July 1, 1958 H. SENGEBUSCH 2,841,335

COUNTER CONTROLLED MEANS

Filed Nov. 5, 1952 2 Sheets-Sheet 1

FIG. 1

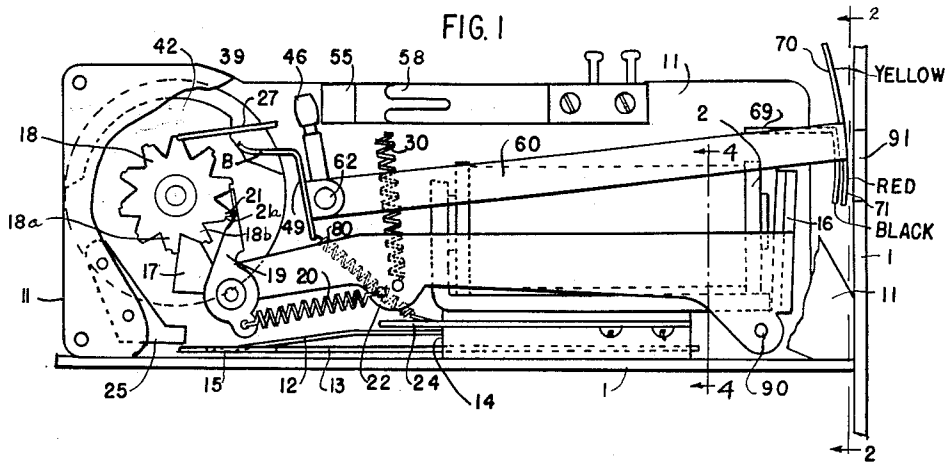


FIG. 2

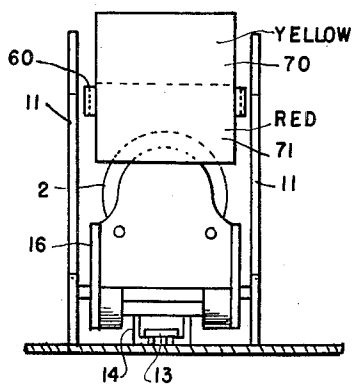


FIG. 3

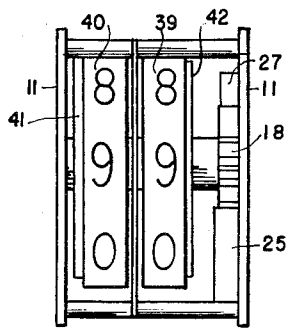


FIG. 4

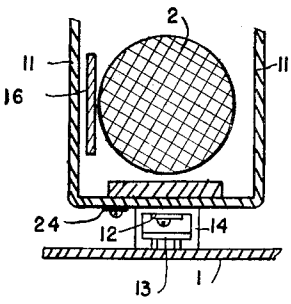
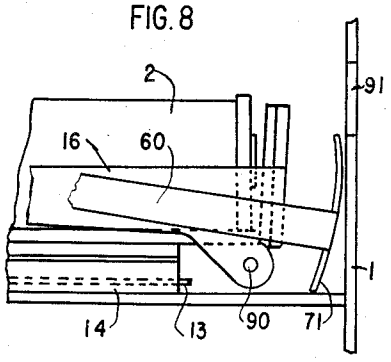


