May 8, 1923. 1,454,108

T. K. DIXON ET AL

TRANSFER ADDING AND TOTALING MACHINE

Filed July 12, 1921 5 Sheets-Sheet 1

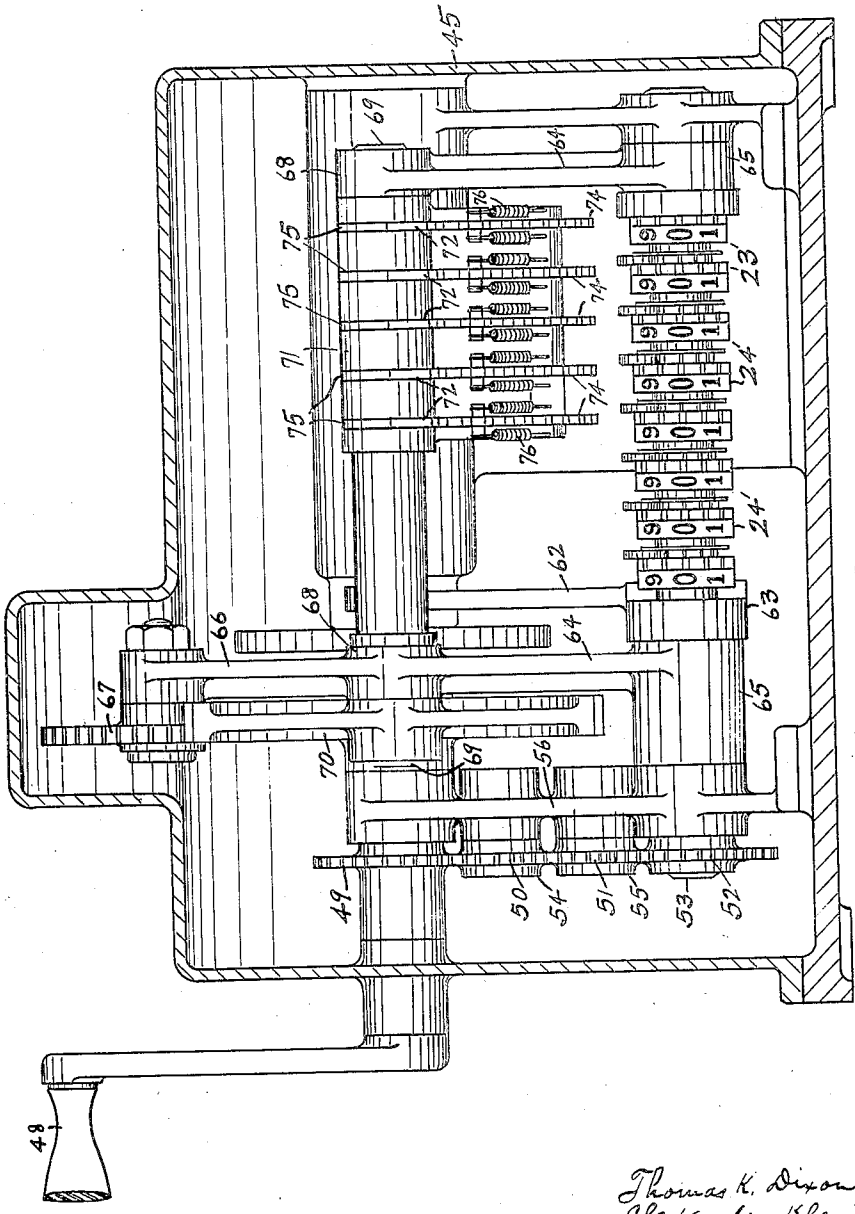

Fig. 1.

