

United States Patent

Englund et al.

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[54] **CONTROL APPARATUS**

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[51] Int. Cl.G06c 23/00

[58] Field of Search235/60 MT, 62, 70-76, 235/60.48

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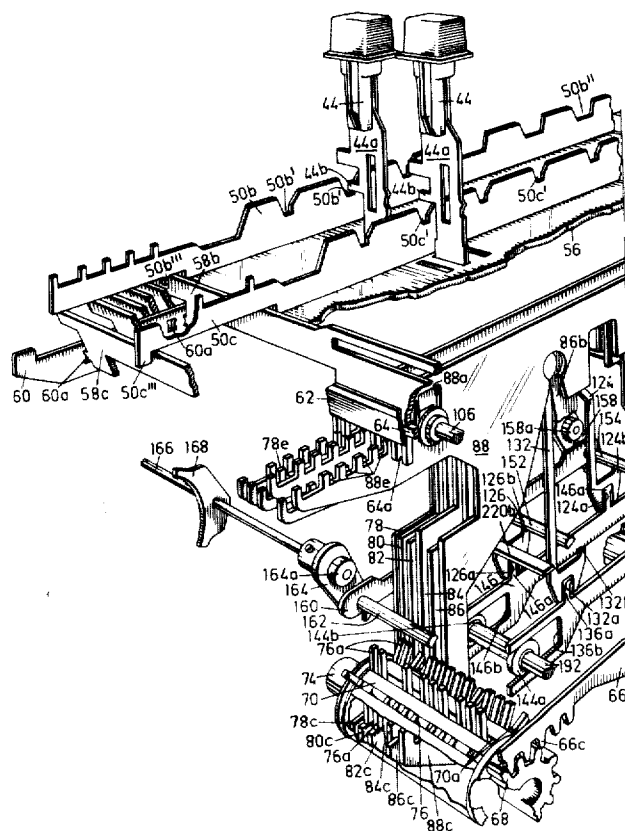
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[57] **ABSTRACT**

A device for performing functions in a cash register includes coupling plates which are affected by programmable cams detachably fastened to function keys and a function means movable to different positions. The cams are easily accessible and can be exchanged by other cams with different configurations in order to change the program of the function selection operations. The programmable cams on the function keys and the function means cooperate in order to affect the coupling plates which control the performance of the different functions.

