

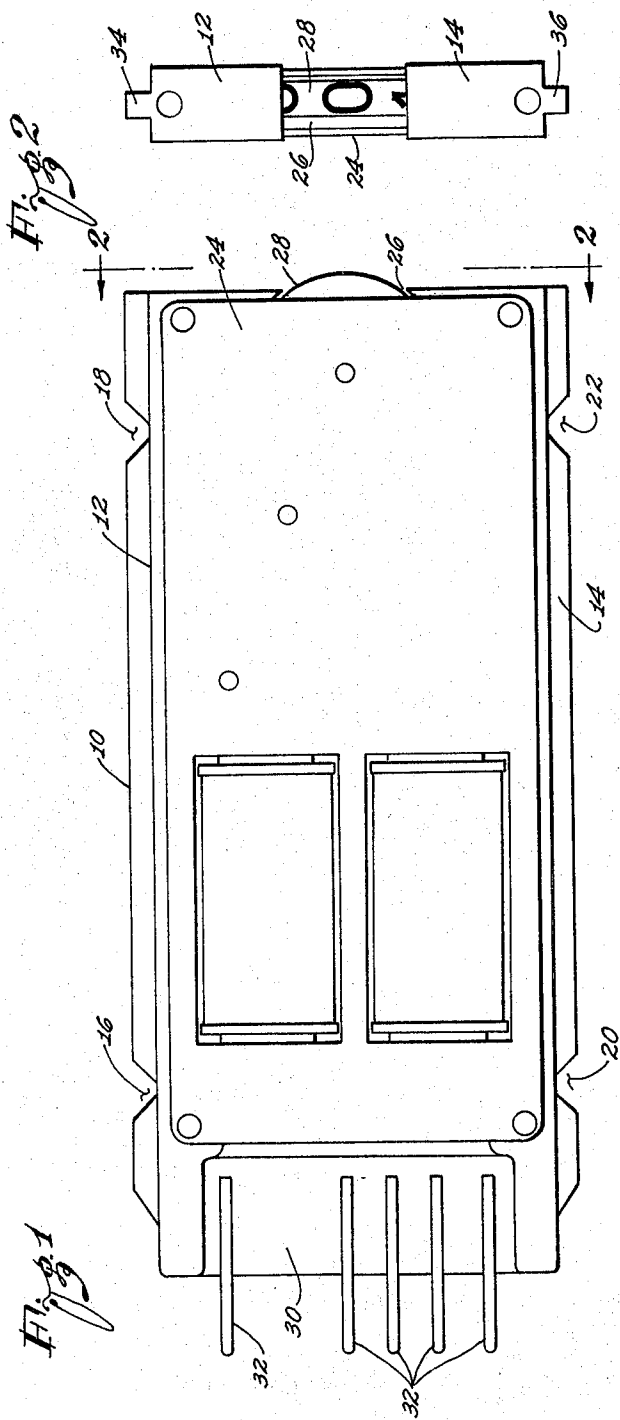
Oct. 11, 1966

O. GUNST
COUNT MODULE

3,278,725

Filed Aug. 31, 1962

5 Sheets-Sheet 1



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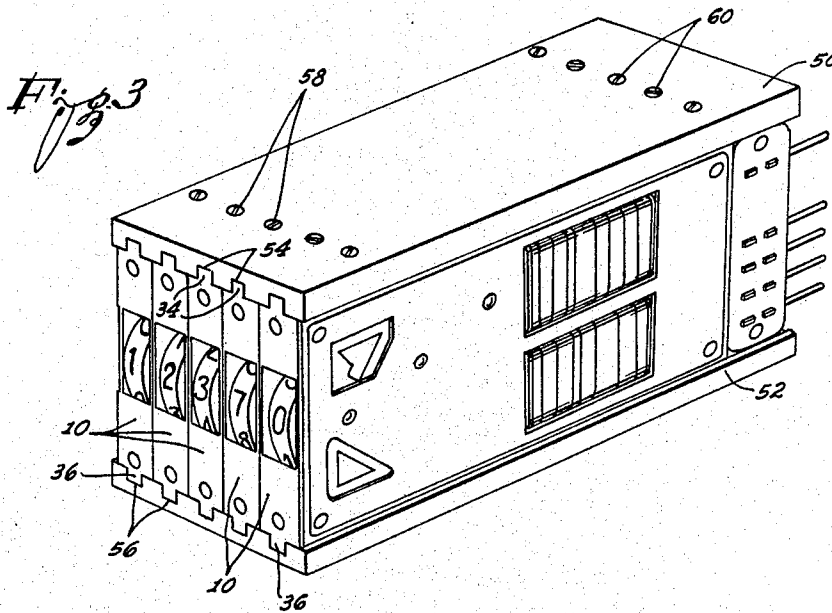
