Nov. 29, 1938. E. WILD 2,138,480

REGISTERING AND RECORDING MECHANISM

Filed Jan. 31, 1936 4 Sheets-Sheet 1

Fig. 1

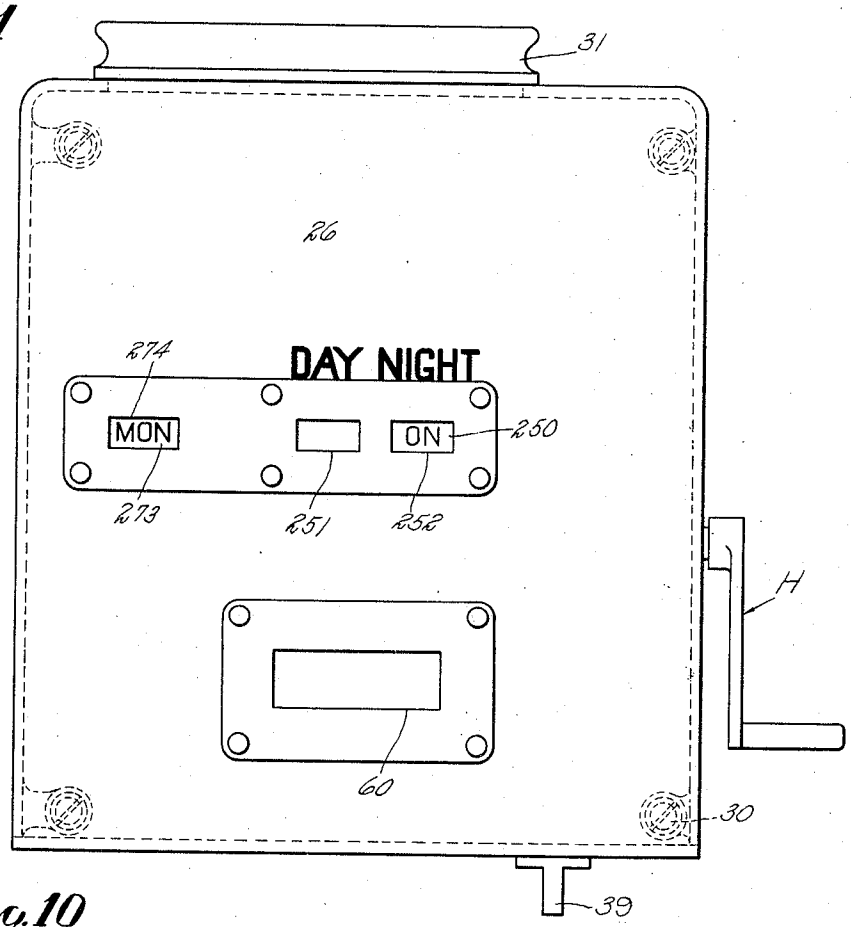
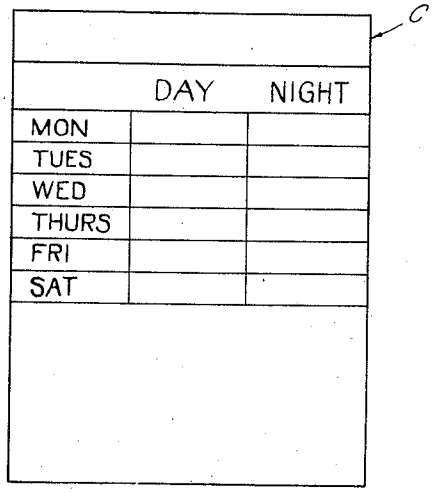


Fig. 10



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REGISTERING AND RECORDING MECHANISM

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Fig. 2

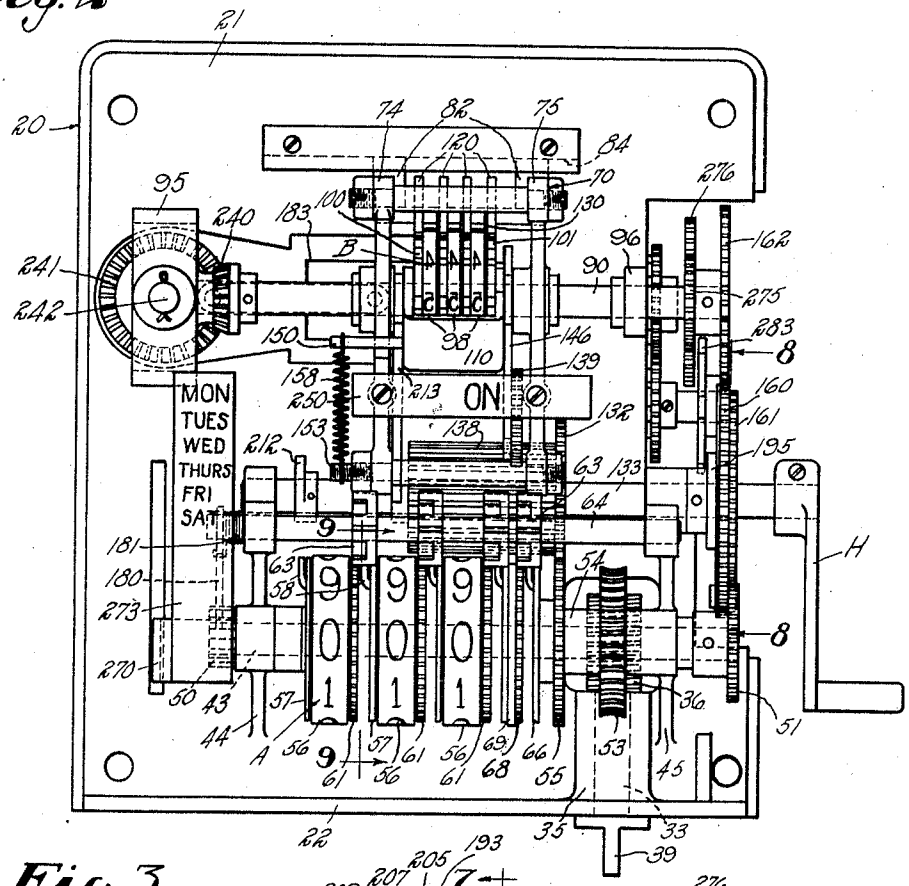
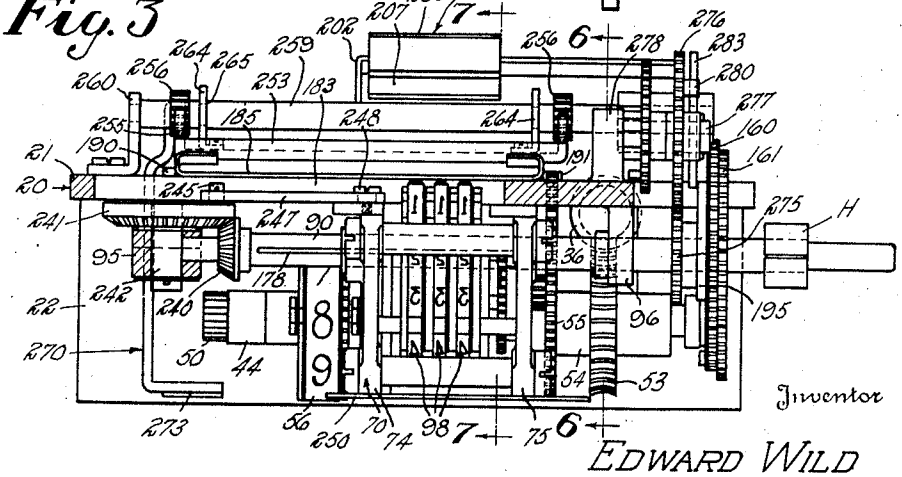