51 Claims, 12 Drawing Figures



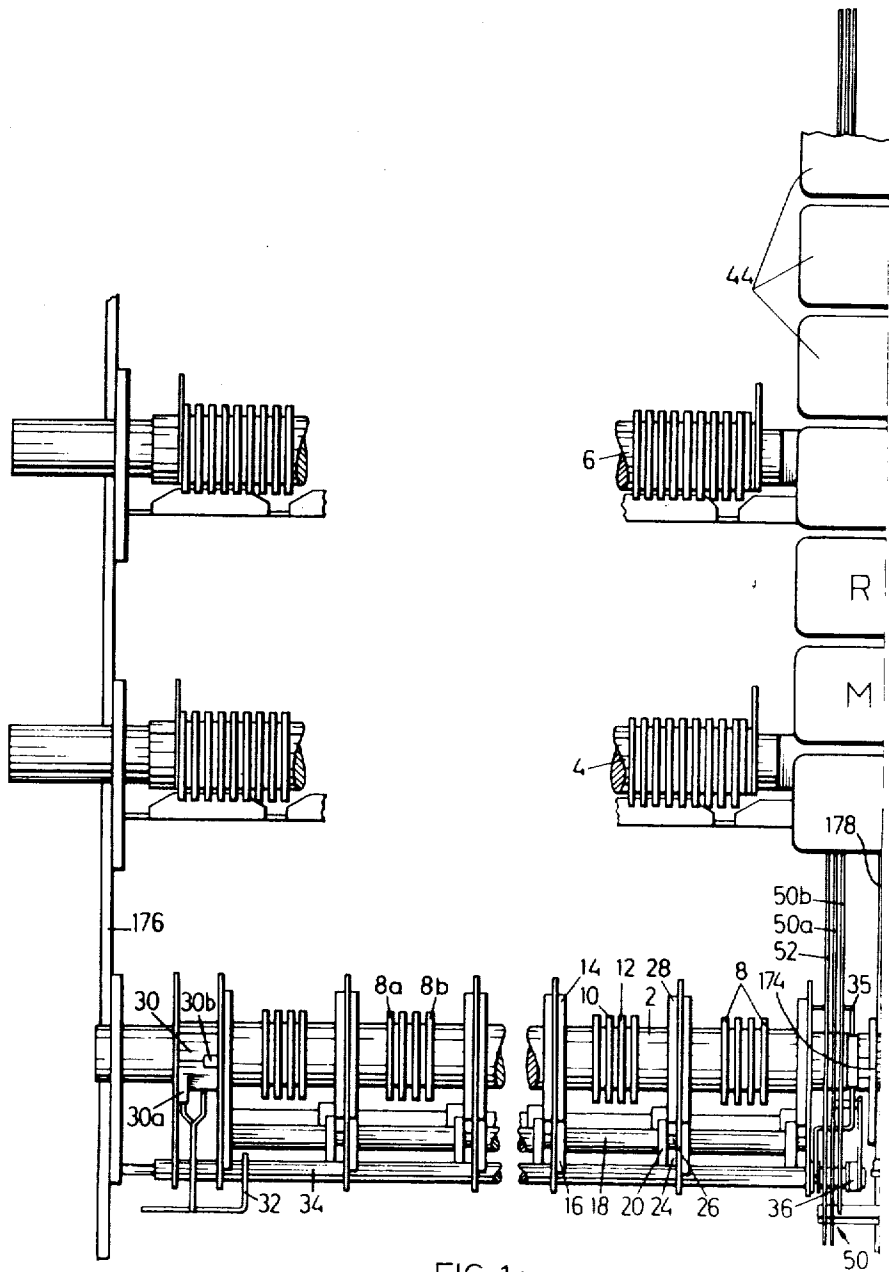


FIG. 1a

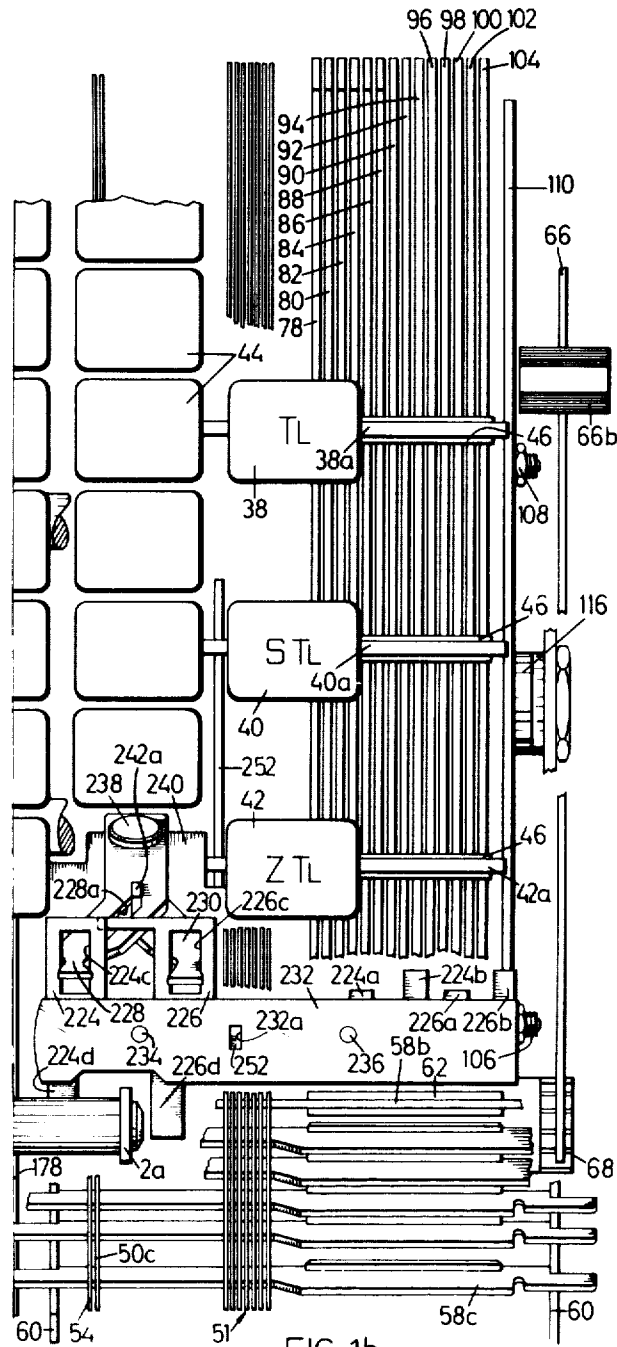


FIG. 1b

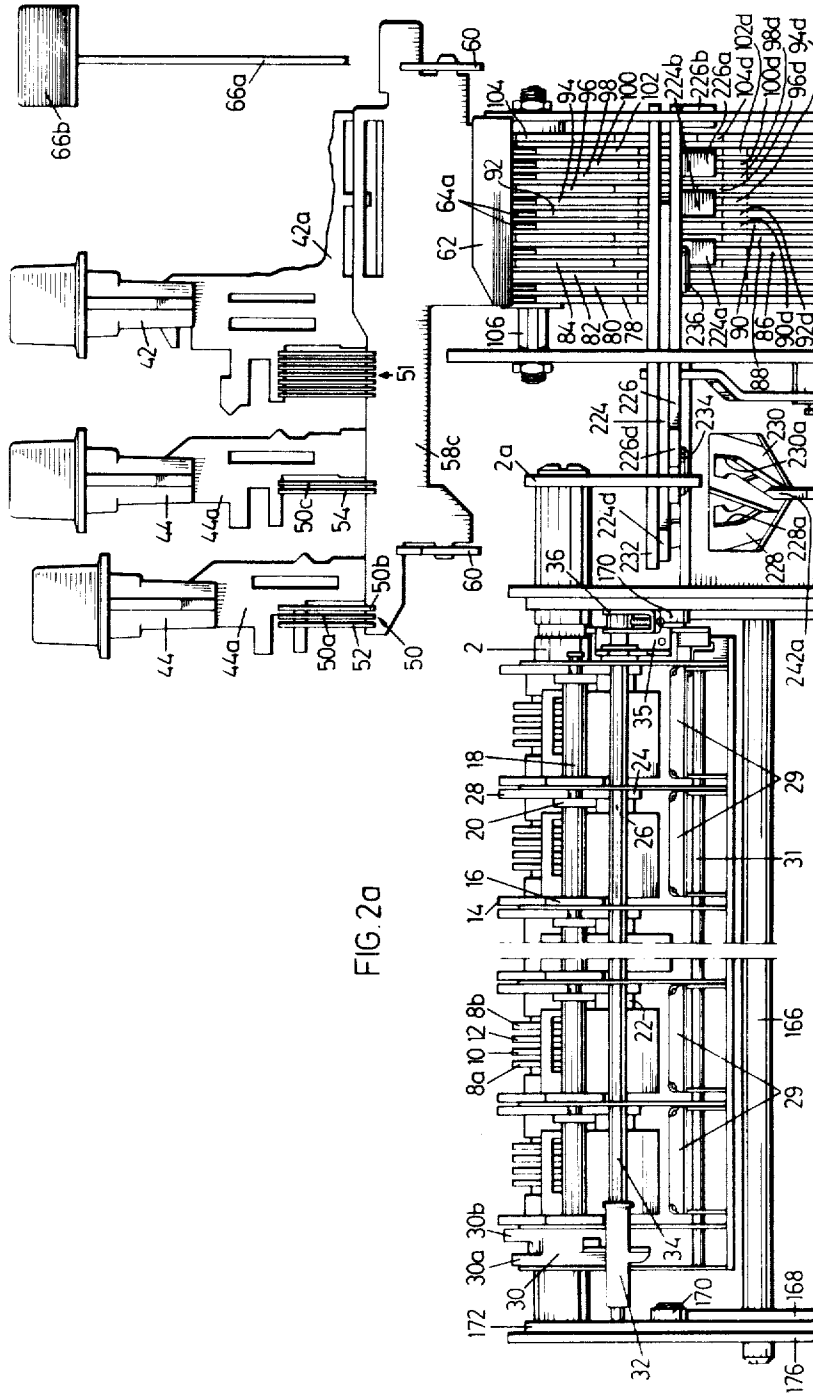
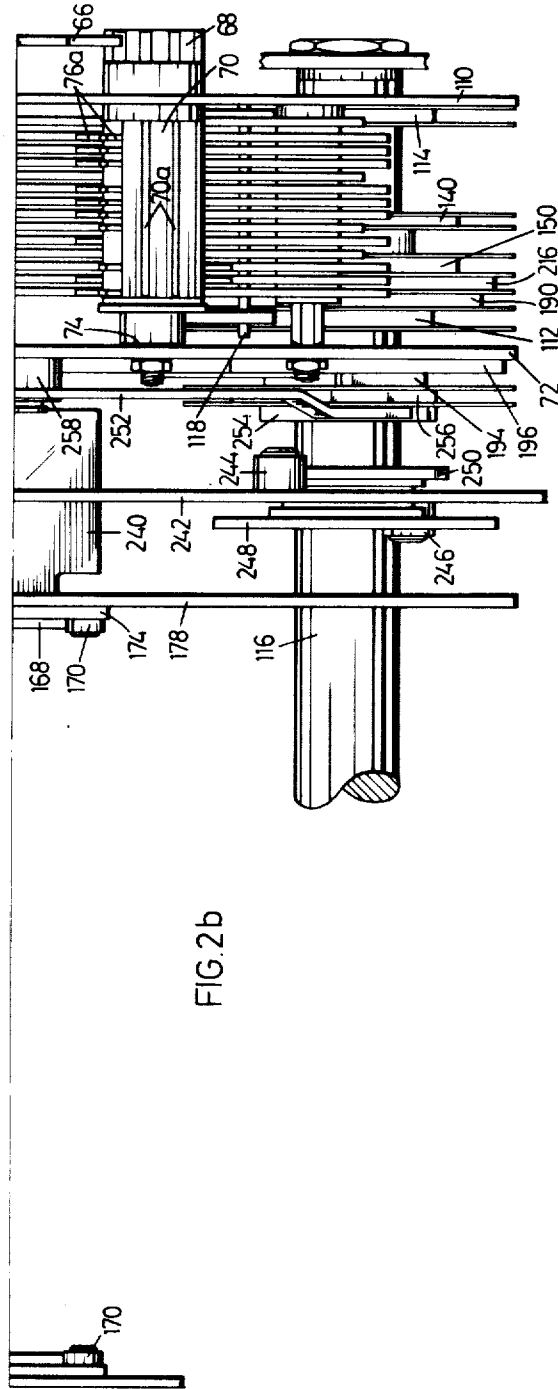