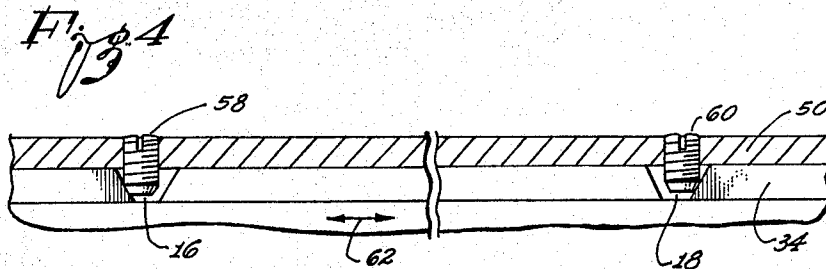
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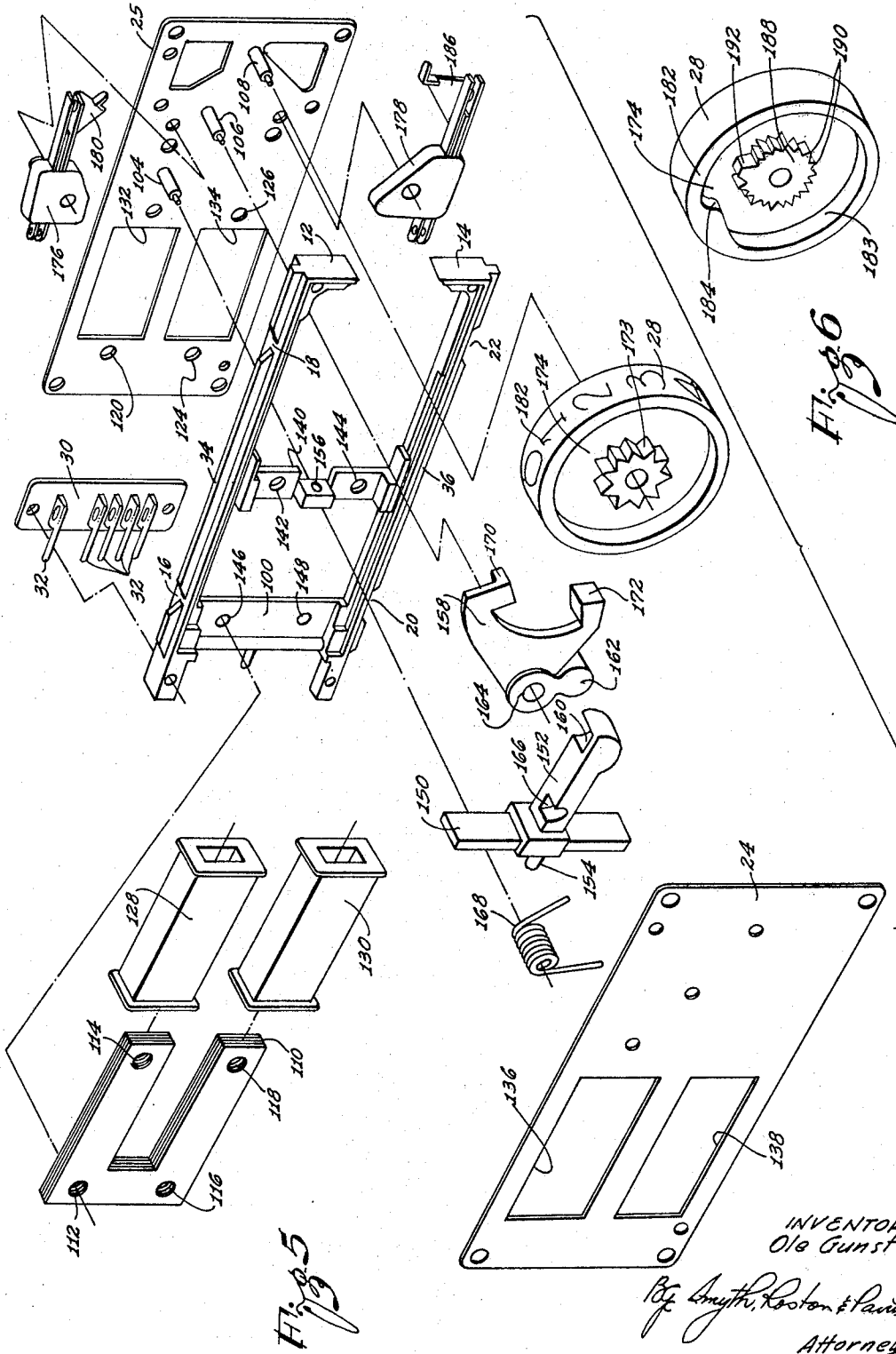
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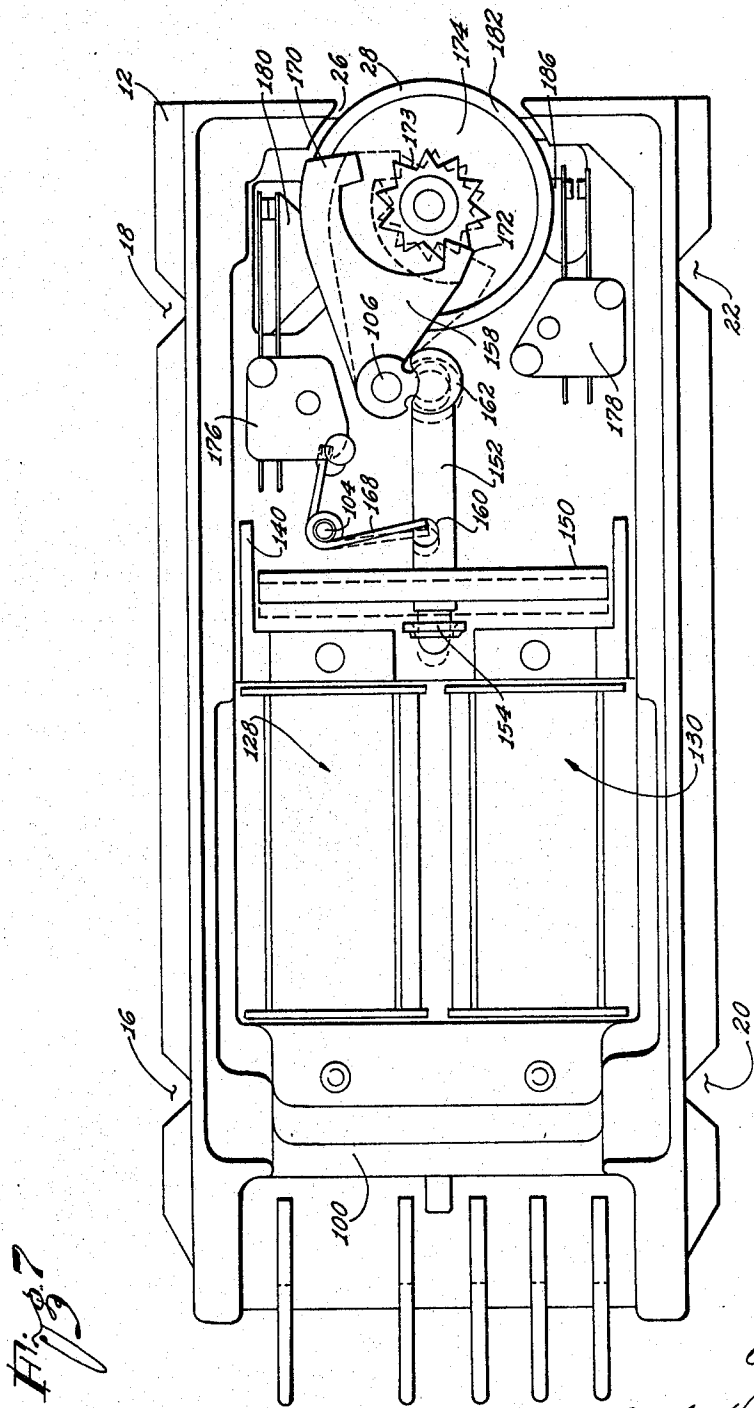


