of the gear **916** and shaft **910** by gear **928** (Figure 20) which in turn causes gear **922** (Figure 25) to rotate the

mounting gear 826 to move said gear 836 into engagement with said gear 732.

The tens setting dial knob may then be lifted to free the aperture 960 from the locking pin 970 and the dial rotated in either direction until the numeral "10" is aligned with the index 942. Rotaton of this dial causes the gear 930 to rotate the gear 918 (Figure 20), causing the shaft 912 to rotate gear 924 (Figure 24). Rotation of gear 924 rotates mounting gear 862 until the selector engaging gear 864 engages gear 758, at which time the setting knob may be released to effect locking between the aperture 960 and the positioning pin 970. After this setting operation, knob 796 is released, causing engagement between gears 778 and 886, whereupon the variator is ready for computing operation.

It will be seen that the shaft 896 provided with the gear 898 for driving the money distributor head is provided above to the top plate 612 with the bevel gear 972 (Figure 20), meshing with the bevel gear 974 of the money totalizer 976 whereby said totalizer is driven with the distributor head.

Similarly had the selected price been twenty-six and four-tenths cents ($26\frac{4}{10}¢$), the setting knob 936 would have been moved until the numeral "20" was in alignment with the index 942, thus rotating shaft 912 until the selector engaging gear 864 engaged the gear 748. Setting knob 934 would have been rotated until the numeral "6" was aligned with the index 940 causing the gear 928 to rotate the shaft 910 through gear 916, which in turn would have caused gear 922 to rotate the mounting gear 826 until the lower selector engaging gear 828 engaged the gear 736. The setting knob 932 would be rotated until the four-tenths cents ($\frac{4}{10}¢$) indication was in alignment with the index 938, causing rotation of the shaft 908 through gears 926 and 914, which in turn cause gear 920 to rotate mounting gear 810, in which case the upper selecting engaging gear 812 would engage gear 744. In the case of a zero indication, as for example, twenty cents (20¢), dial knobs 934 and 932 would be rotated until the zero indications were in alignment with the indices 940 and 938, thus rotating the respective mounting gears 826 and 810 to a position where the upper selecting engaging gear 836 engaged the fixed stop 844, and the lower selecting engaging gear 820 engaged the fixed stop 824.

*Remote setting indication (Figures 28 and 29)*

In order to indicate the setting of the variator, as for example on a remote electrical indicator such as shown in Figure 15, which indicator is adapted to be associated with the registering mechanism particularly shown and described in application Serial No. 409,570, filed September 4, 1941, the fractions, units and tens setting shafts 908, 910 and 912 extend below the plate 600 and are provided with bevel gears 978, 980 and 982. Said bevel gears mesh with bevel gears 984, 986 and 988 respectively, said last named bevel gears being non-rotatably mounted on the switch shafts 990, 992 and 994, said switch shafts being suitably journaled as at 996 and 998, and being provided with the rotatable conductor rings 1000, 1002 and 1004, respectivbely, of the fractions, units and tens switches 1006, 1008 and 1010 (Figures 28 and 29). The switches are provided with the conductor shoes 1012, 1014 and 1016 for supplying current to the movable rings 1000, 1002 and 1004. The conductor 1018 is adapted to be connected to a suitable source of current supply (not shown) and to the shoe 1016. Said conductor is also adapted to be connected through the conductor 1020 to the shoe 1012 and through conductors 1020 and 1022 to the shoe 1014.