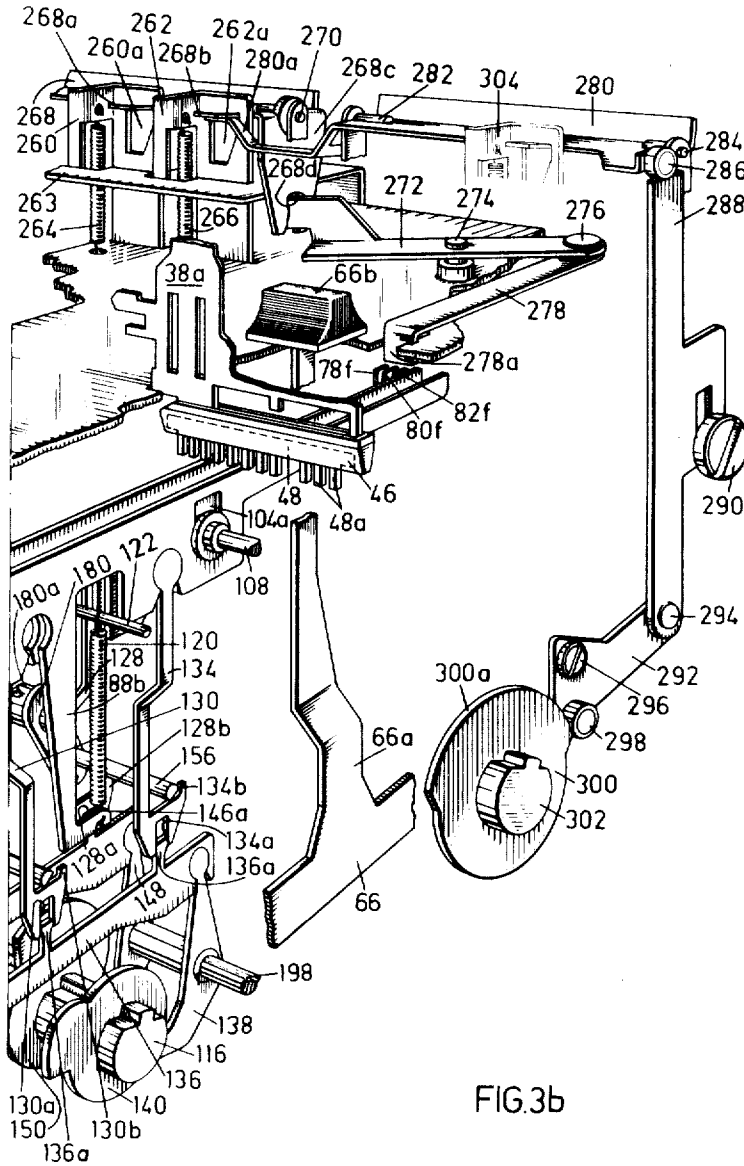
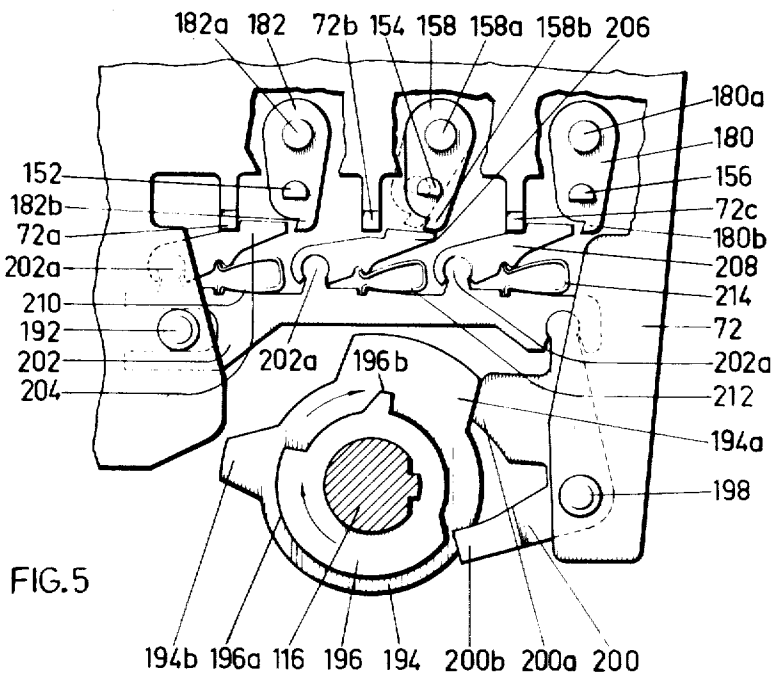
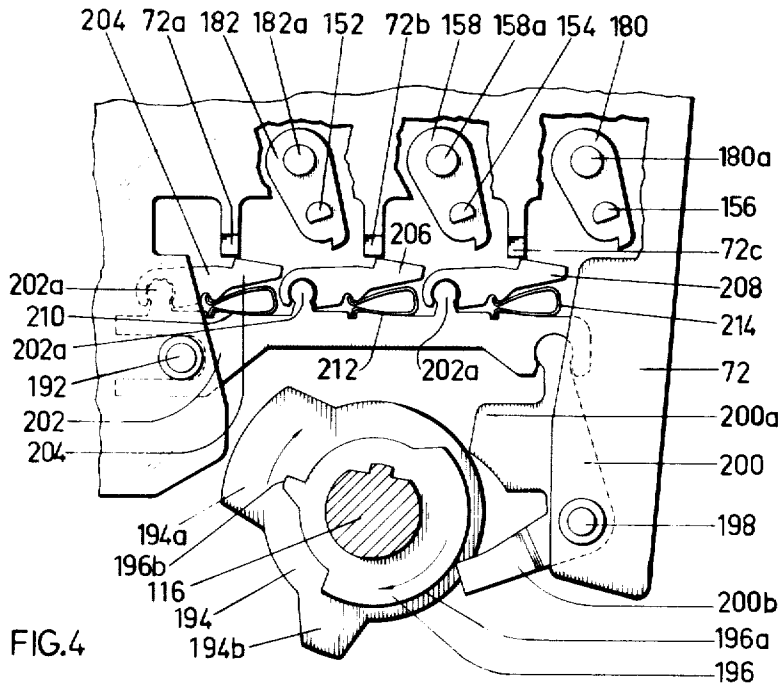
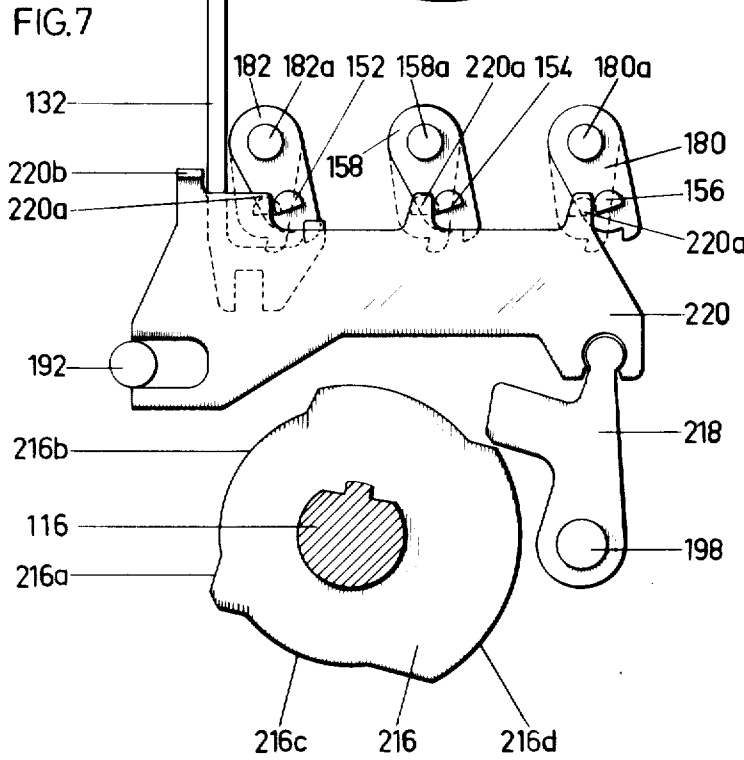
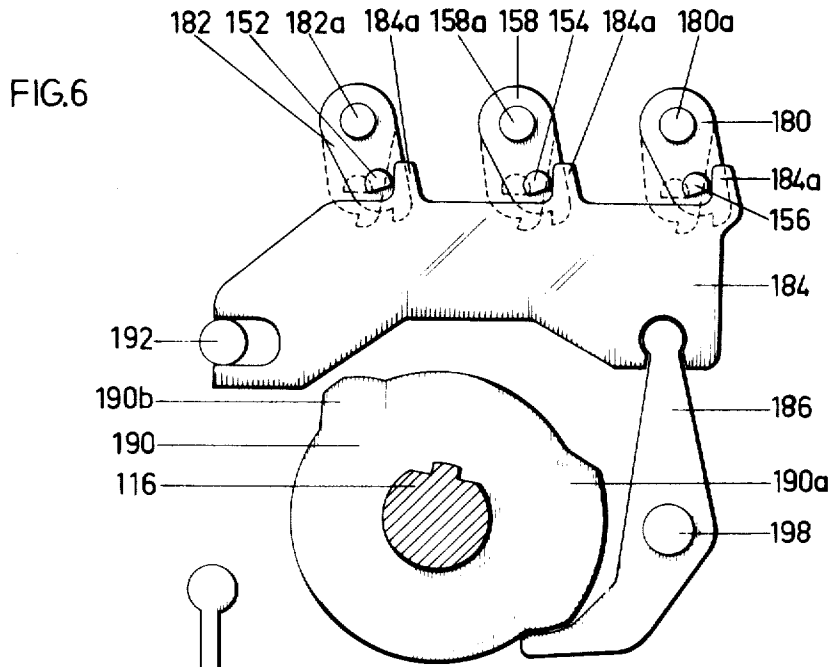