Fig. 7

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Fig. 8

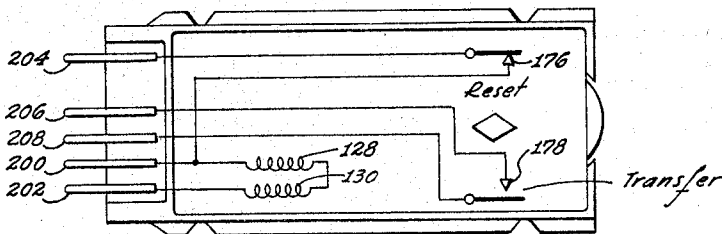


Fig. 9

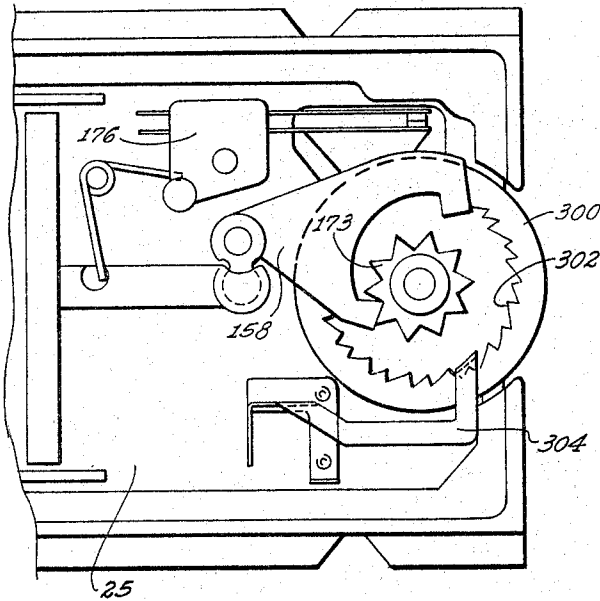
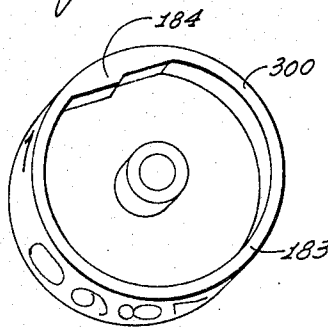


Fig. 10



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3,278,725

COUNT MODULE

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20 Claims. (Cl. 235-92)

This invention relates to an electromagnetic counter. More specifically the invention relates to a count module having application for counting, readout, printing and predetermination. Also the count module includes electrical means to provide reset and to effect a transfer of information.