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May 8, 1923. 1,454,108

T. K. DIXON ET AL

TRANSFER ADDING AND TOTALING MACHINE

Filed July 12, 1921 5 Sheets-Sheet 2

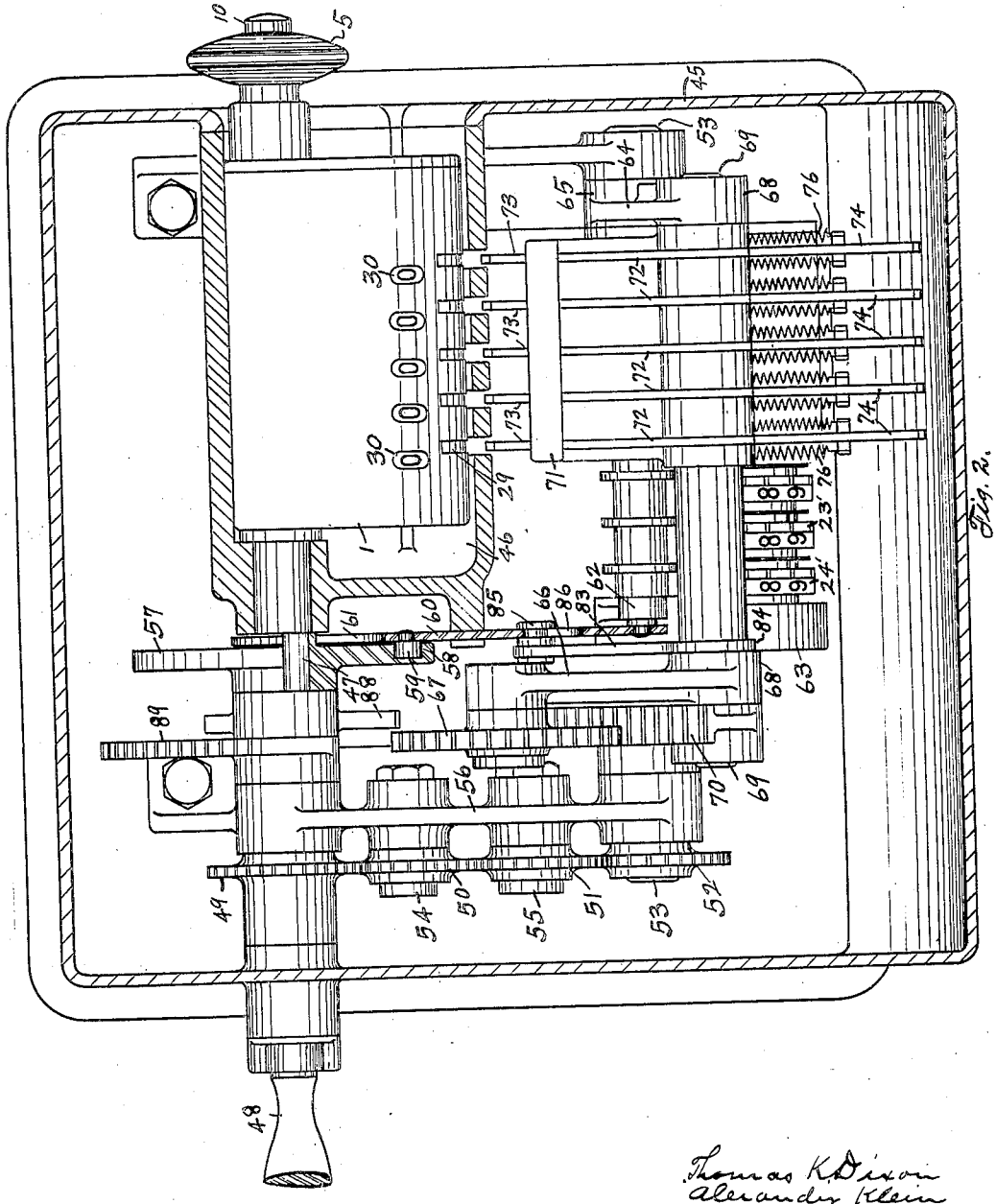

Fig. 2.

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1,454,108

T. K. DIXON ET AL

TRANSFER ADDING AND TOTALING MACHINE

Filed July 12, 1921 5 Sheets-Sheet 3

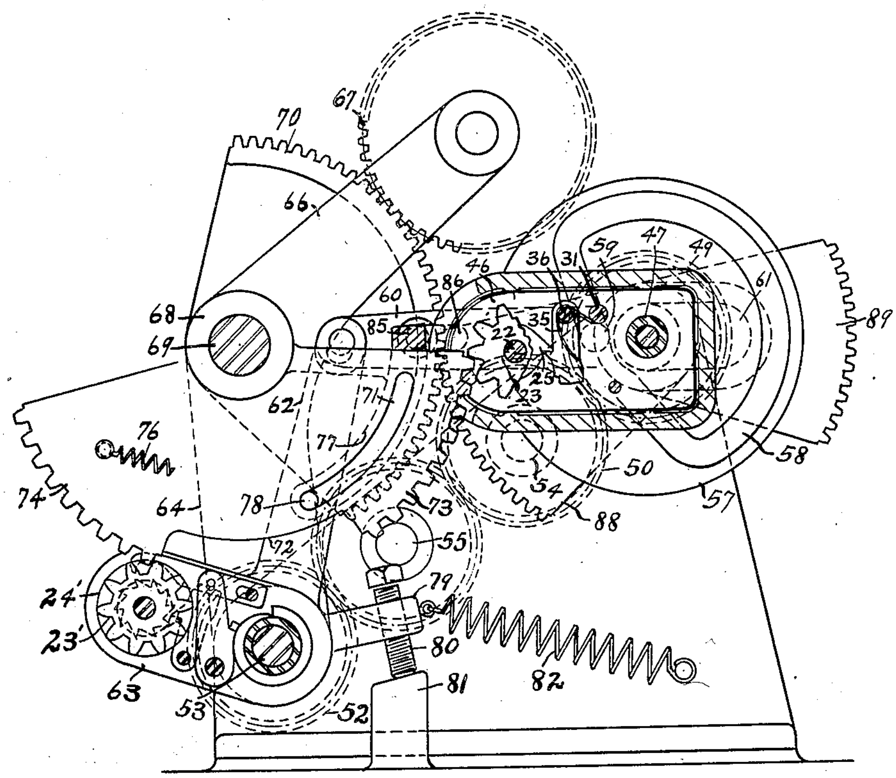

Fig. 3.