Fig. 3



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REGISTERING AND RECORDING MECHANISM

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Fig. 4

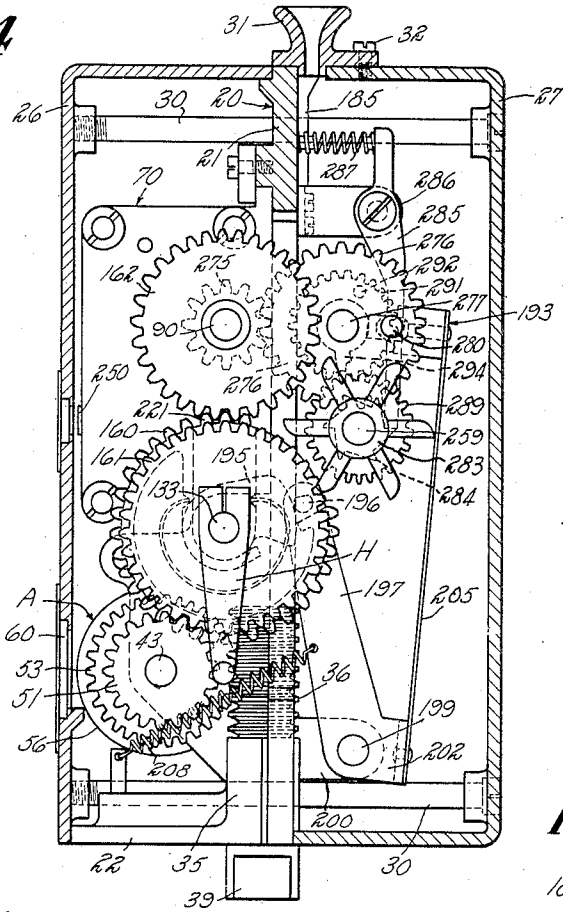


Fig. 5

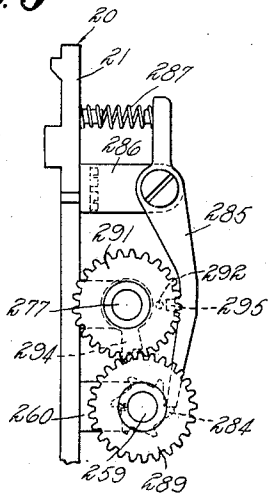
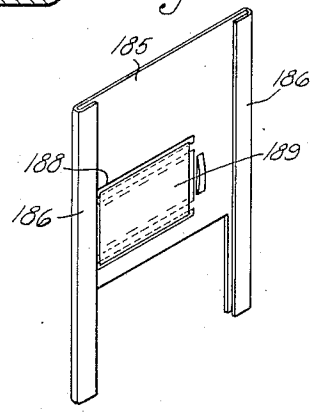


Fig. 11



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REGISTERING AND RECORDING MECHANISM

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Fig. 6

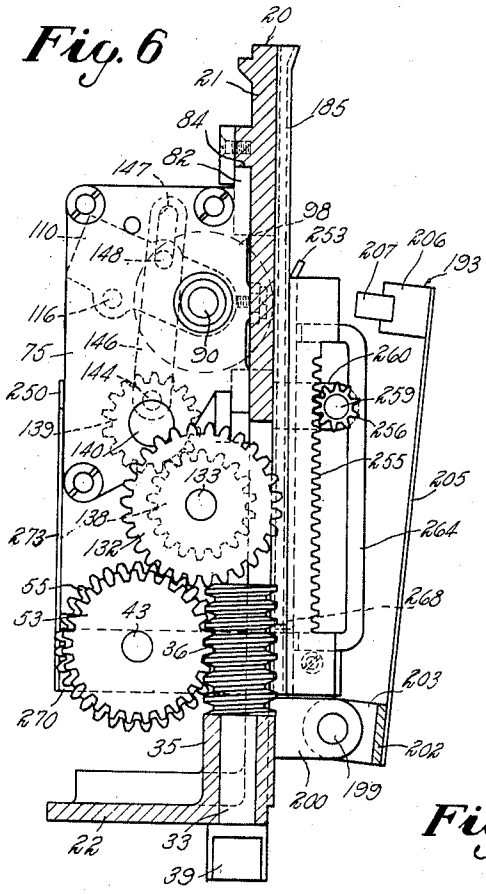


Fig. 7

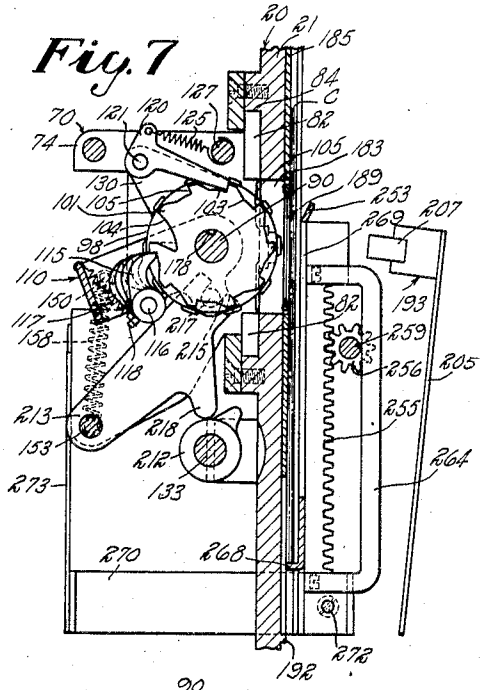


Fig. 8

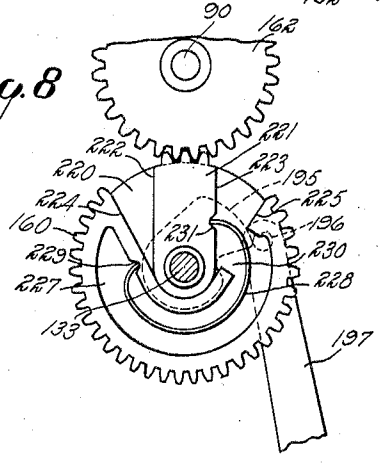
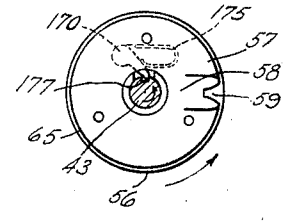


Fig. 9



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UNITED STATES PATENT OFFICE

2,138,480

REGISTERING AND RECORDING MECHANISM

Edward Wild, Hartford, Conn., assignor to Veeder-Root Incorporated, Hartford, Conn., a corporation of Connecticut

Application January 31, 1936, Serial No. 61,714

18 Claims. (Cl. 234—2)

This invention relates to counting devices and, more particularly, to a combined resettable registering and recording counting mechanism adapted to print successive count records in predetermined positions on the same card.

As the description proceeds, it will be appreciated that mechanisms embodying the present invention may be employed in various fields for registering and for recording in tabulated form various operations, functions, or amounts successively performed, the several recorded amounts being segregated into groups as desired depending upon predetermined factors such as the period of time or intervals. As one instance of the use to which the present invention may be applied, reference is herein made to the registering and recording of the number of picks of a loom, the picks being recorded at the completion of each shift, for example, at the completion of each day's work and each night's work, the day shift items being printed in one column upon a suitable card, and those of the night shift in another column. It is, of course, understood that this specific disclosure is by way of illustration only.