Most of the prior art devices have used a mechanical transfer between counting stages to actuate a second counter when a first counter has reached a predetermined level. This necessitates a mechanical interrelationship between the count stages. Therefore, the counters of the prior art are usually designed as a single inclusive unit having a number of digits equal to the largest number which is to be presented. Upon a breakdown of a single component the entire unit must be removed in order to service the counter. The present invention provides individual count modules which can be easily replaced in the event of a breakdown. Also the transfer between stages is electrically interrelated so as to eliminate mechanical coupling.

The invention incorporates in each count module complete structure to operate as a single digit. Moreover, the individual count modules are very slim in construction so as to displace less space than the counters of the prior art. An important contribution to the slender construction of the count module is in the particular construction of a display wheel in combination with the actuating mechanism. The count module is designed to slide on rails as a plug in unit so as to effect an easy insertion and removal.

The module includes a display wheel which may have a variety of numerical positions, for example 10, 11 or 12 positions. Also the display wheel incorporates means included within the structure of the wheel to determine when the wheel has gone through a predetermined position. For example, the wheel includes a continuous cam surface which actuates a switch to provide particular functions. One function which may be effected by the cam surface is the provision of a reset of the wheel at a zero reading. This is accomplished by opening a switch to disconnect the applied power to the count module to stop the wheel at the zero reading. The count module requires a particular period of time to rotate from, for example, the nine position to the zero position. In order to insure a positive activation of the wheel to the zero position, the switch which disconnects the power is opened during the second half of the period of time.

The count module also may have a second continuous cam surface included in the wheel structure to close a second switch so as to provide a transfer of information from a first module to a second module. For example, when the unit counts from nine to ten the first module becomes zero and the closure of the switch activates the second module to the one position. The second switch closes only during the first half of the particular period of time so as to insure only a single activation of the second module. The second continuous cam surface may also be used as a detent to prevent bounce in the wheel during rotation from one discrete position to another.

The count module of the present invention also includes a simple aligning means to properly position the display wheel when the counter unit is used in printing the information. When used as a printer the numerals are raised and reversed in construction. It will be appreciated that when the counter unit is used as a printer

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each module must be at the same relative axial position so that the printed number has the same intensity for all the digits of the number. The modules of the present invention provides this aligning by use of a screw slide arrangement incorporated in the side rails of the module.

The counter of the present invention is also designed to operate at higher speeds than the counter of the prior art. For example, the operating speed of each module may be in excess of 60 steps per second and even higher speeds may be obtained by the use of special pulsing techniques to the input terminals of the modules. The description and operation of the count module and its relationship in a counting system are further explained with reference to the drawings wherein:

FIGURE 1 is a top view of a first embodiment of an individual count module;

FIGURE 2 is a front view of the count module shown in FIGURE 1 and further illustrating the display of a numerical bit of information;

FIGURE 3 is an isometric view of a plurality of count modules interrelated to provide a counting unit;

FIGURE 4 is a detailed drawing of a means to provide an axial alignment of the count modules;

FIGURE 5 is an exploded view of one embodiment of the count module illustrating the internal components;

FIGURE 6 is a back view of the display wheel illustrated in FIGURE 5;

FIGURE 7 is a top view of the count module illustrated in FIGURE 5 showing the assembly of the internal components;

FIGURE 8 is a diagram illustrating the electrical connections in the first embodiment of the count module;

FIGURE 9 is a detailed portion of a second embodiment of the count module; and

FIGURE 10 is a back view of the display wheel shown in FIGURE 9.

In FIGURE 1 an individual count module is generally designated as 10. The count module includes a pair of side rails 12 and 14. The side rails are designed to operate as support members and include V-shaped slots 16, 18, 20 and 22 which are used in the axial alignment of the count module 10. A cover plate 24 is connected on one side at its four corners to the side rails and a second similar cover plate 25 illustrated in FIGURE 2 is connected on the other side. In this way a box structure is formed and all of the components of the count module are disposed within the box.

The side rails 12 and 14 are spaced from each other at one end to define an opening 26. A display wheel 28 slightly protrudes from the opening 26. The wheel 28 carries various symbols displaced at periodic circumferential positions along the periphery of the wheel. A terminal block 30 is disposed at the other end of the side rails and includes contact pins 32. The contact pins 32 plug into a connector (not shown) to supply energy to activate the count module and also to transfer information from the count module 10 to a second similar count module.

FIGURE 2 is a front view of the count module 10 illustrated in FIGURE 1 showing the presentation of an Arabic numeral zero by the wheel 28. As can be seen in FIGURE 2 the side rails 12 and 14 include extensions 34 and 36. These extensions are used during the mounting of the individual count modules into a count unit. This can be seen in more detail with reference to FIGURE 3 wherein a plurality of count modules 10 are interrelated to provide as indication of a five digit number.