The fraction switch is provided with the zero contact shoe 1024 and the $\frac{1}{10}$ to $\frac{9}{10}$ shoes 1026, 1028, 1030, 1032, 1034, 1036, 1038, 1040 and 1042, said shoes being adapted to be selectively engaged by the shoe engaging or switch member 1044 of the ring 1000. Each of the shoes 1024 to 1042 inclusive, is connected through suitable conductors to the proper calibrating solenoids of the register such as shown in Figure 15, the zero solenoid 1046 (Figure 29) being shown connected through the conductor 1048 to the zero shoe 1024 and being grounded as at 1050. The unit switch is provided with the zero contact shoe 1052 and the 1 to 9 shoes 1054, 1056, 1058, 1060, 1062, 1064, 1066, 1068 and 1070, said shoes being adapted to be engaged by the switch member 1072 of the ring 1002, and each of said shoes is adapted to be electrically connected to their respective solenoids of the units daily price wheel as shown in Figure 15; Figure 29 merely showing the zero shoe 1052 electrically connected to the zero solenoid 1074 through conductor 1076, said solenoid being grounded as at 1078.

The tens switch is provided with the zero shoe 1080, the ten cent (10¢) shoe 1082, twenty cent (20¢) shoe 1084, thirty cent (30¢) shoe 1086, and the forty cent (40¢) shoe 1088, said shoes being adapted to be electrically connected to their respective solenoids of the tens indicating wheel, as shown in Figure 15, Figure 29 showing the zero shoe 1080 electrically connected to the zero solenoid 1090 through the conductor 1092, said solenoid being grounded as at 1094.

The ring 1004 is provided with the switch member 1096 adapted to be moved to selectively engage the contace shoes. Of course when the shafts 908, 910 and 912 have been moved to set the variator for the seventeen and three-tenths ($17\frac{3}{10}¢$) price selection, the shafts 990, 992 and 994 will have moved the contact rings 1000, 1002 and 1004 to positions where the switch members 1044, 1072 and 1096 engage shoes 1030, 1066 and 1082, energizing the corresponding solenoids of the fractions, units and tens indicating daily price numeral wheels, shown in Figure 15, to arrest movement of said daily price numeral wheels so that seventeen and three-tenths cents ($17\frac{3}{10}¢$) appears in the window of the adjacent dial.

*Operation*

In the operation of the variator, assuming it has been set to seventeen and three-tenths cents ($17\frac{3}{10}¢$), rotation of the meter shaft 622 by dispensing operation through the meter causes rotation of the coupling 620 and the shaft 614. Rotation of the shaft 614 causes the drive gear 624 to rotate the drive gears disposed between plates 600 and 606, causing said drive gears to rotate the drive shafts 634, 642, 650, 656, 664, 672, 680, 694 and 702, whereby the gear 708 will drive gear 712 through the train 710, which will cause movement of the amount or gallons distributor head (not shown) which in turn operates the gallons register, all as particularly shown and described in application Serial No. 409,570, filed September 4, 1941. Rotation of said drive shaft 680 will cause the bevel gears 684 and 686 to operate the gallons totalizer 688. Rotation of said drive shaft 680 causes the gear

750 to rotate the gear 820, which in turn rotates the fractions gear 768. Rotation of the drive shaft 650 causes the selector gear 732 to rotate the selector engaging gear 836, rotating gear 850 through gears 840, 832 and 852.

Rotation of shaft 694 causes the selector gear 758 to rotate selector engaging gear 864, which in turn rotates gear 874 through gears 868 and 872. Rotation of the fractions gear 768 rotates the gear 770, which in turn rotates the differential gears 854, causing gear 858 to rotate gear 772, whereby gear 776 rotates the differential gears 882. Rotation of the gear 850 rotates the fractions to units differential mounting plate 846, rotating the differential gears 854 and 858 about the shaft 614. Rotation of gear 874 causes rotation of differential gears 882 about the shaft 614. Thus a summation of the rotation of the fractions, units and tens gears is transmitted to the declutching gear 778 by rotation of said gear by differential gears 886. Rotation of the declutching gear 778 rotates the shaft 896 through gears 890 and 894. Rotation of the shaft 896 causes rotation of the gear 898 (Figure 28), which in turn rotates the shaft 902 through the gear train 904–900, whereby the money distributor head is rotated in accordance with the rotation of the variator. As described in application Serial No. 409,570, filed September 4, 1941, this operation of the distributor head operates the money register to indicate the cost of the liquid dispensed. It will be seen that should either the fractions, units or tens tier be set to zero, that tier would be inoperative to rotate the differential gears of that tier.

