Jan. 10, 1956 C. W. BRAATZ 2,730,425

PRINTING COUNTER

Filed July 28, 1950 2 Sheets-Sheet 1

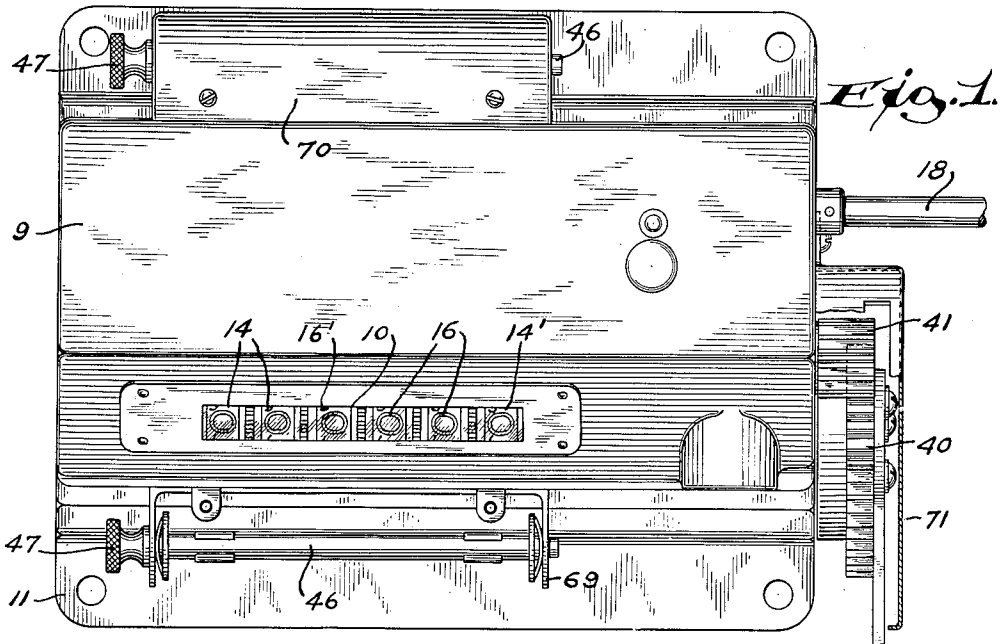


Fig. 1.

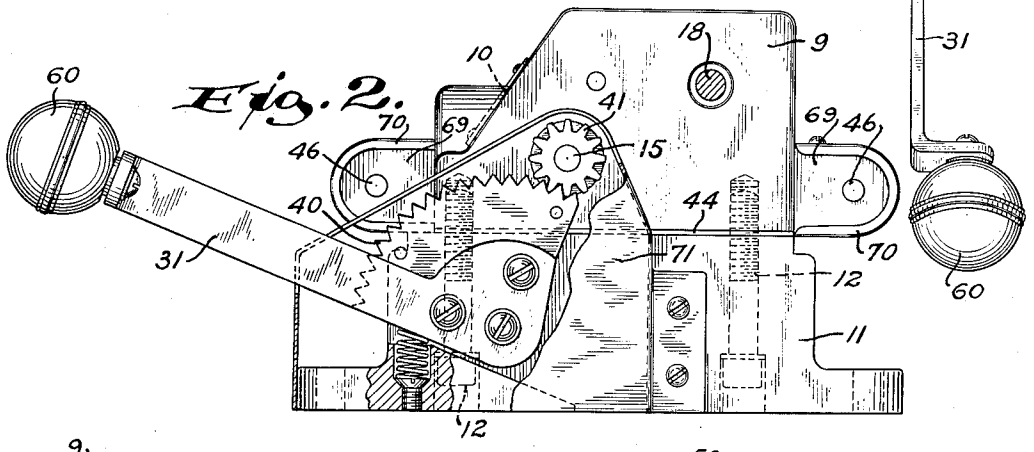


Fig. 2.

