

July 11, 1939.

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2,165,733

LOCKED PICK COUNTER

Filed Aug. 19, 1935

2 Sheets-Sheet 1

FIG. 1.

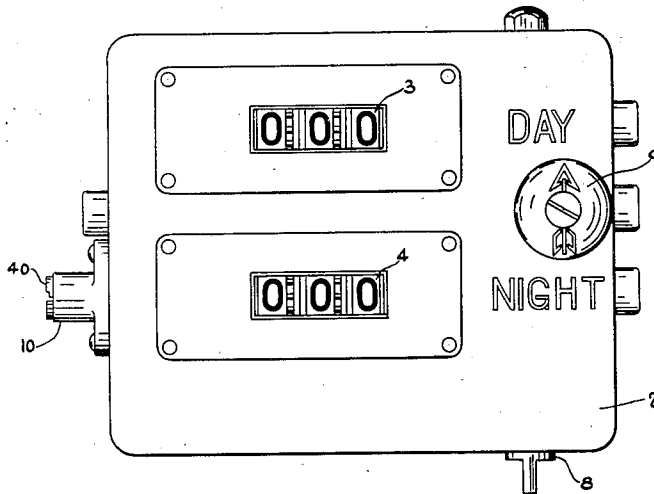


FIG. 2.

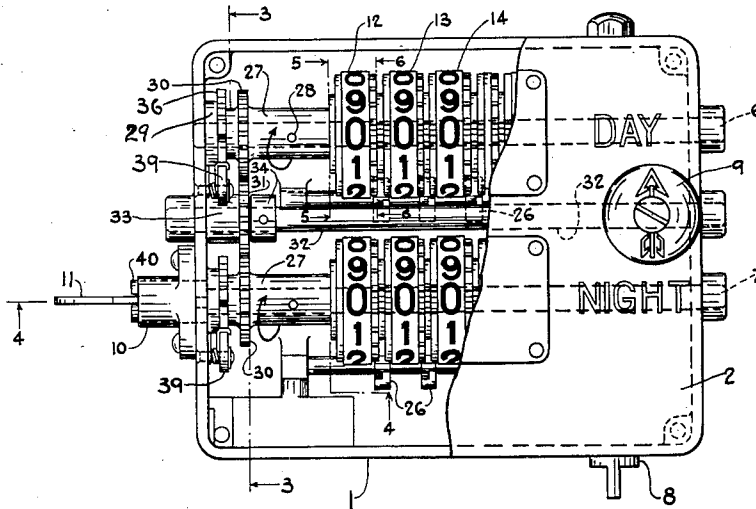
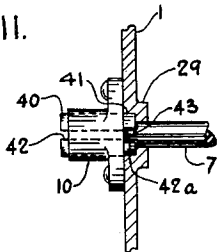


FIG. 11.



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2 Sheets-Sheet 2

FIG. 3.

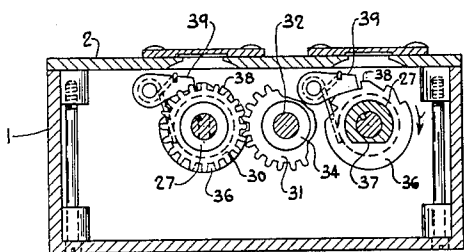


FIG. 4.

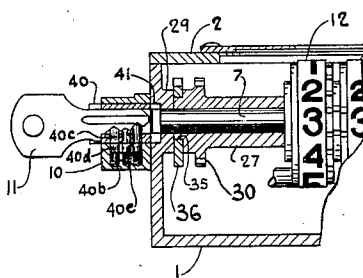


FIG. 5.

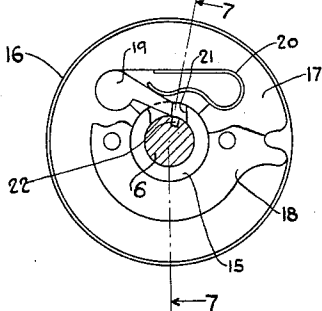


FIG. 6.