An aim of this invention is to provide an improved counting apparatus arranged to indicate the number of repetitive cycles of operation of a device and to produce a printed record in accordance therewith at the termination of each counting operation, said record being arranged to show several successive counting operations.

A further aim of the present invention is to provide an improved apparatus of the character described having a visible counter and a recording print counter operated in timed relation to each other and a resetting mechanism operable at the will of the machine operator to first provide a printed record of the number of cycles of a machine and thereafter reset both counters to initial zero starting positions preparatory to the next counting cycle.

To the accomplishment of these and other objects which will be apparent to those skilled in the art from the ensuing description and the appended claims, the present invention resides in the unique construction and combination of members which provide a novel type of counting mechanism including a simultaneously actuated visible counter and a print counter arranged to be manually reset to initial zero positions at the will of the operator and preferably at the termination of his period of work, said resetting mechanism being so devised that during its initial movement the count is recorded in successive predetermined positions on a card whereby an accurate tabulated record is kept of several successive counting operations.

Referring to the drawings, wherein is illustrated one embodiment of this invention and wherein like numerals indicate like parts:

Figure 1 is a front elevation of the counting device as employed for a pick counter on a loom or other similar purpose;

Fig. 2 is a front elevation of the invention with the protective covers removed and showing the various operative parts;

Fig. 3 is a plan view of the invention with the covers removed;

Fig. 4 is a right-hand side elevation of the invention with the protective covers broken away to show the operative mechanism;

Fig. 5 is a fragmentary view illustrating part of the record card positioning mechanism;

Fig. 6 is a sectional view taken substantially along the line 6—6 of Fig. 3 and illustrating the printing mechanism;

Fig. 7 is a fragmentary sectional view taken substantially along the line 7—7 of Fig. 3 and illustrating the mechanism employed to bring the print wheel of lowest order into proper register in the event that it is not correctly set just prior to the printing operation;

Fig. 8 is a fragmentary view taken substantially along the line 8—8 of Fig. 2;

Fig. 9 is a view taken substantially along the lines 9—9 of Fig. 2;

Fig. 10 illustrates one type of recording card which may be employed with the present invention; and

Fig. 11 shows the card holder and printing ribbon.

As illustrated, one embodiment of my invention may comprise a frame member, generally indicated at 20, having an upright portion 21 and a base portion 22 adapted to be supported on a loom or other suitable mechanism by convenient clamping devices. The marginal edges of the upright portion 21 may be rabbeted to receive the respective front and rear protective covers 26 and 27 suitably secured in position as by means of bolts 30. These covers fit tightly against the frame 20 to protect the mechanism therein and prevent dirt and other foreign matter from getting into the operative parts. As will be later described, the front cover has windows therethrough whereby certain indicating devices may be viewed; and the rear cover has an upper slot therethrough adapted to receive a record card guide member 31 provided with a bell-mouthed

slot therethrough and secured in position by screws 32.

As herein illustrated, the present invention comprises, generally, a visible count register A, a printing register or counter B which is operated in cyclic relation therewith and arranged to record the same count as indicated by register A on a suitable record card C insertable through the slotted member 31, and a resetting mechanism operated by a handle H which is so constructed that during the initial operation of handle H, the count record will be printed, and further movement of handle H will serve to reset both counting devices A and B to initial zero positions as well as to shift the record card and print counter to other predetermined positions preparatory to printing the next record.

In the form of my invention as herein illustrated, the counting mechanism is intended to be reset at the end of each successive period or predetermined interval of time, such, for example, as the end of each operator's shift. In the present illustrated disclosure, the counting mechanism is reset at the termination of each day's work and thereafter reset the next time at the termination of the following night's work. The resetting movement of handle H also serves the further purposes of laterally shifting the print counter B from a day recording to a night recording position, and vice versa, on card C, and of lifting the card a predetermined extent on alternate resetting operations so that the successive printed records will be tabulated in predetermined previously labelled positions. At the termination of Saturday night's work, the card bearing the complete week's record may be removed, and the next resetting operation of handle H to initially locate the count mechanism for the following week serves to drop the card positioning means again to its starting position whereby a new card inserted therein will have the Monday record printed thereon in the required position.

The registering counter A and the recording print counter B are simultaneously operated by the same driving mechanism and at the same rate so that they will each indicate the same count. Any suitable driving mechanism may be employed for this purpose, and, in the present instance, it comprises a vertical drive shaft 33 journalled within a bearing 35 of the frame adjacent to the junction of upright portion 21 and base portion 22. Shaft 33 has a worm 36 integrally secured to its upper end, and a driving tongue 39 at its lower end. The tongue is adapted to slidably fit within a suitable driving head to cause rotation of worm 36. It will be appreciated, however, that tongue 39 may be replaced with any suitable driving connection, and it is not intended that this invention be limited to the particular construction shown.

Count mechanism A is supported on a shaft 43 journalled in the brackets 44 and 45 which laterally extend from the upright portion 21 of frame 20. Fixed to the opposite ends of the shaft 43 are a ratchet member 50 and a gear 51. The purposes of the ratchet and gear will be later described, but they also serve to cooperatively engage the respective brackets 44 and 45 to axially locate the shaft 43 and prevent any sliding movement thereof. Worm 36 is in continuous enmeshed relation with a worm wheel 53 journalled for free rotation on shaft 43 adjacent to bracket 45 and having a hub 54, at the other end of which is secured a gear 55 arranged to transmit rotation through associated mechanism to the print counter, as will be later described.

Referring in detail to the resettable count register A, the same includes a plurality of (in the present instance three) adjacent freely rotatable count wheels 56 journalled on shaft 43 and each having uniformly spaced numerals running consecutively from "0" to "9". These wheels are arranged to be cooperatively rotated and perform a consecutive counting operation through the instrumentality of an intermediate transfer mechanism of the general type disclosed in the United States Patent to Orme, No. 368,163 issued August 9th, 1887. As shown in Figs. 2 and 9, the left-hand side of each wheel 56 has a disk 57 integrally secured thereto and having a laterally extending offset lip 58 provided with two gear teeth having a notch 59 therebetween. The right-hand side of each wheel 56 is provided with a coaxial driving gear 61 suitably ratchet connected thereto and journalled on shaft 43 so that the count wheels may be operatively driven only in a registering direction, and a resetting movement of the wheels, which will be later described, will not be transmitted to the driving mechanism. A plurality of transfer pinions 63 journalled on an intermediate shaft 64 are so arranged that a pinion is located between each pair of adjacent count wheels. These pinions are provided with alternately disposed wide and narrow teeth. Both the wide and narrow teeth are enmeshed with an arranged to transmit rotation to gears 61, and the wide teeth are adapted to slidably lock against the peripheral faces 65 of disks 57 except at such times as when an intervening narrow tooth is periodically engaged by the laterally projecting lip 58 of the wheel or member of next lower order and causing a wide tooth to enter notch 59, thereby transmitting a partial rotation to the count wheel of next higher order. It will thus be appreciated that each transfer movement results in a partial rotation of the intermediate pinion, and, in the present showing, each complete rotation of the member of lower order serves to cause a tenth rotational movement to the adjacent member of higher order. As shown in Fig. 1, a suitably located window 60 is provided in the front of cover 26 whereby the registrations of wheels 56 may be easily read.