It is to be understood that I do not wish to be limited by the exact embodiment of the device shown, which is 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 variating mechanism, the combination of a driving shaft, differential means rotatably mounted with respect to said shaft, drive shafts arranged around said driving shaft, operative connections between said drive and driving shafts, selecting gears on said drive shafts, gears movable to selectively connect said selecting gears to said differential means, driven means connected to said differential means and adapted to be driven in accordance with the rotation of the selected of the selecting gears, and means for disconnecting said driven means from said differential means while said second named gears are being moved to engage the selected of the selecting gears, whereby said differential means are free to move unrestrainedly.

2. In variating mechanism, the combination of a driving shaft, differential means, drive shafts arranged around said differential means, operative connections between said drive and driving shafts, selecting gears on said drive shafts, gears movable to selectively connect said selecting gears to said differential means, driven means connected to said differential means and adapted to be driven in accordance with the rotation of the selected of the selecting gears, and means for disconnecting said driven means from said differential means while said second named gears are being moved to engage the selected of the selecting gears, whereby said differential means are free to move unrestrainedly.

3. In variating mechanism, the combination of differential means, means for selectively and variably driving said differential means, driven means connected to said differential means, and means for disconnecting said driven means from said differential means while said second named means is being set, whereby said differential means are free to move unrestrainedly.

4. In variating mechanism, the combination of a driving shaft, drive shafts continually connected to said driving shaft and rotatable whenever said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, differential means, and means for selectively connecting said selecting gears to said differential means.

5. In variating mechanism, the combination of a driving shaft, drive shafts continually connected to said driving shaft and rotatable whenever said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, differential means, stop means for arresting parts of said differential means, and means for selectively connecting said selecting gears to said parts of said differential means or to said stop means.

6. In variating mechanism, the combination of a driving shaft, drive shafts continually driven by said driving shaft whenever said driving shaft rotates, tiers of coplanar selecting gears non-rotatably provided on said drive shafts, differential means, said differential means having a gear for each of the tiers of selecting gears, and independent means for selectively connecting said selecting gears to said gear of said differential means in said tiers.

7. In variating mechanism, the combination of a drive shaft, driven means, a train of driving gears comprising a plurality of gears having spaced, parallel axes and continually operated by said drive shaft, selecting gears respectively operated by said driving gears, differential means, and means for connecting the selected of said last named gears to said differential means whereby said driven means is driven in accordance with the selected of said selecting gears.

8. In variating mechanism, the combination of operating means, a plurality of shafts connected to said operating means to be rotated thereby, said shafts having spaced, parallel axes and each being continually rotated by said operating means, selecting gears fixedly mounted on said shafts, a driven shaft, and means for simultaneously connecting a plurality of said selecting gears to said driven shaft.

9. In variating mechanism, the combination of operating means, a plurality of shafts connected to said operating means to be rotated thereby, said shafts having spaced, parallel axes and each being continually rotated by said operating means, a plurality of sets of selecting gears, each of said sets of selecting gears including gears non-rotatably mounted on certain of said shafts, a driven shaft, and means for connecting the selected of said selected gears to said driven shaft whereby said driven shaft is rotated in accordance with the motions of the selected of said selecting gears.

10. In variating mechanism, the combination of operating means, a plurality of shafts connected to said operating means to be rotated thereby, said shafts having spaced, parallel axes and each being continually rotated by said operating means, selecting gears non-rotatably mounted on said shafts, a driven shaft, and means for selectively connecting a plurality of the selecting gears to said driven shaft whereby said driven shaft is rotated in accordance with the selected gears.

11. In variating mechanism, the combination of operating means, a plurality of selecting gears having their axes parallel and spaced apart, said gears being rotated continually when said operating means is operated, a driven shaft, and means for selectively connecting a plurality of the selecting gears to said driven shaft whereby said driven shaft is rotated in accordance with the selected gears.