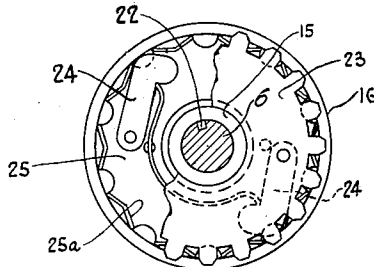


FIG. 7.

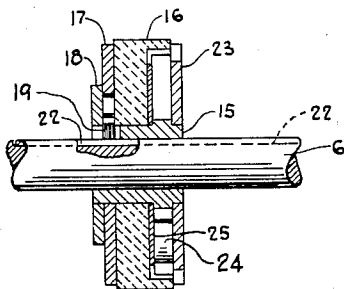


FIG. 8.

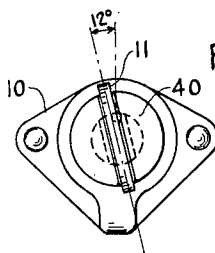


FIG. 10.

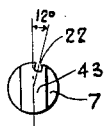
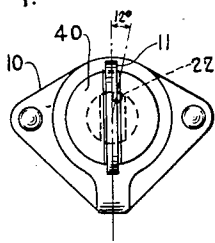


FIG. 9.



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2,165,733

LOCKED PICK COUNTER

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Application August 19, 1935, Serial No. 36,858

9 Claims. (Cl. 235-144)

My invention relates to locked pick counters.

It has among its objects to provide an improved pick counter of the reset type adapted to be locked during operation and unlocked to permit resetting. A further object of my invention is to provide improved mechanism associated with such a counter to prevent tampering with the resetting mechanism to fraudulently vary the count both while the counter is locked and while it is unlocked, and such mechanism having improved means operative to prevent advance of the counter by a blow on the resetting mechanism, either following resetting and before locking or following locking of the counter. A still further object of my invention is to provide a pick counter mechanism having a plurality of counters and a single lock for locking all the counters while eliminating the necessity for a locking member extending across the resetting shafts of the counters and in general to simplify the locking and resetting mechanism for counters of this type. Further objects of my invention include the provision of improved means for preventing removal of the key following initiation of a resetting movement until the counter wheels have been completely reset to zero position and the resetting mechanism is in a position in which the operative connections between the driving elements of the resetting mechanism and the counter wheels are disengaged. A still further object of my invention is to provide improved locked resetting mechanism for a multiple pick counter of the type having a common locking means and in which the key for the lock comprises the operating member for the resetting mechanism for both counters. These and other objects and advantages of my improved construction will, however, hereinafter more fully appear.

In the accompanying drawings I have shown for purposes of illustration one embodiment which my invention may assume in practice.

In these drawings,

Figure 1 is a plan view of my improved pick counter mechanism showing the counter locked following resetting;

Fig. 2 is a similar view of the counter mechanism before locking and with a portion of the cover broken away;

Fig. 3 is a section on line 3-3 of Fig. 2;

Fig. 4 is a partial sectional view on line 4-4 of Fig. 2;

Fig. 5 is a detail sectional view on line 5-5 of Fig. 2;

Fig. 6 is a detail sectional view on line 6-6 of Fig. 2;

Fig. 7;

Fig. 7 is a sectional view on line 7-7 of Fig. 5;

Fig. 8 is a detail view showing the position of certain of the resetting and locking parts immediately following resetting of the counter wheels to zero and prior to locking the counter;

Fig. 9 is a similar detail view showing the position of these parts just prior to withdrawing the key;

Fig. 10 is a detail end view of the resetting shaft with which the lock is operatively associated, and

Fig. 11 is a detail showing the operative connection between the lock and the shaft of Fig. 10.

In this illustrative construction, I have shown my invention applied to a double pick counter mechanism of a well known type including a casing comprising a body 1 and removable cover 2 and having two like counters therein, generally indicated at 3 and 4. These counters are mounted on parallel shafts 6 and 7, journaled in the ends of the casing and are adapted to be driven selectively from a counter drive shaft 8 by usual clutch mechanism, not shown, depending upon the position of connection of a usual manually adjustable control member 9, one counter, herein the counter 3, being connected for use on the day shift and the other for use on the night shift. The counters 3 and 4, which are adapted to be locked during counting operation by improved locking mechanism including a lock 10 and a key 11, herein of the usual "Yale", or pin tumbler type, also have improved resetting mechanism, hereinafter described, controlled by said lock and key.