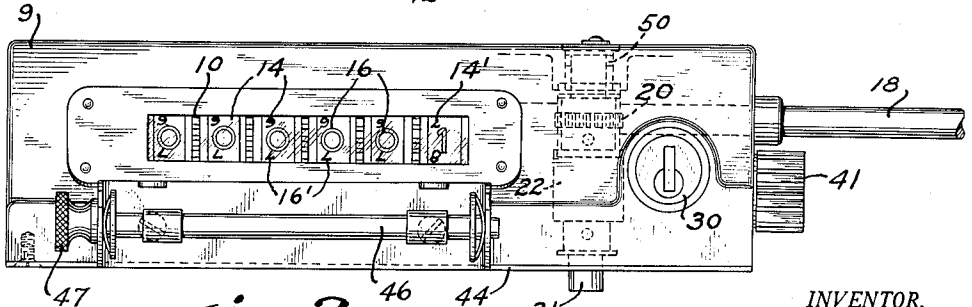


Fig. 3.

INVENTOR.
Clarence W. Braatz
BY
Lieber & Lieber
ATTORNEYS.

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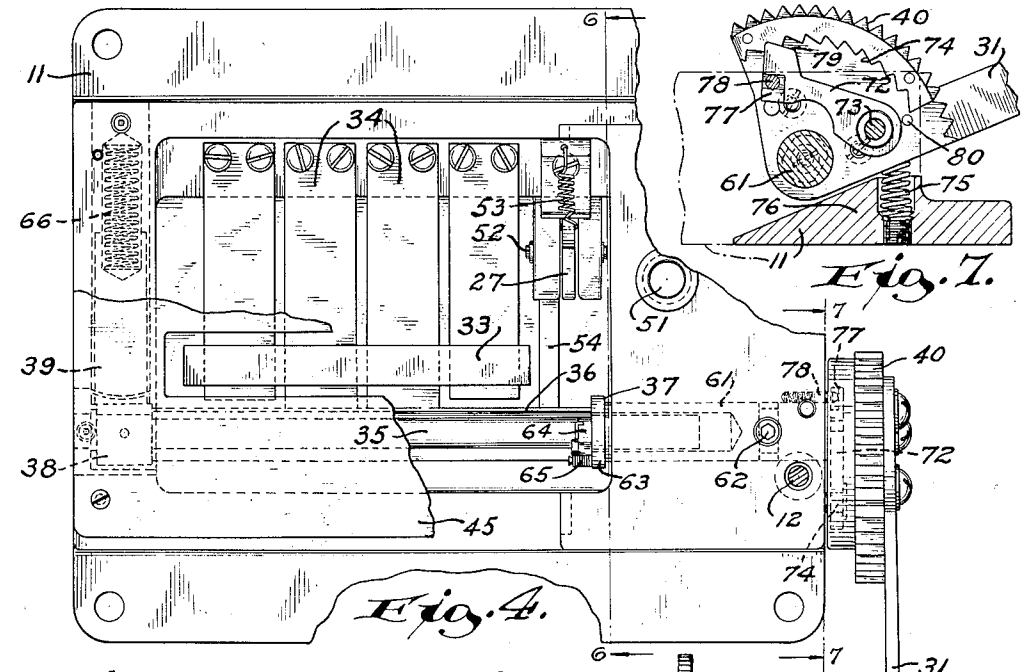


Fig. 4.

Fig. 7.