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May 8, 1923. 1,454,108

T. K. DIXON ET AL

TRANSFER ADDING AND TOTALING MACHINE

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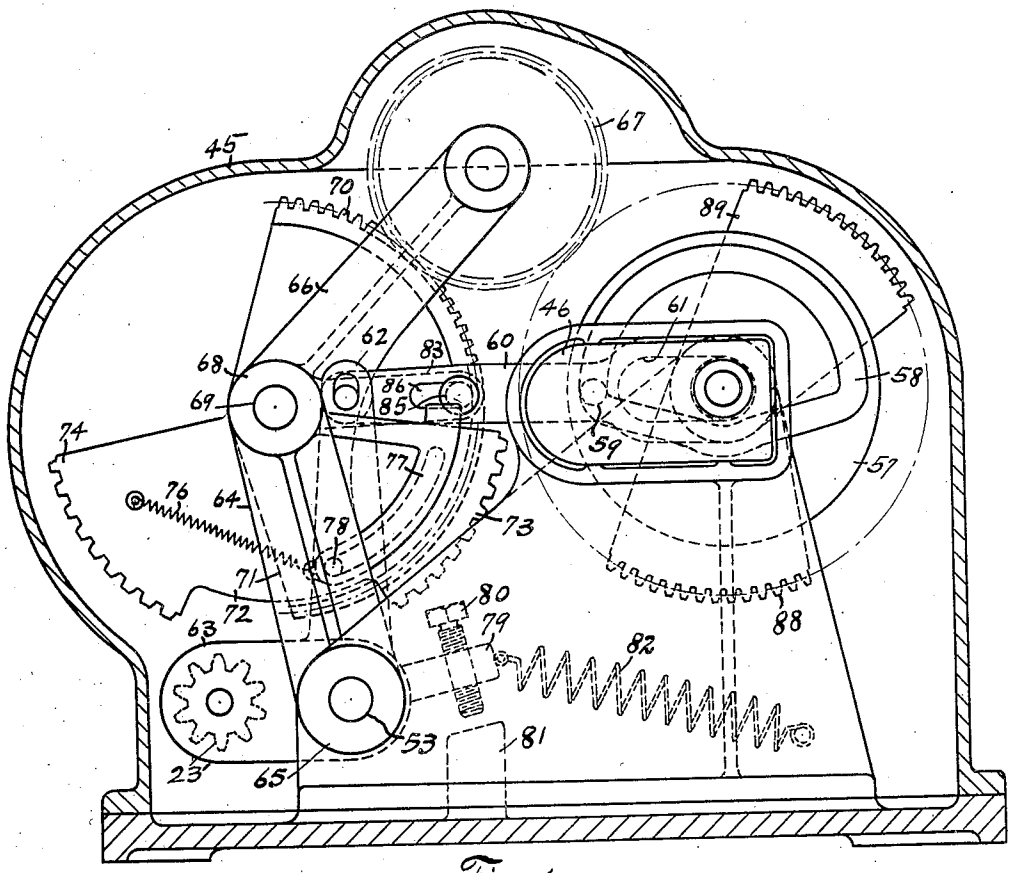

Fig. 4.

BY

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May 8, 1923. 1,454,108

T. K. DIXON ET AL.

TRANSFER ADDING AND TOTALING MACHINE

Filed July 12, 1921 5 Sheets-Sheet 5

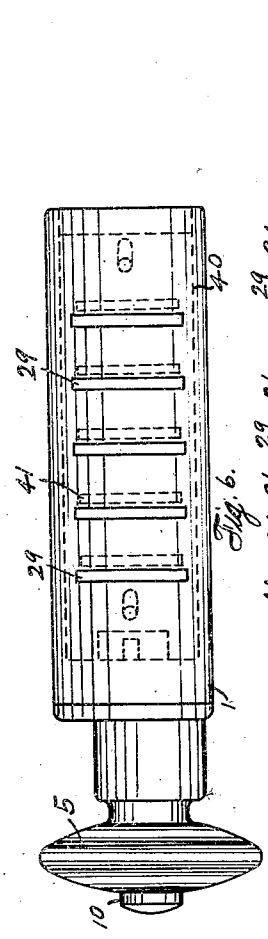

Fig. 6.