FIG. 8



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COUNTER CONTROLLED MEANS

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FIG. 5

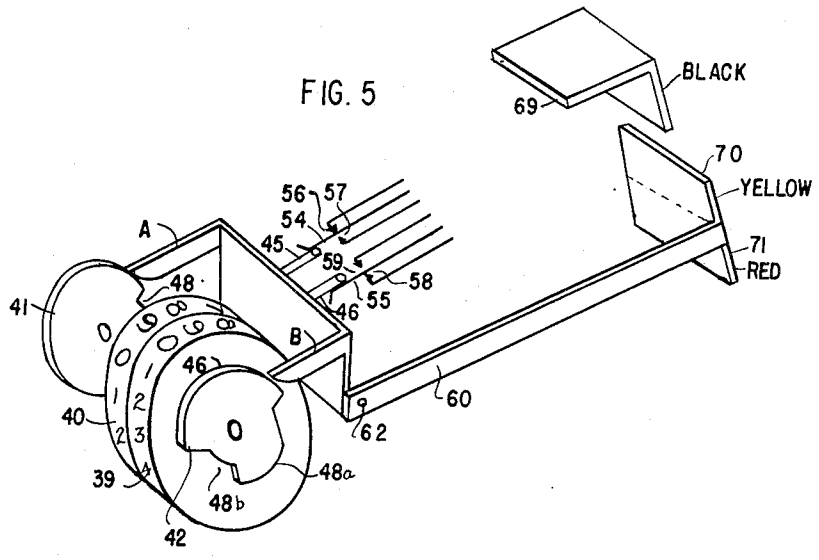


FIG. 6

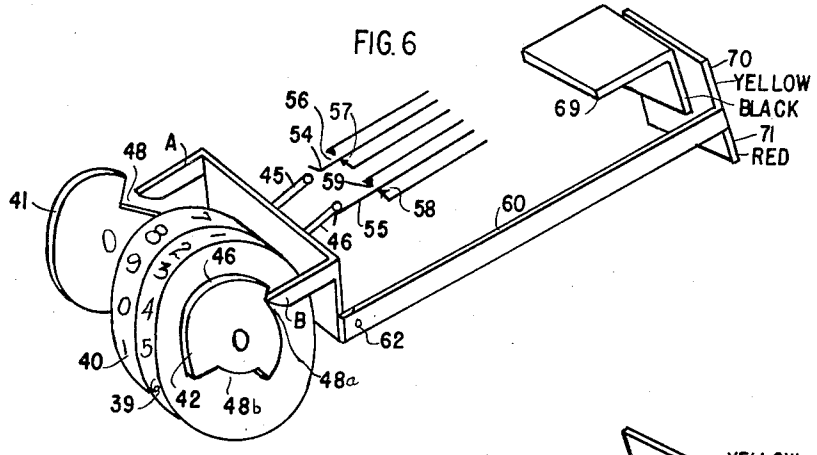
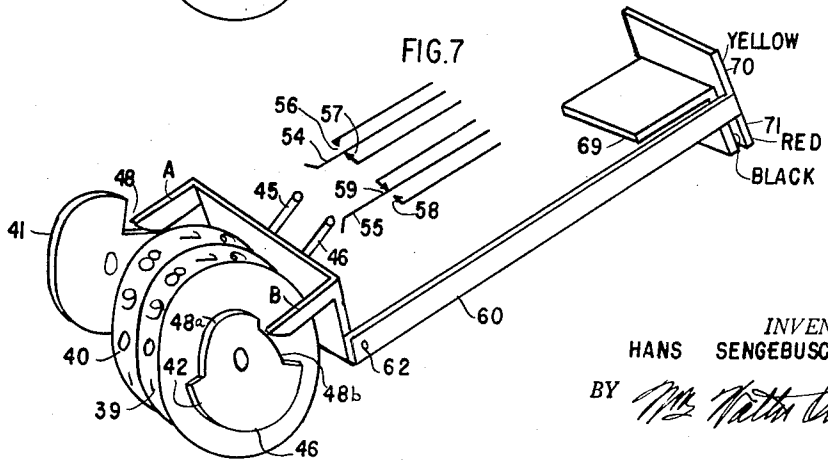


FIG. 7



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COUNTER CONTROLLED MEANS

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7 Claims. (Cl. 235—128)

This invention relates in general to an improved digit counter and more specifically to such a counter adapted for use in a space reservation system and having provisions for giving signals after a predtermined number of steps of the counter have been taken.

In space reservation systems it is desirable to have a counter set normally to indicate the number of available seats or spaces and to operate the counter in steps to subtract from the indicated number so that the number displayed at any time indicates the remaining seats available at that time.

It is also desirable in such systems to give a warning signal when only a certain predetermined number of seats remain for sale and to give another signal or alarm when all seats have been sold.