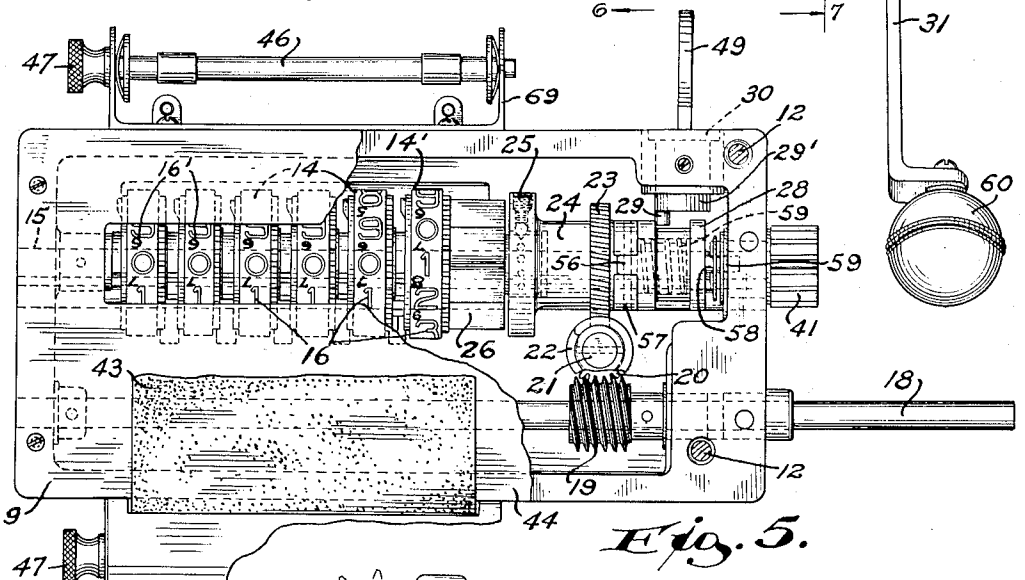


Fig. 5.

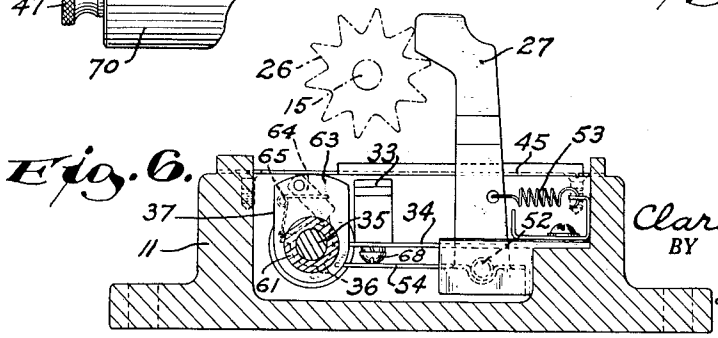


Fig. 6.

INVENTOR.
Clarence W. Braatz
BY
Lieber & Lieber
ATTORNEYS.

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2,730,425

PRINTING COUNTER

Clarence W. Braatz, Milwaukee, Wis., assignor to Durant Manufacturing Co., Milwaukee, Wis., a corporation of Wisconsin

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2 Claims. (Cl. 346—98)

This invention relates in general to improvements in the art of producing printed records of a continuous succession of events or performances; and relates more specifically to improvements in the construction and operation of automatic counters having mechanism associated therewith for periodically printing or otherwise recording the number of successive actuations of the counter by a machine or the like, upon a record sheet.

It frequently becomes desirable when counting and recording successive articles, events or performances with the aid of an automatic counter, to be able to obtain periodic accurate printed or similar recordings of the total count at predetermined intervals, without necessarily interrupting the continued operation of the counting mechanism and without permitting tampering so as to produce inaccurate totals. While counters have heretofore been provided with printing attachments for recording operating conditions, it was necessary with most of these prior recording devices, to at least momentarily stop the counter drive; while others of the previous count recorders would skip one or more counts at all speeds and could be tampered with so as to voluntarily produce inaccurate final results. The prior counting and recording assemblages therefore have not proven satisfactory where precision results are required at moderate or low speeds and could not be effectively utilized in such cases.

It is therefore a primary object of my present invention to provide an improved printing counter which obviates all of the above mentioned objections and defects, and which is adapted to function with utmost precision at moderate speeds and with greatest safety at all times.

Another important object of the present invention is to provide a continuously driven counter having a printing attachment adapted to effectively record total counts periodically at the will of an attendant.

A further important object of this invention is to provide an improved counting and recording unit which may be manipulated at intervals to produce sharp and legible printed impressions of count totals, without losing any counts or records of operation when operating at moderate or low speeds.

Still another object of the invention is to provide a tamper-proof counting and count recording assemblage in which the numeral wheels can be adjusted or reset only by authorized individuals.

An additional object of my invention is to provide an improved mechanism for counting successive events, performances or articles and for effecting periodical totalization and recording of the counts, which is simple, compact and durable in construction and highly efficient in operation, and which is moreover adapted for diverse uses.

These and other objects and advantages of the invention will be apparent from the following description.