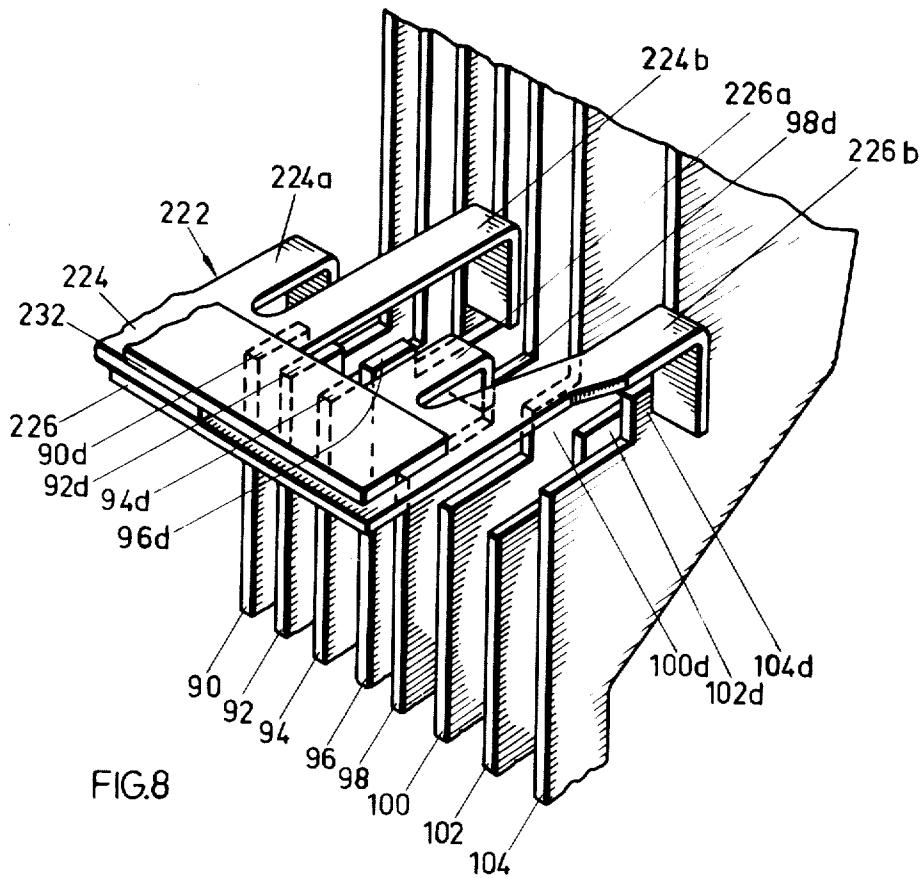
FIG 2a











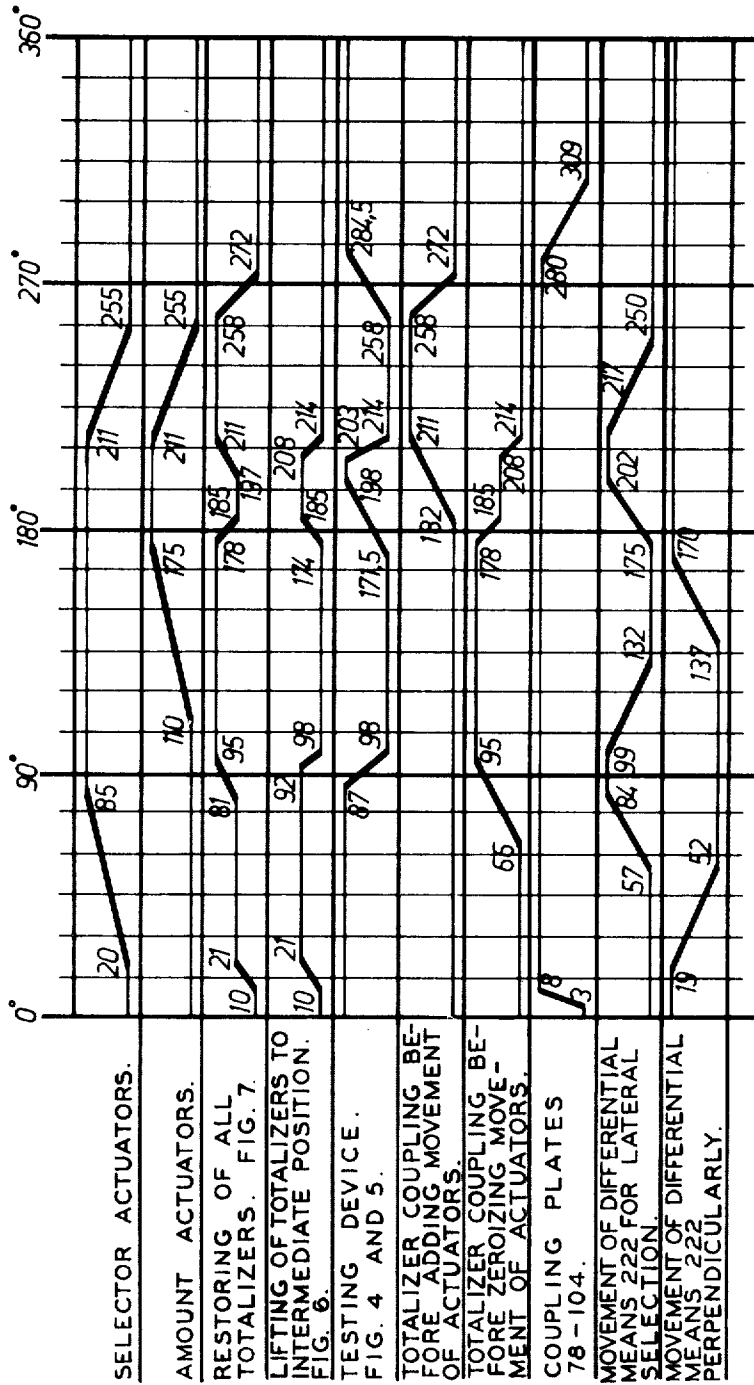


FIG. 9

CONTROL APPARATUS

This invention relates to a device for performing functions in a business machine such as in a cash register.

The devices which are described below as examples of embodiments of the present invention are designed to meet the increased requirements of quickly and safely performing functions, such as machine operations, in business machines. The devices according to the present invention are also designed to be programmed in such a way that the program thereby obtained is not permanent, but can easily be changed, if required.

Known devices for programming the function controlling and selecting means in business machines do not possess nearly enough flexibility for use in modern advanced and widely varied accounting systems. Generally, they are constituted in such a way that they only to a very limited extent, without construction and other changes, facilitate selection of different programs, while for increasing these programming possibilities they generally require considerable modification of the construction.

The present invention has kept hold of this and refers to a device for performing functions in a business machine, such as in a cash register, whereby without modification of the construction of the machine, a very great number of programs can be obtained. Additionally, these programs can easily be changed by exchanging special program means, whereby the machine will receive another pattern of operation in order to perform the functions.

In accordance herewith, the present invention refers to a device for performing functions in a business machine, such as in a cash register, of the kind mentioned in the introduction of claim 1 and its characteristics appear from the characterizing parts of the claims.

The functions performed by the devices according to the present invention are hereinafter in the main part described as totalizer controlling and selecting functions, but it is to be noted that the invention is not limited to that, but can be applied to perform other functions, such as guiding the so-called zero-stops on the key board of the machine, guiding the stop mechanisms of the actuators or affecting the counters contained in the machine.

The programmed means according to the present invention consist of cams, arranged on the operation means, or on means being controlled by these means which can select and/or control the totalizers which are arranged in the machine. Influenced by one or more of these operating means which consist of selector keys, function keys and a zeroizing-reading slide in the embodiment described below, attached cams will extort that a number of coupling means (coupling plates) will obtain a position wherein they are able to indirectly control and select totalizers. These coupling means are not programmable by themselves but constitute a unit, which can be affected by all of the operating means. Thus, each coupling means will, when activated, indirectly control and/or select a setting of a certain totalizer at a certain time during the machine cycle.

Each cam, constituting one of the programmable means, is provided with a number of teeth maximally corresponding to the number of coupling means. In purpose to obtain a certain pattern of operation for the

totalizers certain definite teeth arranged on every cam have been removed whereby there is possibility for one or more coupling means to be activated after the operation means have been affected.

When delivering a number of cash registers, which include the above mentioned devices, from manufacturer to retail dealer, each cash register is provided with a certain system, with a certain program for selecting and controlling the totalizers which will satisfy the desire of presumptive customers. However, if such a customer finds that the systems that the retail dealer can offer will not answer to his requirements, it is necessary that the cash register can be easily reprogrammed. With the devices according to the present invention such a reprogramming is made possible in a very simple and time-saving manner in that the cams positioned in one to a retail dealer already delivered cash register can be easily removed by the retail dealer and can be exchanged against cams with a different configuration of teeth and in doing so another pattern of operation for controlling and selecting the totalizers is obtained. The only condition precedent for changing of cams is that the housing which covers the cash register is removed. Thereafter, the exchange can be performed by hand without the use of tools and without interfering in the cash register. All of the cams in the cash register have the same configuration, except for the positioning and number of the teeth, and therefore the retail dealer needs to store only one type of re-programmable means.

The devices according to the present invention also include means which are able, in a machine cycle, to control a totalizer shaft laterally in order to perform zeroizing in one of its totalizers during a first part of the machine cycle and in order to perform accumulation in another of its totalizers during a second part of the machine cycle. These means consist of a number of the above described coupling means which are affected by the cams on the operating means, whereby two different groups of coupling means control the mentioned totalizer before zeroizings — respectively accumulation operation. The two groups of coupling means are arranged to be sensed by a sensing device, which controls the totalizer shaft laterally and before zeroizing operations senses the adjusting of one group of the coupling means and before the accumulating operations senses the adjusting of the second group of coupling means.

To make it possible only for certain totalizers in the machine to be engaged with the actuators (racks) at certain determined points of time during a machine cycle a testing device is provided which, at least at one point of time during the machine cycle, senses all the settings of totalizer shafts and brings the totalizer shaft (s), the totalizer (s) of which must not be in engagement with the actuators during their movement, away from the actuators.

In case the invention is utilized to obtain direction of the zero-stops and/or the stop mechanism of the actuators and/or to affect counters, these are affected by the coupling means which, depending on the positions they have received from the programmed means, affects the corresponding zero-stop and/or stop mechanism to be activated or to remain inactivated and/or activates groups of counters in the counter assembly in which,

according to the depressed function keys, accumulation is to be set about.

Other purposes and advantages with the present invention will become more apparent from the following description together with the accompanying drawings, wherein:

FIG. 1a and 1b are top views of certain of the devices according to the present invention;

FIG. 2a and 2b are front views of the devices shown in FIG. 1;

FIG. 3a and 3b are perspective views of certain of the devices according to FIGS. 1 and 2, wherein irrelevant details have been removed for the sake of clearness and for the understanding of the invention;

FIG. 4 is a side view of the testing device in the beginning of the machine cycle according to the present invention;

FIG. 5 is also a side view of the testing device according to the present invention after the main shaft has turned 90°, whereby the position of the totalizers is other than the position shown in FIG. 4;

FIGS. 6 and 7 show in detail certain devices which are embraced in FIGS. 1-3;

FIG. 8 is a perspective, fragmentary view of the sensing device according to the present invention; and

FIG. 9 is a time diagram on the functions and movements of devices embraced in the present invention.

The devices which control the movement, coupling and decoupling of the different totalizers, at different points of time during a machine cycle are shown in FIG. 1a and 1b. The cash register, which includes the devices according to the present invention, has in the figures, as an example, been shown to contain three totalizer shafts 2, 4 and 6. On the totalizer shaft 2 are three totalizers rotatably arranged, one itemizer 8 and two totalizers 10 and 12. Itemizer 8 (see also FIG. 2a) is of a conventional credit-balance type with addition totalizer wheels 8a and subtraction totalizer wheels. Addition totalizer wheel 8a is in each order meshed with subtraction totalizer wheel 8b via a gear including a toothed wheel 14 attached to wheel 8a, a toothed wheel 16, a hub 18, on which toothed wheel 16 and a toothed wheel 20 are attached, a toothed wheel 22 (FIG. 2a) rotatably arranged together with a toothed wheel 24 on a shaft 26, and a toothed wheel 28. Depending on this gear the actuators in the machine which consist of racks (not shown), when affected by addition counting gears 8a will move these in one direction a number of steps corresponding to the movement of the racks, whereby subtraction wheels 8b receive a corresponding movement in the opposite direction. When the actuators affect subtraction wheels 8b addition wheels 8a will in a similar way be moved in the opposite direction towards the subtraction wheels 8b because of the gear but will be moved as many steps as these. Itemizer 8 as well as all the totalizers shown in the machine has seven order positions, and is also provided with devices for transfer of the fugitive one. If a figure is registered in any order of itemizer 8, which results in that its algebraic condition will be changed, a bracket 29 (FIG. 2a) on shaft 31 (FIG. 2a) will be moved down in the nearest higher order (to the left in FIG. 2a), when one of totalizer wheels 8a of itemizer 8 has been moved past "0." On a following lowering of itemizer 8 to its bottom position, wherein it is in en-

agement with the 10s transfer means (not shown), the totalizer wheels in each order of the itemizer positioned to the left of the order where the racks moved the totalizer wheels of the itemizer past "0" will be turned one step. When the 10s transfer takes place in the highest order, i.e. the order which is positioned at the very left, whereby the figure one is registered, the totalizer wheel 8a is turned one step in this order. A sleeve 30 is attached to toothed wheel 14 in the highest order and thus attached to the addition wheel 8a in this order. Sleeve 30 is provided with a protrusion 30a which will pivot one pivoting arm 32 which is attached to one end of a shaft 34 which extends over all orders. Shaft 34 is in its other end provided with a transmission bracket 36, which affects a movable angular arm 35, to drop bracket 29 (FIG. 2a) in the lowest order of itemizer 8. On a repeated transfer wave, brackets 29 are dropped in sequence to the left of the first order up to and including the order where the figure which changed the algebraical condition of the itemizer was registered, and totalizer wheels 8a are rotated one step in these orders. Itemizer 8 is now in the condition corresponding to the figure registered in the machine according to the above mentioned example.