One of the objects of this invention is to provide a digit counter construction which will be simple, inexpensive, compact and rugged.

Another object of this invention is to provide a novel means to operate an alarm or alarms after the counter has registered a predetermined number of spaces.

A feature of this invention is the apparatus for operating the counters.

Another feature of this invention is its general construction for eliminating the need for great accuracy in the manufacture of certain parts and for thereby reducing the cost of this unit.

Another feature of this invention is the simple method of securing alignment of the armature for properly operating the registering counters.

Still another feature of this invention is the means for fastening or removing the entire unit from a carrying plate so that it may be replaced by another unit in the event of faulty operation or other cause.

The invention accordingly consists in the construction, combination of elements and arrangements of parts as will be exemplified in the structure that is hereinafter described in the remainder of the application and which will be indicated in the appended claims.

In the accompanying drawings is shown by way of illustration one of the various embodiments of my invention:

Fig. 1 is a plan view of the digit counter with part of the mounting plate removed.

Fig. 2 is a view taken along the section **2—2** showing the position of the visual alarm if there are no available spaces.

Fig. 3 is a front elevation showing the number display of the counters at the beginning setting used herein.

Fig. 4 is a view taken along the section **4—4** showing the arrangement for mounting the digit counter on the carrying plate including the sleeve **14** and the strip **13**.

Fig. 5 shows the positioning of the cams, cam follower arms and the visual and electrical alarms while the digit counter has any number of spaces available from 99 to and including 5. During this period of registration it will be understood that cam **42** will be rotated through all of its various positions without effecting any other of the elements.

Fig. 6 shows the arrangement of the various elements of Fig. 5 while the numbers 4 to and including 1 are registered.

Fig. 7 shows the arrangement of the various elements of Fig. 5 when the numbers 00 are displayed by the digit counter.

Fig. 8 shows the pivoted visual alarm plate in its normal position where it prevents the removal of the digit counter from the carrying plate if any of the numbers 99 to and including 5 are displayed.

As was hereinbefore noted a counter of this type might find its most general application for providing a record of the number of spaces available for reservation. In the vertical portion of the carrying plate **1** is a window **91**. Through this window there would be visible to a reservation clerk a colored plate indicating according to the color the maximum number of available spaces or seats in accordance with the particular color visible. Thus in this example, a two digit counter is used for indicating a maximum of 99 spaces or seats. If the black plate is visible at the rear window the clerk will know that a maximum of 99 spaces or a minimum of 5 spaces are available and she may continue to record reservations. The black plate is permanently fastened to mounting plate **11** in front of the window in plate **1**. When the yellow plate is visible in window **91** a maximum of 4 spaces and a minimum of 1 space are available. If the red plate is visible no space is available. Simultaneously with the appearance of the yellow plate in window **91** an electrical alarm is operated and another electrical alarm is operated when the red plate appears.

At the opposite end of the device are a tens wheel **40** and a units wheel **39** indicating the exact number of spaces available. The units wheel operates the tens wheel one step for each revolution of the units wheel by means of any well known counter gear arrangement. Each of these wheels has an associated cam. Each of these cams is followed by rider arms of a cam follower which in turn operates the aforementioned visual signals at the proper time and electrical alarms simultaneously therewith. The numerical indicators might be visible to a controller, who having a great number of numerical indicators to watch might have to have her attention attracted by operation of a particular alarm or the alarms might be used to prevent the clerk from operating the counters or for any one of numerous purposes. In this example, electrical alarms are operated at two times, once when four spaces are the maximum number available and again when zero spaces are available. Each alarm in this example is operated simultaneously with either the yellow or red plate.

The driving mechanism for the counters consists of a modified star wheel and pawl arrangement, the pawl being hinged upon the armature which has an elongated portion, the elongated portion of the armature forming a projection normally positioned in the indentation between two adjacent teeth of the star wheel. The pawl itself is normally positioned with its vertical face against the outer circumference of one of the teeth and must first be moved to bring its driving or horizontal face into contact with a recess in the tooth in order to rotate or step the tooth. This stepping of the tooth rotates the star wheel **18** of which it is a part to in turn rotate units wheel **39**. This mechanism is arranged to secure better operation than would be ordinarily possible due to the heavy load imposed by operation of the contact springs. This construction further eliminates the need for great accuracy in the manufacture of the pawl and armature length and at the same time secures perfect alignment of the counter for registration as the armature may be positioned by simply adjusting the position of the electromagnet.