A clear conception of the features constituting the present improvement, and of the construction and operation of a typical printing counter embodying the invention, may be had by referring to the drawings accompanying and forming a part of this specification wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is a top view of the assembled printing counter showing the printing and reset lever swung into its lowermost position, a portion of the recording ribbon housing having been omitted;

Fig. 2 is a side elevation of the completely assembled printing counter looking toward the printing and reset lever which is in normal lowermost position and having a portion of the guard casing broken away;

Fig. 3 is a front view of the upper casing section of the same counter having the front ribbon housing omitted;

Fig. 4 is a fragmentary top view looking into the lower casing section of the printing counter, showing a fragment of the record sheet supporting plate;

Fig. 5 is a bottom view looking into the top casing section of the counter unit showing a fragment of the recording ribbon and of the supporting plate therefor and also showing the clutch actuating key in inactive position as when being inserted or withdrawn;

Fig. 6 is a transverse section through the lower casing taken along the line 6—6 of Fig. 4; and

Fig. 7 is a fragmentary transverse section through the anti-cheat device of the unit, the section having been taken along the line 7—7 of Fig. 4.

The gist of my present invention is the provision of an improved printing and recording counter which will enable the owner to obtain accurate records of the performance of the machine or other equipment with which the counter is associated, and while a typical printing counter operable by a continuously revolving drive shaft has been shown and described it is not my desire or intention to unnecessarily restrict the utility of the improved features by virtue of this limited embodiment. It is also contemplated that specific descriptive terms used herein be given the broadest possible interpretation consistent with the disclosure.

Referring to the drawings, the typical printing counter shown therein, comprises in general a two part main frame or casing consisting of a top or upper section 9 having a window slot 10 therein, and a base or lower section 11 detachably secured to the upper section 9 by one or more normally concealed screws 12 and being separated from the major portion of the top section 9 by a horizontal gap; a counting unit mounted within the upper casing section 9 and consising of a series of coaxial wheels 14', 14 of successively higher order drivingly interconnected and rotatable about a normally stationary reset shaft 15, each of these wheels having two annular successions of ten peripheral and alineable numerals 16, 16' thereon; a constantly rotating drive shaft 18 journalled for rotation in the main casing and having a worm gear 19 secured thereto and coacting with a worm wheel 20 carried by a countershaft 21 having thereon a helical pinion 22 meshing with a helical gear 23 secured to a collar 24 which is drivingly connected to the numeral wheel 14' of lowest order by an overriding ball clutch 25 and a ratchet wheel 26 having a numeral alining pawl 27 coperable therewith; a jaw clutch member 28 slidable along the reset shaft 15 by an eccentric projection 29 formed on the cylinder 29' of a key controlled tumbler lock 30 to connect or disconnect the shaft 15 with respect to a reset lever 31; an impact platen 33 carried near the swinging ends of several parallel leaf springs 34 the opposite ends of which are mounted in the lower casing section 11, the platen 33 being projectable with considerable force toward the alined embossed numerals 16' of the wheels 14; a manually rotatable shaft 35 journalled for periodic rotation in the base section 11 and having an annular series of elongated radial projections 36 thereon cooperable with the extreme swinging ends of two of the springs 34, one end of the shaft 35

having a polygonal portion 38 coacting with a spring pressed plunger 39 and the other shaft end being drivingly connectable with the printing and reset lever 31 by means of a one-way clutch mechanism 37; a quadrant rack 40 carried by the lever 31 and coacting with a pinion 41 adapted to be drivingly connected to the reset shaft 15 by the jaw clutch member 28 when the lock 30 is actuated; and a carbon ribbon 43 adapted to be advanced through the gap between the frame sections 9, 11 and between upper and lower guide plates 44, 45 respectively which line this gap, by means of spools 46 rotatable by buttons 47.

The casing sections 9, 11 are formed of durable metal and the window opening 10 of the top section 9 is covered by a transparent window, while the cylinder lock 30 is provided with a key 49 which when withdrawn places the counting mechanism into normal counting condition as shown, but may be applied to the lock to effect printing and resetting of the numeral wheels 14', 14. In the counting wheel unit each wheel 14 is provided with one set of numerals 16 visible through the opening 10 whenever the corresponding embossed numerals 16' of the other set are in printing position. Each wheel 14 of higher order is automatically advanced by one-tenth of a revolution whenever the adjacent wheel of lower order completes a revolution, and the constantly rotating drive shaft 18 for the counter wheels 14', 14 may either be rotated continuously or by steps from any suitable source. This drive shaft 18 may be disposed either horizontally as illustrated, or otherwise, and the auxiliary motion transmitting shaft 21 which carries the worm wheel 20 and the helical pinion 22 has its upper end journalled in a bearing 50 in the top casing section 9 while its lower end is likewise journalled in a bearing 51 in the base section 11, see Figs. 3 and 4.