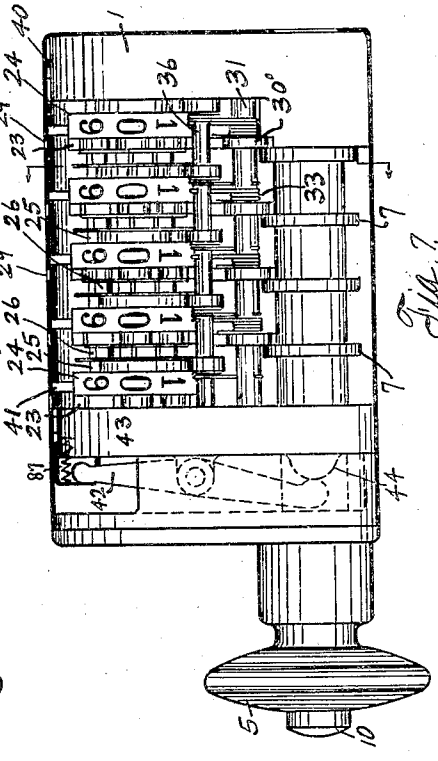

Fig. 7.

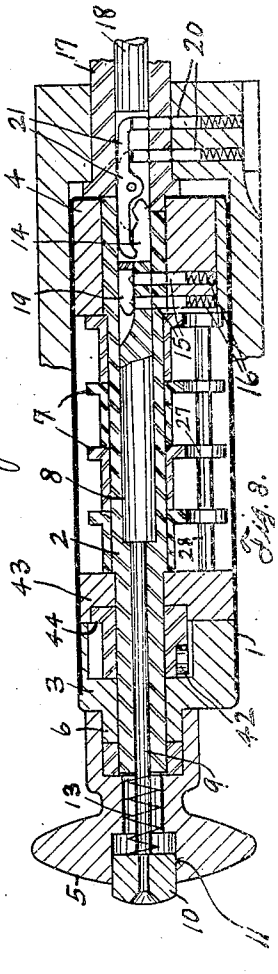

Fig. 8.

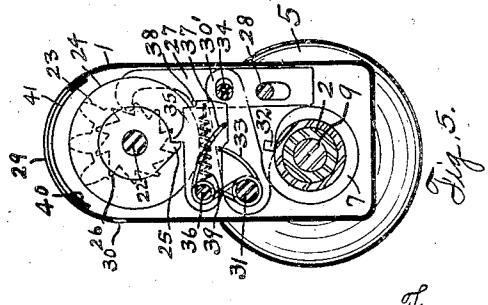

Fig. 5.

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Patented May 8, 1923. 1,454,108

UNITED STATES PATENT OFFICE.

THOMAS K. DIXON, ALEXANDER KLEIN, JESSE C. COX, AND GEORGE R. GHENT, OF HOUSTON, TEXAS, ASSIGNORS TO DIXON DEVELOPEMENT COMPANY, OF HOUSTON, TEXAS, A CORPORATION OF TEXAS.

TRANSFER ADDING AND TOTALING MACHINE.

Application filed July 12, 1921. Serial No. 484,359.

To all whom it may concern:

Be it known that we, THOMAS K. DIXON, ALEXANDER KLEIN, JESSE C. COX, and GEORGE R. GHENT, citizens of the United States, residing at Houston, in the county of Harris and State of Texas, have invented certain new and useful Improvements in a Transfer Adding and Totaling Machine, of which the following is a specification.

This invention relates to new and useful improvements in a transfer adding and totaling machine.

One object of the invention is to provide a machine of the character described which has been specially designed for the purpose of mechanically transferring the totals, registered on adding machines, to the totaling machine whereby a register is made of the grand total of the amounts indicated by the different individual adding machines. The machine herein described is particularly useful in connection with our mechanical store described in our application for patent thereon, filed in the United States Patent Office on the 7 day of June, 1921, under Serial No. 475,629, for the purpose of keeping a total register of the individual adding keys used in the operation of said store.

Another object of the invention is to provide a machine of the character described which in addition to transferring and combining said totals will set back the adding machine, or adding key, to zero so that it can be re-used by other customers.

With the above and other objects in view this invention has particular relation to certain novel features of construction, operation, and arrangement of parts, an example of which is given in this specification and illustrated in the accompanying drawings, wherein:—

Figure 1 shows a side view of the machine with the casing in section.

Figure 2 shows a plan view thereof, partially in section.

Figure 3 shows an end view partially in section, showing the mechanism in active position.

Figure 4 shows an end view with the mechanism in inactive position.

Figure 5 shows an end view partially in section, of the adding key,

Figures 6 and 7 show edge and side views, respectively, thereof, and Figure 8 shows a longitudinal sectional view thereof.