The extreme right-hand or lowest order count wheel 56, as viewed in Fig. 2, is rotatably connected to gear 55 by means of a suitable speed reducing mechanism which, in the present instance, comprises a plate 66 secured to gear 55 and arranged to periodically transmit a partial rotary movement to a gear 68 journalled on shaft 43 through a transfer pinion 63 in the same manner as described with reference to the adjacent count wheels 56. Gear 68 is further provided with a plate 69 secured thereto and similar in construction to plate 66 and connected to periodically and partially rotate gear 61 of the lowest order wheel 56 through a transfer pinion 63 in the same manner as previously described. It will be appreciated, of course, that any suitable speed reducing mechanism may be employed between shaft 33 and the count wheel of lowest order or such a mechanism may be dispensed with without deviating from the scope of this invention.

Referring in detail to my print recording device B, there has been provided a laterally movable carriage 70 having side plates 74 and 75 secured in spaced relation to each other by suit-

able cross members. These side plates terminate in substantially vertically projecting feet 82 slidably mounted in laterally extending tracks 84 secured to upright 21. Carriage 70 is arranged to be laterally moved within its guiding tracks in timed relation to the resetting operation, as will be later described. A transverse shaft 90 slidably and rotatably passes through side members 74 and 75 and is rotatably supported at its ends within laterally projecting brackets 95 and 96 of frame 20, and a plurality of adjacent print wheels 98 corresponding in number to the registering wheels 56 are located within carriage 70 and rotatably and slidably supported on shaft 90. Each of these print wheels is provided with a series of raised type numerals in spaced relation thereon running consecutively from "0" to "9" and adapted to register in duplicate relation to count wheels 56.

A toothed operating member, such as a ratchet wheel 100, is secured to the left-hand side of each print wheel for rotation therewith, and a similar toothed operating member 101 is located at the right-hand end of the count wheel assembly, as shown in Figs. 2 and 7, and journalled for individual free rotation on shaft 90. Each of these ratchet members is provided with a plurality of peripherally spaced notches 103 located in corresponding spaced relation to the numerals on a print wheel, and one of said notches 104 is much deeper than the other notches to aid in the operation of a transfer mechanism which will be hereafter described. A suitable transfer mechanism is arranged to periodically and selectively engage one or more pawls, as may be required, within notches 103 and 104 and against substantially radial shoulders 105 at the side of each notch whereby the print wheels may be rotated in timed relation to count wheels 56. To accomplish this, a substantially U-shaped or yoked member 110 is provided with its arms straddling the print wheel assembly and journalled for free pivotal movement at their inner ends on shaft 90. A pawl member 115, having a plurality of spaced inwardly projecting fingers, each of which is arranged to engage within the successive notches in a respective ratchet wheel, is supported for free pivotal movement on a short shaft 116 mounted within the yoke 110.

As shown in Fig. 7, I have provided the same number of spaced fingers and in the same relative spaced relation as the ratchet wheels so that each finger will be in a position whereby it may engage the shoulders 105 of its respective ratchet wheel. These fingers project inwardly in consecutive stepped relation to each other and are urged into ratchet wheel engagement by means of a coiled spring 117 tensioned between member 110 and a pin 118 mounted in pawl member 115. In the counting registration of the print wheels, member 110 is periodically rocked upwardly about shaft 90. During each upward movement of the transfer mechanism, the right-hand and most inwardly projecting pawl, as viewed in Figs. 2 and 7, will engage successive shoulders 105 of ratchet wheel 101 until it drops within the deep groove 104, at which time the pawl assembly 115 will be free to rock further inward, and the second pawl will then be moved into registering engagement with one of the shoulders 105 of the ratchet wheel 100 connected to the print wheel 98 of lowest order. In view of the fact that there are ten of these notches in each ratchet wheel and one of them is a deep notch, it will be appreciated that for each complete rotation of the ratchet wheel of lower order, the next left ratchet wheel and associated print wheel of higher order will be rotated a tenth of a revolution, thereby transferring a consecutive count registration to the print wheels.

To prevent backward movement of the print wheels and improper registration thereof, I have further provided a suitable ratchet locking mechanism wherein a plurality of spaced pawls serve to prevent any reversed rotation of the print wheels as occasioned by the friction of pawl assembly 115 against ratchet wheels 100 and 101 during the outward rocking movement of member 110. To accomplish this, a plurality of duplicate pawls 120 are individually journalled in spaced relation upon a transverse pin 121 supported in the side plates 74 and 75 of carriage 70. Each of the pawls 120 is arranged to abut against a shoulder 105 and is urged into ratchet wheel engagement by means of a coiled spring 125 secured under resilient tension between the pawl and a pin 127 transversely mounted in the carriage. To guide the movement and aid in laterally locating each of the pawl fingers of member 115 as well as each of the pawls 120 so that they may only engage their respective ratchet wheels, a plurality of guide plates 130 are provided and arranged to extend from shaft 121 between each print wheel and the adjacent ratchet wheel.

As previously stated, my driving mechanism simultaneously causes a duplicate registration of count wheels 56 and print wheels 98. To accomplish this and yet permit lateral movement of carriage 70 and its associated print wheel mechanism, gear 55, mounted on shaft 43 and actuated by drive shaft 33, worm 36, and worm wheel 53, is maintained in continuous enmeshed relation with a gear 132 which is arranged for free rotation upon a shaft 133 having the reset handle H clamped to its outer end and rotatably journalled within the respective brackets 44 and 45. Secured to gear 132, I have provided a coaxial elongated drum gear 138 in constant enmeshed relation with a print wheel driving gear 139 journalled upon a laterally projecting stub shaft 140 rigidly secured to side plate 75 of carriage 70 and adapted for lateral slidable movement therewith while in driven engagement with gear 138. Gear 139 has an eccentrically mounted pin 144 to which is connected a link 146 having a slot 147 at its upper end adapted to slidably engage a pin 148 laterally projecting from member 110.

Yoke member 110 is further provided with a laterally protruding pin 150 to which is connected a coiled spring 158 anchored at its lower end to a pin 153 projecting from the carriage. It will thus be appreciated that tensioned spring 158 tends at all times to urge yoke member 110 downwardly and outwardly and to urge pin 148 towards the bottom of slot 147 except at such times as when yoke 110 is pivotally lifted by other mechanism which will be later described. The various driving gears are so chosen with relation to each other that gear 139 will be rotated at such a rate as to cause link 146 to periodically actuate yoke member 110 and provide a duplicate registration of the print wheels at the same time that visible count wheels 56 are operated. It will be noted that any lateral movement of the carriage 70 cannot disturb this count registering operation of the print wheels since gear 139 is mounted in continuously driven but slidable re-

lationship with gear 138, and print wheels 98 and their associated ratchet wheels are freely slidable on shaft 90.

Handle H is gear connected through adjacent concentric gears 160 and 161 secured to shaft 133 to transmit rotation to gears 162 and 51 respectively secured to the ends of shafts 90 and 43. It will thus be appreciated that rotation of shaft 133 by means of handle H will serve to cause rotation of shafts 90 and 43 which in turn are arranged to engage and reset the print wheels 98 and registering count wheels 56 to initial zero positions.

As shown in Fig. 9, each of the counting wheels 56 is provided with a reset pawl 170 which is urged into operative engagement with shaft 43 by means of a spring 175. Shaft 43, as is usual in resettable count wheel mechanisms, is provided with an elongated keyway or slot 177 engageable with pawls 170 when the shaft is rotated by means of handle H and as shown in Fig. 9. It will be appreciated, of course, that during a counting operation, shaft 43 is maintained immovable, and the count wheels are each operated through the instrumentality of the driving mechanism and transfer mechanism in a direction as indicated by the arrow in Fig. 9 so that pawl 170 will not operatively engage with slot 177 when it drops therein, but will be free to slide out of said slot and not impede the operative count wheel registration.