The helical gear 23 is fastened directly to one end of the collar 24 which is freely rotatable upon the reset shaft 15 and the opposite end of which is secured to the driving element of the overriding ball clutch 25; and the driven element of this clutch 25 is firmly attached to the ratchet wheel 26 which is secured directly to the numeral wheel 14' of lowest order and with the teeth of which the alining pawl 27 is cooperable as shown in Fig. 6. This pawl 27 is swingably mounted upon a pivot 52 within the base section 11 of the casing and is normally swung away from the ratchet wheel 26 by a tension spring 53, but the pawl 27 has a forwardly extending resilient arm 54 at its lower end which is cooperable with the successive radial projections 36 of the shaft 35 to swing the upper pawl end into the recess between the adjacent teeth of the wheel 26 whenever printing and resetting of the numeral wheels are about to be effected. In this manner, the pawl 27 functions to positively aline the lowermost numerals 16' of the wheels 14', 14 before each printing takes place, thus insuring the production of legible printed records.

The jaw clutch member 28 which is slidable along the reset shaft 15 by the eccentric projection 29 of the tumbler lock, has lugs 56 at one end constantly slidable within recesses in a disk 57 which is attached to the reset shaft by a transverse pin as illustrated in Fig. 5. The opposite end of the member 28 is provided with a single axially extending lug 58 which is adapted to enter a recess 59 in the adjacent end of the hub of the pinion 41 when the key 49 is applied to the lock and is turned to swing the tumbler projection 29 against the flange of the member 28 nearest to the lug 58, and the member 28 is constantly urged toward the right or active position as viewed in Fig. 5 by a spring 59. Whenever the key 49 is withdrawn and the counter is operating normally, the printing and reset lever 31 is normally swung down as in Fig. 2, and effects printing whenever it is swung upwardly, and the reset shaft 15 is freely rotatable in one direction without affecting the numeral wheels 14', 14, but when reversely rotated, as when the key 49 is applied and the lever 31 is swung downwardly after having been elevated, this shaft 15 functions to automatically return all of the numeral wheels to zero position.

As previously indicated, the quadrant rack 40 is rigidly attached as by screws to the printing and reset lever 31 the outer swinging end of which is provided with an actuating knob 60 while its opposite end is likewise connected to the one-way clutch 37 by a pivot shaft 61 journalled in the lower casing section 11 and normally retained in position by a set screw 62, see Fig. 4. The inner end of the pivot shaft 61 is hollow and has a flange 63 constituting a part of the clutch 37 attached thereto, and a pawl 64 pivotally mounted upon the flange 63 is adapted to coact with the extreme ends of the radial projections 36 formed on the shaft 35. The pawl 64 is pressed toward the shaft 35 by a spring 65 and the adjacent end of this shaft is journalled for rotation within the hollow end of the shaft 61. There are three radial projections 36 on the platen actuating shaft 35 and the polygonal end 38 is of triangular shape so that the adjacent end of the plunger 39 may flatly engage the successive faces of the polygonal whenever printing has been effected. The plunger 39 is slidably confined within the lower casing section 11 and is constantly urged toward the polygonal shaft end 38 by a stiff compression spring 66 so as to normally hold the shaft 35 against rotation, see Figs. 4 and 6.

The printing platen 33 which is firmly attached to the leaf springs 34 by screws 68, is adapted to be projected by these springs against the underside of a carbon ribbon 43 spanning the gap between the casing sections 9, 11 whenever the lever 31 has been pulled downwardly into its extreme position and is subsequently elevated, and a recording card or sheet should be inserted beneath the ribbon 43 before each recording is effected. The carbon ribbon supporting spools 46 which are operable by the buttons 47 are rotatable in brackets 69 secured to the upper casing section 9 at the opposite ends of the printing gap; and these brackets 69 may be housed within sheet metal closures 70 as shown. The quadrant rack 40 and the pinion 41 coacting therewith may also be enclosed within a housing 71 which is attached to the lower casing section 11 and also protects and conceals an anti-cheat device associated with the rack quadrant 40 secured to the lever 31.