Referring now more particularly to the drawings, wherein like numerals of reference designate similar parts in each of the figures the numeral 1 designates the casing of the adding key,

A cam shaft 2 is rotatable in the end blocks 3 and 4 of the casing. A hand knob 5 has a bearing sleeve which fits over the end bearing 6 of the block 3 and the corresponding end of the cam shaft is fastened to this knob. The cam shaft carries a plurality of spaced cams 7 and it has a central bore 8 through which the release rod 9 works. The outer end of this rod is reduced and extended through the knob 5 and is formed with a push button 10 which works in a socket 11 in the outer end of said knob. A coil push spring 13 is interposed between the push button and the opposing end of the shaft 2 and is confined within the knob 5.

The inner end of the release rod 9 is formed into a release key 14. This rod is normally locked against operation by means of the sectional spring seated plungers 15 which are seated in the socket 16 in the block 4 and work through aligned bearings in the cam shaft and release rod. The middle section of each plunger is equal in length to the thickness of the wall of the cam shaft through which it works so that when said middle section is in alignment with said wall the cam shaft will be free to rotate but normally the springs on which the plungers are seated hold said middle section out of said alignment and the cam shaft and release rod are thereby locked against operation.

When this adding key is in co-operating relation with the mechanism with which it is designed to operate the inner end of the cam shaft 2 is clutched with the adjacent end of the tubular drive shaft 17. This drive shaft has a release rod 18 therein whose inner end is formed with a release key 19 disposed to engage with and depress the plungers 15 into releasing position. The shaft 17 and rod 18 are normally locked by means of sectional spring seated plungers 20, similar in construction and operation to the plungers 15.

The inner end of the rod 18 carries the pivoted dogs 21 which are actuated by the key 14, when in co-acting relation therewith depress the plungers 20 into releasing position and at the same time the plungers 15 are similarly released by the key 19, so that the interlocking shafts 2 and 17 are free to turn.

The key is equipped with an adding mechanism which will now be described:—rotatably mounted on the shaft 22 are a plurality of rotary units each complete unit consisting of the ratchet wheel 26, the star wheel 23, the counter disc 24, and the stop lug 25, arranged in the order stated, Transfer bars 27 are slidably mounted on the bearing shaft 28 and one end of each bar is formed into a dog, said dogs coacting with the corresponding aligned ratchet wheels 26.

It is contemplated that the counting discs 24 will be rotated by suitable adjustable segments, (not shown) which work through the slots 29 of the casing 1, in mesh with the star wheels 23. Each counting disc has the numerals from 0 to 9 thereon which come successively before the aligned windows 30 of the casing 1, as the discs are rotated, as shown in Figures 2 and 5. Any number of counting discs may be used, depending upon the required capacity, or range of the adding key. As shown five discs are disclosed. The first registers units or cents, the next registers tens or dimes, and so on, the amount indicated on any disc being ten times the corresponding amount indicated by the next preceding disc of a lower denomination. While any disc is being rotated the corresponding transfer bar is driven forwardly, carrying its dog out of the range of the aligned ratchet wheel until said disc has performed nine tenths of a complete rotation, that is, has counted to nine, and then said dog will engage with and actuate the ratchet wheel 26 of the next unit to accomplish a partial (one tenth) rotation of the counting disc of the next higher denomination and transfer the amount indicated by the next partial rotation of the former disc, to the latter.

In order to bring this action about oscillating levers 30′ are mounted on the bearing rod 31 and at their free ends are pivoted to the respective dogs 27. These levers have the offset lugs 32 and the corresponding cams 7 work against said lugs, and drive the levers and the corresponding transfer bars 27 forwardly, and the levers are returned by the tension of the coil springs 33. When the transfer bars are driven forwardly the shoulder 34 of each dog rides upon the adjacent end of the pawl 35 to hold the dog of said bar out of engagement with the aligned ratchet 26. The pawls 35 are mounted on the bearing rod 36 and are aligned with the stop lugs 25, and held yielding thereagainst by means of the tension spring 37. When a counting disc has accomplished nine tenths of a revolution the sloping side of the lug 25 pushes back, or retracts, the corresponding pawl 35 and thereupon the shoulder 34, of the corresponding bar 27, is pulled down into the notch 38 of the pawl 35 and the dog of said bar 27 then engages with the ratchet wheel 26 and upon the next backward movement of said bar the ratchet, and the corresponding counting disc is turned one tenth of a rotation thus in effect transferring the amount counted by the preceding counter to it. A pull spring 39 is attached, at one end, to each bar 27 and at its other end to the rod 36 and is effective to hold the shoulder 34 against the adjacent end of the corresponding pawl 35, and to cause it to drop into the notch 38 when said pawl is retracted,

As the bar moves backwardly to effect this partial rotation of said ratchet wheel the shoulder 34 rides up out of the notch 38 and the lug 25 having passed the pawl 35 said pawl drops in behind said lug, acting under the influence of the spring 37, so that the dog of said bar 27 will thereafter be held out of engagement with the aligned ratchet until the corresponding pawl 35 is again retracted, as hereinbefore explained.

