Aug. 24, 1954 M. M. HENNESSY ET AL 2,687,088

PRINTING RECORDING COUNTER

Original Filed Aug. 30, 1948 3 Sheets-Sheet 1

FIG. 1.

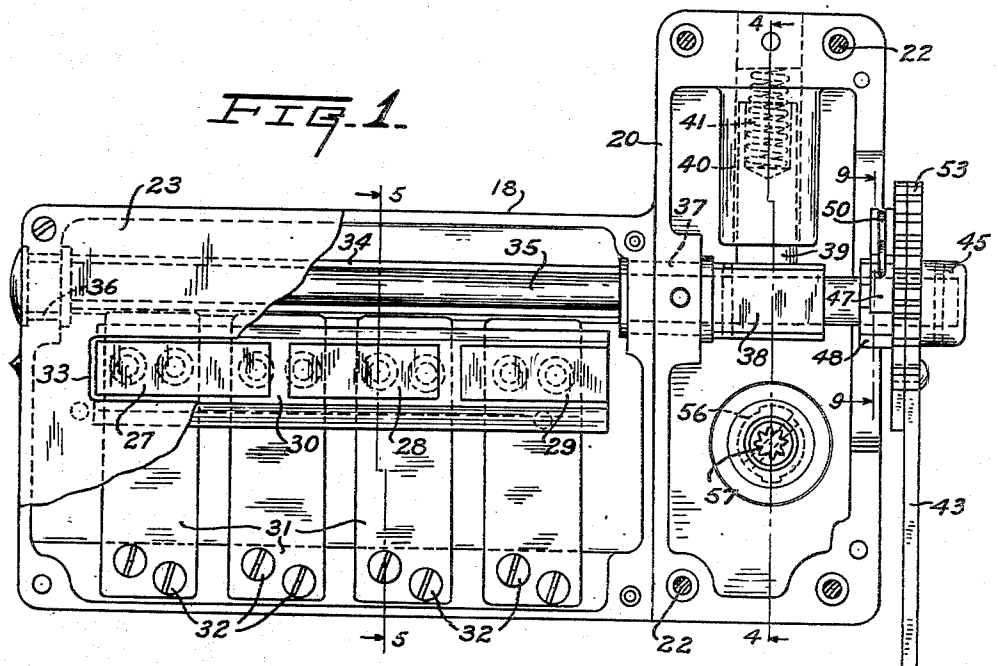
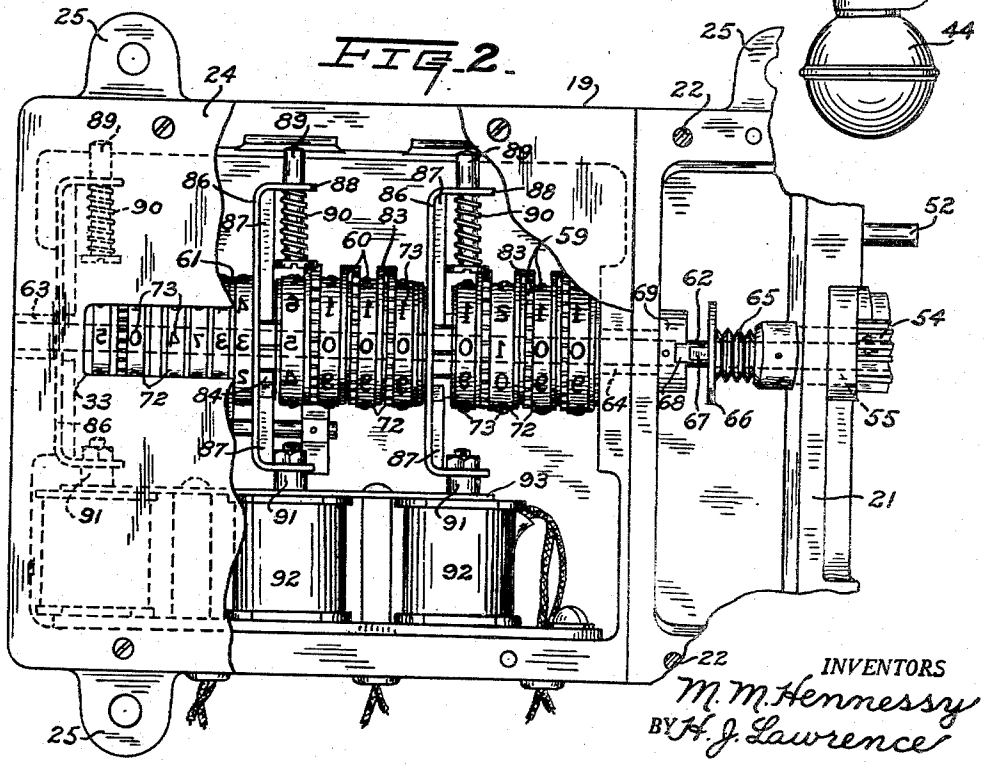