During the resetting rotation of shaft 43, which is in the direction indicated by the arrow thereon in Fig. 9, each of the pawls 170 associated with one of the count wheels 56 will be positively engaged by a side face of slot 177, and the wheels will be rotated thereby. Due to the ratchet connections between gears 61 and their respective count wheels, the resetting movement imparted to the wheels 56 will not impart rotation to gears 61 and their associated driving mechanism. The pawls are so positioned with respect to the count wheels that upon completion of the resetting operation, when shaft 43 is brought to the position illustrated in Fig. 9, each of the count wheels will lie in a zero starting position. Shaft 90 is similarly provided with an elongated keyway 178 corresponding to keyway 177 of shaft 43, and each of the print wheels 98 is provided with a movable pawl arranged to engage therein in the same manner as is employed for my count wheels 56 and illustrated in Fig. 9. To save duplication of illustration, it is not deemed necessary to show this feature in the drawings. An improper resetting operation of the various count wheels, as might be caused by a possible backward movement of resetting handle H, is prevented by means of a pawl 180 journalled on the intermediate shaft 64 and urged into operative locking engagement with the teeth of ratchet 50 by means of a spring 181.

In order to provide a printed record on card C, an aperture 183 is provided through the frame 20 so that the print wheels 98 may radially project therethrough and have their registering type numerals record on the card through the medium of an ink impregnated flexible ribbon. As shown particularly in Fig. 11, I have provided a card holder 185 formed from sheet metal and having two folded over end portions 186 arranged to slidably receive and guide the edges of card C therein without interfering with the printing operation. Intermediate of the ends of the holder and substantially centrally thereof, I have provided an aperture 188 having an ink impregnated print ribbon 189 suitably secured therein, as by means of outwardly extending fingers of said holder engaging within sleeve portions of the ribbon. Card holder 185 is arranged to slidably and removably fit between a pair of laterally projecting ribs 190 and 191 of the frame and is located at its lower end by an outward frame projection 192. The ribbon 189 is so positioned within card holder 185 that substantially the central portion thereof will always lie adjacent to the registering portion of the print wheels but in slight spaced relation therefrom so that the card holder may be vertically slid from or into position when desired, and ink will not be smeared upon the wheels during their rotation.

To provide the desired printing operation upon card C, I have so constructed my device that a cam operated mechanism will throw a platen 193 into sudden engagement with the back of the card opposite the type wheels and thereby quickly deflect that portion of the card to be printed and cause the ribbon to be momentarily clamped between the card and the type wheels. This printing operation is so timed as to occur during the initial movement of handle H but before any resetting operation of type wheels 98. To accomplish this, a cam 195 is fastened to shaft 133 and arranged to engage a pin 196 protruding from the upper end of an arm 197 journalled on a shaft 199 supported in spaced brackets 200 extending rearwardly from upright 21. The lower end of arm 197 has a laterally extending portion 202 journalled on shaft 199. Platen 193 is fastened to the top of an upwardly extending somewhat resilient arm 205 rigidly mounted at its lower end on portion 202. My platen may also include a striking block 207 made of leather, or other slightly deformable cushioning material, to aid in providing a uniform printing operation.

As illustrated in Fig. 4, cam 195 is maintained in constant slidable engagement with pin 196 by means of a coiled spring 208 tensioned between arm 197 and a pin mounted on the frame. Cam 195 is so shaped that as it is rotated in a counter-clockwise direction (Fig. 4) during the initial movement of handle H, arm 197 is swung outwardly away from shaft 133 until pin 195 engages the high point of said cam, as shown in Fig. 8. Adjacent to said high point, the cam has a substantially radial portion so that a further counter-clockwise cam movement permits pin 196 and platen 193 to quickly swing inwardly towards shaft 133 as urged by spring 208, thereby causing the platen to be suddenly and violently thrown against the back of card C, resulting in a printing operation. Cam 195 is so shaped that this operation occurs momentarily and periodically once during the first part of each rotation of handle H, and, consequently, a printing operation is performed on card C during the initial movement of each resetting operation. It will be understood, of course, that cushioning block 207 is so positioned relative to type wheels 98 that it only strikes against that portion of the card aligned with the registering numerals on the type wheels, and block 207 normally remains away from the card.

In view of the fact that the resetting operation, as controlled by handle H, may be operated when the registering wheel 56 of lowest order is in an intermediate position between two digits, and since the print wheels 98 are arranged through the instrumentality of their associated driving mechanism to register in identical relation to count wheels 56, I have provided a further mech-

anism so that the print wheel of lowest order will be automatically moved through a sufficient extent to be brought to print registering position just prior to the printing operation in the event that it does not already lie in printing position. It will be appreciated that if a mechanism for this purpose were not provided, occasionally the resetting operation would be actuated when print wheel 98 of lowest order lay in an inbetween position, and the ensuing print on record card C would not provide a legible record of the numeral of lowest order. To assure this proper registration, shaft 133 supports a pair of spaced similar cams 212 for rotation therewith. As will be later described, carriage 70 is arranged to be located at an extreme right-hand position, as shown in Fig. 2, to provide a recording for the night operation of my machine, and in a correspondingly extreme left-hand position (not shown) to provide a recording of the day operation of the machine so that the correct recordings will be respectively printed in the "Day" and "Night" columns on card C. The cams 212 are so located that one of them will serve to bring the print wheel 98 of lowest order into print recording position when the carriage is in one or the other of the above noted positions.

As shown in Fig. 7, pin 153 has a lever 213 journalled at its lower end for pivotal movement thereon, and the upper end of the lever is provided with a slotted portion 215 slidably and rotatably engageable with a laterally projecting stud 217 mounted in a depending portion of a side arm of yoke 110. Intermediate of the ends of lever 213 is a depending portion 218 having a rounded end adapted to be engageable with the protruding nose of one of the cams 212. In the event that one of the numerals on the print wheel 98 of lowest order does not lie in the exact registering position required to provide a printing operation, cam 212, as rotated by handle H, will engage depending portion 218 and impart an upward rocking movement to lever 213, resulting in an upward movement of yoke 110, which in turn will cause pawl member 115 to move the print wheel of lowest order to proper printing position. It will be appreciated, of course, that this operation will only occur when the pawl associated with ratchet wheel 101 is in a position to drop into the deep notch 104, and it will further be noted that in the event that the driving mechanism has stopped its rotation at a point wherein yoke member 110 has been moved to its uppermost point, having just caused a registration of print wheel 98 of the lowest order, the engagement of pin 217 within slot 215 will serve to lift yoke 110 and the depending portion 218 out of engagement with one of the pawls 212, and hence no further movement will be imparted to move a print wheel at this time.