Referring to the counters 3 and 4, it will be noted that each of these includes a plurality of coaxial counter wheels operatively connected by transfer mechanism and that the same are identical in construction. More particularly, it will be noted that, using the counter 3 as an illustration, the same comprises three counter elements 12, 13 and 14, each including a number wheel, operatively connected through usual tens transfer mechanism of the locking type so as to register the rotation of the driving shaft 8 in terms of multiples of picks woven, with each unit on the wheel 14 representing a predetermined number of picks, as, for example, 1,000 picks, each unit on the wheel 13 representing ten thousand picks and each unit on the wheel 12 representing one hundred thousand picks.

Considering more particularly the construction of one of the counter elements 12, 13, and 14, it will also be understood that each of these is identical in construction so that reference to only ele-

ment 12 appears necessary. Here it will be noted that this element, as shown in Figures 5, 6 and 7, includes a sleeve 15 on which the number wheel 16 is fixed and which also has fixed thereto a locking disc 17 and a mutilated transfer gear 18, the latter being on the opposite side of the locking disc 17 from the number wheel 16. Also, as usual in such counter elements a reset pawl 19 in the disc 17 is normally pressed by a spring 20 downward through an aperture 21 in the sleeve 15 into engagement with the resetting shaft 6 ready to drop into a longitudinal groove 22 in the shaft 6. Further, it will be noted that a driving gear 23 is rotatably mounted on the opposite end of the sleeve 15 from the mutilated transfer gear 18 and, through a pair of spring pressed pawls 24, carried on the inner face thereof, is adapted to cooperate in a usual way with a cup-shaped ratchet member 25 which is fixed within a usual recess in the face of the number wheel 16 adjacent the gear 23. It will be noted (Fig. 6) that the ratchet cup 25 has a series of ten equally spaced notches in its peripheral flange, corresponding to the numeral positions of number wheel 16, and that the portions of said flange between adjacent notches are formed into inwardly directed cam faces 25a which cooperate with the pawls 24 in a well known manner to advance the number wheel 16 to the next numeral position as the pawl moves over the peak of the cam 25a, irrespective of whether the number wheel 16 has been moved completely through the 36° rotation corresponding to advance of one unit on the number wheel. Thus it will be evident that, with the several counter elements 12, 13 and 14 of counter 3 operatively connected by usual transfer pinions 26, the counter will count progressively in the usual manner and will be reset to zero upon rotation of the shaft 6 through a complete revolution, the pawls 19 of the several counter elements being picked up by the groove 22 and returned to the zero positions illustrated in Figures 1 and 2, all in a well known manner.

In my copending application, which has issued as Patent No. 2,040,031, I have shown and described in detail a pick counter of this general type having a locking mechanism common to the two counters in which fraudulent advance of the count is prevented when the counter is locked, and reference is made to said application for a better understanding of the locked pick counter art prior to the present invention. In my above mentioned application a double pick counter construction is shown permitting either counter to be reset to zero following unlocking without disturbing the indicated count on the other counter. The construction of the present application differs from this prior application in providing mechanism for resetting the two counters simultaneously, and in providing a simple and inexpensive combined locking and resetting mechanism having many advantageous features of my earlier application for the prevention of fraudulent advance of the count by a dishonest operator, even when such an operator possesses a key to the counter mechanism.

In the present construction means are provided to rotate the counter shafts 6 and 7 in unison to reset their respective counters. To this end the shafts 6 and 7 each have a sleeve 27 fixed thereon by a pin 28 and completely occupying the space between the mutilated gear 18 of the highest order counter element 12 and the inwardly directed boss 29 on the end wall of casing 1. Each of said sleeves has a spur gear 30, preferably formed integral therewith, meshing with an intermediate idle

gear 31 rotatably mounted on the drive shaft 32 of the common selective driving mechanism for the counters, and held in mesh with said gears 30 by means of an integral hub 33 engaging the end wall of the casing and a collar 34 pinned to said shaft 32. Thus it will be evident that by rotating either shaft, as the shaft 7, by means hereinafter described, both shafts will be rotated in the same direction.