The fugitive one is in a similar way transferred from subtraction wheel 8b of the highest order in itemizer 8 to subtraction wheel 8b in the lowest order of itemizer 8 in that protrusion 30b (itemizer 8 takes up the position at the very left in FIG. 2a) affects pivoting arm 32 whereby shaft 34 is rotated in the opposite direction to the earlier described direction, and affects angles 35 and therewith the bracket 29.

The construction of itemizer 8 has only been briefly described above. Equally, the 10s transfer means has not been shown or described in detail. However, when an itemizer of the credit-balance type and corresponding tens transfer means do not constitute a condition for realization of the invention, such as has been expressed in the claims, and as these means furthermore are well known to the man skilled in art, see for example U.S. Pat. No. 3,244,367, the specification above ought to be satisfactory.

Totalizer wheels 10 and 12 of the totalizer are, as is apparent from FIGS. 1a and 2a, arranged between addition and subtraction wheels 8a, 8b of itemizer 8. Totalizers 10 and 12 can be used to collect items which are liable respectively not liable to taxation during a certain time or can be used as Grand Totalizers.

The selection of totalizers on the different totalizer shafts 2, 4 and 6 at different points of time during a machine cycle is controlled by keys on the key board of the machine. The key row or bank positioned to the very right in FIG. 1b contains three keys in the present example of embodiment, one total key 38, one subtotal key 40 and one zeroizing total key 42. The two banks positioned beside the bank positioned to the very right in FIGS. 1a and 1b contain department keys 44. It is to be realized that the number of keys in each bank can be varied depending on the way of working of the machine and each bank can maximally contain nine keys. To the left of the three described banks are seven banks of amount keys (not shown) which are well known to the man skilled in art and will not require any specification.

Each key 38, 40, 42 in the bank positioned to the very right in FIG. 1b, below referred to as the first

bank, is provided with a key shaft 38a, 40a, 42a, on the lower part of which a cam holder 46 of plastic is arranged (see FIG. 3b). Each cam holder 46 is provided with a steel cam 48 the teeth of which extends out of the cam holder. Cam holder 46 with its cam 48 will, via a simple movement of ones hand, be pushed on to the key shaft and can just as easily be removed, if desired.

Key shafts 44a of keys 44 affect group slides 50 arranged in the two selector banks, i.e. in the two banks positioned to the left of the first bank. In the second bank, i.e. in the bank positioned nearest to the first bank, is a group slide 50c positioned and in the third bank, which is positioned adjacent the second bank there are two group slides 50a and 50b. In FIG. 3a are group slides 50b and 50c shown. Other slides positioned in the selector banks, such as locking slides 52 and 54, which do not take any part in the present invention and whose function therefore has not been described, have been left out in FIGS. 3a and b for the sake of clearness. In the first bank seven slides 51 have been shown. These constitute locking, starting and blocking functions which do not have anything to do with the understanding of the present invention and they are therefore not described any further. Group slides 50a, b and c rest with their bottom edges on a lower keyboard plate 56, which is fixed to the machine, and in their upper edges they are provided with recesses in which protrusions 44b of key shafts 44a can be positioned. The recesses in slides 50 can be of two kinds and therewith exhibit different functions. Recesses 50b' and 50c' are shaped with a part that inclines towards the ground plane, which part will be affected by a key positioned above the same when this key is depressed, whereby group slide 50b or 50c receives a longitudinal movement to the right in FIG. 3a. Recesses 50b'' have such a large horizontal extension that it is impossible for the key positioned above this recess to move slide 50b. Recesses similar to recesses 50'' can also be provided in slides 50a and 50c.

Keys 44 in the two selector banks are divided into classes, which means that they are able to control totalizer shaft 2 to different positions at different points of time during a machine cycle. Keys 44 of the same class in a selector bank thus work on the same group slide. Keys of different classes in the same selector bank work on different group slides such as on group slides 50a and 50b in the third bank, in doing which a recess which is not provided with an inclining part, such as recess 50b'', on a group slide, such as group rack 50b, is positioned immediately under a key 44, which is intended to affect another group rack in the same bank. In its to the very left in FIG. 3a positioned end, every group slide 50b, 50c in its lower edge is provided with a protrusion 50b'', 50c'' which when the respective group slide moves obliquely upwards to the right in FIG. 3a, via a key 44, affects a group link 58b, 58 c, supported for turning movements, in dovetail-shaped groves 60a in two bearing plates 60 being fixed to the machine. Each group like 58 is on the end which is positioned at the opposite end of the group slides provided with a cam holder 62 of the same construction and material as the cam holder 46, which is pushed on the key shafts 38a, 40a, 42a. Also the cam 64 which is positioned in the cam holder 62 is of the same material

and construction as the cam 48. The teeth 64a of cam 64 extend out of the cam holder 62 and their number and position is depending on the operation program determined for the machine. Cam holder 62 can with a simple movement of ones hand be removed from group link 58 and cam 64 can be replaced against another cam with another number of teeth, for reasons which appear from the following.

As will be best understood from FIGS. 3a and 3b, at the very right in the machine, a zeroizing and reading slide 66 is arranged for horizontal movement. In one end slide 66 has an upwards extending arm 66a on which there is a button 66b, accessible on the keyboard of the machine. In its other end slide 66 is provided with a gear track 66c which is in constant mesh with a toothed wheel 68 attached to a rotatable means, below mentioned whirligig 70. Whirligig 70 which is rotatable on a shaft 74 attached to the frame 72 of the machine is provided with eleven lateral slots 70a in which cams 76 are arranged. Cams 76, which are of the same construction and material as cams 46 and 64 and are provided with teeth 76a, can with a simple movement of ones hand be pulled out of slots 70a and can be exchanged against other cams, that thereafter can be put back into the recesses 70a just as easily.

Slide 66 which is movable upwards — downwards in FIG. 1b can take up the same number of positions as whirligig 70 has slots 70a and cams 76, i.e. eleven positions. When slide 66 is moved downwards in FIG. 1b, from a neutral position, called register position, whirligig 70 is rotated counter clockwise, in FIG. 3a, to a so called reading position and when slide 66 is moved upwards whirligig is rotated clockwise in FIG. 3a to a so called zeroizing position. Hence, we conclude that slide 66 can take in one register position, five reading positions and five zeroizing positions.

Keys 38, 40, 42 with their cams 46, keys 44 with their cams 64, and whirligig 70, with its cams 76 are arranged to be able to affect 14 coupling plates 78 — 104 (see FIGS. 1b and 2a and 2b) which are arranged for movement upwards — downwards (FIGS. 2a and 2b) by recesses 78a-104a, which surround shafts 106, 108 fixed in the frame 72 of the machine and the plate 110. All coupling plates 78 — 104 receive a movement upwards (FIGS. 2a and 2b) by tension springs 120 (one is shown in FIG. 3b), one for each coupling plate and attached between shafts 122 (one is shown) being attached to the machine and downwards projecting legs (86b, 88b shown) of the coupling plates, which tension springs strive to pull the coupling plates upwards by way of cams 112, 114 being secured on the main shaft 116 of the machine which — in the beginning of a machine cycle — releases a pawl 118 positioned above all coupling plates.

If any key 38, 40, 42 or 44 has been depressed before the machine cycle starts certain of coupling plates 78-104 positioned immediately under a key 38, 40, 42, or under cams 64 on category links 58, will, during their attempts to move upwards, be stopped in this movement by teeth 48a, 64a on cams 48, 64. Consequently, if teeth 76a on cams 76 of whirligig 70 are positioned immediately above certain recesses 78c-104 c of the coupling plates 78-104 it will not be able to move these plates upwards.

Coupling plates 78-104 can thus be prevented from moving upwards partly by teeth 48a on a depressed key 38, 40, 42 in the first bank, whereby the upper parts of coupling plates 78-104 are in direct contact with teeth 48a, partly by teeth 64a on a group link 58, which, receives a motion of rotation by belonging key 44 when depressed, so that teeth 64a which are normally positioned above recesses 78e-104e in coupling plates 78-104, take up a position directly above the remaining sections between recesses 78e-104e on coupling plates 78-104, in doing which the remaining sections between the recesses make contact with teeth 64a, partly by teeth 76a on the whirligig, which has been set by zeroizing — reading slide 66, whereby recesses 78c-104c make contact with teeth 76a.

Each of cams 46, 64 and 76 can be provided with maximally 14 teeth 46a, 64a, 76a. In case that all fourteen teeth are positioned on a depressed key 38, 40, 42 or 44, or on that cam 76 on whirligig 70, which has been set directly above recesses 78c-104c none of coupling plates 78-104 can be raised. In order to make it possible for some of coupling plates 78-104 to be raised after the pawl 118 has been released, one or more teeth 46a, 64a, 76a on a depressed key or on the set whirligig 70 must be removed.