The individual count modules 10 are inserted between two plates 50 and 52 which include grooves 54 and 56. The grooves cooperate with the extensions 34 and 36 of the count module to form a slide path for the count modules. As illustrated in FIGURE 3, the plates 50 and

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52 are not connected together, but it will be appreciated that side members may be provided so as to form a box structure to lock the entire counter into an integral unit. The plates 50 and 52 include screw means 58 and 60 which cooperate with the V-shaped grooves 16 and 18 of the count modules 10 to lock the modules in place.

The screw means 58 and 60 also are used to provide an axial alignment of the count modules. When the modules are used for printing the wheel 28 includes raised reversed numerals. Since the count modules 10 are individually placed in a counter unit inaccuracies in the axial direction are possible, and the plurality of wheels will not provide a uniform printing of all the numerals. The screw means illustrated in FIGURE 4 provides the axial alignment necessary to ensure a uniform printing of all the numerals. The screw members 58 and 60 are designed to contact opposite sides of the walls of the V-shaped grooves 16 and 18. In this way, dependent upon the relative insertion of the screw members 58 and 60, it is possible to provide axial movement of the count module as illustrated by the arrow 62. For example, if it is desired to move the count module to the right the screw member 60 would be inserted to a greater degree than the screw member 58. This has the effect of moving the count module in a rightward direction.

FIGURE 5 illustrates an exploded view of the various components included within the count module 10. The side rails 12 and 14 are shown to have the opening 26 at one end, but are rigidly interconnected at the other end by a structural member 100. The side rails plus the member 100 form a single integral unit which is the basic support member in the count module 10. The top cover plate 24 is disposed to one side of the side rails and the bottom cover plate 25 is disposed to the other side. The cover plate 25 has three outwardly extending pins 104, 106 and 108 which are used during the operation of the count module as pivot points. The cover plate 25 also has various openings for clearance of particular components and for providing appropriate mounting positions for other components.

A laminated U-shaped member 110 is used to develop a magnetic field during the operation of the count module. The member 110 has four openings 112, 114, 116 and 118 which cooperate with four openings 120, 122, 124 and 126 in the cover plate 102. Rivet members (not shown) pass through the openings in the cover plate and the member 110 to rivet the member 110 to the plate 102.

The U-shaped member 110 has two coil windings 128 and 130 disposed around the legs of the member. Electrical energy is supplied to the coils 128 and 130 so that the member 110 in cooperation with the coils 128 and 130 operate as an electromagnet. The cover plate 25 is also provided with openings 132 and 134 to clear the coils 128 and 130. In the same manner the cover plate 24 is also provided with openings 136 and 138 to clear the coils 128 and 130. The terminal board 30 which is mounted at one end of the frame member has contact pins 32 which receive electrical energy from a source in accordance with the information and that energy is supplied to the coils 128 and 130.

In mounting the member 110 to the plate 25, the structural member 100 and a second member 140 are sandwiched in the middle. Accordingly the member 140 is provided with holes 142 and 144, and the structural member 100 is provided with holes 146 and 148 so as to pass the connecting rivets. It will be noted the riveting of the various elements together provides for a great degree of rigidity in the count module without the use of heavy structural members.

In addition to providing a mounting function the member 140 also shapes the magnetic field produced by the laminated member 110 to increase the magnetic coupling from the member 110 to an armature 150. The armature 150 provides a reciprocating movement during the activation and deactivation of the magnetic field. The mem-

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ber 150 is composed of magnetic material and is interrelated with the electromagnet to be attracted to the ends of the member 110 during activation of the electromagnet. An arm 152 is disposed around the center of the armature 150. The arm 152 has an outwardly extending pin 154 which slides in a hole 156 included in the member 140. The pin and hole guide the movement of the armature to follow a predetermined path.

The arm member 152 is also coupled to a rotating follower arm 158 by the use of the slot 160. The follower arm 158 has an extension 162 which rotates in the slot 160 as the arm 152 is actuated in a reciprocal fashion by the electromagnet. The follower arm 158 is provided with a hole 164 which fits over the pin 106 in the plate 25 to contain the rotational movement of the arm around a stationary pivot point. The member 152 also includes a slot 166 which is designed to receive one end of a spring 168. The spring 168 biases the armature away from the ends of the member 110 and fits over the pin 104 on the cover plate 25.

The arm 158 includes a U-shaped segment having end portions 170 and 172. The end portions are thicker than the body of the follower arm 158. The end portions 170 and 172 extend into the display wheel to cooperate with a star shaped structure 173 to provide a rotary movement of the wheel. The star shaped structure 173 is built up from a flat disc 174. Also a rim 182 is disposed around the circumference of the disc 174. This type of construction provides for a minimum width of the count module with a maximum size of a display number. This is because the rotational actuation of the display wheel is accomplished within the space formed by the star shaped structure 173, the flat disc 174 and the circumferential rim 182. The ends 170 and 172 of the U-shaped members push against the sloping sides of the star shaped structure 173 to impart a discrete rotary movement to the wheel.