Mechanism is also provided for preventing reverse rotation of the resetting shafts 6 and 7 in certain positions of the latter. Herein, as shown most clearly in Figures 3 and 4, the sleeves 27 are provided with generally cylindrical reduced end portions 35 adjacent the bosses 29 to receive ratchet wheels 36, said reduced portions 35 being cut away to provide flat portions 37 thereon which cooperate with corresponding flat portions in the generally circular apertures in said ratchet wheels to lock the latter against rotation relative to said sleeves 27. Each ratchet wheel is provided with any suitable number of teeth 38, herein four, and a spring pressed pawl member 39 carried by the inside end face of the casing 1 is adapted to cooperate with these teeth, riding over the teeth and the untoothed portion of the periphery of the ratchet member and dropping in back of each tooth as the ratchet wheel is rotated past the stationary pawl during resetting, the direction of rotation during resetting being indicated by arrows in Figures 2 and 3. Thus, it will be evident that if the resetting shafts are rotated even slightly in a resetting direction, each pawl 39 will drop in back of a tooth in such manner as to prevent a return movement of the shaft and compel the operator to continue the resetting movement in order to lock the counter mechanism, as will now be explained.

Combined reset operating and locking mechanism, including the lock 10 and key 11, is associated with the resetting shaft 7 for controlling the locking and resetting of the counter mechanism. The lock 10, which herein is of the well known pin tumbler type, is secured externally of the casing on an end wall thereof by rivets or other suitable means with the inner cylindrical end of its rotatable lock plug 40 disposed in a recess 41 formed in the casing wall in axial alignment with the shaft 7 (Figure 11). The lock 10 is of a well known construction. A series of aligned radial holes 40a are provided in the lock plug 40 and the enclosing lock barrel which coincide in the normal locking position of the plug illustrated in Figures 2 and 4, in which position the key slot 42 is vertically disposed. Pin tumblers 40c and drivers 40d are located in each hole and are urged by springs 40e in the bottom of the holes toward the key slot 42, the length of the pins being such that one or more of the drivers 40d normally project into the lock plug 40 and thus prevent rotation of the latter. When the right key is inserted in the key slot 42, however, the pin tumblers are depressed by the key until the abutting ends of the pin tumblers and drivers in the several holes coincide with the periphery of the bore in the lock barrel, as shown in Figure 4, permitting rotation of the lock plug 40 in the barrel. Also, as appears from this figure, the key cannot be withdrawn, once the lock plug 40 has been rotated to misalign the tumblers and the portions of the holes in the lock barrel, until the lock plug has been returned to its normal locking position, shown in Figures 2 and 4, in which the key slot is vertical. The key slot 42 is provided at its inner end with an enlarged portion 42a

(Figure 11) which is beyond the portion of the key slot occupied by the key. This enlarged portion of the slot is adapted to receive the tongue 43 formed on the left-hand end of the shaft 7 as viewed in Figure 2.

Here attention is again directed to the fact that the key slot 42 in the lock plug is vertically disposed in the locking position of the parts (Figure 9) in which the key can be withdrawn from the lock, and that in the position of the resetting mechanism immediately following a resetting movement of the number wheels 16 to zero (Figure 8), the key 11 has been advanced beyond the position in which it can be withdrawn. In other words, the slot 22 in shaft 7 is located at an angle to the vertical tongue 43, and hence to the key slot 42. It will also be evident that, when the key plug 40 is rotated by turning the key, the shaft 7 will be rotated and, by reason of the interconnecting gear train, the shaft 6 will also be rotated in the same direction, as indicated by the arrows in Figure 2. Also, as stated above, the lock plug 40 can not be rotated except when the key is inserted therein; and further when the plug has been released and turned by the key through even a small part of a revolution beyond the Figure 8 position, the key can not be removed until the plug has been turned to its initial locking position. Thus, it will be evident that when the key 11 is removed from the lock 10, the counter mechanism is not only locked but, since the key constitutes the resetting member for rotating the shafts 6 and 7, tampering with the resetting mechanism is made difficult.