The task of coupling plates 78-104 is partly to control the totalizer shafts 2, 4 and 6 to and out of engagement with the differential actuators i.e. the racks, partly control the lateral movement of totalizer shaft 2 at different points of time. Each of coupling plates 78, 80, 82 controls a totalizer shaft at zeroizing operations, each of coupling plates 84, 86, 88 controls a totalizer shaft 2, 4, 6 at registering operations, such as addition, coupling plates 90, 92, 94, 96 control totalizer shaft 2 immediately before the racks being their zeroizing movement, whereat coupling plate 90 controls totalizer shaft 2 sideways so that it takes up a position where wheel 8b of itemizer 8 is in a position immediately below the racks. Coupling plate 92 controls shaft 2 laterally so that the wheels of its totalizer 12 are positioned immediately below the racks. Coupling plate 94 controls shaft 2 laterally so that the wheels of its totalizer 10 are positioned immediately below the racks. Coupling plate 96 controls shaft 2 laterally so that addition wheels 8a of itemizer 8 are positioned immediately below the racks. Coupling plates 98-104 control totalizer shaft 2 immediately after that the racks have finished their zeroizing movement but before the racks have begun their returning movement, i.e. addition movement. Coupling plates 98-104 control, in a similar way as coupling plates 90-96, but with the exception of the points of time for the movement, totalizers 8, 10 and 12 laterally.

A coupling link 124, 126, 128, 130, 132, 134 is rotatably supported on each coupling plate 78-88. Each link 124-134 is in its lower part provided with a recess 124a-134a and a hook-shaped part 124b-134b. In the recesses 130a, 132a, 134a, of each link 130, 132, 134 is a protrusion 136a on a coupling slide 136 positioned. Coupling slide 136 receives a longitudinal reciprocal movement during each machine cycle via a coupling arm 138 which is supported on the coupling slide and a curve 140 on the machine's main shaft 116 which curve affects coupling arm 138. Coupling arm 138 is rotatably supported on shaft 198 which is fixed to the machine.

Coupling slide 136 is in one end provided with a recess 136b which extends on a roller 144a on a shaft 192 fixed to the machine. In recesses 124a, 126a, 128a of each link 124, 126, 128 is positioned a protrusion 146a on a coupling slide 146. Coupling slide 146 receives a longitudinal, reciprocal movement during each machine cycle via a coupling arm 148 which is supported in coupling slide 146 and a curve 150 on the register main shaft 116. Coupling slide 146 is provided with a recess 146b on one end, which extends on a roller 144b on shaft 192.

Immediately above the lower parts of each pair of coupling links 126, 132; 124, 130; 128, 134 is a semi-circular shaft 152, 154, 156. Shaft 154 is attached to a coupling crank 158 which — via its shaft 158a — is rotatably supported in frame 72 of the machine. A transfer link 160 is pivotally supported partly on shaft 154 partly on a shaft 162. Shaft 162 is similar to shafts 152, 154, 156 and is like these provided with a coupling crank 164 which is rotatably supported in frame 72 via its shaft 164a. In shaft 164a, which is hollow, is a coupling shaft 166 inserted and secured. On shaft 166 two lifting curves 168 (only one is shown in FIG. 3a) are attached. Lifting curves 168 (see FIG. 2b), when rotated, affect rollers 170 on plates 172, 174 on which totalizer shaft 2 is fixed. Plates 172, 174 slide on totalizer frames 176, 178.

Shaft 156 is attached to a coupling crank 180 that — via its shaft 180a — is rotatably supported in frame 72 of the machine, and shaft 152 is fixed to a coupling crank 182 (FIGS. 4-7) which via its shaft 182a also is rotatably supported in frame 72. A shaft similar to shaft 166 (not shown) is attached to each shaft 180a, 182a, and is provided with curves similar to curves 168. The movement of each shaft 152, 156 is transferred via its crank 182, 180, shaft 182a, 180a to the totalizer shafts 4 and 6, respectively, over means identical to shaft 166, curves 168, rollers 170 and plates 174, 176.

It appears from FIG. 3a that the movement of crank 158 is carried off to crank 164 via transfer link 160, while each of cranks 180, 182 directly affects one shaft corresponding to shaft 166. This carrying off has been made because of the determined positioning of totalizer shaft 2, with itemizer and totalizer, outside, i.e. in FIG. 3a in front of coupling plates 78-104. It is viz. of practical reasons not possible to arrange coupling links in front of coupling plates 78-104 with simple means. In case that the machine is to be equipped with an itemizer that cannot be moved laterally, it is possible to connect it directly to shaft 158a of coupling crank 158. Transferring link 160, and totalizer shaft 2 with belonging devices are therefore unnecessary.

Coupling bar 146, which receives a longitudinal, reciprocal movement during every machine cycle, transfers the setting of coupling plates 78, 80, 82 to totalizer shafts 2, 4 and 6 during the zeroizing operations, and coupling bar 136, which also receives a longitudinal, reciprocal movement during each machine cycle but at a later point of time, transfers the setting of coupling plates 84, 86, 88 to totalizer shafts 2, 4 and 6 during adding operations.

For example, if coupling plates 84 and 88 at the beginning of a machine cycle have been allowed to be raised, they have activated each coupling link 130, 134 (see FIG. 3b) that is supported in corresponding coupling plate. Thereby, coupling slide 136 will, when

moved forward in the machine (obliquely downwards to the left in FIG. 3b) at a later point of time during the machine cycle, activate coupling links 130, 132, 134 whereby these receive a pivoting movement forwards around their bearing points in the coupling plates. Although links 130 and 134 of coupling plates 84 and 88 have been moved upwards it will be possible to move these forward because the recesses 130a and 134a have such a long vertical extension that it exceeds the vertical distance of movement of each coupling plate. When coupling links 130, 134 are moved forward they bring, via the hook-shaped parts 130b, 134b, shafts 154, 156 in the forward movement as these shafts are positioned in the path of movement for parts 130b, 134b, while coupling link 132 does not bring shaft 152 due to the fact that, in the present example, this is positioned above the path of movement of hook-shaped part 132b.

When shafts 154, 156 according to the preceding example receive a forward movement cranks 158, 180 are turned, and belonging counter shafts 2 and 6 are thereby raised to engagement with the racks in order to allow these to perform accumulation in the raised totalizers.

At an earlier point of time during the machine cycle coupling bar 146 has received a forward movement in a way similar to the way just described and before a zeroizing operation activated one of shafts 152, 154, or 156, and therewith raised totalizer shafts 2, 4 or 6, which are connected to the same. In FIGS. 3a and 3b none of coupling plates 78, 80, 82 has been shown in raised position, implying that none of totalizer shafts 2, 4, 6 is in engagement with the racks during a zeroizing operation.

Between the raising and lowering of the racks, i.e. between their zeroizing and accumulating movements it must be possible for totalizer shaft 2 to be set laterally in order to make it possible for one of the totalizers on this shaft, for example totalizer 8, to be in engagement with the racks during the first part of the machine cycle (the zeroizing operation) and another totalizer, for example totalizer 10, to be in engagement with the racks during a second part of the machine cycle (the accumulation operation). How this lateral setting is performed is described below in the specification.

In the beginning of the machine cycle, after about 10° movement of the main shaft (see the time-schedule in FIG. 9) all of totalizer shaft 2, 4, 6 will be raised to an intermediate position, where their totalizers are neither in engagement with the tens transfer means nor with the racks. (When the totalizer shaft is in its lower position one of its totalizers is always in engagement with the tens transfer means and in its upper position one totalizer on every totalizer shaft is always in engagement with the racks.) This raising is performed by protrusions 184a on a slide 184, which receives a movement to the left in FIG. 6 via an arm 186 being supported in the slide, which is rotatably supported in a shaft 198 attached to the machine, and a curve 190 on main shaft 116 of the machine. When curve 190 is rotated clockwise from the position shown in FIG. 6 arm 186 is rotated round shaft 198 via extending part 190a on curve 190, whereby slide 184 which is displaceably supported in shaft 192 receives a movement to the left and rotates coupling cranks 182, 148, 180

clockwise with its protrusions 184a to the dashed position in FIG. 6. Belonging totalizer shafts 2, 4 and 6 are thereby raised to the intermediate position. The raising of totalizer shafts 2, 4, 6 to the intermediate position is finished when main shaft 116 is rotated 21°.

When totalizer shafts 2, 4, 6 are in the intermediate position totalizer shafts 4 and/or 6 are moved laterally to a position corresponding to depressed key 44 in any one of the selector banks. This lateral movement is described in U.S. Pat. No. 3,263,915 to which reference is made for a detailed specification. Totalizer shaft 2 is also moved sideways, if necessary, by below described means. After totalizer shafts 2, 4 and 6 have taken up their determined positions only the totalizer shafts whose coupling shafts 152, 154, 156 have been activated by coupling links 124, 126, 128 at the forward movement of the coupling slide 146 are raised to the racks. This raising begins when main shaft 116 is rotated about 66° and is finished at 95°.

When main shaft 116 has been rotated 110° the racks begin their zeroizing movement, which is finished at 175°. During this time the selected totalizer on any of shafts 2, 4 or 6 which was in engagement with the racks has been zeroized.

Before the zeroizing movement of the racks can begin those of totalizer shafts 2, 4 or 6 that have not been raised against the racks must be restored to their lower positions in order not to be affected during the zeroizing movement. For this purpose restoring means are provided the construction and function of which appear from FIGS. 4 and 5.