FIG. 2.



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FIG. 4.

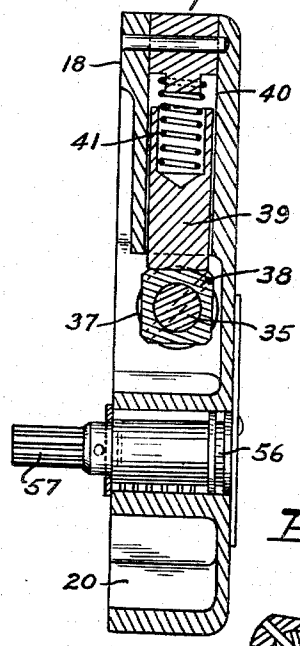


FIG. 3.

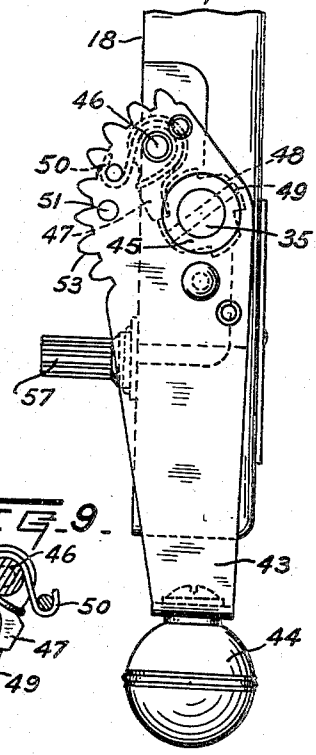


FIG. 5.

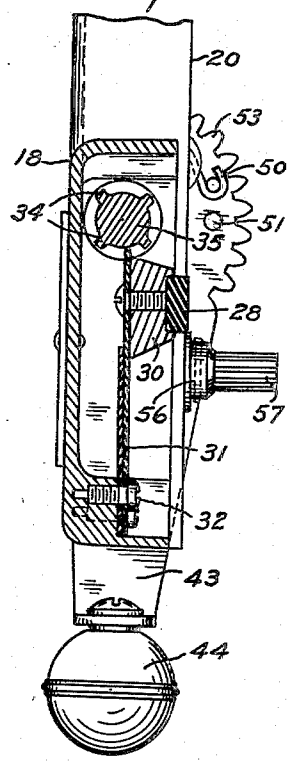
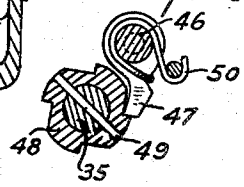


FIG. 9.



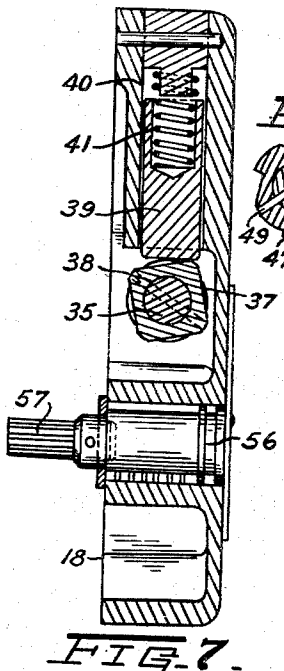


FIG. 7.

