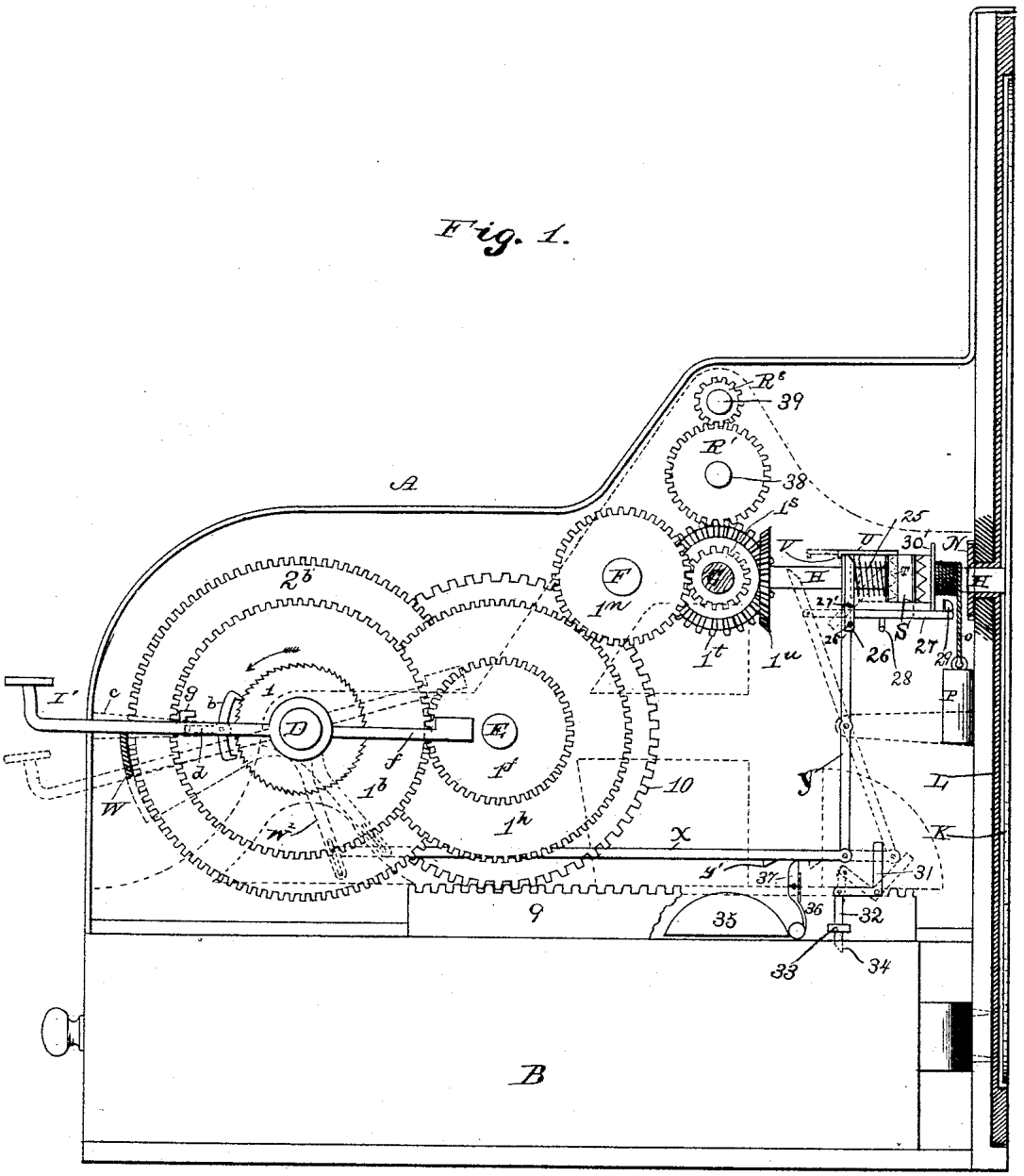
(No Model.) 4 Sheets—Sheet 1.

R. E. NELSON, Jr.

CASH REGISTER.

No. 449,248. Patented Mar. 31, 1891.

Fig. 1.



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(No Model.) 4 Sheets—Sheet 2.

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Fig. 2.

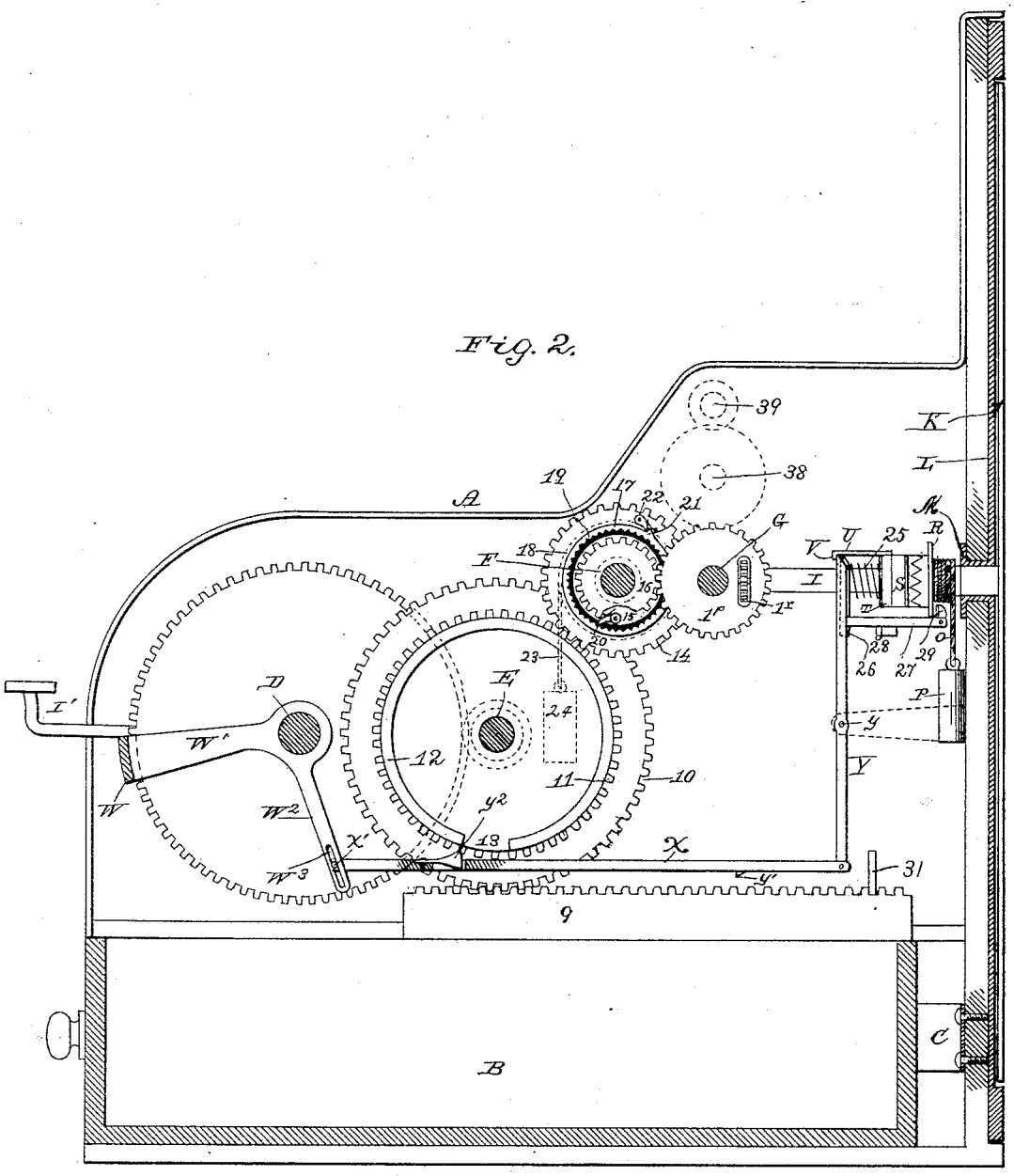
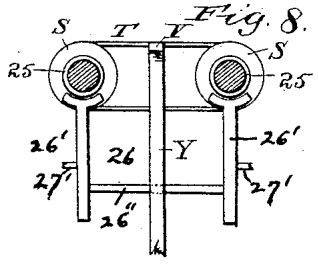