From the foregoing it will appear that each counter disc, in effect, adds one for each partial rotation up to nine, and with the tenth partial rotation the amount added by it is transferred to the next succeeding counter disc of a higher denomination.

When the adding key is not in operation the slots 29 are closed by a sliding shutter 40 which works within the casing 1 and partially surrounds the counting units forming the adding mechanism. This shutter has the transverse slots 41 out therethrough and it is actuated by the lever 42. This lever is pivoted to the bearing block 43, confined within the casing 1. One end of the lever is pivoted to the shutter and its other end rides on the cam 44 which is fastened on the shaft 2.

When the adding key is inserted into the mechanism with which it works and the

shaft 2 is turned the cam 44 rides out from under the end of the lever 42 and the slots 41 align with the slots 29 permitting the gears of the said mechanism to mesh with and operate the corresponding star wheels 23, and then said cam 44 again actuates said lever to again shift the shutter to close said slots 29 and thus protect the counting mechanism against interference.

It is to be understood that the mechanical adding key hereinbefore described is primarily designed to be used in connection with our mechanical store described in the application for United States Letters Patent hereinbefore referred to.

When a customer enters the store he procures said key and by its use gains access to the goods and as the purchases are made the total cost of the articles purchased is registered by said key. The key is then returned to the cashier and the price, registered by the key, is paid to the cashier. A register of said price must be made and the key must be set back to zero so that it can be delivered to another customer for use. It is obvious that a number of these keys will be necessary to accommodate all customers. A machine for totaling the registers of the keys used and for setting said keys back to zero will be necessary for conducting the business with dispatch. Such a machine will now be described:—

The numeral 45 refers to the casing which is formed with a pocket, or keyway 46 therein to receive the mechanical adding key, hereinbefore described. When this key is inserted its shaft 2 will align with the crank shaft 47, which is rotatable in suitable bearings in the casing 45 and whose outer end has the crank 48 by means of which it may be turned. When in operative position the shafts 2 and 47 are released for rotation and clutched together by means of a mechanism disclosed in Figure 8 and hereinbefore described. The crank shaft 47 has a spur gear 49 fixed thereon which drives a train of spur gears 50, 51 and 52, the latter of which is fixed on the counter shaft 53. The gears 50 and 51 rotate on suitable spindles 54 and 55 carried by the web 56, and this web is formed with bearings in which the respective shafts 47 and 53 rotate. The shaft 47, as it is turned will rotate the shaft 2 and will also rotate the shaft 53 in the opposite direction.

The inner end of the shaft 47 has a disc 57 fixed thereon, whose inner face is formed with a cam-shaped groove 58 in which the roller 59 runs. This roller is carried by the link 60 one end of which has a long bearing 61 to receive the hub of the disc 57 and the other end of which is pivoted to the upper end of the arm 62. The lower end of this arm is fixed to the frame of an adding mechanism 63 which totals the sums indicated by the mechanical adding keys. In other words the amounts carried by said adding keys are transferred to the adding mechanism 63 and the totals thereby registered.

The mechanical construction and operation of this totaling machine 63 are similar to the mechanism of the key shown in Figures 5 to 8, inclusive, and will not be further described in detail.

End brackets 64, 64 have their lower ends formed into bearings 65, 65 in which the shaft 53 works, and one of these brackets is extended forming the arm 66 whose free end has the spur gear wheel 67 rotatably mounted thereon.

The upper ends of these brackets 64 are formed with aligned bearings 68, 68 in which the shaft 69 rotates. Keyed on one end of the shaft 69 there is a segmental rack member 70, and fixed thereon, between the bearings 68 there is slotted cage 71. Loosely mounted on the shaft 69 there are the segmental rack members 72, each composed of wings 73 and 74 having gear toothed margins. These rack members 72 work through the slots 75 of said cage. A pair of pull springs 76 are attached to each wing 74, at one end, and at their other ends these springs are attached to said cage. Each wing 73 has an arcuate slot 77 therethrough, forming bearings, which move on the bearing rod 78 which is anchored in, and extends transversely through, the cage.

One of the bearings 65 is formed with a projection 79, forming integrally therewith, and a screw 80 is threaded therethrough, forming an adjustable stop, which is arranged opposite the abutment 81 which stands up from the bottom of the casing 45. A pull spring 82 is attached at one end of the projection 79, and at its other end it is fastened to the casing 45.

An arm 83 is formed with a bearing 84 at one end, which works on the shaft 69, and its other end has a bearing pin 85 which projects laterally through an oblong bearing slot 86 in the link 60.