As previously stated, my apparatus is so constructed as to cause a printed recording on card C only during the initial movement of handle H and before the print wheels are engaged by shaft 90 for a resetting operation. To accomplish this feature, gear 160, as shown in Fig. 8, is formed as an arcuate segment having an open recessed portion 220 in which no gear teeth are cut and within which a cooperative gear sector 221 is mounted for individual co-axial pivotal movement on supporting shaft 133. Gear sector 221 is provided with three teeth of the same size and having the same pitch radius as gear segment 160 and having two opposed lateral side faces 222 and 223 adapted to selectively abut against the internal faces 224 and 225 of recessed portion 220. Gear 160 is further provided with a curved depressed cavity 227, within which a substantially C-shaped spring 228 is mounted. One end of spring 228 engages within a depression 229 of gear 160, and the other end passes through an aperture 230 in face 225 and engages within a depressed portion 231 in face 223, thereby tending to urge gear sector 221 in a counter-clockwise direction, as viewed in Fig 8, so that face 222 will tend to abut against face 224, and the teeth of sector 221 will cooperate with and serve as a continuation of the gear teeth in segment 160.

It will thus be appreciated that when the operator wishes to perform a resetting and printing operation, he grasps handle H and imparts a counter-clockwise movement to gears 160 and 161 and shaft 133, as viewed from the handle end of shaft 133. The gear 161 immediately transmits rotary movement to gear 51 and reset shaft 43, resulting in a resetting operation of the count wheels 56. However, at the start of movement of handle H, gear 160 is in a position as illustrated in Fig. 4 wherein gear 162 has just left segment 160 and meshed with gear sector 221. Further rotational movement of shaft 133 at this time will cause gear segment 160 to continue to rotate, and gear 162 will remain stationary while sector 221 remains in the substantially vertical position shown in Fig. 8 until face 223 abuts against face 225, at which time sector 221 will cooperate with segment 160 to transmit rotary movement to gear 162, thereby rotating shaft 90 and causing a resetting operation of print wheels 98. It will thus be apparent that while gear segment 160 moves through a partial rotation and sector 221 remains stationary, a dwell will be imparted to the resetting shaft 90, and during this time pin 196 engaged by cam 195 leaves the high point of said cam and causes a printing operation. The various gears connecting shafts 90 and 43 with shaft 133, as operated by handle H, are so chosen that each resetting operation will be completed during a single rotation of handle H to its initial position.

As shown in Fig. 10, the embodiment of my invention herein illustrated is arranged to successively print a count record of each day's and each night's work in two adjacent columns designated by the words "Day" and "Night". Consequently, each rotation of handle H serves further to laterally shift the carriage 70 and its associated print mechanism so that the print record will occur first in one column and then in the other. To accomplish this, the left-hand end of shaft 90 has a bevelled gear 240 fastened thereto and arranged to be in continuous enmeshed relation with a bevelled gear 241 rotatably supported upon a journal pin 242 mounted in protruding portion 95 of frame 20. Gear 241 has a stud 245 eccentrically mounted therein. A link 247 is journalled at one end on stud 245 and at its other end upon stud 248 which, in the present instance, is illustrated as a screw threaded member secured in the back of carriage 70.

Hence, any rotary movement transmitted to reset shaft 90 during the resetting operation results in a rotary movement of gears 240 and 241 and a sliding movement of the carriage from "Day" to "Night" position, and vice versa. The gears are preferably so chosen that the termination of each resetting movement of handle H locates said carriage in a reverse shifted position so that the print wheels may register in the "Day" or "Night" column, as the case may be. To ascertain in which position the carriage is located,

I have further provided an indicator plate **250** secured to the front of the carriage and having the legend "On" thereon. The front casing member **26** is provided with a pair of spaced windows **251** and **252** respectively designated by the words "Day" and "Night", through which the legend "On" may be viewed to indicate in which position the count mechanism is located to record on card C.

In addition to providing a day and night recording, the card C is also arranged to provide a day and night record for each of the six working days and nights of the week so that successive day records will be printed in successive positions in the same vertical column, and the corresponding night records will be similarly positioned. To accomplish this feature, the card is automatically lifted through a predetermined extent at the termination of alternate resetting operations, as herein shown, at the end of each night resetting operation. Card C is vertically positioned within holder **185** by means of a guide plate **253** provided with opposed upturned lateral edges in the form of spaced racks **255** which are cooperatively engaged by a pair of pinions **256** secured to a transverse shaft **259**. Shaft **259** is journalled within a pair of spaced brackets **260** protruding rearwardly from the frame **20**. Plate **253** is laterally positioned by means of a pair of spaced U-shaped brackets **264** suitably fastened thereon and adapted to slidably engage within spaced peripherally grooved portions **265** of transverse shaft **259**, as illustrated in Figs. 3 and 7. The upper edge of plate **253** is bent rearwardly to aid in guiding its vertical sliding movement, and the lower portion of said plate terminates in an inwardly projecting lip **268** arranged to fit between bent end portions **186** of card holder **185** and to support the bottom of the card, thereby locating its vertical position. The projection **192** serves to engage lip **268** and limit the downward slidable movement of plate **253** and, consequently, locate the lowest position of card C when it is located to print the Monday record. The intermediate portion of plate **253** is further provided with an elongated aperture **269** which is of such shape and size that the striker block **207** may pass therethrough and cause a printing operation in any one of the positions to which the plate may be vertically shifted.

To further indicate which portion of card C is in printing position, a bracket **270** having a lateral projecting member extending through a suitably located slot in upright **21**, is secured at one end to one of the racks **255** by any suitable means, such as a screw **272**. The forward end of member **270** is provided with an upwardly extending substantially vertical plate **273** having successive legends printed in a vertical column thereon and representing the days of the week. As the card supporting plate **273** is raised a predetermined amount during the resetting operation at the termination of each night's work, the legends of "Monday", "Tuesday", "Wednesday", "Thursday", "Friday", and "Saturday" successively appear through a suitable window **274** in the front cover **26** so that it will be immediately apparent in what position the card is located for printing the count record thereon.

To accomplish the necessary periodic partial rotation of shaft **259** to vertically position card C for each day's record thereon, shaft **90** is provided with a pinion **275** secured thereon and maintained in continuous enmeshed relation with a gear **276** journaled for free rotation on a stub shaft **277** supported by a protruding hub **278** projecting from the frame upright **21**. Gear **276** is further provided with an eccentrically located laterally projecting pin **280** arranged to periodically engage one of six uniformly spaced radially extending arms of a star wheel **283** secured upon the end of shaft **259** and arranged to transmit rotation thereto. Pinion **275** and gear **276** are preferably so chosen with such relation to each other that pin **280** will only engage with one of the arms of said star wheel and rotate shaft **259** one sixth of a turn during each succeeding but alternate rotation of handle H so that upon the completion of each night's work, the resetting operation, as caused by the rotation of handle H, will lift plate **253** a predetermined amount to position the card for the next day's record.

To locate the card and prevent its downward movement as it is periodically lifted to its six successive printing positions, I have provided a ratchet wheel **284** having six teeth, each of which corresponds to one of the star wheel arms and is arranged to be successively engaged by a pawl **285** pivotally supported upon a bracket **286** and urged into operative position by a spring **287**. It will thus be apparent that every alternate resetting operation, as caused by the rotation of handle H, will serve to lift card C through a predetermined extent into position for the next day's print record, and at the termination of the week's work when the card C has a complete printed record thereon for each day's and night's work, the card will rest in its uppermost or "Saturday" position.