In the use of my improved construction, it will be understood that the counter mechanism is supposed to be locked during the operation of the loom and that the supervisor at the end of the day or the week, after recording the readings of the day and night counters, is able to unlock the counter mechanism and reset the same by means of the key 11. It will be understood that in the normal locking position of the mechanism shown in Figures 2 and 9, the key slot 42 is vertically disposed and the resetting grooves 22 of shafts 6 and 7 are disposed approximately 12 degrees back of the vertical position in which they engage the resetting pawls 19 of a counter wheel which is in the zero position. Thus, it will be evident that when the supervisor inserts the key in the vertically disposed slot 42, unlocking the counter mechanism, the first 12 degrees of rotation in the direction of the arrows shown in Figure 2 merely moves the resetting shaft 7, and with it, of course, the shaft 6, from the position shown in Figure 9 to that shown in Figure 8 in which the grooves 22 are vertically disposed and engage immediately the pawls 19 of any counter wheels which may be in the zero position. From this vertical position of the re-setting grooves, a complete 360 degree rotation of the re-setting shafts 6 and 7 by the key 11 will pick up the reset pawls 19 of all the counter wheels of both counters and return the same to the zero position of Figures 2 and 8 in a well known manner. Here, it will be noted, however, that the key 11, following such a resetting operation, has moved beyond its normal vertical position of Figure 9 and consequently can not be withdrawn, the operator instead being required to reversely rotate the resetting mechanism through approximately 12 degrees into the vertical position of the key, during which reverse movement of the resetting shafts the grooves 22 are moved away from the reset pawls 19 into the position shown

most clearly in Figure 5 in which the pawls rest on the circular periphery of the shafts.

If the supervisor fails to turn the key 11 beyond the vertical position of Figure 9 in resetting the counters to zero, and withdraws his key without rotating the resetting shafts 6 and 7 through the last 12 degrees of a resetting movement, the counter wheels will nevertheless automatically complete the resetting movement under the action of the pawls 24 acting on cams 25a, so that all the counter wheels will read zero. It will be evident that in any case the displacement of the resetting grooves 22 and the resetting pawls 19 will take place, either by the reverse rotation of the key by the supervisor to enable withdrawal and locking or by the automatic advance of the counter wheels to zero under action of cams 25a. From the above, it will be evident that in resetting the counter mechanism the supervisor, once he has started to reset the counters, can not carelessly leave the counters incompletely reset but that both counters will not only be properly reset to zero but that the disengagement of grooves 22 and pawls 19 must take place before the supervisor can withdraw his key from the lock of the counter mechanism.

Further, should an operator wrongfully obtain a key or be trusted with a key and attempt to fraudulently advance a legitimately registered count, when he has unlocked the counter and rotated the key to advance the counter resetting shafts 6 and 7, even to the extent of one tooth 38 of ratchets 36, the spring pressed pawls 39 will drop behind the ratchet teeth and will prevent any backward movement of the resetting key. Since the operator can not withdraw the key without turning it back to its normal vertical position, in order to avoid detection, which would follow if he were found with his counter unlocked, the operator will be obliged to complete the resetting movement after such a partial movement, thus wiping out the legitimate count. Thus, the average operator is so penalized by his attempt to advance the count that he will not again attempt to cheat.