12. In variating mechanism, the combination of operating means, a plurality of selecting gears having their axes parallel and spaced apart, said gears being rotated continually when said operating means is operated, a driven shaft, differential means for rotating said driven shaft, and means for selectively connecting a plurality of the selecting gears to said differential means whereby said driven shaft is rotated in accordance with the selected gears.

13. In variating mechanism, the combination of a driving shaft, a gear train driven by said shaft and comprising a plurality of continually rotating gears having spaced, parallel axes, intermediate shafts driven by certain of the gears of said train at predetermined speeds, selecting gears non-rotatably mounted on said intermediate shafts, bodily movable gears adapted to selectively engage said selecting gears, differential means having a plurality of gears adapted to be driven by said bodily movable gears, means for selectively arresting movement of any of said bodily movable gears, and a driven member driven by said differential means in accordance with the total movement imparted thereto by said bodily movable gears.

14. In variating mechanism, the combination of a driving shaft, a gear train driven by said shaft and comprising a plurality of continually rotating gears having spaced, parallel axes, intermediate shafts driven by certain of the gears of said train at predetermined speeds, selecting gears non-rotatably mounted on said intermediate shafts, bodily movable gears adapted to selectively engage said selecting gears, differential means having a plurality of gears adapted to be driven by said bodily movable gears, means for selectively arresting movement of any of said bodily movable gears, a driven member driven by said differential means in accordance with the total movement imparted thereto by said bodily movable gears, and means for indicating the setting of said bodily movable gears.

15. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatively mounted on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means for preventing rotation of said last named gear when said gear means is in engagement with a selecting gear or said stop, said preventing means being rendered inoperative by bodily movement of said setting shaft, driven means driven by said differential means in accordance with the setting of said gear means, and means for disconnecting said driven means from said differential means when said setting shafts are to be moved.

16. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means for preventing rotation of said last named gear when said gear means is in engagement with a selecting gear or said stop, said preventing means being rendered inoperative by bodily movement of said setting shaft, driven means driven by said differential means in accordance with the setting of said gear means, means for disconnecting said driven means from said differential means when said setting shafts are to be moved, and indicating means for indicating the setting of said gear means.

17. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means for preventing rotation of said last named gear when said gear means is in engagement with a selecting gear or said stop, said preventing means being rendered inoperative by bodily movement of said setting shaft, driven means driven by said differential means in accordance with the setting of said gear means, means for disconnecting said driven means from said differential means when said setting shafts are to be moved, indicating means for indicating the setting of said gear means, said indicating means including a dial and pointer associated with each of said setting shafts.

18. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each

of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means for preventing rotation of said last named gear when said gear means is in engagement with a selecting gear or said stop, said preventing means being rendered inoperative by bodily movement of said setting shaft, driven means driven by said differential means in accordance with the setting of said gear means, means for disconnecting said driven means from said differential means when said setting shafts are to be moved, indicating means for remotely indicating the setting of said gear means, said indicating means including a switch for each tier, said switch having contacts corresponding to the selecting gears in that tier, a switch member for closing said contacts in accordance with the engagement between said gear means and the selecting gears, a rotatable shaft, means for rotating said shaft, numeral wheels frictionally mounted on said shaft, said numeral wheels corresponding to said tiers and having indicia thereon corresponding to said selecting gears, a stop on each of said numeral wheels, solenoids corresponding to the number of contacts for each tier, each solenoid having a plunger out of the path of said stop when the solenoid is deenergized, and electrical connections between the respective contacts and solenoids, energization of any solenoid by contact between said switch member and the corresponding contact causing the plunger of said solenoid to move into the path of the stop of the numeral wheel whereby movement of the numeral wheel is arrested.