At the completion of Saturday night's work and upon the termination of the printing operation during the resetting operation, further mechanism serves to drop the card supporting plate **253** from its highest position as required for Saturday's recording to its bottom position for Monday's recording so that a fresh card may be inserted and the records thereon automatically and successively printed in the required positions. To accomplish this, shaft **259** has a gear **289** secured thereon and maintained in continuous enmeshed relation with a gear **291** journalled on shaft **277**. Gear **291** has a protruding pin **292** eccentrically secured thereto and arranged to periodically engage a pawl **294** journalled on shaft **277**. As illustrated in Figs. 4 and 5, pawl **285** has an inwardly extending portion **295** arranged to be periodically engaged by pawl **294** so that pawl **285** will be lifted from locking engagement with ratchet wheel **284**, and plate **253** will be free to drop to its bottom position at this time. During the downward movement of plate **253**, pinions **256**, shaft **259**, and gears **289** and **291** will rotate in a reverse direction, causing pin **292** to move from the under side of pawl **294** and strike against the upper side of said pawl, thereby disengaging it from operative position so that it is free to drop again to the position illustrated in Fig. 5. It will be understood, of course, that gears **289** and **291** are of such size that pawl **285** will be released from engagement with ratchet wheel **284** at the termination of a predetermined number of resetting operations, which, in the present instance, is twelve since the invention as herein illustrated is shown as providing a record for six successive days and nights.

In the operation of this invention, drive shaft **33** is suitably connected to provide a registering and recording unit for a machine which, in the present instance, may be a loom, and through the instrumentality of worm **36**, worm wheel **53**, gear **55**, disk **66**, and the associated speed reducing and

transfer mechanisms, count wheels 56 are arranged to register the successive number of cycles of operation of said machine—for example, the number of picks of a loom. The same count registration is simultaneously caused on print wheels 98 through gears 132, 138, 139, and eccentric pin 144 which reciprocates link 146 to cause successive rocking movements of yoke 110 and operates print wheels 98 through pawl member 115 and the associated ratchet wheels 100 and 101.

At the start of the week's work the card C is inserted within slotted guide member 31 and card holder 185. At this time, plate 253 is located in its bottom position, and the card is in a position to have the Monday day record printed thereon. At the termination of each day's and each night's work, handle H is given a single complete revolution. The initial handle movement immediately starts a resetting operation of count wheels 56 through gears 161 and 51, shaft 43, and slot 177 therein which engages pawls 170. During this initial resetting movement, a dwell is imparted to reset shaft 90 supporting print wheels 98 while gear segment 160 moves relative to sector 221, and during this relative movement, cam 195 causes platen 193 to suddenly and momentarily engage the back of card C and cause a printing operation while the print wheels are stationary. In the event that the print wheel 98 of lowest order is not in correct recording position at this time, one of the cams 212 on shaft 133 engages lever 213 just prior to the printing operation, causing an upward movement of pawl member 115 to correctly locate said wheel in recording position.

Upon the completion of the dwell, sector 221 and segment 160 cooperate to impart rotation to gear 162 and shaft 90, causing a resetting operation of print wheels 98. During this rotation of shaft 90, gears 241 and 240 and link 247 serve to laterally shift print wheel 98 from their respective day to night printing positions, and vice versa. Coincident with rotation of shaft 90, gears 275, 276, pin 280, star wheel 283, shaft 259, and gears 256 enmeshed with racks 255 serve to lift the card supporting plate 253 and card C through a predetermined extent to the next day's printing position. It will be noted, however, that this operation occurs only during alternate resetting operation at the termination of a night's work to lift the card to the required following day printing position. When the card has been finally lifted to its top or Saturday recording position, the last operation of handle H at the termination of Saturday night's work brings pawl 284 into release engagement with pawl 285 so that it is lifted away from ratchet wheel 284, and card supporting plate 253 is free to drop to its initial or Monday recording position. Hence, it is only necessary to replace the card bearing the printed record for the entire week with a fresh card at this time, and all of the apparatus is now again preset to go through the ensuing operative cycle for another week.

In view of the fact that many changes could be made in the above construction and many apparently different embodiments of this invention could be provided without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted purely in an illustrative and not in a limiting sense.

It is also to be understood that the language as presented in the following claims is intended to cover all of the generic and specific features of this invention as herein described and statements relative to the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim as my invention:

1. A print counter comprising a plurality of type wheels arranged to be shifted axially as a unit, driving means to rotate said wheels to perform a counting operation, means for supporting a record sheet relative to said type wheels, means for intermittently feeding the record sheet in one direction, means for shifting the position of the type wheels in a direction transversely to the direction of movement of the record sheet, means for taking impressions from the type wheels onto the record sheet, and mechanism common to and operatively associated with said feeding means, shifting means, and last mentioned means for causing said means to operate in sequential relation.

2. A print counter comprising a plurality of type wheels, driving means therefor, record sheet supporting means, means for intermittently feeding the record sheet in one direction, means for shifting said type wheels as a unit axially and alternately from one position to another and transversely to the direction of movement of the record sheet, means for taking impressions from the type wheels onto the sheet in each position of the record sheet and in each shifted position of the type wheels and operating means common to said feeding means, shifting means, and impression taking means for operating the same in sequential relation.

3. A print counter comprising a plurality of type wheels arranged to be axially shifted as a unit, driving means to rotate said wheels to perform a counting operation, means including a movable support for positioning a record sheet relative to said type wheel, means for intermittently moving said support to feed the record sheet in one direction, means for shifting said wheels as a unit and transversely of said feeding movement, mechanism for taking impressions from the type wheels onto the sheet in each position of the record sheet and in each shifted position of the type wheels, an operating device arranged to actuate the feeding means, impression taking means, and wheel shifting means in predetermined relation, and means responsive to the record sheet feeding means for returning the record sheet support to its initial position at the termination of a predetermined number of said intermittent feeding movements.

4. A resettable print counter having a reset shaft, a series of resettable type wheels axially shiftable on said shaft as a unit, driving means to rotate said wheels to perform a consecutive counting operation, an operating member, means for supporting a record sheet adjacent to the type wheels, means operated by said member for intermittently transmitting a uni-directional feed to the record sheet, means responsive to said member for axially shifting the type wheel unit on the shaft transversely of the record sheet movement, means actuated by said member for taking impressions from the type wheels onto the record sheet, and means connectible with the reset shaft and operated by said member to reset the type wheels to initial zero positions.

5. A print counter having a reset shaft, a series of type wheels thereon, driving means to rotate said wheels to perform a counting operation, a manually operable member to rotate the reset shaft to reset said wheels to zero positions, means movably supporting a record sheet relative to

said type wheels, means operatively connected with said member to take an impression from the type wheels onto the record sheet, means responsive to the resetting operation to axially and alternately shift the type wheels to one of two predetermined positions during each resetting operation, and means responsive to the resetting operation to cause a uni-directional feeding movement of the record sheet for a predetermined extent during alternate resetting operations.

6. A print counter comprising a plurality of type wheels, driving means to rotate said wheels to perform a counting operation, resetting mechanism arranged to engage and return said type wheels to initial zero positions, a manually operable member for actuating said resetting mechanism, a record sheet support, means for intermittently feeding the record sheet in one direction, means responsive to the resetting operation for axially shifting the position of the type wheel unit at an angle to the direction of record sheet movement simultaneously with said resetting operation, and means for taking impressions from the type wheels onto the record sheet during the initial movement of the manually operable member and prior to the resetting operation whereby several records may be printed on said sheet in tabulated form.

7. A resettable print counter having a reset shaft supporting a series of type wheels thereon, driving means to rotate said wheels, a manually operable member to rotate the reset shaft and return the type wheels to initial zero positions, a movable support for holding a record sheet adjacent to said type wheels, means operatively connected with said member including a platen to take an impression from the type wheels during the initial movement of said member but prior to the resetting operation of the type wheels, a lost motion connection between said member and the reset mechanism providing a dwell of the reset mechanism during the taking of said impression, means actuated by said member for causing a uni-directional feed of the movable support and the sheet through a predetermined extent during alternate resetting operations, means for holding said movable support in each of its respective positions, and means arranged to return said movable support to its initial starting position after a predetermined number of feeding operations.