Fig. 8.



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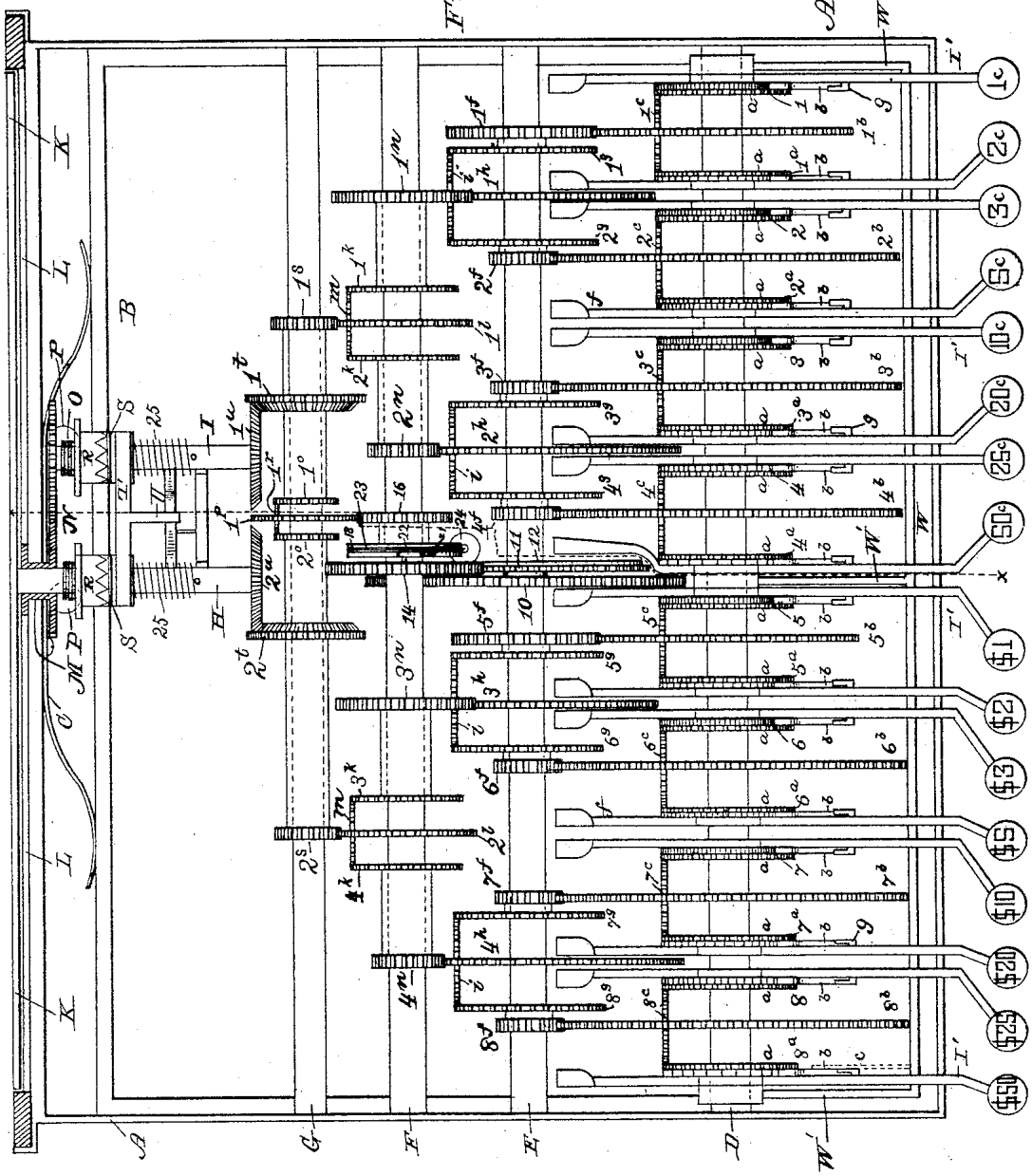
R. E. NELSON, Jr.

CASH REGISTER.

No. 449,248. Patented Mar. 31, 1891.

Fig. 3.



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R. E. NELSON, Jr.

CASH REGISTER.

No. 449,248. Patented Mar. 31, 1891.

Fig. 4.