19. In variating mechanism, the combination of a driving shaft, drive shafts operatively connected to said driving shaft and rotatable whenever said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, differential means, means for selectively connecting said selecting gears to said differential means, switch mechanism, said switch mechanism including contacts corresponding to said selecting gears, a switch member movable with said second named means to engage the contacts corresponding to the selecting gears connected to said differential means, and indicating control means connected to said contacts and operable in accordance with the contacts engaged by said switch member to show the setting of said variating mechanism.

20. In variating mechanism, the combination of a driving shaft, drive shafts operatively connected to said driving shaft and rotatable whenever said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, differential means, means for selectively connecting said selecting gears to said differential means, switch mechanism, said switch mechanism including contacts corresponding to said selecting gears, a switch member movable with said second named means to engage the contacts corresponding to the selecting gears connected to said differential means, indicating means, and indicating control means connected to said contacts and operable in accordance with the contacts engaged by said switch member to cause said indicating means to show the setting of said variating mechanism.

21. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means movable between a plurality of positions for selectively preventing or permitting rotation of said last named gear means, driven means driven by said differential means in accordance with the setting of said gear means, and means for disconnecting said driven means from said differential means when setting is to be effected.

22. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means associated with each setting shaft and movable between a plurality of positions for selectively preventing or permitting rotation of said last named gear means, and driven means driven by said differential means in accordance with the setting of said gear means.

23. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatably mounted on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means movable between a plurality of positions for selectively preventing or permitting rotation of said last named gear means, driven means driven by said differential means in accordance with the setting of said gear means, means for disconnecting said driven means from said differential means when setting is to be effected, and indicating means associated with said means movable between a plurality of positions for indicating the setting of said gear means.

24. In combination, a driving shaft, drive shafts disposed adjacent thereto, operative connections between said drive and driving shafts whereby said drive shafts rotate when said driving shaft rotates, selecting gears non-rotatably mounted

on said drive shafts, certain of said selecting gears being disposed in different planes whereby tiers of selecting gears are provided, a stop in each tier, differential means having a gear in each tier, gear means for each tier constantly connected to the gear of the differential in the respective tier and adapted to be moved to selectively engage the selecting gears or the stop of said tier, movable means for moving each of said gear means, said movable means each including a rotatable gear, a setting shaft for each tier rotatable to move said last named gear, means movable between a plurality of positions for selectively preventing or permitting rotation of said last named gear means, driven means driven by said differential means in accordance with the setting of said gear means, means for disconnecting said driven means from said differential means when setting is to be effected, indicating means for remotely indicating the setting of said gear means, said indicating means including a switch for each tier, said switch having contacts corresponding to the selecting gears in that tier, a switch member for closing said contacts in accordance with the engagement between said gear means and the selecting gears, a rotatable shaft, means for rotating said shaft, numeral wheels frictionally mounted on said shaft, said numeral wheels corresponding to said tiers and having indicia thereon corresponding to said selecting gears, a stop on each of said numeral wheels, solenoids corresponding to the number of contacts for each tier, each solenoid having a plunger out of the path of said stop when the solenoid is deenergized, and electrical connections between the respective contacts and solenoids, energization of any solenoid by contact between said switch member and the corresponding contact causing the plunger of said solenoid to move into the path of the stop of the numeral wheel whereby movement of the numeral wheel is arrested.

25. Indicating means for indicating the setting of variating means, including switch means for said variating means, said switch means having contacts corresponding to the settings of said variating means, a switch member for closing said contacts in accordance with the setting of said variating means, a rotatable shaft, means for rotating said shaft, numeral wheels having indicia thereon and frictionally mounted on said shaft, a stop on each numeral wheel, solenoids corresponding to the number of contacts for said variator means, each solenoid having a plunger out of the path of said stop when said solenoid is deenergized, and electrical connections between the respective contacts and solenoids, energization of any solenoid by contact between said switch member and the corresponding contact causing the plunger of said solenoid to move into the path of the stop of the numeral wheel whereby movement of the numeral wheel is arrested.

KENLY C. BUGG.