The feature whereby the unit may be locked to the

carrying plate is a very novel arrangement in which removal is prevented unless the counters have displayed a predetermined number at which time the visual signal plates are operated. It will be noted that the sleeve 14 at the bottom of the mounting plate 11 will not disengage the strip 13 on the horizontal portion of the carrying plate 1 until the spring 12 and the visual signal plate are both raised. The signal plate will not be raised until the cam on the tens and units wheel have operated the rider arms to operate the colored plates.

The invention and the above noted and other features thereof will be understood more clearly and fully from the following description.

As was noted before, this device may display a maximum of 99 spaces available and therefore each of the counter wheels 39 and 40 respectively register 9 as displayed in Fig. 3. When any number of spaces more than 4 are available a black painted plate shows at the window 91 in carrying plate 1 while the bottom surface of red plate 71 rests on the horizontal surface of carrying plate 1 and prevents the removal of the mount 11 from plate 1 at this time as shown in Fig. 8.

When a clerk desires to register a certain number of reservations she will pulse the electromagnet 2 in any well known manner attracting armature 16 a number of times in accordance with number of pulses passing through the electromagnet 2. Armature 16 is normally tensioned upward by spring 30 thereby forcing armature projection 17 to fit snugly between adjacent teeth 18*a* and 18*b* of the star wheel 18 which is mounted on the same shaft as digit wheel 39 and rotates with wheel 39. Wheel 40 will rotate a distance corresponding to one number on its face whenever wheel 39 makes a complete revolution which is the equivalent of registering 10 spaces. Pawl 19 is pivoted on the armature 16 at a point adjacent projection 17. As will be noted by referring to Fig. 1 when pivoted pawl 19 is in its normal position its vertical face is biased against the outer circumference of tooth 21 by spring 20 fastened on one end to projection 22 on the armature 16 and on the other end to pawl 19. When the electromagnet 2 is energized projection 17 on the armature is pulled down and away from star wheel 18 as armature 16 is pivoted at 90. Pawl 19 is pulled downward by the armature 16 and forward by spring 20 so that its top horizontal edge or face may engage recess 21*a* on tooth 21. Armature 16 moves downward until projection 22 on the armature 16 strikes flat spring 24 and on de-energization of the electromagnet 2 armature 16 then returns to its former position under tension of spring 30 thus enabling pawl 19 to rotate tooth 21. Stop 25 is provided to prevent projection 17 from travelling too far downward. As the armature 16 returns to its normal position pawl 19 now engaged with recess 21*a* on tooth 21 rotates or steps tooth 21 to thus rotate star wheel 18 and units wheel 39. However after the first ⅔ of a step recess 21*a* is no longer engaged by pawl 19 and rotation would cease except that projection 17 of the armature has now contacted the rear surface of tooth 18*a*. The continued return of the armature to its normal position causes projection 17 to force tooth 18*a* the remaining ⅓ of a step to thus complete one full step of the star wheel 18 and digit wheel 39 and lock them securely in place. Detent spring 27 prevents rotation of the star wheel in a direction opposite to the registration of spaces. This operation will continue as many times as the electromagnet is pulsed in accordance with the number of spaces to be reserved.