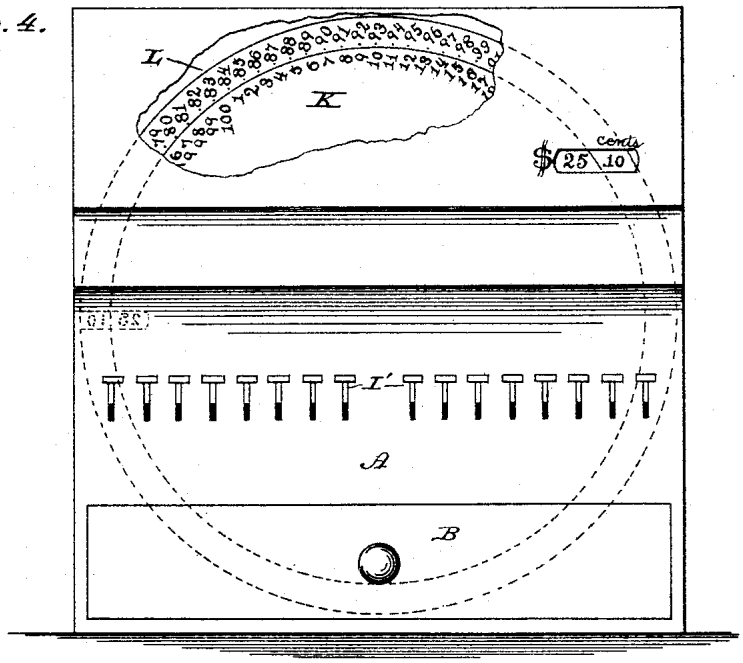


Fig. 5.

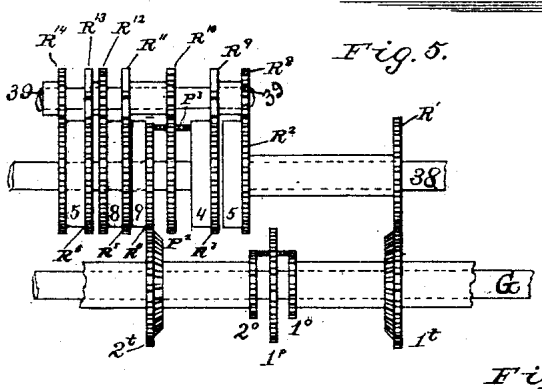


Fig. 6

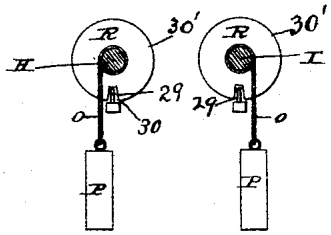
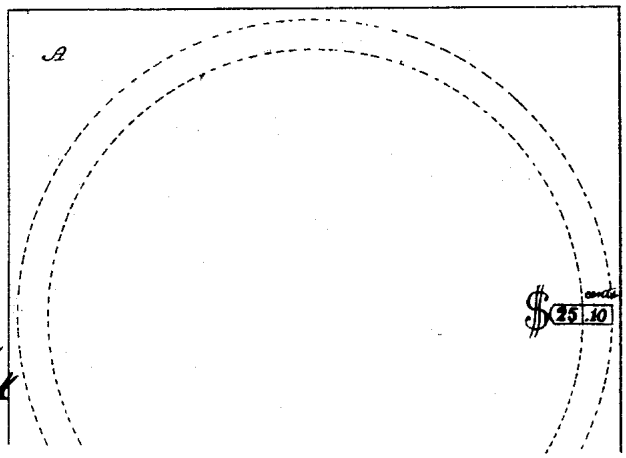


Fig. 7.



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UNITED STATES PATENT OFFICE.

ROBERT E. NELSON, JR., OF COLUMBIA, VIRGINIA.

CASH-REGISTER.

SPECIFICATION forming part of Letters Patent No. 449,248, dated March 31, 1891.

Application filed August 15, 1890. Serial No. 362,061. (No model.)

To all whom it may concern:

Be it known that I, ROBERT E. NELSON, JR., of Columbia, county of Fluvanna, and State of Virginia, have invented a new and useful Improvement in Cash-Registers; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to make and use it, reference being had to the accompanying drawings, forming a part thereof.

My invention relates to an improvement in cash-registers; and it consists in the peculiar construction and combination of devices that will be more fully set forth hereinafter, and particularly pointed out in the claims.

The object of my invention is to construct a cash-register wherein—

First. The adding and indicating mechanism is normally locked and can only be unlocked by the movement of a key, which in so doing must add and indicate its full value under all conditions, thus effectually preventing any tampering with the internal parts should access to them be obtained.

Second. Wherein over-registration due to momentum of the adding-wheels cannot take place, nor can under-registration. If a key be operated quickly or slowly, it is not possible to add a greater or less amount than the value of the key, nor is it possible to indicate a greater or less amount than the amount to be added. This prevents all errors due to "pumping" the keys up and down, and also all errors due to a sudden and violent operation of a high-valued key.

Third. Wherein any number of keys may be actuated simultaneously and the full value of all will be correctly added and indicated. This feature renders all key-locks or other devices to prevent two or more keys being operated at the same time unnecessary.

Fourth. Wherein if the key is only partially operated the full value will still be correctly added and indicated to the customer. This renders all devices unnecessary which compel a full stroke of a partially-operated key.

Fifth. Wherein the values of all the keys are counted on a single register and indicated at a single opening, so that no addition of the separate amounts at the close of a day's business is necessary, nor does the customer have to look at different parts of the machine to see the value of his purchase indicated. If $9.96 are indicated, it appears at a single opening in large figures, ($9.96,) and the sum is added at a single opening on the register to the amount previously sold.

A further object of my invention is to so construct the mechanism that when a key is depressed it will be arrested for a brief interval of time previous to the registration and indication, so that the operator has time to think whether he has depressed the key intended.

Further objects of my invention will hereinafter appear, and be specifically pointed out in the claims.