FIG. 10.

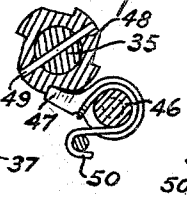


FIG. 6.

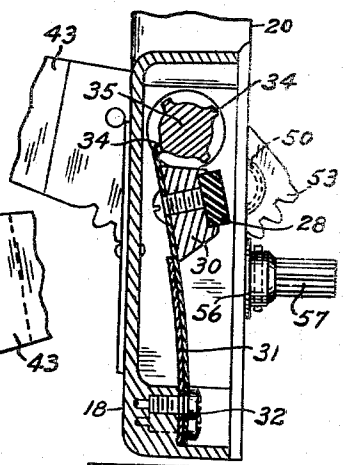


FIG. 8.

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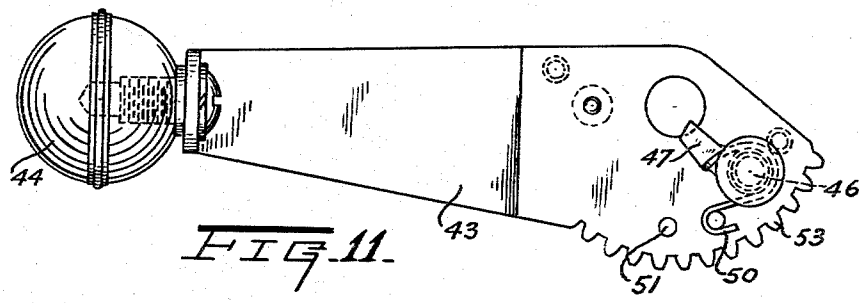


FIG. 11.

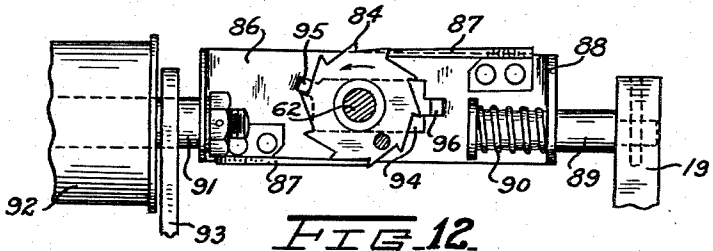


FIG. 12.

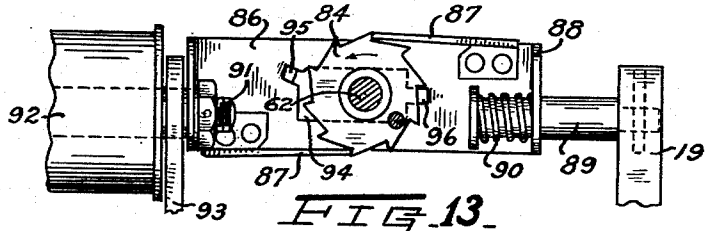


FIG. 13.

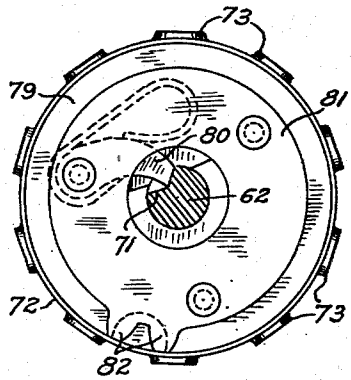


FIG. 14.

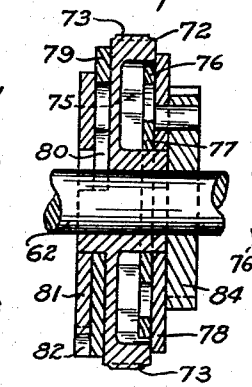


FIG. 15.