When main shaft 116 has been rotated 87° totalizer shafts 2, 4, 6 whose totalizers must not be in engagement with the racks during the zeroizing position begin to be restored to their lower positions. The restoring means shown in FIG. 4 includes curves 194, 196 positioned beside each other and fixed on main shaft 116. An arm 200, rotatably supported in fixed shaft 198 cooperates, via a projecting part 200a, with curve 194 and via another projecting part 200b with curve 196. Arm 200 is supported in a drive bar 202 which in its turn is displaceably supported in fixed shaft 192. On its upper side bar 202 is provided with three circular protrusions 202a on which test arms 204, 206, 208 are rotatably supported. Test arms 204, 206, 208 are via leaf springs 210, 212, 214 forced upwards in FIG. 4, which visualizes the rotation of main shaft 116 after 10°, and contacts the lower side of protrusions 72a, 72b, 72c on frame 72.

After totalizer shaft 2 has begun its movement towards the racks, which movement is finished after the main shaft has rotated 95°, test arms 204, 206, 208 will restore the totalizer shafts whose totalizer wheels must not be in engagement with the racks during the zeroizing movement, from the intermediate position to the lower position. This restoring takes place between 87° and 98° rotation of main shaft 116, i.e. before the racks have begun to move which happens at 110°. In FIG. 5 is visualized as example a machine operation where totalizer shaft 2 is about to be raised to engagement with the racks during the restoration of totalizer shafts 4 and 6 to the lower position. This example must not be mixed up with the example shown in FIGS. 1-3 where it is quite apparent that no totalizer shafts 2, 4, 6 are in engagement with the racks during a zeroizing operation.

Coupling crank 158 which belongs to totalizer shaft 2 has, as is apparent from FIG. 5, received a clockwise movement while coupling cranks 180, 182 which belong to totalizer shafts 4 and 6 have not been rotated at all from their intermediate positions. When the totalizers are in their lower positions coupling cranks 182, 158, 180 are in the angular position visualized in FIG. 4. When main shaft 116 is rotated to the position shown in FIG. 5 bar 202 will receive a motion to the right by the high periphery 194a of cam 194, whereby the upper edges of test arms 204 and 208 move away from protrusions 72a and 72c and spring upwards to a position between corresponding protrusions and a hook 182b, 180b on crank 182, 180. When the bar is moved to the right, the upper edge of test arm 206 will also move away from protrusion 72b but will not spring upwards and take up a position between protrusion 72b and hook 158b, depending on the fact that crank 158 is moved so far clockwise that the distance between protrusion 72b and hook 158b is less than the horizontal extension of the upper edge of test arm 206. Thus, when bar 202 is moved to the right the upper edge of test arm 206 will take up a position below crank 158, as shown in FIG. 5.

At the continued movement to the right of bar 202 test arms 204, 208 will push on the vertical parts positioned at the very left of hooks 180b, 182b and thereby restore coupling cranks 180, 182, and therewith totalizer shafts 4 and 6 to the position shown in FIG. 4. However, test arm 206 will with its upper edge slide on the lower part of hook 158b, whereby the setting of coupling shaft 2 will not change. Bar 202 will be restored to its position at the very left in FIGS. 4 and 5 by path 196a and curve 196 when main shaft 116 has rotated between 171,5° and 198°. During this restoration, test arms 204, 206, 208 are forced back over protrusions 72a, b, c to the position shown in FIG. 4.

After the zeroizing movement of the racks is finished, the totalizer shaft 2, 4 or 6 which was in engagement with the racks during the zeroizing operation is moved down to the intermediate position in order to allow totalizer shaft 2 to be moved sideways, if desired. The restoring to the intermediate position is performed by a curve 216 on main shaft 116. Curve 216 is shown in FIG. 7 after 10° rotation of main shaft 116. After main shaft 116 has been rotated 178° path 216a on curve 216 will contact an arm 218, rotatably supported in shaft 198, whereby arm 218 receives a clockwise motion and displaces slide 220 which is supported in arm 218 to the right in the figure. Totalizer shaft 2 — according to the above described example having been in engagement with the racks during their zeroizing movement — will be restored from the dashed position in FIG. 5 to the dashed position in FIG. 7 by protrusions 220a on slide 220, via corresponding coupling crank 158 and its shaft 154. When main shaft 116 has been rotated 185° the restoring of totalizer shaft 2 to the intermediate position has been finished. When the rotation of main shaft 116 is continued, path 216c, will contact arm 218, whereby shafts 152, 154, 156 of coupling cranks 182, 158, 180 are not affected by protrusions 220a.

After the lateral selection of totalizer shaft 2 has been performed, the totalizer shafts 2, 4, 6, in whose

totalizer wheels accumulation is to be performed, will be raised to engagement with the racks. However, before this and the lateral selection of the totalizer shaft takes place, the totalizer shafts (in the above example totalizer shaft 4) which during the zeroizing movement were not in mesh with the racks, i.e. were positioned in their lower positions, by path 190b of curve 190, arm 186, slide 184, protrusions 184a etc. (FIG. 6) have been raised to the intermediate position. The raising of totalizer shafts 2, 4, 6 from the intermediate position to be in mesh with the racks immediately before these begin their accumulation movement is performed by coupling plates 84, 86, 88, coupling links 130, 132, 134, coupling slide 136, arm 138, curve 140, shafts 152, 154, 156 etc. in a way described above in connection with FIGS. 1-3. In the example according to FIGS. 1-3 totalizer shafts 2 and 6 are raised towards the racks. Totalizer shaft 4, in which, according to the example, accumulation is not to be performed, is restored from the intermediate position to the lower position in the same way as described above, viz. by the devices according to FIGS. 4 and 5, but with the difference that the movement is performed by the path 194b on curve 194 instead of by path 194a, which was the case immediately before the zeroizing operation. When the devices according to FIGS. 4 and 5 are restored to non-operating position path 196b affects curve 196 immediately before the accumulation operation.

After the accumulation is performed, each totalizer shaft 2, 4, 6 will be moved to the lower position, i.e. to engagement with the tens transfer means. FIG. 7 shows that curve 216 with its path 216a — at the end of the machine cycle — affects arm 218, which in turn affects slide 220 to be moved to its end position to the right in the figure, whereby protrusions 220a of slide 220 contact shafts 152, 154, 156. Thus, in the example shown in FIG. 7 coupling cranks 182, 158, 180 (continuous lines) are positioned in their counter clockwise position whereby totalizer shafts 2, 4, 6 are in their lower positions.

Slide 220 is provided with an angle-shaped arm 220b (also see FIG. 3a), which affects coupling links 126 and 132 to pivot counter clockwise when slide 220 is moved to the right in FIG. 7. During the counter clockwise movement of coupling links 126 and 132, slides 146 and 136 will move to the right in FIGS. 3a and 3b whereby also coupling links 124, 128, 130, 134 will pivot counter clockwise. As arm 220b receives its movement to the right at the end of the machine cycle (at a rotation of 258° of main shaft 116) each of coupling links 124-134 will be restored before a new machine cycle begins.

It should be noted that slide 184 cannot be restored by its arm 218 and curve 216. However, when protrusions 184a are in a position immediately to the right of shafts 152, 154, 156 and protrusions 220a are in a position immediately to the left of these shafts and, as curves 190 and 216 have such a shape so as to cooperate with each other, curve 190 will restore shafts 152, 154, 156 to the left after curve 216 has performed its movement and affected shafts 152, 154, 156. Curve 216 will restore shafts 152, 154, 156 to the right after curve 190 has performed its movement and affected shafts 152, 154, 156. It becomes more apparent by FIG. 9 how the described cooperation between curves

190 and 216 is performed in the span of a machine cycle.

It is apparent from FIGS. 1a, 1b, 2a, 2b, 8 and 9 how totalizer shaft 2 is selected laterally once before the zeroizing operation once before the accumulation operation. As mentioned above there are eight coupling plates 90-104 which control the lateral movement of totalizer shaft 2. Coupling plates 90-104 strive to move upwards in the same manner as coupling plates 78-88, whereby certain plates are allowed to be raised since teeth 48a, 64a, 76a on cams 48, 64, 76 are not positioned in the path of movement of these plates. As mentioned above coupling plates 90-96 control the lateral movement of totalizer shaft 2 immediately before the racks begin the accumulation movement. Each coupling plate 90-96 is provided with a protuberance 98d-104d in the form of a shelf, positioned a bit further backwards on the coupling plate in the machine than protuberance 90d-96d on coupling plate 90-96.

A differential means, generally designated 222, is arranged to sense protuberances 90d-104d on coupling plates 90-104 in a way that it immediately before the zeroizing movement of the racks senses the setting of coupling plates 98-104 and immediately before the accumulation movement of the racks senses the setting of coupling plates 98-104. Differential means 222 consists of two racks 224 and 226, which receive movement via one drive arm 228, for each rack 230, which are meshed with recesses 224c, 226c, in the racks. Racks 224, 226 are supported in a support plate 232, via rivets 234 and 236, and will move in relation to this only from the right to the left and conversely in FIG. 1b. Rack drive arms 228, 230 are in their, from the racks 224, 226 turned ends rotatably supported on a joint shaft 238, which is attached to a support 240, fixed in the machine. In oblong, S-shaped slots 228a, 230a in rack drive arms 228, 230, a projecting part 242a on a drive arm 242 is arranged to run vertically in FIGS. 2a and 2b. Drive arm 242 is provided with two rollers 244 and 246 which run on curves 248, 250 affixed to the main shaft 116 of the machine. Curves 248, 250 have such a shape that drive arm 242 receives an upwards and downwards, vertical movement before the zeroizing movement and an identical movement before the accumulation operation (see FIG. 9). During a vertical upwards movement of drive arm 242, rack drive arms 228, 230 will rotate towards each other around shaft 238. Thereby also racks 224, 226 will be driven towards each other during a vertical, downwards movement of drive arm 242 rack drive arms 228, 230 will rotate from each other, whereby racks 224, 226 recede from each other. In FIG. 2 drive arm 242 is shown in its lower position.