It will further be noted that my improved combination of lock and ratchet mechanism is effective in preventing fraudulent operation of the resetting shafts at the beginning of the shift by an operator having a key and using it for fraudulent purposes. Thus, for example, an operator using the above described locked counter but without the ratchet and pawl structure 36, 39, and finding the counter at zero when he comes to work can advance the count fraudulently at the beginning of his shift. One way in which he could do this would be to unlock the counter mechanism and rotate the key to reset the counters to say 999, then leaving the key in the lock, weave 2,000 picks until the counter shows 001; then turn the key 11 backward until he picks up the "1" counter wheel and, reversing the rotation of the key, turn it forward until he reaches the normal reset position of the resetting shaft when the counter for his shift registers "010". He would then lock the counter mechanism and remove the key, starting his day's work with a reading of 10,000 picks, when, as a matter of fact, he had woven only 2,000. By reason of the ratchet and pawls 36, 39, however, he would not be able to turn back the key to pick up the "1" wheel as described. Likewise he would be unable, attempting this method of cheating, to turn up 9's or 8's or anything beyond 7's. Consequently the operator would have to leave his

key in the lock while he wove 223,000 picks, which would, of course, subject him to wholly unreasonable risk of detection.

Attention is also directed to the fact that my improved mechanism is also proof against a fraudulent advance of the count by tapping on any part of the resetting mechanism as, for example, the slotted end of the lock plug 40, i. e. by holding an implement against one end of the slot 42 and striking the implement a sharp blow with any suitable object when the counter is locked and the counter wheels are in zero position, in such manner as to advance one or more of the counter wheels. For example, by striking the lock plug in this manner with the counting wheel's in zero position, it is possible to advance one or more of the counter wheels to read "1" or "2" when, as in the usual construction, the reset pawls 19 are left in contact with the vertical walls of the resetting grooves 22. This type of fraudulent manipulation and damage to the counter mechanism resulting therefrom is prevented in my construction by the angular relation between the tongue 43 of shaft 7 and the resetting groove 22 of the resetting shafts (Figure 10) which requires that the grooves 22 and the pawls 19 occupy the relative positions shown in Figure 5 before the counter mechanism can be locked. In this spaced position of the grooves 22 and reset pawls 19, it will be evident that it is impossible to transmit movement to the counter wheels by a blow on any part of the resetting mechanism. Here it will be observed that the relation of the teeth 38 to the pawls 39 is such as to permit this 12 degrees backward rotation of the resetting shafts from the zero position of the number wheels.

The pawls 39 in addition to preventing reverse rotation of the resetting shafts also cooperate effectively with the resetting mechanism to prevent an operator having a key from advancing the counter wheels by an eccentric blow on the key 11 while the pawls 19 are still in grooves 22 immediately following a resetting operation and before reversely rotating the shafts by the key and locking the counter mechanism. Such operation is prevented by the frictional restraint imposed by these spring pressed pawls 39 which makes it impossible to strike the key 11 a sufficiently hard blow to advance the counter wheels without rotating the unlocked lock plug 40 and with it the resetting shafts 6 and 7, which requires another resetting operation before the key can be withdrawn.

Thus, it will be evident that the no-reverse pawls and ratchets cooperate with the locking and resetting mechanism to prevent withdrawal of the keys to lock the counters with a counter wheel of either counter advanced beyond zero in any of the previously described ways. Further, the no-reverse ratchets and pawls 36, 39 also cooperate with the blow-proof structure as previously described, to prevent advance of the resetting mechanism by a blow following resetting and prior to locking, while the blow-proof structure also cooperates with the resetting mechanism and locking mechanism to prevent such advance following locking; all as distinguished from a counter mechanism without either the no-reverse device or the blow-proof feature, wherein the resetting mechanism could be struck either a sufficiently light blow when unlocked to advance the count, or a sufficiently severe blow when locked also to advance the count.

Attention is further directed to the fact that

my improved construction is of a character adapted to be applied to standard types of pick counters, the structure being readily disposed in the end of the casing opposite the selective clutch mechanism. It will further be evident that the structure is simple and of a rugged character and that the resetting mechanisms of two or more counters can be controlled by a single lock while providing all the above mentioned safeguards as regards fraudulent advance of the count even by an operator having a key to the counter mechanism in his possession. These and other objects and advantages of my improved construction will, however, be clearly apparent to those skilled in the art.