When the crank 48 is turned the shaft 47 rotates the shaft 2 and the cam 44 rides out from under the end of the lever 42. Thereupon the pressure of the push spring 87 actuates the shutter 40 to align the slots 41 thereof with the slots 29 of the casing 1, so that the segmental wings 73 may work through said slots into mesh with the star wheels 23 of the adding key. At the same time the cams 7 operate, through the adding key mechanism described, to carry the bars 27 out of engagement with the ratchet wheels 26 to permit their reverse rotation until they are stopped by the contact of the lugs 25 against the corresponding opposing dogs 35, in which position the zeros of the counting discs 24 will align behind the

windows 30 and the adding key will then be set back for use by another customer. As the link 60 moves under the influence of the cam groove 58 the frame 63 is partially elevated causing the star wheels 23′ to approach the opposing segmental wings 74 with which they are designed to mesh, and the brackets 64 move with said link being swung around on their shaft 69 under the influence of the pull spring 82, until the wings 73 are in position to mesh with the star wheels 23, at which point the stop 80 contacts against the abutment 81, as shown in Figure 3. The segmental rack 88 has in the meantime moved into position to mesh with the rack member 70 and the further movement of the link 60 will further elevate the frame 63 and bring the star wheels 23′ into position to mesh with the rack teeth of the wings 74. The further rotation of the shaft 47 will now operate, through the rack 88, to rotate the member 70 and the shaft 69 to which it is fixed, and the rack teeth of the wings 73 will mesh with and rotate the star wheels 23, of the adding key, reversely, until they are carried back to zero and stopped, as above explained. Some of these star wheels will be stopped before the others, this depending on their respective positions when the adding key is inserted in the socket 46, and the springs 76 of the corresponding segments, also stopped, will yield to permit the others to move on until all of said star wheels 23, and the counter discs 24 are returned to zero position.

The wings 73 and 74 have a corresponding number of teeth. The latter mesh with the star wheels 23′ when the former mesh with the corresponding star wheels 23. The numerals carried by the counter wheels 24′ are arranged reversely with respect to the arrangement of the numerals of the counter wheels 24 so that as the latter are turned backwardly the former will be turned forwardly with the result that the numbers taken off of the adding key will be totaled onto the adding mechanism 63.

The continued rotation of the shaft 47 will operate through the cam groove 58 to move the link 60 backwardly which in turn will operate through the arm 62 to lower the adding mechanism 63 out of operative connection with the wings 74, and as said link 60 moves on backwardly it will operate through the link 83 to swing the brackets 64, 64 backwardly and release the wings 73 from the star wheels of the adding key. The pull of the springs 76 will then bring the segments 72 back in alignment in their original positions, relative to the cage 71.

The rack segment 89, fixed on the shaft 47 is now in position to intermesh with the gear 67 and as the shaft 47 continues to rotate the rotation of said gear is reversed, thus reversing the movement of the rack member 70 and restoring the cage 71, and the segments carried therein, to original, or starting position.

The adding key may then be removed, and another inserted and the operation repeated. The sums indicated by the adding keys will thus be transferred to and totaled on the adder 63.

What we claim is:—

1. The combination with a total retaining device of an adding machine detachable from said device but adapted to be combined therewith, and mechanism included in said retaining device whereby the total sum indicated by said machine is transferred to said retaining device and said machine is restored to zero.

2. The combination with a total retaining device of a detachable adding machine adapted to be combined therewith, and mechanism adapted to effect the transfer of the total sum indicated on said machine to said retaining device and restore said machine to zero.

3. The combination with a total retaining device of a detachable adding machine adapted to be combined therewith, and mechanism adapted to effect the transfer of the total sum indicated on said machine to said retaining device and restore said machine to zero, said mechanism permitting the machine to be detached from said total retaining device while in zero condition.

4. The combination with a total retaining device, of an adding machine detachable from said device but adapted to be combined therewith, register mechanism including counting wheels in said adding machine and mechanism in said total retaining device adapted to restore said counting wheels to zero and to add to said total retaining device the sum taken off the adding machine.

5. The combination with a casing having a receiving pocket, of an adding machine within said casing, an independent adding machine adapted to be inserted in said pocket and mechanism adapted to actuate said machines whereby the latter will be restored to zero and the sum indicated thereon will be registered on the former.

6. The combination with an adding machine, of an independent adding machine adapted to be moved into and out of cooperative relation therewith, and mechanism adapted to actuate said machines simultaneously to restore said independent machine to zero and to register the sum indicated thereon to the first-mentioned machine.

7. The combination with a casing of an adding machine therein, an independent adding machine capable of movement into and out of cooperative relation with the

first-mentioned machine, and a common mechanism through which said machines may be actuated to set the latter back to starting position and simultaneously register the sum indicated thereon on to the former machine.