Two switch units 176 and 178 are also mounted on the cover plate 25. The switches are used to provide the reset and transfer functions in the count module. The switch 176 has an arm 180 extending from one of its contacts so as to be actuated by a cam surface 183 included in the wheel 28. The cam surface 183 is illustrated in FIGURE 6 as part of the outer rim 182. At one position along the rim an outward extension 184 serves as a cam. The arm 180 follows the cam surface 183 and upon contact with the outward extension 184 the switch is opened. When the switch 176 is used to provide a reset a series of pulses are applied to the electromagnet through a circuit including the switch in series. Also the 60 cycle line may be used to provide the pulsing signal. At an appropriate position, for example, the second half of the period of time necessary to rotate from the nine to the zero position of the wheel 28, the switch 176 is opened by the camming action of the outward extension 184 and the pulse signal is disconnected from the electromagnet.

The switch member 178 also includes a similar arm 186 extending from one of its contact members to provide a closing of the switch 178 at an appropriate position. Again with reference to FIGURE 6, the wheel 28 includes an irregularly shaped star member 188 extending from the flat disc 174 and surrounding the center of the wheel. The irregularly shaped portions 190 of the member 188 cooperate with the arm 186 to form a detent. The detent serves to provide a resilient locking of the wheel 28 at its discrete rotational positions. For example, if the wheel is moved from a first position to a second position the end of the element 186 falls in between the points of the star to resiliently hold the wheel in that position. The detent helps to eliminate bounce as the wheel rotates and provides for a more positive action in rotating between the discrete positions along the wheel.

The member 188 has one point of the star designated as 192 extending beyond all the other points. The extension 192 operates as a cam to actuate the element 186 of the

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switch 178 to close the switch at an appropriate position during the rotation of the wheel 28. For example, the switch 178 can transfer information from a first count module to a second count module to move the second count module one position each time the first count module counts to ten. The switch 178 preferably is closed only during the first half of the time required for the count module to go from a nine position to a ten position. This switch 178 therefore provides for serial counting by the unit without the necessity of mechanical transfer elements. It will be noted that the arms 180 and 186 are designed to extend into the space defined by the star shaped segment 190, the disc 174 and the rim 182. This also helps to minimize the overall width of the count module.

FIGURE 7 shows the interrelationship of the components illustrated in FIGURE 6. FIGURE 8 illustrates the electrical connections in the count module illustrated in FIGURE 7.

With reference to FIGURE 8 the input to the electromagnetic actuating device is through the contact pins 200 and 202 to the coils 128 and 130. The coils are connected as series aiding so as to provide the maximum flux density from the electrical input with a minimum width of the count module. As shown in FIGURE 7 the normal position of the armature 150 is as illustrated by the solid line. The armature is maintained in this position by the spring 168. Upon the appearance of an input signal to the electromagnet, the armature 150 is attracted to the electromagnet to produce a clockwise rotation of the follower arm 158. The new position of the armature and follower arm is shown by the dotted line. It will be noted that the end 170 of the arm 158 pushes against the sloping wall of the star 173 to produce a clockwise rotation of the wheel 28.

When the armature 150 is released the arm 158 pivots in a counterclockwise direction to have the end 172 continue to push the star 173 in a clockwise direction to complete a cycle. The wheel 28 is therefore moved in discrete clockwise steps as the sections 170 and 172 alternately push against the star shaped portion 173. Although the arm 158 rotates clockwise and counterclockwise, the movement of the wheel is always clockwise. It will be appreciated that the whole mechanism can be reversed so as to have a counterclockwise rotation of the wheel 28.

During appropriate rotational positions of the wheel 28 the switches 176 and 178 have an operational effect. As illustrated in FIGURE 8 the switch 176 is used to reset the count module to, for example, a zero reading. A continuous series of pulses are applied as an input signal across the contacts 202 and 204. The wheel then rotates until the zero position is approached. At this time the member 180 of the switch 176 is actuated to open the switch 176 to disconnect the input to the coils 128 and 130.

The switch 178 may also be designed to close at approximately the same time the switch 176 is opened. The switch 178 therefore provides a closed circuit between a pair of contact pins 206 and 208. Circuitry can then be incorporated with the contact pins 206 and 208 to provide a single pulse to a second count module to rotate the second count module one position. Actually, the transfer switch 178 is closed during the first half of the cycling time to move one position and the reset switch 176 is opened during the second half.

FIGURE 9 illustrates a second embodiment of the invention. Components which are similar to components illustrated with reference to the first embodiment are given similar reference characters. A wheel 300 is rotated by the follower arm 158 through the star shaped member 173 in the same manner as illustrated in FIGURE 7. FIGURE 10 illustrates the other side of the wheel 300 showing a cam surface 183 having an outward extension 184 to activate switch 176. This construction is similar to that shown in FIGURE 7. The embodiment of FIGURES 9 and 10, however, incorporates a separate member to pro-

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vide a detent during the operation of the count module. This detent includes a jagged inner rim 302 on the wheel 300. The rim 302 cooperates with a detent member 304 which extends from the bottom plate 25. The use of a detent is important for many reasons. For example, during rotation of the wheel 300 the wheel some times tends to stick in a particular position. The detent actively forces the wheel to stop at discrete positions and therefore prevents this sticking. Also the detent minimizes bounce during rotation by resiliently locking the wheel at the discrete positions. It will be noted that the first embodiment of the invention as illustrated in FIGURE 6 also provides a detent action by the use of the arm 186 riding against the member 188.