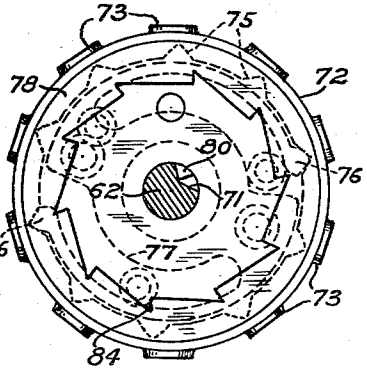


FIG. 16.

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UNITED STATES PATENT OFFICE

2,687,088

PRINTING RECORDING COUNTER

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Original application August 30, 1948, Serial No. 46,772, now Patent No. 2,619,283, dated November 25, 1952. Divided and this application February 28, 1952, Serial No. 273,852

4 Claims. (Cl. 101—95)

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The present invention relates in general to improvements in the art of producing permanent records of a succession of events or performances, and relates more specifically to improvements in the construction and operation of printing mechanism associated with a counter for periodically recording the number of actuations of the latter.

This application is a division of our copending application Serial No. 46,772, filed August 30, 1948, now U. S. Patent No. 2,619,283, and the primary object of this present invention is to provide improved printing mechanism for recording the performance of one or more automatic counters at preselected intervals and with utmost precision.

Another important object of our invention is to provide improved printing means cooperable with the numeral wheels of a rotary counter to produce legible printed records of the total number of counts effected at any selected time.

Still another important object of the present invention is to provide an improved rotary counter and means for recording its functioning in a permanent and accurate manner at the will of an operator or attendant.

A further important object of the invention is to provide improved printing mechanism for a recording counter, which is simple and durable in construction, readily manipulable, and exceedingly reliable in operation.

An additional more specific object of this invention is to provide a counter having a series of numeral wheels of progressively higher order and each provided with a succession of embossed peripheral numerals, with effective means for producing a permanent and clear printing of alined numerals of all of the counter wheels whenever such a printed record is desired.

These and other objects and advantages of the invention will be apparent from the following detailed description, from which it will be noted that the gist of the improvement is the provision of a recording counter having a series of coaxial wheels each provided with a succession of embossed peripheral numerals, a platen supported by a cantilever leaf spring and adapted to deliver blows toward alined numerals of all of the wheels, a shaft having a projection for stressing and releasing the leaf spring with a snap action, a lever cooperable with the shaft through an overriding one-way clutch to cause the shaft projection to activate the spring, and a plunger constantly cooperable with the shaft to positively arrest the rotary motion thereof after each printing operation.

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A clear conception of the specific features constituting this invention and of the mode of constructing and operating a commercial printing recording counter embodying the same, may be had by referring to the drawings accompanying and forming a part of this specification and wherein like reference characters designate the same or similar parts in the various views.

Fig. 1 is an inverted plan view of the upper impact platen and actuating lever elements of the printing portion of one of our improved printing recording counters, the lever being in inactive position;

Fig. 2 is a plan view of the lower counter wheel confining portion of the recording unit, and with which the assemblage of Fig. 1 normally coacts;

Fig. 3 is an end view of the mechanism of Fig. 1, looking toward the print actuating lever while in inactive position;

Fig. 4 is a transverse section through the assemblage of Fig. 1, taken along the line 4—4 and looking toward the left;

Fig. 5 is another transverse section through the same mechanism, taken along the line 5—5 of Fig. 1 but looking toward the right;

Fig. 6 is an end view similar to Fig. 3, but showing a fragment of the print actuating lever swung into active position as when producing a printed record, or when resetting the counters;

Fig. 7 is a transverse section through the printing device also taken along the line 4—4 of Fig. 1, but showing the printing mechanism in action;

Fig. 8 is another transverse section through the platen portion of the printing device, also taken along the line 5—5 of Fig. 1, but showing the printing platen just prior to delivery of a printing blow;

Fig. 9 is a transverse section through the ratchet or overriding clutch mechanism for effecting actuation of the printing platen, the section being taken along the line 9—9 of Fig. 1 and showing the clutch elements just prior to manipulation of the operating lever;

Fig. 10 is a section similar to that of Fig. 9 but showing the ratchet clutch mechanism in the position corresponding to Figs. 6 to 8 inclusive;

Fig. 11 is a plan view of the actuating lever for the printing mechanism with the clutch pawl attached;

Fig. 12 is a fragmentary side view of one of the counter wheel actuating electro-magnets showing the same retracted;

Fig. 13 is a similar side view of the same electromagnet, showing the same just after registering a count;

Fig. 14 is an enlarged end view of one of the magnetically actuated numeral wheels of either counter of the unit;

Fig. 15 is a similarly enlarged central section through the counter wheel assemblage of Fig. 14; and

Fig. 16 is a likewise enlarged opposite end view of the same numeral wheel.