Figure 1 is a side elevation of my improved cash-register, the end of the case being removed to disclose the interior mechanism. Fig. 2 is a vertical transverse sectional view of the same, taken on the line $x\,x$ of Fig. 3. Fig. 3 is a top plan view of the same, the registering-disks being removed to disclose the subjacent mechanism. Fig. 4 is a front elevation showing the arrangement of the indicating-disk. Fig. 5 is a detail side elevation of the registering mechanism. Fig. 6 is a detail view of the trip mechanism. Fig. 7 is a rear elevation showing the indicator-disks. Fig. 8 is a detail view of the yoke or lever 26 and the parts coacting therewith.

The inclosing case A is of any suitable shape and has a drawer B in its bottom provided at its outer side with a knob. A spring C is secured to the rear side of the case and bears against the rear side of the drawer to start the latter when the indicating mechanism, presently to be described, is operated.

A longitudinal shaft D is arranged in the case near the front side thereof. This shaft is fixed, and on the same is mounted a series of escapement-wheels 1 1^a 2 2^a 3 3^a 4 4^a 5 5^a 6 6^a 7 7^a 8 8^a. The wheels 1, 2, 3, 5, 6, and 7 have each one hundred teeth; the wheels 1^a, 3^a, 5^a, and 7^a have each fifty teeth; the wheels 2^a 6^a have each sixty teeth; the wheels 4 8 have each forty teeth, and the wheels 4^a 8^a have each twenty teeth; also, loose on the shaft D and mounted midway between the respective pairs of escapement-wheels are gear-wheels 1^b 2^b 3^b 4^b 5^b 6^b 7^b 8^b. In each of

the said gear-wheels at a suitable distance from its center is mounted an orbital wheel 1^c 2^c 3^c 4^c 5^c 6^c 7^c 8^c, respectively, the shafts of the said orbital wheels being arranged radially in the said gear-wheels, and said orbital wheels suitably gearing with spur-teeth *a* on the pairs of escapement-wheels.

Each escapement-wheel is provided with an escapement-pallet *b*, pivoted on a support *c* in the case, and having an extended arm *d*. A series of finger-keys I′ are loosely sleeved on the shaft D and arranged on the outer sides of the escapement-wheels, respectively. These finger-keys vary in value from, say, one cent to fifty dollars, as shown in Fig. 3, and have extended counterweighted arms *f* at their inner ends; or a spring may be substituted. The finger-keys are further provided with tappets *g*, adapted to operate their escapement-pallets after the keys have been depressed a certain distance, as will hereinafter appear.

The pairs of wheels, the intermediate gears, and the orbital wheels on the shaft D constitute the primary summation-gears. A shaft E is arranged parallel with shaft D and is likewise fixed. A series of pinions 1^f 2^f 3^f 4^f 5^f 6^f 7^f 8^f are loosely mounted on the shaft E and mesh with the respective gears 1^b 2^b, &c., on a shaft D. Pairs of gears 1^g 2^g 3^g 4^g 5^g 6^g 7^g 8^g are loosely mounted on shaft E and connected each to the proximate pinion by a sleeve, as shown in Fig. 3. Gears 1^h, 2^h, 3^h, and 4^h are loosely mounted on shaft E midway between the pairs of gears aforesaid, and in each of said gears 1^h 2^h 3^h 4^h is journaled an orbital wheel *i*, which engages the respective pairs of gears. The said pairs of gears, intermediate gears, and orbital wheels constitute the secondary summation-gears.

On a rigid shaft F, parallel with shaft E, are loosely mounted two pairs of gears 1^k 2^k 3^k 4^k. Midway between the said pairs of gears are loosely mounted gears 1^l 2^l, carrying orbital wheels *m*, which mesh with the aforesaid pairs of gears; also, loose on shaft F are pinions 1^n 2^n 3^n 4^n, which mesh with the gears 1^h 2^h 3^h 4^h, respectively. Sleeves connect the said pinions to the proximate members of the pairs of gears, as shown in Fig. 3. The said pairs of gears, together with their intermediate gears and orbital wheel on shaft F, constitute the tertiary summation-gears.

On a rigid shaft G, parallel with shaft F, are mounted a pair of gears 1^o 2^o, and midway between them is mounted a gear 1^p, having an orbital wheel 1^r, which engages said pairs of gears. The latter, the intermediate gear, and its orbital wheel constitute the quaternary summation-gear. A sleeve connects the gear 1^o with a pinion 1^s, that engages the gear 1^l, and on said sleeve is a miter-wheel 1^t, having also spur-teeth. A similar sleeve connects the gear 2^o with a pinion 2^s, that engages the gear 2^l, and on said sleeve is a miter-wheel 2^t, having also spur-teeth.

A pair of horizontal shafts H I at right angles to shaft G extend to the back of the case and are geared to the miter-wheels 1^t 2^t by miter-wheels 1^u 2^u, respectively. A dollars-disk K is attached to the rear end of shaft H, and a cents-disk L is loosely mounted on said shaft by a sleeve M, which is connected to shaft I by gears N. A cord O is coiled on shaft I and has a weight P, the function of which is to return the cents-disk, as will be understood. The dollars-shaft has a similar cord and weight. Clutches R, having serrated crown-teeth, are fixed on the shafts H I, and loosely fitted on said shafts are sliding clutches S, likewise provided with crown-teeth and normally interlocked with the clutches R. The sliding clutches S are provided with peripheral flanges, between which flanges are fitted the endless strap or belt T, which connects said sliding clutches and moves with them in their sliding movements. From the front side of this endless belt or strap projects an arm U, having a depending spur V, with which engages the upper end of a vertical lever Y.

A trip-bar W is arranged under the finger-keys, and connected at its ends and center to sleeves on the shaft D by means of arms W′. An arm W^2 depends at right angles from the center arm and has a slot W^3, to which is connected the front end of a trip-rod X by a pin X′ working in the slot. A trip-lever Y, pivoted at *y* to a suitable support, has its lower end pivoted to the rear end of the trip-rod, and its upper end normally engages the spur V. A tappet *y′* is on the lower side of the trip-rod, and a spring-tappet y^2 is on the upper side of said rod.

On the upper side of the drawer is a rack 9, which engages a spur-wheel 10, loose on shaft E. A spur-wheel 11 is connected to wheel 10 by a sleeve, and said wheel 11 has an annulus 12 on one side, with a space or notch 13, adapted to be engaged by the spring-tappet y^2. A wheel 15, Fig. 2, is loose on shaft F, near the wheel 14, and inside the rim of wheel 17, and is connected by means of a sleeve to a spur-wheel 16, that meshes with the wheel 1^p of the quaternary summation-gear.