This anti-tampering device is shown in detail in Fig. 7 and comprises a pawl 72 swingably suspended from the casing section 11 by a pivot 73 and which is cooperable with a series of internal notches 74 formed within the rack whenever the lever 31 is returned to normal position against a stop spring 75 carried by a lug 76 extending outwardly from the base section 11 of the casing. This spring 75 serves to prevent the numeral wheels 14, 14' from overthrowing during resetting operations. The side of the pawl 72 facing the casing section 11 is provided with a cam surface 77 adapted to be engaged by a retractable spring pressed pin 78 which is slidably confined in the end of the section 11, and a knock out pin 80 secured to the lever 31 is cooperable with the upper surface 79 of the pawl 72 when the lever 31 is swung upwardly and has completed a printing operation. With this assemblage of elements, the numeral wheels 14', 14 cannot be rotated manually while the lever 31 is being raised and before printing of the count has been effected by the platen 33, thus positively preventing cheating or inaccurate recording of the counts.

When the improved printing counter unit has been properly constructed and assembled as above described, it may be operated to normally count a succession of operations of a machine or the like, by connecting the drive shaft to the machine and withdrawing the key 49 from the lock. The drive shaft 18 may then be constantly rotated either continuously or by successive steps, to cause the numeral wheels 14', 14 to revolve and to accurately and automatically totalize the count. While the key 49 is thus removed and the counter is functioning

normally, the lever 31 may be swung upwardly from its normal position at any time to effect printing, but it will not reset the numeral wheels 14, 14' unless the key 49 is applied to actuate the lock 30.

If it becomes desirable to obtain a printed record of the total count, and to thereafter reset the numeral wheels 14', 14 to zero without disconnecting the drive or necessarily losing a count, a record card should be inserted and the key 49 may be applied to the tumbler barrel 30 of the lock and turned so as to cause the projection 29 to shift the clutch member lug 58 into engagement with the notch 59 of the pinion hub, thereby drivingly connecting the pinion 41 with the reset shaft 15. The lever 31 should then be swung downwardly after printing until the coil spring 75 has been contacted whereupon the pin 78 will snap the pawl 72 into normal engagement with the teeth 74 and the pawl 64 of the one way clutch 37 will also be snapped into engagement with one of the projections 36 of the printing shaft 35. While this downward swinging of the lever 31 will reset the counting wheels 14', 14 to zero, these wheels will promptly continue to add counts after resetting has been effected.

However, when the lever 31 is subsequently elevated, the pawl 64 will press against the adjacent radial shaft projection 36 and will turn the shaft 35 thereby causing another of the projections 36 to bend and stress the leaf springs 34 and to pull the platen downwardly. Simultaneously with this action, the plunger 39 will be pushed against the stiff spring 66, and the pawl 27 will also be forced into the adjacent peripheral recess of the ratchet wheel 26 so as to perfectly aline the lowermost alined printing numerals 16' of the wheels 14', 14, such alinement being permitted by the overriding ball clutch 25. As the upward swinging motion of the lever 31 is continued, the active projection 36 of the shaft 35 will suddenly be released from the ends of the two central leaf springs 34 and will permit these springs to project the platen 33 against the underside of the record card, thereby causing the embossed numerals 16' to print a perfect record of the total count upon the record card inserted beneath the ribbon 43 and these numerals. Simultaneously with this release of the platen, the adjacent projection of the shaft 35 will coact with the arm 54 and will swing the pawl 27 into the recess between the adjacent teeth of the wheel 26, thereby insuring perfect alinement of the lowermost printing numerals 16'.