While the invention has been shown and described as applied to an audit recorder especially adapted for use in a commodity vending machine, it is not intended to limit the utility of the improvement to such use since the improved printing mechanism may also be advantageously applied to counters associated with other types of machines; and it is also contemplated that specific descriptive terms employed herein be given the broadest interpretation consistent with the disclosure.

Referring especially to Figs. 1 and 2 of the drawings, the improved printing recording counter shown therein comprises in general, a housing or casing consisting of an upper impact platen and actuating lever carrying section 18, and a lower base or counter wheel and electro-magnet confining section 19. The two casing sections 18, 19 are provided respectively with integral housing portions 20, 21 disposed at corresponding ends thereof for normally confining impact producing and clutch mechanisms; and the casing portions 20, 21 are firmly but detachably united by clamping screws 22. The remainders of the two casing sections 18, 19 are spaced apart to provide an intervening printing gap or zone into which a record sheet or card and carbon paper may be inserted, and this printing gap is bounded at the top by a flat plate 23 secured to the upper section 18 and at the bottom by another flat plate 24 secured to the lower section 19. The lower or base section 19 may also be provided with integral mounting lugs 25 for fastening the counting unit to a suitable support so that the various parts thereof are conveniently accessible.

Associated with the upper impact platen and actuating lever carrying section 18, is a series of impact platens 27, 28, 29 formed of relatively hard rubber or the like, which are attached to a rather heavy elongated bar 30 firmly secured to the medial portions of four stiff cantilever leaf springs 31 the corresponding anchored ends of which are secured to the casing section 18 by screws 32. These platens 27, 28, 29 are adapted to be projected into the printing zone through an elongated opening 33 formed in the upper plate 23, and the extreme free ends of the cantilever leaf springs 31 are cooperable with successive elongated radial projections or ribs 34 formed integral with the periphery of a long sturdy shaft 35 which is journalled in spaced bearings 36, 37 carried by the casing section 18, see Fig. 1. The successive shaft ribs 34 coact with the free ends of all of the springs 31 to stress and release all of the latter simultaneously; and the part of the shaft 35 which is located within the casing portion 20, has a square or otherwise polygonal member 38 provided with successive flat surfaces and rigidly attached thereto, by a transverse pin, see Figs. 1, 4 and 7. A shaft arresting plunger 39 is slidably confined within a bore 40 formed in the housing section 18 and is constantly urged toward the axis of the shaft 35 with considerable force by a stiff helical compression spring 41, and has an outer flat end face which is successively cooperable with the flats of the polygonal member 38. This plunger 39 functions to arrest and hold the shaft 35 in fixed position after each printing impact has been delivered, as shown in Figs. 1 and 4, and also prevents the shaft 35 from rotating more than one-quarter turn during each printing operation.