8. The combination with an adding machine of an independent register machine adapted to be moved into and out of cooperative relation therewith, each of said machines including register wheels, means within said adding machine adapted to actuate the register wheels of the two machines in opposite directions to transfer the amount indicated on said register machine to said adding machine and restore the register machine to zero.

9. The combination with an adding machine, of a device detachable from but adapted to be combined with said machine, said device containing register mechanism; actuating means within said machine adapted to effect the transfer of the total indicated on said register device to said adding machine and to restore said register device to zero, said register device having an opening through which said register mechanism may be engaged by said actuating means, a cover for said opening adapted when in position to prevent access to said register mechanism, and means for locking said cover.

10. The combination with an adding machine, of a device detachable from but adapted to be moved into and out of cooperative relation with said machine, said device containing register mechanism, actuating means within said machine adapted to effect the transfer of the total indicated on said register device to said adding machine and to restore said register device to zero, said device having an opening through which said register mechanism may be engaged by said actuating means, a movable cover for said opening, means for locking said cover, and means whereby the cover is unlocked and the opening uncovered when the register device is in cooperative relation with said adding machine.

11. The combination with an adding machine having a series of total wheels, of a register device detachable from but adapted to be combined with said machine, said register device including a series of counting wheels, oppositely movable pivoted racks in said machine adapted to actuate said total wheels and said counting wheels to transfer to said total wheels a sum indicated on said counting wheels and to restore said counting wheels to zero.

12. The combination with an adding machine having a series of total wheels, of a register device detachable from but adapted to be combined with said machine, said register device having a series of counting wheels and openings through which said counting wheels may be engaged, a pivoted rack in said adding machine adapted, when the adding machine and register device are in cooperative relation, to engage and actuate said counting wheels, a second pivoted rack in the adding machine adapted to actuate said total wheels, and means for simultaneously operating said racks in opposite directions, whereby the sum indicated on the counting wheels is transferred to the total wheels and the counting wheels are restored to zero.

13. The combination with an adding machine having a series of total wheels, of a register device detachable from, but adapted to be combined with said machine, said register device including a series of counting wheels, and oppositely movable members in said machine adapted to actuate said total wheels and said counting wheels to transfer to said total wheels a sum indicated on said counting wheels and to restore said counting wheels to zero.

14. The combination with an adding machine having a series of total indicators, of a register device detachable from but adapted to be combined with said machine, said register device having a series of counting members, a movable rack member in said adding machine adapted, when the adding machine and register device are in cooperative relation, to actuate said counting members, a second movable rack member in the adding machine adapted to actuate said total indicators, and means for operating said rack members to transfer the sum indicated on said counting members to the total indicators and to restore said counting members to zero.

15. The combination with an adding machine having a series of total wheels, of a register device detachable from but adapted to be combined with said machine, said register device including a series of counting wheels, a rocking member adapted to engage both series of wheels to transfer the total from the register device to the adding machine and to restore the wheels of the register device to zero.

16. The combination with a casing having a pocket, of an adding machine within the casing, and independent adding machine formed to be inserted into said pocket, and a mechanism within the casing through which the first mentioned machine may be actuated forwardly and the independent adding machine may be simultaneously actuated reversely.

17. The combination with a casing having a pocket, of two adding machines, each including counting discs, one of said machines being permanently located within the casing and the other one being independent and formed to fit within said pocket, and a mech-

anism adapted to rotate the discs of said independent machine rearwardly and to simultaneously rotate the discs of the other machine forwardly.

18. The combination with a casing having a pocket, of two adding machines, each including counting discs, one of said machines being carried by the casing and the other being independent and formed to fit into said pocket, and a mechanism adapted to rotate the discs of the latter rearwardly and the corresponding discs of the former the same degree forwardly.

19. The combination with a casing, of a totaling machine therein, an independent adding key, means normally locking said key against operation, a common mechanism through which said totaling machine and key may be actuated to set back the latter to zero and simultaneously register the sum indicated thereby onto the former, means normally locking said mechanism against movement, and releasing means carried by the adding key and actuating mechanism, respectively, each disposed to mutually release the locking means of the other when the key and actuating mechanism are in cooperative relation.

20. The combination with a casing having a pocket, of an adding key, and a totaling machine, each including counting discs, said totaling machine being permanently located in the casing and said adding key being independent and formed to fit into said pocket, a mechanism adapted to rotate the discs of said key rearwardly and to simultaneously rotate the discs of the totaling machine forwardly, means normally locking the key against operation, means normally locking said mechanism against movement, and releasing members carried by said key and mechanism respectively, said releasing member of one operating to release the locking means of the other when said key is in cooperative relation with said mechanism.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

THOMAS K. DIXON.
ALEXANDER KLEIN.
JESSE C. COX.
GEORGE R. GHENT.

Witnesses:
E. G. WESSELS,
C. C. KILLINGSWORTH.