For every complete revolution of the units wheel 39, tens wheel 40 will rotate a distance sufficient to display the next lower numeral on its circumference. Rotating with units wheel 39 is a cam 42 while rotating with tens wheel 40 is a cam 41. Cams 41 and 42 are followed by a cam follower 49 having two arms A and B. Follower arm A rides on cam 41 while follower arm B rides on cam 42. Cam follower 49 is pivoted on shaft 62 and has attached thereto one end of lever arms 60 which carry at their other end a yellow painted plate 70 above a red painted plate 71. Cam follower arms A and B are held against cams 41 and 42 respectively by means of pivoting spring 80 so that if a depression appears in cams 41 and 42 simultaneously follower arms A and B being in the same plane and approximately the same length, will both fall forward under the tension of spring 80 to pivot cam follower 49, lever arms 60 and painted plates 70 and 71. Pivoted at the same time would be rollers 45 and 46 attached to the upper portion of cam follower 49 allowing springs 54 and 55 to operate the alarm contacts. When the clerk has reserved 90 spaces the tens wheel 40 registers 0 and the units wheel 39 the number 9, a depression 48 appears under cam follower arm A in cam 41 and a raised portion 46 on cam 42 under cam follower arm B holds cam follower 49 in the same position as it has occupied during the previous 90 reservations. As the clerk continues to reserve spaces units wheel 39 continues to rotate until the number 4 is displayed on its face at which time a depression 48*a* appears under cam follower arm B as shown in Fig. 6 and at which time cam follower 49 is pivoted forward by spring 80 to raise lever arm 60 and cause the yellow painted plate 70 to cover the black painted plate 69 at the window 91 in carrying plate 1. Simultaneously roller arms 45 and 46 are pulled forward but only spring 54 disassociates from its contact 56 and makes contact 57 for operating an appropriate alarm circuit in any well known manner while roller arm 46 holds spring 55. If the clerk continues to reserve spaces, the units wheel will continue to rotate and when it displayes 0 a deeper depression 48*b* will appear in cam 42 under follower arm B and thus allow cam follower 49 to be pivoted further under the influence of spring 80 to thereby raise lever arms 60 and red painted face 71 to the window in carrying plate and simultaneously move roller arm 46 away from spring 55 so that spring 55 will break contact 58 and make contact 59 as shown in Fig. 7 for operating another alarm circuit in any well known manner. At this time the number 00 will be displayed on the counters and if the clerk again registers a reservation the raised portion of cam 41 will appear under follower arm A and thus restore cam follower 49 to cause roller arms 45 and 46 to be restored to their original position and break contacts 57 and 59 and make contacts 56 and 58 and simultaneously return yellow and red painted plates 70 and 71 to their normal positions.

The unusual locking feature will now be described. The horizontal portion of carrying plate 1 has fastened thereto a metal strip 13 having an aperture 15 at one end. The strip 13 is located parallel to the position occupied by mounting plate 11 on plate 1. Mouting plate 11 has fastened to its bottom a sleeve 14 shaped to conform to the strip 13 as shown in Fig. 4. Also fastened to mounting plate 11 is a flat spring 12. One end of this spring is located in the sleeve 14, the other end being free so that when the sleeve 14 is slid over strip 13 the end of spring 12 will fit into aperture 15 in Fig. 1 and prevent removal of mounting plate 11 unless the end of the spring is lifted from the aperture. Mounting plate 11 is further locked into place by plate 71 which in its normal position fits between strip 13 and the vertical portion of carrying plate 1 as shown in Fig. 8 and is firmly held against the horizontal portion of plate 1 by the lever arm 60 and cam follower 49. Plate 71 will not be raised to allow removal of the mounting plate 11 until the tens wheel 40 displays 0 and the units wheel 39 displays 4 in the manner previously described.

Although a specific embodiment of my invention has been shown and described, it will be understood that it is but illustrative and that various modifications may be made without departing from the scope and spirit of the invention as defined in the appended claims.

What is claimed is:

1. For use with a digit counter having tens and units wheels, and means for rotating said wheels, said tens wheel rotating a certain distance for every complete revolution of said units wheel, a separate cam for each wheel and rotating with its wheel, a cam follower means, means for pivoting said cam follower means, said cams preventing said cam follower means from pivoting until said wheels and said cams have rotated a predetermined distance, said cams shaped for allowing said cam follower means to pivot when said predetermined distance is reached, an electrical and visual alarm means operated by said pivoted cam follower means, said units wheel cam further shaped for allowing further pivoting of said cam follower means after another predetermined distance of travel of said units wheel without returning said cam follower to normal after said first pivoting, and another electrical and visual alarm means operated by said further pivoting.