After a printing has been thus completed, the plunger 39 will become active to again hold the shaft 35 fixed against rotation, and each upward movement of the lever 31 will automatically effect printing while each downward motion thereof when the key 49 has been applied and turned will reset all of the numeral wheels 14', 14 to zero through the rack 40 and pinion 41. The completion of this resetting downswing of the lever 31 also causes the retractable pin 78 to effect contact of the pawl 72 with the teeth 74, and restores the entire counter to normal starting position. If the drive shaft 18 continues to rotate slowly while a printed record is being obtained and the numeral wheels are being reset, these wheels 14', 14 will continue to function without losing any counts, and the key 49 should be promptly withdrawn from the lock after each manual printing and resetting operation.

From the foregoing detailed description of the construction and operation of my improved mechanism, it will be apparent that I have provided a printing counter unit which besides being simple and compact in construction, is also highly efficient and accurate in operation. When finally installed, the base section 11 of the casing should be firmly attached to a support so as to conceal the screws 12, but when removed from such support, all elements of the assemblage are readily accessible for inspection. The various parts of the unit may be manufactured at moderate cost and easily assembled or dismantled, while also being well protected against damage and tampering if the key 49 is in trustworthy hands. The ribbon 43 should be slightly advanced after each printing with the aid of the buttons 47 and rollers 46, and the various clutches and safety devices insure most accurate recording. It is also notworthy that the numerals 16 which are visible through the opening 14, correspond with the numerals 16' presented to the printing platen 33, due to the staggering of the two sets.

The single lever 31 cooperates with the key actuated lock to effect both printing and resetting with a single stroke when retsetting is desired. The tumbler lock serves to drivingly connect this lever 31 with the reset shaft 15 whenever resetting of the numeral wheels is to be accomplished, but successive printed records may also be obtained without necessarily resetting the counter or using the key 49. In such cases the printed records will merely appear as successive totals of the counts, and in any event, the alining pawl 27 will function to properly aline the numerals 16' before each printed record is made. The pawl 72 which coacts with the teeth 74 whenever the lever 31 is elevated for printing, positively prevents unauthorized shifting of the numeral wheels 14', 14, and the one-way clutch 37 provides a simple but effective driving connection between the lever 31 and the printing shaft 35. The construction of the counter is also simplified by providing each wheel 14, 14' with two sets of numerals 16, 16' since it avoids necessity of using two sets of these wheels. The improved counter has proven highly successful and effective in actual use and may be utilized for diverse recording purposes.

It should be understood that it is not desired to limit this invention to the exact details of construction and operation of the printing counter herein specifically shown and described, for various modifications within the scope of the appended claims may occur to persons skilled in the art.

I claim:

1. In a printing counter, a series of coaxial wheels of successively higher order each having a like series of peripheral numerals, a normal fixed reset shaft rotatably supporting said wheels, a constantly revolving driving member for rotating said wheels about said reset shaft, means for positioning a recording sheet adjacent to alined numerals of said wheels, a platen for delivering a recording blow against said sheet in opposition to said alined numerals, a pinion mounted upon said reset shaft, a clutch operable to drivingly connect said pinion with said shaft to reset said wheels, a platen actuating shaft having thereon a rack provided with an arcuate series of external teeth meshing with said pinion, said rack also being provided with an arcuate series of internal notches, a fixedly pivoted pawl cooperable with said notches, and a lever for oscillating said platen actuating shaft and said rack to produce printed records and to also reset said wheels through said pinion and said clutch without interrupting the rotation of said driving member, said pawl being cooperable with said notches during oscillation of said lever to positively prevent rotation of said numeral wheels independently of said driving member.

2. In a printing counter, a series of coaxial wheels of successively higher order each having a like series of peripheral numerals, a normally fixed reset shaft rotatably supporting said wheels, a constantly revolving driving member for rotating said wheels about said reset shaft, means for positioning a recording sheet adjacent to alined numerals of said wheels, a platen for delivering a recording blow against said sheet in opposition to said alined numerals, a pinion mounted upon said reset shaft, a rotary platen actuating shaft having thereon a rack provided with an arcuate series of external teeth meshing with said pinion and also being provided with an arcuate series of internal notches, a fixedly pivoted pawl cooperable with said notches, means cooperating with said pawl and with said numeral wheels for positively preventing rotation of the latter independently of said driving member, and a lever for oscillating said platen actuating shaft and said rack to

produce printed records and to selectively reset said wheels through said pinion without interrupting the rotation of said driving member.

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