A wheel 17, loosely mounted on the shaft F, between the wheels 14 15, has an annular rim 18, that projects laterally over the wheel 15, so that the latter is concealed. On the inner side of this rim are serrated teeth 19, engaged by a spring-pressed pawl 20 on the wheel 15. This enables both wheels to move together in one direction, and enables one to move independently of the other in the reverse direction. The wheel 17 has a tooth 21 on one side, adapted to be engaged by a spring-pressed pawl 22, pivoted to the wheel 14.

A cord 23 is coiled on the rim of the wheel 17, Figs. 2 and 3, and from the free end of the cord depends a weight 24. This wheel 17 being connected by pawl 20, wheel 15, and wheel 16 to the quaternary summation-gear, which is connected to the tertiary summation-gears, and those in turn connected to the secondary

summation-gears, which mesh with the primary summation-gears, it follows that the weight tends to turn all of the escapement-wheels in the direction of the arrow in Fig. 1. The escapement-pallets being normally engaged with the escapement-wheels, keep the trains of gear or transmitting mechanism normally at rest and locked.

Coiled springs 25 are fitted on the shafts H I, and they bear at one end against suitable collars or pins on the shaft, and at their opposite ends they operate against the sliding clutches S, and said springs tend to keep the sliding clutches in engagement with the fixed clutches R, which serve as stops to arrest the axial rotation of the shafts H I, and also limit the rearward movement of the sliding clutches S. The shafts H and I are broken between the clutches S and R, so that the clutches R, which are nearest the indicators, can revolve independently of the clutches S, which are nearest the keys, and this happens each time the indicators are reset to zero, as will hereinafter appear. The clutches S, which are splined on the longer parts of the shafts H I, after being moved out of engagement with the clutches R, might become caught, and after being released from the lever Y might fail to re-engage the clutches R, in which case the register would fail to revolve the indicators after being actuated. To obviate this I provide what I term a "shoving" device or "yoke" lever 26, Figs. 1, 2, and 8, which consists of a pivoted yoke-lever having the arms 26′, adapted to bear against the clutches S, the cross-bar 26″, connecting the two arms 26′, and the pivots 27′, which may be fitted into any suitable support (not shown) attached to the frame of the machine.

Suitably attached to the lever Y is a rod 27, working in suitable guides and provided at its end with a spring-pressed pawl 29, which can only turn on its pivot when rod 27 is moving toward the indicators K L. Rod 27 is also provided on its under side with a depending tappet-pin 28, Figs. 1 and 2, which takes against the cross-bar 26″ and turns the shoving device on its pivots 27′, when the rod 27 is moved toward the keys. One pawl 29 is sufficient; but I prefer to use two, Fig. 6, in which case I connect them in any suitable manner, so that they may always move together. These pawls are adapted to pass through notches 30, cut through the rim or flange of the non-sliding clutches R on the short ends of the shafts H I. From this construction it will be seen that upon the depression of a key the lever Y will be turned on its pivot, carrying with it the rod 27, the arm U, strap T, and clutches S, thus disengaging the register from the indicators. When the upper end of lever Y reaches the dotted-line position of spur V, (shown in Fig. 1,) it will become disengaged therefrom, and tappet 28 on rod 27 being so placed that it will at this point strike cross-bar 26″ the yoke-levers 26′ will turn on their pivots 27′ and their upper ends will shove the clutches S back into engagement with the clutches R, as shown in dotted lines, Fig. 1.

It being understood that the drawing in Fig. 8 is somewhat exaggerated for clearness and that it does not show the rod 27 and pawls 29, if the clutches S should become caught the longitudinal motion of rod 27 is stopped, as is also the lever Y and bar W and operating-key.

Weights P are provided for automatically returning the indicators K L whenever clutches S R are disengaged. These weights are automatically rewound every time the register operates the indicator-disks. When this happens, the clutches S R are turned together, the former revolving in the strap or band T, which is kept from turning by any suitable attachment to a fixed part of the frame, (not shown)—for instance, the same part which supports the yoke-lever or shoving device 26. The power for operating these parts is supplied from the heavier weight 24, which is wound up by the drawer, as previously described. When a key is depressed and rod 27 begins to move toward the keys, the pawl 29 takes against the flange of clutch R and stops the downward motion of the key; but clutches S R being disengaged the weights P return the indicators to zero, when the pawl or pawls 29 will pass through the notches or slots 30 in said flanges and the further movement of the key and re-engagement of clutches S R takes place. The tappets *g* on the finger-keys are of such a length that the escapement will not be operated until just before the key completes its downward stroke and after the shoving device 26 has re-engaged the clutches S R, so that no registration can take place while said clutches or while the registers and indicators are disengaged. After the key is released all parts return to the position shown in Fig. 1 through the action of the weights *f* or any other suitable means. Arm U having a slight spring in it, lever Y automatically re-engages spur V. A bell-crank lever 31 is pivoted to a suitable support in the frame and has its vertical arm arranged in the path of the trip-rod. A bolt 32 is pivoted to the horizontal arm of the bell-crank lever and passes through a keeper 33 and normally engages a notch 34 in the drawer to keep the latter locked when closed. A bell 35 is mounted in the case and has a pivoted hammer 36, provided with a spring-pressed tappet 37 at its upper end adapted to be engaged by the tappet on the lower side of the trip-rod when the latter is returning to its normal position, as will appear hereinafter.