Although this application has been disclosed with reference to particular embodiments, it will be appreciated to those skilled in the art that other adaptations and modifications may be made and the invention is only to be limited by the appended claims.

What is claimed is:

1. In combination for use with a count module, an indicator wheel including,
 - a flat circular member having a central opening,
 - a cylindrical member disposed around the periphery of the flat circular member and extending from at least one side of the flat circular member,
 - the cylindrical member including an outer peripheral portion containing symbolic information at periodic circumferential positions around the member,
 - means disposed on one side of the flat circular member and surrounding the central opening for providing a rotational movement of the wheel member around the central opening, and
 - means disposed on the other side of the flat circular member for providing a detent to position the wheel at discrete intervals as the wheel rotates,
 - the last mentioned means including a camming device at one position of the detent.
2. The combination of claim 1 wherein the means for providing a detent includes an irregular circular star shaped member, and the camming device is one point of the star shaped member of a greater size than the remaining points of the star shaped member.
3. In combination for use with a count module, an indicator wheel including,
 - a flat circular member having a central opening,
 - a cylindrical member disposed around the periphery of the flat circular member and extending from the flat circular member,
 - the cylindrical member including an outer peripheral portion containing symbolic information at periodic circumferential positions along the member,
 - means disposed on one side of the flat circular member and surrounding the central opening for providing a rotational movement of the wheel member about the central opening,
 - means disposed on the other side of the flat circular member and surrounding the central opening for providing a detent to position the wheel at discrete intervals as the wheel rotates,
 - the last mentioned means including a first camming device at a particular position of the detent, and
 - means disposed on the cylindrical member for providing a second camming device at a particular rotational position of the wheel.
4. The combination of claim 3 wherein the means for providing a detent includes an irregular circular star shaped member, and the first camming device is one point of the star shaped member of a greater size than the remaining points of the star shaped member.
5. The combination of claim 3 wherein the second camming device is a raised portion along the inner periphery of the cylindrical member.
6. In combination with a count module, means for providing an axial alignment of the module including,

an elongated side member for providing a support of various components included within the count module,
 the elongated side member including V-shaped cut-out portions at selected positions at the outer edge of the side member,
 means operatively coupled to the side member for slideably receiving the side member,
 the last mentioned means including a plurality of openings located along the slide path of the side member with each opening corresponding to a particular V-shaped cut-out portion of the side member, and
 screw means disposed within the openings and engaging the V-shaped cut-out portions to provide an axial movement of the side member in accordance with the depth of insertion of the screw means.

7. In combination for use with a count module, an indicator wheel and switch means including,
 a circular wheel member having a central opening and including a flat circular member having an outer rim containing symbolic information at periodic circumferential positions extending from the flat circular member,
 the wheel member further including a cam surface disposed as a continuous circular path inside the space defined by the inner surface of the outer rim and having an outwardly extending portion at a particular location on the cam surface,
 means disposed relative to the wheel member for providing a rotational movement of the wheel member about the central opening, and
 switch means disposed relative to the wheel member and including an arm member to activate the switch means,
 the arm member of the switch means operatively coupled to the cam surface of the wheel member to activate the switch in a particular direction upon the appearance of the outwardly extending portion along the cam surface during rotation of the wheel member.

8. In combination for use with a count module, an indicator wheel and switch means including,
 a circular wheel member having a central opening and including an outer peripheral portion containing symbolic information at periodic circumferential positions,
 the wheel member further including a circular star shaped portion disposed around the central opening and having one particular point of the star extending outwardly at a greater distance than the other points of the star,
 means disposed relative to the wheel member for providing a rotational movement of the wheel member about the central opening, and
 switch means disposed relative to the wheel member and including an arm member to activate the switch means,
 the arm member of the switch means operatively coupled to the star shaped portion of the wheel member to provide a detent for the wheel member as the wheel rotates and to provide an activation of the switch means upon the appearance of the one particular point of the star during rotation of the wheel.

9. In combination for use with a count module, an indicator wheel and switch means including,
 a circular wheel member having a central opening and including a flat circular member having an outer rim containing symbolic information at periodic circumferential positions extending from the flat circular member,
 the wheel member further including a pair of cam surfaces disposed as continuous circular paths inside the space defined by the inner surface of the outer rim

and with each cam surface having an outwardly extending portion at a particular location,
 means disposed relative to the wheel member for providing a rotational movement of the wheel member about the central opening,
 first switch means disposed relative to the wheel member and operatively coupled to one of the pair of cam surfaces for activating the switch means upon the appearance of the outwardly extending portion, and
 second switch means disposed relative to the wheel member and operatively coupled to the other of the pair of cam surfaces for activating the switch means upon the appearance of the outwardly extending portion.