The end of the impact producing shaft 35 which projects outwardly beyond the casing portion 20, is provided with an actuating arm or lever 43 the swinging end of which has a manipulating handle or knob 44 attached thereto, and the opposite pivoted end of which is journalled for free oscillation about the shaft 35 but is confined thereon by a collar 45, as shown in Figs. 1, 3 and 6. The fulcrumed end of the lever 43 has a pivot pin 46 projecting laterally therefrom, and a pawl 47 which is cooperable with successive peripheral notches of a ratchet wheel 48 secured to the shaft 35 by a fastening pin 49, is constantly urged toward the periphery of this ratchet wheel 48 by a spring 50, as illustrated in Figs. 3, 6, 9 and 10. The pawl 47 and ratchet wheel 48 provide a one-way overriding clutch, and the lever 43 carries a pin 51 cooperable with the lower casing portion 21 to limit the swinging motion of this lever in one direction, while a stop pin 52 secured to the lower casing 19 limits this swinging motion in the opposite direction, these pins being shown in Figs. 2, 3, 5 and 6. The pivoted end of the lever 43 may also be provided with a toothed segment 53 meshing with a pinion 54 carried by a hollow countershaft 55; and a key actuated tumbler lock 56 mounted in the housing portion 20 has an elongated pinion 57 secured to its rotary cylinder and projecting into the casing section 20, see Figs. 1, 2, 3, 4, 6 and 7.

The base section 19 of the main casing, has three independent counters 59, 60, 61 concealed therein in axial alinement with the pinion 54 and beneath the slotted closure plate 24, as depicted in Fig. 2. The numeral wheels of all of these counters, are rotatably supported upon a common elongated shaft 62 which is normally fixed but journalled for resetting rotation in spaced bearings 63, 64 carried by the casing section 19, and the extreme end of which is also disposed centrally within the hollow countershaft 55 to which the pinion 54 is fastened. The countershaft 55 is journalled in the lower housing portion 21 and is prevented from moving axially, but it is drivingly connected to a circular rack 65 so as to transmit rotary motion to the latter while also permitting movement thereof along its supporting shaft 62. The pinion 57 of the tumbler lock 56 normally meshes with the annular teeth of the circular rack 65, and the end of this rack remote from the shaft 55 is provided with a disc 66 having a pair of diametrically opposite radial projections 67 which are adapted to enter recesses 68 formed in a collar 69 secured to the shaft 62, so as to rotate the latter when a re-set key is applied to the lock 56 and the lever 43 is manipulated.

The portion of the shaft 62 which is located within the counters 59, 60, 61 is provided with a longitudinal reset notch 71, and each of the counter wheels 72 supported by the shaft 62 is provided with an annular series of ten equally spaced and embossed peripheral numerals 73 adapted to be brought into alinement with the elongated slots 33 in the upper and lower housing plates 23, 24 so as to expose the alined numerals to the printing zone and to the platens 27, 28, 29, see Figs. 1, 2, 14, 15 and 16. The platen 29 is so disposed that it will coact with the adjacent

alined numerals 73 of the counter 59, while the platen 30 is adapted to likewise coact with the numerals of the counter 60, and the platen 27 is located for similar coaction with the numerals 73 of the counter 61. Each impact delivered by the three platens 27, 28, 29 will therefore cause the same to simultaneously cooperate with all of the alined adjacent embossed numerals of the three counters 59, 60, 61 to produce printed recordings of these numerals upon a record sheet disposed within the printing zone and having carbon properly applied thereto.

The numeral wheels 72 of each of the counters 59, 60, 61, are of progressively higher order, and the peripheral embossed or projecting numerals 73 are adapted to indicate successive performances or operations of the machine with which the recording unit is associated. As shown in Figs. 14, 15 and 16, each wheel 72 besides having the numerals 73 projecting outwardly from its periphery, is also provided with an inner annular series of notches 75 with which spring pawls 76 of a resilient spider plate 77 are successively cooperable during operation of the counters. The spider plate 77 of each wheel assembly is riveted to a driving plate 78 on one side of the wheel 72, and the opposite side of the wheel is secured to a disc 79 carrying a reset pawl 80 which normally coacts with the groove 71 of the shaft 62. A transfer plate 81 having two teeth 82 on its periphery is adapted to transmit motion through the usual pinion 83 to the driving plate 78 of the adjacent higher order wheel 72 of the series, and the lowest order wheel of each counter is provided with a ratchet wheel 84 riveted to its driving plate 78, substantially as shown in Patent No. 2,444,570 except for the embossed numerals 73.