A registering mechanism consisting of a series of gears is mounted on shafts 38 and 39, arranged parallel and vertically above the shaft G. This registering mechanism, Figs. 3 and 5, consists of the wheels 1^t 2^t, gearing respectively into the pinions R′ R^4. The pinion R′ is connected to the wheel R^3, and both are loosely mounted on the shaft 38. The

register-wheel R^2 gears into a pinion R^8 on shaft 39. To the pinion R^8 is sleeved the pinion R^9, also loosely mounted on shaft 39 and having a single tooth, which meshes with the registering-wheel R^3 on shaft 38. The registering-wheels R^4 and R^3 are connected by the loosely-mounted wheel P^2, carrying an orbital wheel P^3, to the pinion R^{10}, which is sleeved to the single-toothed pinion R^{11}, both loosely mounted on shaft 39, and the single tooth of pinion of R^{11} gearing into registering-wheel R^5, which also gears into pinion R^{12}, which is sleeved to pinion R^{13}, carrying a single tooth, which gears into registering-wheel R^6, which wheel R^6 also gears into pinion R^{14}, and so on, it being seen that the pinions and wheels are all loosely mounted on their shafts and that when the registering-wheel R^2 makes a full revolution or half-revolution or a quarter-revolution, according to the diameters of the pinion on shaft 39, its tens will be carried to the registering-wheel R^3, and as the registering-wheel R^3 turns it will turn the wheel P^2. It will also be seen that the wheel 2^t, through register-wheel R^4, also turns wheel P^2, which wheel P^2 thus sums up correctly the angular movements of wheels 1^t and 2^t, whether the latter be actuated simultaneously or successively, and that the summations on the wheel P^2 will be carried successively to the register-wheels R^5 R^6, &c., so that the register will indicate at a single opening units, tens, hundreds, thousands, &c.

The operation of my invention so far is as follows: When a finger-key, say the value of one cent, is depressed, it trips the escapement-pallet on the wheel 1 and the said wheel turns through the space of one tooth by means of the weight 24 and the gears, as follows: The primary escapement-wheel 1 turns its orbital wheel 1^c, which, the primary wheel 1^a being locked by its escapement-detent, revolves on its axis and moves on the gear attached to said wheel 1^a as a track, thus turning the wheel 1^b half the angular value of one tooth on wheel 1. The pinion 1^f, being half the diameter of wheel 1^b, causes wheel 1^g to turn the full angular value of one tooth of wheel 1. The wheel 1^g likewise turns wheel 1^h half the angular value of one tooth on wheel 1. Pinion 1^n, being half the diameter of wheel 1^h, turns wheel 1^k the full value of one tooth on said primary wheel 1. Likewise through orbital wheels m, pinion 1^s, of half the diameter of wheel 1^l, the wheel 1^t is turned the full value of one tooth on said primary wheel 1. Wheel 1^u is of same diameter as wheel 1^t, as shown, and turns, through the clutches S and gears N, the cents-indicator wheel the full angular value of one tooth on said primary wheel 1. The cents-indicator is divided into one hundred spaces, and marked from zero to 99, the primary wheel, having one hundred teeth, the angular value of one tooth through which it has been turned will cause the indicator to show one cent. Likewise if the two-cent key should be depressed, its escapement-wheel 1^a, having only fifty teeth, it will turn said indicator so as to show two cents. The escapement-wheel 2 for the three-cent key also has one hundred teeth, but its pinion 2^f, which meshes the wheel 2^b, is made of one-sixth the diameter of said wheel 2^b. Hence the motion transmitted to wheel 2^g is multiplied to three times the value of one tooth on the primary wheel 1. Hence through the train of gears described the indicator will be turned to show three cents. In the same manner the five-cent, ten-cent, twenty-cent, twenty-five cent, fifty-cent, one-dollar, two-dollar, three-dollar, five-dollar, ten-dollar, twenty-dollar, twenty-five dollar, and fifty-dollar escapement-wheels and their connecting pinions are so proportioned that in each instance their indicating-disks will show the correct value of the operated key or keys. It will be seen that if both the one-cent and two-cent keys are simultaneously operated the orbital wheel i will cause the wheel 1^b to transmit to wheel 1^s the full value of both keys, and if any number of keys are operated simultaneously or successively the full value of all of such keys will be correctly transmitted to wheels 1^t or 2^t, as the case may be; and it follows that such value will be correctly indicated on the indicating-disk. Wheels 1^t and 2^t, gearing into the dollar and cents wheels of the register, as described, their full value will be registered, and it will be seen that is immaterial whether such keys are depressed simultaneously or successively, since the register is capable of summing up in either case the correct value through the transmitting mechanism just described. It will also be seen that the same part of such transmitting mechanism that operates the register also operates the indicator, so that it is not possible to indicate a greater or lesser amount than is registered. It will also be seen that said transmitting mechanism, as well as the indicator and register, is normally locked through the escapement-detents, thus rendering it impossible to move the register backward or forward, except through the operation of the key, and momentum is impossible. A suitable key or zero-setting mechanism is to be used with the register to reset it to zero when desired; but such mechanism, being well known in the art, is neither shown nor described here. At the initial depression of the key the trip-bar W moves with it, and the arm W^2 forces the trip-rod Y rearward, and the trip-rod operates the bell-crank lever 31 and causes the bolt to unlock the drawer, as represented by dotted lines in Fig. 1. As the drawer moves forward, the rack 9 turns wheel 10, and wheel 11, being connected to wheel 10 by a sleeve, also turns, and the wheel 14, meshing with wheel 11, turns with it, the pawl 22 slipping loosely over the rim 18 of wheel 17. Inasmuch as the escapement-pallet permitted the wheel 1 to turn through only the space of one tooth, the weight and cord on wheel 17 causes the latter to turn through