10. The combination of claim 9 wherein the first switch means is normally closed and is activated to be opened by the one cam surface to operate as a reset mechanism so as to stop the rotation of the wheel member at the particular location of the cam surface.

11. The combination of claim 9 wherein the second switch means is normally open and is activated to be closed by the other cam surface to operate as a transfer mechanism when the cam surface passes the particular location during rotation of the wheel.

12. The combination of claim 9 wherein one of the cam surfaces is irregularly shaped so as to cooperate with the switch means to produce a detent operation during rotation of the wheel.

13. A count module including,
 a pair of elongated side members having a rigid connection between the side members at one end and an opening at the other end,
 a pair of plate members operatively coupled to opposite sides of the side members to enclose a space defined by the inner surfaces of the plate members and side members,
 a solenoid structure disposed relative to the plate and side members within the enclosed space,
 a circular wheel member disposed within the enclosed space and having a particular portion of the periphery of the wheel extending into the opening at the other end of the side members, the circular wheel member including a flat circular member having an outer rim extending from the flat circular member and including an actuating portion extending from an inner surface portion of the flat circular member, and
 an actuating arm operatively coupled to the solenoid and to the actuating portion included in the wheel in the space defined by the flat circular member the outer rim and the actuating portion providing a rotation of the wheel in accordance with the operation of the solenoid.

14. A count module for use in displaying symbolic information, including,
 an electromagnetic actuator responsive to the information for providing a movement of the electromagnetic actuator in accordance with the information,
 a wheel member disposed relative to the electromagnetic actuator and including a flat circular member having an outer rim extending from the flat circular member with a continuous cam surface having an actuating portion at a particular location along the cam surface within the space defined by the inner surface of the outer rim,
 an arm member operatively coupled to the electromagnetic actuator and to the wheel and responsive to the movement of the electromagnetic actuator to provide a rotation of the wheel, and
 a switch means disposed relative to the wheel member and including a member operatively coupled to the cam surface to provide an operation of the appearance of the actuating portion along the cam surface.

15. A count module for use in displaying symbolic information, including,

- an indicator wheel having a circular star shaped hub portion and also including a continuously irregular shaped surface for operation as a detent,
 an electromagnetic member responsive to the information for producing a pulsating magnetic field in accordance with the characteristics of the information,
 an armature member disposed relative to the electromagnetic member and responsive to the pulsating magnetic field for providing a movement of the armature member in accordance with the pulsations of the magnetic field,
 means operatively coupled to the star shaped hub portion of the wheel and to the armature member for translating the movement of the armature member into a rotational movement of the wheel, and
 means operatively coupled to the detent surface included within the wheel member to provide a resilient locking of the wheel member at discrete positions as the wheel rotates.
16. A count module for use in displaying symbolic information including,
 a display wheel having a central hub portion and including an irregular circular star shaped portion having one particular point of the star outwardly extending at a distance different than the other points,
 an electromagnetic member responsive to the information for producing a magnetic field in accordance with the characteristics of the information,
 an armature disposed relative to the electromagnetic member and operatively coupled to the central hub portion of the display wheel for providing a rotational movement of the display wheel in accordance with the information, and
 a switch means disposed relative to the display wheel and including a resilient arm member operatively coupled to the star shaped portion of the wheel for providing activation of the switch during the one particular point of the star and for providing a resilient locking of the wheel at discrete positions corresponding to the other points of the star.
17. A display wheel for use in a count module including,
 a hub portion having a central opening,
 a flat circular member extending from the hub portion,
 a cylindrical outer section disposed around and extending from the flat member and having symbolic information displaced at periodic positions on the outside periphery,
 a circular star shaped portion disposed on one side of

- the flat circular member and extending from the hub portion, and
 a continuous cam surface disposed within the space defined by the inner surface of the cylindrical outer section and having an outwardly extending portion at one particular location.
18. The display wheel of claim 17 wherein the continuous cam surface additionally has irregularly placed indentations to function as a detent.
19. The display wheel of claim 17 additionally including a second continuous cam surface having an outwardly extending portion at a second particular location.
20. A count module for use in displaying symbolic information, including,
 an electromagnetic actuator responsive to the information for providing a movement of the electromagnetic actuator in accordance with the information,
 the electromagnetic actuator including,
 a U-shaped magnetic core having a pair of series connected coils coupled to the information wound on the two extending legs formed by the U-shaped core,
 an armature member disposed relative to the open end of the U-shaped magnetic core for providing a movement of the armature member in response to the information coupled to the pair of coils, and
 a display wheel including a flat circular member and a cylindrical rim extending from the flat circular member disposed relative to the electromagnetic actuator and operatively coupled to the armature member through a member disposed within the space defined by the inner surface of the cylindrical rim for providing a rotation of the wheel in response to movements of the armature.

References Cited by the Examiner

UNITED STATES PATENTS

1,554,283	9/1925	Kern	235—131
1,641,199	9/1927	Roucka	235—92
2,295,968	9/1942	Poole	235—132
2,973,145	2/1961	Daniels et al.	235—132
2,998,188	8/1961	Mast et al.	235—92
3,023,957	3/1962	Goodman	235—92

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