The lowest order wheel 72 of each of the counters 59, 60, 61 is adapted to be independently actuated by an electro-magnet through mechanism such as shown in Figs. 2, 12 and 13. Each of these driving mechanisms consists of a yoke 86 carrying upper and lower spring pawls 87 which are cooperable with the teeth of the adjacent ratchet wheel 84, and each yoke 86 is reciprocable in a plane perpendicular to the axis of the shaft 62 and has an end flange 88 slidable upon a fixed guide rod 89. A helical compression spring 90 embracing each guide rod 88 causes the yoke 86 and its pawls 87 to move in one direction while the core 91 of an electro-magnet 92 is secured to the end of the yoke 86 remote from the flange 88 and causes the yoke to move in the opposite direction whenever the magnet is energized. The magnet cores 91 are slidable through openings in a fixed plate 93 so as to additionally guide the yoke 86, and the medial portion of each yoke has a slot 94 therein through which the shaft 62 passes and is also provided with a pair of spaced integral stop lugs 95, 96 which are alternately cooperable with the ratchet wheel 84. The lug 95 is cooperable with the teeth of the adjacent wheel 84 as in Fig. 12 to prevent it from advancing more than one tooth during each reciprocation, while the lug 96 is cooperable with the wheel as in Fig. 13 to prevent advancement thereof during resetting of the counter.

When the improved printing recording counter has been constructed and assembled as above described, and has been properly associated with a machine of which printed performance records are to be made, the electro-magnets 92 may be operated to cause the yokes 86 to actuate the several counters 59, 60, 61 in a well known manner while the lock 56 is inactive and the clutch projections 67 are out of engagement with the recesses 68 of the collar 69 as in Fig. 2. The wheels 72 of the several counters will then rotate freely about the shaft 62 to bring the successive embossed numerals 73 thereof in alinement with the openings 33 of the plates 23, 24 thereby establishing readings of the number of performances effected at these openings of which printed recordings may be made at the will of an operator and without necessarily resetting the counters.

If it is desired to make a printed record of the readings thus established at the printing zone at any predetermined time, a record sheet with carbon paper may be inserted in the gap between the plates 23, 24 and the lever 43 may be swung back and forth from the position shown in Figs. 1, 3 and 6. When this lever 43 swings in a counterclockwise direction as viewed in Figs. 3 and 6, the pawl 47 carried thereby engages the ratchet wheel 48 and rotates the shaft 35 in a like direction, thereby causing one of the shaft projections 34 to initially bend and stress the leaf springs 31 while simultaneously retracting the platens 28 as in Fig. 8, and to thereafter release the springs 31 with a snap action so as to cause the heavy bar 30 and platens 28 to deliver an impact printing blow toward the alined adjacent numerals 77 through the record sheet. The coil spring 41 which coacts with the plunger 39 will also be compressed during such retraction of the platens 28, and will function to positively arrest the rotation of the shaft 35 after each printing operation, while the one-way clutch comprising the pawl 47 and ratchet wheel 48 will permit the lever 43 to travel until its movement is arrested by the stop pin 51 and also permits free return motion of this lever until it engages the fixed stop pin 52.

Whenever the lever 43 is manipulated, the toothed segment 53 thereof will rotate the pinion 54 and the hollow countershaft 55, but unless a key is applied to the lock 56 so as to cause the tumbler pinion 57 to move the circular rack 65 to the left as viewed in Fig. 2, sufficiently to bring the projections 67 within the recesses 68 of the collar 69, no resetting of the counters will occur. However, if the lock 56 is manipulated to shift the clutch rack 65 and disc 66 toward the left so as to drivingly interconnect the shafts 55, 62, return movement of the lever 43 to inactive position after a printing operation has been effected, will cause the numeral wheel supporting shaft 62 to rotate in a counterclockwise direction as viewed in Fig. 14 and will thus cause the pawls 80 which coact with the shaft groove 71, to reset all of the numeral wheels 72 to zero reading at the slots 33. During such zeroizing or resetting of the wheels 72, the lugs 96 on the yokes 86 will prevent rotation of the numeral wheels 72 in a clockwise direction.