the angular distance equivalent to the value of the key, and the pawl 20 caused the wheel 15 to move a corresponding distance in the same direction with the wheel 17, thereby moving the stop or tooth 21 on the wheel 17 to a position equal to the value of the key. Inasmuch as the shafts H I are connected by gears to the primary gears of the indicating mechanism, the motion of the wheel 16, connected to wheel 15, was transmitted to the wheel 1^p, and consequently the wheel 1^r, retaining its engagement with wheel 2^o, did not affect the latter, but caused the wheel 1^o to turn one space, and with it the various transmitting or summation mechanism back to primary wheel 1. It will be understood that the indicator showing an amount—say $1.50—the rearward movement of the trip-rod heretofore described causes the upper end of the lever to move forward, and being in engagement with the strap T, connecting the clutches moves the latter forward out of engagement with the stops or clutches R on the disk-shafts. Hence the latter will be free to turn under the influence of their weights, back to zero positions or any other predetermined position, the said position being determined by a notch in the flange of the stops, Fig. 6, presently to be described. While the trip-lever is thus moving and before reaching the full limit of its stroke, the pawl 29 on bar 27 strikes against the flanges 30′ of the stops, and thus arrests the motion of the bar W. The contact of the pawl 29 with flange 30′ continues until the notch 30 in flange 30′ comes opposite pawl 29, when the pawl slips through said notch and the movement of trip-lever continues. At this point the pin or bar 28 strikes the yoke or pivoted lever 26, causing it to turn on the pivot, shoving the clutch back into engagement, the trip-bar in the meantime having become disengaged from said clutches. The movement of the trip-bar continues until, through the shoving device consisting of the pin 28 and yoke-lever 26, the clutches are in engagement with the stops. When this takes place, the drawer is released and the escapement mechanism is operated and registration and indication takes place, after which the bell is rung. Yoke-lever 26, it being understood, operates the clutches for both indicators, resetting them to zero. It will be seen that the arresting of the pawl 29 against flange 30′ causes the key to be arrested in its downward motion until the indicators are reset by their weights and the pawl can pass through the notch above described, at which time the indicators are at zero. This allows the operator time to think if he has depressed the key intended, and if he has not, since no registration has taken place, the tappets on the keys being at some distance from the escapement-detents, he may depress the proper key; also, since bar 26 has insured the re-engagement of the clutches (helped by springs) before the registration takes place, the indication is compelled to be correct. As the drawer opens and immediately after the registering mechanism has been operated, as hereinbefore described, the notch of the annulus wheel engages the spring-tappet Y^2 of the trip-rod, and thereby restores the latter, the trip-lever, and the trip-bar W to their initial positions and ringing the bell. (Shown in solid lines in Figs. 1 and 2.) When the drawer is closed, the rack 9 and wheels 10 11 cause the wheel 14 to reverse its rotary motion and the pawl 22, by engaging the stop or tooth 21 of wheel 17, moves the latter wheel an angular distance corresponding to the value of the key or keys operated, and hence raises the weight to the position it formerly occupied.

From the foregoing it will be understood that whenever the drawer is closed after a key, no matter of what value, has been operated the weight will be restored to its initial position, and hence never runs down. This power mechanism being geared to the drawer, the tooth or stop 21 in wheel 17 being in engagement with pawl 22 when the drawer is closed, it will be seen that the action of weight is taken off said power mechanism and it is then rendered inactive, so that as long as the drawer is closed if any key were operated no power could be transmitted to the escapement or transmitting mechanism, and hence no registration or indication could take place without first opening the drawer a predetermined distance. It will also be seen that when the keys are returned to their normal position when the drawer is open all the keys are locked through annulus 11 and tappet y^2 and bar W.

In Fig. 3 I illustrate my improved cash-registering machine provided with sixteen keys. These range in value from one cent to fifty cents and from one dollar to fifty dollars. By means of these keys and their connected mechanism any sum ranging from one cent up to fifty dollars may be registered at a single operation.

Having thus described my invention, I claim—

1. In a cash-register, the combination of a series of keys, a register, a rotating indicator, and connecting mechanism adapted to transmit at all times to said register and indicator the full value of simultaneously-operated keys of said series.

2. In a cash-register, the combination of a series of keys, a register, an indicator, and a rotating escapement mechanism for simultaneously operating said register and indicator.

3. In a cash-register, the combination of a series of keys, a register, an indicator, and an escapement mechanism operating both and adapted to transmit to both said register and indicator the full value at all times of simultaneously-operated keys.

4. In a cash-register, the combination of a series of keys, a register, and an indicator

operated by said register, and connecting mechanism for transmitting the full value of simultaneously-operated keys.

5. In a cash-register, the combination of a key, a rotating escapement mechanism and an indicator operated by said escapement mechanism, and means for resetting said indicator to a predetermined position.

6. In a cash-register, the combination of a key, a rotating escapement mechanism, a register and indicator operated by said escapement mechanism, and means for resetting said indicator to a predetermined position.

7. In a cash-register, the combination of a series of keys, a register and indicator operated by the register, and connecting mechanism whereby upon the simultaneous operation of two or more keys the indicator will be first returned to a predetermined position and then their full value will be registered and indicated.

8. In a cash-register, the combination of a key, a register, escapement-connections between said key and said register, an indicator, operating connections between said register and said indicator, and means whereby said indicator is reset before said key begins to operate said register.

9. In a cash-register, the combination of an operating-key, an escapement mechanism controlled thereby, a register, and means for arresting said key just before the registration takes place.

10. In a cash-register, the combination of an operating-key, an indicator, an escapement mechanism controlling the same, and mechanism for arresting such key when its stroke is partially completed and holding it until the indicator is reset to a predetermined position.

11. In a cash-register, the combination of an operating-key, a register and indicator, an escapement device for controlling both said register and indicator, and mechanism for arresting such key when partially operated until the indicator is reset to a predetermined position and before the registration takes place.

12. In a cash-register, the combination of an operating-key, an escapement mechanism controlled by the same, and means for arresting said key in its downward motion and for automatically releasing the same to operate said escapement mechanism after a brief interval of time.

13. In a cash-register, the combination of an operating-key, an indicator, an escapement mechanism controlling said indicator, and mechanism for arresting such key in its downward motion and for automatically releasing said key and resetting said indicator after a brief interval of time.

14. In a cash-register, the combination of an operating key, an escapement mechanism, a register, an indicator operated by said register, and mechanism for arresting said key in its downward motion and for automatically releasing said key and resetting said indicator after a brief interval of time and before it begins its registering stroke.

15. In a cash-register, the combination of a key, a register escapement, connections between said key and said register, an indicator, operating connections between said register and said indicator, and means whereby upon the depression of said key it releases said indicator and stops until the same is at a predetermined position and upon the further depression of said key it actuates both said register and indicator to its full value.

16. In a cash-register, the combination of an operating-key, a cash-drawer, and a power and an escapement mechanism connecting said key and drawer, adapted to be put under tension upon the opening of said drawer and to be relieved from strain upon the closing of the same.

17. In a cash-register, the combination of an operating-key, a power-transmitting mechanism controlled by the key, a cash-drawer, and connections between said drawer and said mechanism, adapted to render the latter inactive while said drawer is closed and to render it active upon the opening of the same.

18. In a cash-register, the combination of a power mechanism, a drawer, an escapement mechanism, and connections between the drawer and power mechanism, whereby the escapement mechanism is inactive while the drawer is closed.

19. In a cash-register, the combination of a series of pivoted keys, a power mechanism, and connections between the keys and the power mechanism, whereby all the keys are reset at predetermined times.