While I have in this application specifically described one embodiment which my invention may assume in practice, it will be understood that the same is shown for purposes of illustration only, and that the invention is not limited thereto but may be modified and embodied in various other forms without departing from the spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. The combination with a counter having a resetting shaft and a plurality of operatively connected counter wheels separately rotatable on said shaft, of reset locking means comprising a lock having a rotatable key receiving member operatively connected with said shaft and a key also constituting a reset operating member withdrawable in only one position of said shaft, and means for automatically advancing said wheels relative to said shaft following a resetting movement of said shaft in to a position permitting withdrawal of said key, but less than a complete resetting movement.

2. In a pick counter mechanism, a counter including a plurality of operatively connected number wheels, resetting mechanism for said counter including an axial rotatable element and cooperating pawl elements within said wheels engageable to return the latter to zero upon operation of said rotatable element, a key operated lock controlling the rotation of said resetting mechanism having a key adapted to be removed only upon completion of resetting, and means for effecting a relative movement between said rotatable element and pawl to disengage the same at the completion of resetting and independently of a corresponding movement of said key.

3. In a counter, a denominational order counter unit having a driving member, a driven member including a number wheel, and clutch mechanism between said members including a ratchet carried by one member and a spring pressed pawl carried by the other member, said ratchet having spaced notches corresponding to the numeral positions on said number wheel and having in the spaces between the notches raised cam portions coacting with said pawl to cause the number wheel to rotate in a direction to permit the pawl to enter the nearest notch.

4. In a counter, a denominational order counter unit having a driving member, a driven member including a number wheel and a resetting pawl, and clutch mechanism between said members including a ratchet carried by one member and a spring pressed pawl carried by the other member for effecting step by step movement of said wheels from one numeral position to the next, an axial resetting shaft having a portion engageable with the resetting pawl to reset the same to zero upon a complete rotation

of said shaft, said ratchet having spaced notches corresponding to the numeral positions on its wheel and having in the spaces between said notches raised cam portions coacting with said pawl to cause said number wheel to rotate through an incompleting part of any wheel movement from one number to the next irrespective of the completion of a corresponding movement of said shaft.

5. The combination with a counter having operatively connected counter elements, of resetting mechanism therefor adapted to be locked during counting and unlocked for resetting, said mechanism including cooperating engageable resetting elements and a reset operating member, and mechanism for preventing fraudulent advancement of said resetting mechanism operative while said resetting mechanism is unlocked including means automatically operative following resetting rotation of said reset operating member for automatically disengaging said resetting elements.

6. The combination with a counter having operatively connected counter elements, of resetting mechanism therefor adapted to be locked during counting and unlocked for resetting, said mechanism including cooperating engageable resetting elements and a reset operating member rotatable in one direction to reset said counter elements, and mechanism for preventing fraudulent advancement of said resetting mechanism while said resetting mechanism is unlocked including means automatically operative following resetting rotation of said reset operating member for automatically disengaging said resetting elements, said means comprising cooperating members one of which is rotatable with said resetting mechanism, and means for automatically angularly relating said members following rotation of said operating member.

7. The combination with a counter having operatively connected counter elements, of a combined resetting and reset locking mechanism having a common reset operating and locking member and a cooperating member receiving the latter, and means governed by the operation of said first mentioned member for disconnecting the resetting connection to said counter elements and inhibiting advancement of any counter element by a blow on said receiving member when said mechanism is locked.

8. The combination with a counter having a resetting shaft and a plurality of operatively connected counter wheels separately rotatable on said shaft and having operative connections with said shaft during resetting, of reset locking means comprising a lock having a rotatable key receiving member operatively connected with said shaft and a key also constituting a reset operating member withdrawable in only one position of said shaft, and means for effecting relative movement between said shaft and said counter wheel to break said operative connections as said key is moved into the position in which it is withdrawable at the end of the resetting operation.

9. The combination with a counter having operatively connected counter elements, of combined resetting and reset locking mechanism having a common reset operating and locking member and a cooperating member receiving the latter, means for inhibiting advancement of any counter element by a blow on said mechanism when said mechanism is locked, and means inhibiting removal of said operating member to lock the counter following a blow on said mechanism capable of advancing any counter element when said mechanism is unlocked until said operating member has been moved through a complete resetting operation.

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