2. In a digit counter, a units wheel and a tens wheel having numbers on their outer circumference, a notched cam for said tens wheel, a notched cam for said units wheel, said units cam notch arranged in two steps, a pivotally mounted cam follower having a pair of rider arms, each of said rider arms located on and following one of said cams, said notch on said tens wheel aligned in certain positions with said steps on said units wheel cam when said tens and units wheel display predetermined numbers, means for pivoting said rider arms and cam follower when said notch and said steps are aligned, an electrical and visual alarm operated by said cam follower when said pivoting occurs responsive to the alignment of said notch with one of said steps, another electrical and visual alarm by said cam follower responsive to its pivoting when said notch and said second step are aligned when said units wheel reaches another predetermined number.

3. In a digit counter having a tens and a units indicator wheel with a magnet for operating the units wheel and carry over mechanism for operating the tens wheel, the provision of a cam rotating with the units wheel and another cam rotating with the tens wheel, a signal operating device associated with the counter having a cam follower for each of said cams, one cam follower operated to permit the operation of the device only when the tens wheel is in a certain position, and the other cam follower operating the device only when the units wheel is in one position to give one signal and further operating the device to give another signal when the units wheel is in another position.

4. In a digit counter, a pair of digit wheels having numbers on the face thereof for display, a cam associated with each digit wheel, follower arms for each of said cams, a pivoted body portion common to said follower arms, a vari colored plate attached to said body portion, a plurality of sets of contacts arranged to be operated by said body portion, a spring for pivoting said body portion to thereby pivot said follower arms and said vari colored plate, one of said cams preventing pivoting of said follower arm and body portion for a predetermined distance of travel, the other cam thereafter preventing pivoting of said follower arm and body portion until a predetermined number is displayed on said digit wheels, said cams then allowing said follower arms, body portion and vari colored plate to be pivoted by said spring to thereby operate one of said sets of contacts and for causing said vari colored plate to be operated for displaying one of its colors, continued operation of said digit wheel to display another predetermined number resulting in further operation of said last cam to cause the

operation of another set of contacts and display of another one of said colors by said plate in the same manner, and said first cam returning said follower arms, body portion, plates and contacts to normal if said digit wheels are moved past said other predetermined number.

5. A combination for use with a digit counter having numbered wheels, a shaped cam for each wheel, and means for operating said wheels to cause said wheels to display said numbers, each cam operated in accordance with the operation of its associated wheel comprising, a cam follower means associated with said cams, said cam follower means operated when both said cams have been operated a predetermined distance, an electrical and visual alarm means operated by said operated cam follower means, further operation of one of said wheels causing further operation of said cam follower means without disturbing said electrical alarm means, another electrical and visual alarm means operated by said further operation of said cam follower, a carrying plate, and a locking means for locking the described structure to said carrying plate and operated to enable release of said described structure from said carrying plate by operation of one of said visual alarm means, continued operation of said cams causing return of said cam follower, electrical and visual alarm means to their original position and thereby preventing release of said structure.

6. A combination such as described in claim 5, in which said locking means comprises an apertured strip carried by said plate, a mount for carrying the structure exclusive of said plate, a flat spring fastened at one end to the bottom of said mount, a sleeve piece fastened to the bottom of said mount for engagement with said strip, said spring other end engaging said aperture when said sleeve is in engagement with said strip, said sleeve, spring and said visual alarm means cooperating to prevent removal of said mount from said plate until one of said visual alarm means is operated.

7. In a digit counter, a units wheel and a tens wheel having numbers on their circumference, a separate notched cam for each wheel, a pivotally mounted cam follower having a pair of rider arms following said cams, said notches in said cams aligned when said tens wheel and said units wheel reach predetermined numbers, means for pivoting said cam follower when said notches are aligned, an alarm operated by said pivoted cam follower, said cam associated with said units wheel having a second notch therein, said second notch on said units wheel cam aligned with said notch on said tens wheel cam when said units wheel reaches another predetermined number for again pivoting said rider arms and cam follower and another alarm operated by said pivoted cam follower.

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