20. In a cash-register, the combination of a series of pivoted keys, a power mechanism, a drawer, and connections between the keys and the power mechanism, whereby all the keys are reset after the drawer has opened a predetermined distance.

21. In a cash-register, the combination of a series of keys, a power mechanism, a drawer, and connections between the keys and power mechanism, whereby the keys are reset and locked while the drawer is opened a predetermined distance.

22. In a cash-register, the combination of a series of keys, a power mechanism, an escapement mechanism operated thereby, and a cash-drawer, whereby said power mechanism is automatically rewound and the escapement mechanism is rendered inactive upon the closing of said drawer.

23. In a cash-register, the combination of a series of keys, a power mechanism, a cash-drawer for putting said power mechanism under tension, and a resetting and bell-ringing mechanism for said keys, operated by said power mechanism.

24. In a cash-register, the combination of a series of keys of different values, a transmitting mechanism, a totalizing-register consisting of a series of loosely-mounted register-

wheels, and carrying-pinions adapted to add up the full value of simultaneously-operated keys.

25. In a cash-register, a totalizing-register consisting of a series of loosely-mounted register-wheels R^2 R^3 R^4 R^5, carrying-pinions R^8 R^9 R^{10} R^{11}, and intermediate gearing P^2 P^3, substantially as described.

26. In a cash-register, the combination of a series of keys, an indicator, a clutch mechanism, and a tripping device adapted to unclutch the indicator and allow it to reset to a predetermined position and to then clutch said indicator and allow it to indicate the full value of an operated key or keys.

27. In a cash-register, the combination of a series of keys, an indicator, a clutch mechanism, a tripping mechanism, and a shoving device adapted to insure the reclutching of the indicator before it begins its indicating movement.

28. In a cash-register, the combination of the series of primary, secondary, tertiary, and quaternary summation-gears, the finger-keys and devices to operate the said primary gears, the weight-wheel having stop 21 and internal teeth 19, the wheel 14, having a pawl 22 to engage stop 21, the rack-and-pinion devices connecting said wheel to the drawer, the gear connected to the intermediate wheel of the quaternary summation-gear and having the pawl 20, engaging teeth 19, substantially as described.

29. In a cash-register, the combination of the indicating-disk shafts, the registering mechanism geared thereto, the pinion-moving wheels and gearing connecting them to disk-shafts, the clutches on the latter, the weight device to return the disks to zero, the keys to operate the prime-moving wheels, the trip-bar operated by the said keys, the trip-rod and trip-lever connecting the trip-bar and the clutches to be tripped when the keys are depressed, and springs to immediately re-engage the clutches, substantially as described.

30. In a cash-register, the combination of the indicating-disk shafts, the prime-moving wheels and intermediate gearing connecting them to the registering mechanism and disk-shafts, the weight devices to return the disks to zero, the trip-bar operated by the finger-keys, the trip-lever to disengage the clutches and connected to the trip-bar, and the yoke-lever connected to the trip-lever and adapted to engage the clutches for the purpose set forth, substantially as described.

31. In a cash-register, the combination of the prime-moving wheels, the weight or spring devices geared thereto, for moving them when released, the rack and pinions connecting the drawer to said weight or spring devices to wind them, as described, the indicating-disk shafts and intermediate gears connecting them to the prime-moving wheels, weight devices to return the disk to zero, the clutches on the disk-shafts, the finger-keys and devices to operate the prime-moving wheels, the trip-bar operated by the keys, the trip-lever to disengage the clutches, the trip-rod connecting said lever to the trip-bar and having the spring-stop Y^2, and the annulus connected to the pinion and having the notch to engage said stop.

32. In a cash-register, the combination of the series of summation-gears, the finger-keys and escapements to operate them, the registering mechanism, indicating-disk shafts geared to the series of summation-gears, the weight or spring wheel for turning the gears, the rack and pinion connecting it to the drawer, the annulus, the indicating-disks and the weights to return them to zero, the clutches on the disk-shafts, the trip-lever and the yoke to disengage and re-engage the clutches, the finger-keys and escapements to operate the prime-moving wheels of the summation-gears, the trip-bar operated by the keys, and the trip-rod connecting said bar with the trip-lever and having the stop to engage the annulus, substantially as described.

33. In a cash-register, the disk-shafts geared to the operating and registering mechanisms, the cents and dollars disk respectively sleeved to and fixed on one of said shafts, the gears connecting said shafts and having the weight or spring devices to return the disks to zero, the clutches on the disk-shafts to free and lock the disks, the trip-lever and connection to disengage and re-engage the clutches when the finger-keys are operated, and the guide-bar attached to the trip-lever and having the stop to control the movement of the trip-lever, substantially as described.

34. In a cash-register, the trip-bar operated by the keys, a trip-rod attached thereto for the purpose set forth, the drawer, the bell-ringing lever in the path of the trip-rod, the bell-crank lever in the path of trip-rod, and bolt attached to said lever and adapted to unlock the drawer upon the partial operation of the lever and to ring the bell upon the full operation thereof.

35. In a cash-register, the combination of a rotating indicator, a register for operating same, and a weight automatically rewound up proportional to the actuation of said indicator.

36. In a cash-register, the combination of an indicator, a weight for automatically resetting the same, a cash-drawer, and a power mechanism operated thereby for rewinding the weight.

37. In a cash-register, the combination of an indicator, a weight for operating the same, and a power mechanism for automatically rewinding the weight.

38. In a cash-register, the combination of a drawer, a power mechanism operated thereby, a register operated by the power mechanism, an indicator, and a weight rewound by said power mechanism for resetting said indicator.

39. The combination of a key, a rotating escapement, a register operated thereby, a

power mechanism, and a cash-drawer carrying a rack for rewinding the power mechanism.

40. In a cash-register, the combination of a register, a weight for operating the same, a cash-drawer, and means whereby upon the closing of said drawer the weight is automatically restored to a predetermined position after being released varied distances.

41. In a cash-register, the combination of a weight, and escapement mechanism for releasing the same varied distances, a cash-drawer, and connections whereby upon the operation of the drawer the weight is always rewound to a predetermined position.

In testimony that I claim the foregoing I append my signature.

ROBERT E. NELSON, JR.

Witnesses:
J. W. GARNER,
LYDIA CATTELL.