From the foregoing detailed description of the construction and operation of the unit, it should be apparent that the invention provides simple and readily manipulable mechanism cooperable with one or more counters 59, 60, 61 each having a series of numeral wheels 72 provided with a succession of embossed peripheral numerals 73 thereon, for producing accurate and legible printed recordings of the momentarily alined numerals. The printing may be effected at any time without necessarily resetting the counters 59, 60, 61, but the same lever 43 which performs the printing operations may also be utilized to zeroize the counters, by merely manipulating the

lock **56** whenever resetting is desired. The overriding clutch which is interposed between the lever **43** and the shaft **35**, facilitates actuation of this shaft, and the spring pressed plunger **39** cooperates with the flat faces of the polygonal shaft member **38** to positively arrest the rotation of the shaft **35** after each printing operation. The entire printing and resetting mechanism is durable in structure, readily manipulable and accessible for inspection, and applicable to various types of single or multiple counter units, and has proven highly satisfactory and efficient in actual use.

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

We claim:

1. In a recording counter, a casing having upper and lower interconnected sections separated by an open slot, coaxial numeral wheels journalled in one of said sections on one side of said slot, a platen movably mounted in the other of said sections on the opposite side of said slot and in line with alined numerals of said wheels, means for positioning a recording sheet within said slot between said wheel and said platen, an oscillatory leaf spring movably supporting said platen and being secured at one end to said other casing section, a shaft journalled in said casing and having a series of peripheral projections for stressing and releasing said leaf spring with an impact action to cause said platen to deliver a recording blow against the recording sheet, said shaft also having a flat surfaced polygonal portion located axially of the shaft remote from said projections, a spring pressed plunger cooperable with the flat surfaces of said shaft portion to positively arrest the rotary motion of said shaft after each recording, and means for rotating said shaft to advance the successive peripheral projections thereof past the leaf spring and to simultaneously cause the successive flat shaft surfaces to retract said plunger.

2. In a recording counter, a series of counter wheels of progressively higher order rotatable about a common axis and each having a succession of embossed peripheral numerals, means for positioning a record sheet adjacent to alined numerals of said wheels, a cantilever spring having its medial portion disposed in proximity to said alined numerals and having its free end projecting therebeyond, a platen secured to said medial spring portion and being located to deliver a printing blow against said sheet in opposition to said alined numerals, a shaft disposed parallel to said wheel axis and having a flat peripheral surface and a peripheral projection axially remote from said surface cooperable with said free spring end to stress and release the spring with a snap action and to thereby cause said platen to deliver an impact blow against said sheet, a spring pressed plunger cooperable with said flat shaft surface to positively arrest said shaft, and a lever swingable about the axis of said shaft and cooperating with the latter through an overriding pawl and ratchet clutch to rotate the shaft and thereby cause said projection to actuate the platen and to simultaneously cause said flat shaft surface to retract said plunger.

3. In a recording counter, a series of coaxial counter wheels of progressively higher order each having a succession of peripheral numerals, means for positioning a record 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 cantilever leaf spring for actuating said platen, a shaft disposed parallel to the common axis of said wheels and having a flat local peripheral surface and a peripheral projection axially remote from said surface cooperable with the free end of said spring to stress and release the latter with a snap action and to thereby cause said platen to deliver an impact blow against said sheet, a plunger cooperable with said flat shaft surface to positively arrest said shaft, means for constantly urging said plunger toward said surface, and means for rotating said shaft to move said projection past said spring end and to simultaneously cause said flat surface to move said plunger away from the axis of said shaft in opposition to said urging means.

4. In a recording counter, a series of coaxial counter wheels of progressively higher order each having a succession of peripheral numerals, means for positioning a record 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 cantilever leaf spring for actuating said platen, a shaft having a local cam surface and a peripheral projection axially removed from said surface cooperable with the free end of said spring to stress and release the latter with a snap action and to thereby cause said platen to deliver an impact blow against said sheet, a plunger cooperable with said cam surface to positively arrest said shaft, means for constantly biasing said plunger toward said cam surface, and means for rotating said shaft to advance said projection past said spring end and to cause said surface to cam said plunger toward retracted position.

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