8. A print counter having a plurality of type wheels rotatably and slidably supported upon a reset shaft, a carriage supporting said wheels and shaft, means supporting said carriage for lateral slidable movement, said wheels being engaged by the carriage for slidable movement therewith on the reset shaft, driving means to rotate said wheels to cause a counting registration irrespective of the position of the carriage, a record sheet located in printing position adjacent to the type wheels, manually operable means to rotate the reset shaft and shift the type wheels to initial zero positions, a platen mechanism to operate said platen to cause a printing operation on said sheet, and means actuated by the reset shaft rotation to laterally shift the carriage and type wheels to a different printing position at the termination of each printing operation.

9. A count recording apparatus having a plurality of denominational order type wheels rotatably supported on a reset shaft, a ratchet wheel integrally secured to each type wheel, a rocker member journalled on the reset shaft, a pawl member pivotally supported in the rocker member and having laterally projecting fingers engageable with the ratchet wheels, means to angularly reciprocate the rocker member to partially rotate the type wheels to cause a counting operation, a manually operable member arranged to rotate the reset shaft and shift the type wheels to zero positions, a lost motion connection between said member and the shaft permitting an initial movement of said member before it causes rotation of the reset shaft, and means responsive to said initial movement to move the rocker member and locate the type wheel of lowest order into printing position in the event that it does not already lie in said position.

10. A counting apparatus of the class described having a plurality of type wheels and a crank actuated reset mechanism, a vertically movable record card support, cam operated means responsive to said crank movement to cause a printing operation with the type wheels on the card, mechanism connected to the crank and arranged to lift the record card support a predetermined extent in response to alternate crank operations, a ratchet and pawl arranged to hold the card support in each of the positions to which it is successively lifted, and means operable in response to each resetting operation to laterally shift the type wheels whereby each count record will be printed in a different but predetermined position on the card.

11. A resettable print counter having a plurality of rotatable type wheels supported on a reset shaft and arranged to perform a counting operation, a manually operable member to rotate the reset shaft and cause a resetting operation, a lost motion connection between said member and the wheels whereby said member may be moved an initial extent before it causes a resetting operation, a movable support arranged to position a record card relative to the type wheels, mechanism operated in response to each initial movement of the manually operable member to engage the type wheels in printing registration upon the card, means to laterally shift the type wheels to a different printing position in response to each resetting operation, means operated by the movement of said crank to lift the support and card a predetermined extent coincident with alternate resetting operations, and mechanism operated by the card lifting means arranged to disengage said means and drop the card support to its initial starting position at the termination of a predetermined number of said lifting operations.

12. A resettable print counter having a plurality of type wheels rotatably supported upon a reset shaft, said shaft being arranged for rotation to reset the type wheels to zero positions, driving means to rotate said wheels on said shaft to cause a counting operation, a gear secured to the reset shaft, a gear segment engageable therewith, said segment having a coaxial and cooperative gear sector angularly movable therein through a limited extent and engageable with the gear on the reset shaft, means tending to maintain the sector in adjacent cooperative driving relation with the segment, a manually operable member arranged to rotate the gear segment to cause a rotation of the gear and reset shaft to perform a resetting operation, a printing mechanism including a platen actuated by a cam constrained to rotate coaxially with the gear segment, said cam being arranged to oper-

ate the platen when the gear sector engages the gear on the reset shaft, thereby providing a dwell for the reset shaft and causing a printing operation while the type wheels are maintained stationary and prior to the resetting operation.

13. In a print counter, a frame, a carriage supported for lateral slidable movement thereon, a plurality of denominational type wheels in said carriage and rotatably mounted upon a reset shaft journalled for relative slidable movement in the carriage, means to rotate the type wheels to cause a counting operation irrespective of the position of said carriage, a gear secured to the reset shaft to rotate said shaft and reset the wheels to zero positions, a gear segment engageable therewith, said segment having a coaxial gear sector angularly movable therein through a limited distance and engageable with the gear on the reset shaft, means tending to maintain the sector in adjacent cooperative driving relation with the segment, a manually operable member arranged to rotate the gear segment to cause a resetting operation, a record sheet adjacent the type wheels, a platen arranged to deflect the sheet into type wheel engagement, a cam constrained to rotate coaxially with the gear segment, said cam being arranged to operate the platen when the gear sector engages the gear on the reset shaft, thereby providing a dwell for the reset shaft and causing an operation of the platen while the type wheels are maintained stationary.

14. A print counter comprising a plurality of type wheels arranged to be axially shifted and to be reset to zero positions, driving means for said type wheels, a movable support adapted to be moved through successive steps for locating a record sheet relative to the type wheels, means for taking impressions from the type wheels onto the record sheet, an operating member, mechanism actuated by said member for operating the impression means, means secured to the member for shifting the type wheels after each impression is taken, means operated by said member for resetting the type wheels after each impression is taken, and means operated by said member to intermittently feed the record sheet support through a step in its movement each time the member is actuated, said operations occurring in predetermined relation.

15. A print counter including settable type wheels, means for shifting said type wheels to either one of two predetermined positions, means for resetting said type wheels, a record sheet support feedable in steps, and means for taking impressions from said wheels in either shifted position of said wheels; the combination of a manually operable member, and means responsive to an operation thereof for actuating said impression means, for thereafter actuating said shifting means and said resetting means, and means responsive to alternate resetting operations for feeding said sheet support through one step.

16. A resettable print counter comprising a plurality of type wheels supported on a reset shaft, driving means to rotate said wheels to cause a counting operation, resetting means to return said wheels to initial zero positions, a record sheet receiving means including a movable support, a platen engageable with said sheet to deflect it into printing registration with the wheels, an operating member, means actuated by said member to operate the platen, means responsive to operation of said member to actuate the reset mechanism after a printing operation, means actuated by said member for alternately shifting the type wheels to one of two predetermined printing positions coincident with the resetting operation, and means responsive to alternate resetting operations to feed the support through a predetermined extent.

17. A print counter having a plurality of type wheels rotatably supported upon a reset shaft and arranged for axially slidable movement as a unit, driving means to rotate said wheels for a counting operation, resetting mechanism to rotate said shaft and return the wheels to initial zero positions, said reset mechanism including operating member arranged to rotate the reset shaft, means supporting a record sheet relative to said type wheels, means responsive to the rotation of the reset shaft for feeding the record sheet in one direction through a predetermined extent in response to alternate resetting operations, means operated by the reset shaft rotation for axially shifting the type wheels to predetermined positions simultaneously with each resetting operation, and means operated by the initial movement of said operating member for taking impressions from the type wheels onto the record sheet, and a lost motion connection between said member and the reset mechanism arranged to delay the resetting operation until said impression has been taken.

18. A print counter comprising a plurality of type wheels arranged to be axially shifted as a unit between two predetermined positions, means for driving said wheels, a record sheet support movable to successive positions, a platen for taking impressions from the wheels onto a sheet in said support, and manually operable mechanism for causing the platen to take an impression in each position of the record sheet and in each shifted position of the type wheels, means responsive to said mechanism for axially shifting the type wheels after each impression is taken, and feeding means for said record sheet responsive to the manually operable mechanism for moving the sheet one step on alternate operations of said manual mechanism.

EDWARD WILD.