Each of racks 224, 226 is provided with two protrusions in the form of brackets 224a, 224b, and 226a, 226b. Brackets 224a and 226a are intended to affect protuberances 90d-96d while brackets 224b and 226b are intended to affect protuberances 98d-104d. To make it possible for brackets 224a and 226a with their vertical parts to affect protuberances 90d-96d without simultaneously allowing brackets 224b and 226b to affect protuberances 98d-104d and conversely, support plate 232 and therewith differential means 222 are vertically movable in FIG. 1b. This vertical movement is brought about by a drive arm 252 which meshes with a

cutout 232a in support plate 232. Drive arm 252 as well as rivets 234, 236, does not prevent the horizontal movement of racks 224, 226 in FIG. 1b. Drive arm 252 receives a reciprocal movement from curves 254, 256 which are directly cooperating with the same and attached to main shaft 116. Drive arm 252 is, approximately in the middle, rotatably supported in an arm 258 which is attached to frame 72. Support plate 232 is supported in plate 110 and frame 72 for its movement.

In FIGS. 2a and 8 is explicitly shown how coupling plates 96 and 104 at the beginning of a machine cycle have been able to obtain a raised upper position which means that totalizer wheel 8a of itemizer 8 is in a position immediately below the racks before the zeroizing operation. This is also the case before the accumulation operation. In other words — according to the example shown in the figures — a reading operation in the itemizer will be carried out, which means that this must not be laterally moved during the machine cycle. However, it is not necessary for a reading operation to be carried out in the itemizer. As will be understood from the specification above, only coupling plates 78-88 control the totalizers upwards towards the racks while coupling plates 90-104 only control the totalizer shaft laterally. One of coupling plates 90-104, for example coupling plate 96 in FIG. 8, can thus be raised and totalizer shaft 2 moved laterally without requiring this shaft to be brought into engagement with the racks.

After coupling plates 96 and 104 have been raised, drive arm 252 receives a pivoting movement around shaft 258 whereby support plate 232 and therewith differential means 222 receives a position downwards in FIG. 1b. When racks 224, 226 thereafter receive a movement towards each other, from the position shown in FIG. 1b, protuberance 96d is in the path of movement for bracket 224a (whose movement will occur obliquely downwards to the right in FIG. 8) and moves bracket 226a (whose movement occurs obliquely upwards to the left in FIG. 8). Bracket 224a will thereby be moved a distance from the position shown in FIG. 8 while bracket 226a will not be appreciably moved. Since bracket 224a is allowed to be moved, rack 224 whose projecting part 224d is moved to the right in FIG. 1b or 2a so far that an arm 2a attached on totalizer shaft 2 will be affected by part 224d and move to the right, until the side which is turned away from part 224 makes contact with one projecting part 226d on rack 226. When arm 2a is moved to the right, which is decided by the raising of coupling plate 96, totalizer shaft 2, which is supported in totalizer frames 176, 178 for lateral movement, receives a movement to the right in FIG. 1a or 2a, whereby its totalizer wheel 8a is positioned immediately below the actuator racks.

In order not to allow the vertical parts of brackets 224b and 226b (see FIG. 8) to contact any of coupling plates 90-104 immediately before the zeroizing operation, i.e. when brackets 224a and 226a cooperate with protuberances 90d-96d, these will be moved towards each other directly in front of (FIG. 8) protuberances 98d-104d and directly behind protuberances 90d-96d, which means that there is a distance (vertically in FIG. 1b), at least as large as the thickness of the vertical part of each bracket, between the back edge of a protuberance 90d-96d and the front edge of a protuberance 98d-104d.

During the zeroizing movement of the racks, racks 224 and 226 receive a movement from each other by earlier described means, and support plate 232 with racks 224 and 226 receive a movement upwards in FIG. 1b by earlier described means. The lateral position of totalizer shaft 2 during the accumulation operation is thereafter selected in that the brackets 224b and 226b which are moved away from each other are moved towards each other and sense protuberances 98d-104d (see FIG. 8). In doing so also brackets 224a and 226a will be moved towards each other but will not be able to contact any protuberance 90d-104d because they run in front of protuberances 98d-104d and behind protuberances 90d-96d, in the same way as with the brackets 224b and 226b immediately before the zeroizing operation. According to the example in FIG. 8 bracket 226b cannot be moved to the left since protuberance 104d is in its path of movement. Bracket 224b on the other hand will be moved to the right and contact protuberance 104d. However, as totalizer shaft 2 during zeroizing operation was in the position at the very right in FIGS. 1a and 2a and as the raised coupling plate 104 represents the position at the very right, totalizer shaft will during accumulation operation not be moved laterally whereby accumulation will be performed in the totalizer wheel 8a of totalizer 8. However, let us assume, that for example, coupling plate 100 instead of coupling plate 104 had been raised at the beginning of the machine cycle, then bracket 224b as well as bracket 226b will immediately before accumulation operation be moved towards and squeeze against protuberance 100d whereby totalizer shaft 2 via arm 2a is laterally moved to a position where totalizer 12 is positioned directly below the actuator racks. Thus, in the last mentioned case a zeroizing operation of itemizer 8 and an accumulation operation in totalizer 12 are performed during one single machine cycle, under the condition that counter shaft 2 is raised towards the racks during the zeroizing as well as accumulation operation.

In FIG. 3b is shown how the setting of the coupling plates control the zero-stops of the cash register. In the figure two zero-stops 260, 262 have been shown, the purpose of which is to affect the differential actuators (the racks) which are positioned below the lower key board plate 56 in two amount orders in order to keep the actuators in zero position during accumulation operations when no key has been depressed in the amount banks positioned above these actuators. The number of zero-stops is equal to the number of orders in the machine but for the sake of clearness only two are shown in FIG. 3b. Zero-stops 260, 262 extend through recesses in the lower key board plate 56, as well as in a support bridge 263, which is attached to the lower key board plate, and are drawn downwards in FIG. 3b by springs 264, 266, which are attached between the zero-stops and in the lower key board plate. Cams 268a, 268b on a bracket 268 are positioned in recesses 260a, 262a in zero-stops 260, 262. Bracket 268 is supported for rotatory movement, such as at 270, and is provided with a downwards directed arm 268c with recess 268d. An angular arm 272 rotatably, supported in a rivet 274 which is attached to the lower key board plate 56, cooperates with recess 268d. Angular arm 272 is at its from the recess 268d

turned end, via a rivet 276 rotatably supported in a test arm 278 which has a downwards directed part 278a the task of which is to sense the vertical adjustment of coupling plates 78, 80, 82 via a recess in the lower key board plate.

The bottom side of tongue 268b is affected by an arm 280a on a bracket 280, which is rotatably supported in 282 and 284. On bracket 280 is attached a roller 286 which is affected by a lifting arm 288 supported for vertical, reciprocal movement on rivet 290. In the end which is turned away from roller 286 lifting arm 288 is supported in a cam follower 292, by rivet 294. Cam follower 292 is rotatably supported on rivet 296 and is provided with a roller 298 cooperating with a disc 300 attached to a shaft 302 which is driven by the machine. Disc 300, when rotated, affects bracket 280, via follower 292, and arm 288. Disc 300 receives a counter clockwise rotation during a machine cycle whereby arm 280a first receives a downwards movement so that tongue 268b and thereby bracket 268 will be released for downwards movement provided that coupling plates 78, 80, 82 take up the not raised position shown in FIGS. 3a and 3b. When bracket 268 is released from arm 280a springs 264, 266 will pull zero-stops 260, 262 to engagement with the racks, if a key in the corresponding bank is not depressed, whereby the racks cannot be removed.

However, if any of coupling plates 78, 80, 82 is in a raised position bracket 268 cannot be rotated counter clockwise due to a vertical protrusion 78f, 80f or 82f being positioned in the path of movement of test arm 278. After arm 280a has been released from tongue 268b arm 268 strives, influenced by springs 264, 266, to be rotated counter clockwise in order to rotate arm 272 counter clockwise. Arm 272 strives to give test arm 278 a longitudinal movement obliquely downwards to the left in FIG. 3b. However, when such a longitudinal movement of test arm 278 is prevented due to the fact that the downwards directed part 278a bears against the vertical edge of a protrusion 78f, 80f, or 82f, positioned to the very right in FIG. 3b bracket 268 cannot be rotated counter clockwise to allow the downwards directed movement of zero-stops 260, 262.

At a later point of time during the machine cycle the high path 300a will affect follower 292 which, via arm 288 and 280a of bracket 280 raises zero-stops 260, 262 to the position shown in FIG. 3b if these have been in their lower position.

The reason for not allowing zero-stops 260, 262 in the amount banks to be in their lower position when some of coupling plates 78, 80 or 82 is in its upper position is that at zeroizing or reading operations, which is represented by a raising of some of the mentioned coupling plates, the racks can be moved to positions which are represented by the setting of the totalizer wheels without being prevented by any key or any zero-stop.

Each selector bank is also provided with a zero-stop. This zero-stop 304 is schematically shown in FIG. 3b. However, the movement of the zero-stops in the selector banks is not dependent of the setting of the coupling plates and is therefore controlled only by disc 300, follower 292, lifting arm 288 and bracket 280.

The totalizer selecting and controlling devices according to the function of the present invention will be

briefly described below with references to the figures which show a certain type of operation, viz. an accumulation operation in the itemizer and an accumulation operation in one of the totalizers being positioned on totalizer shaft 6, for example the second one from the right in FIG. 1a.

According to this example shown, the operator first depresses one or more of the amount keys (not shown) whereafter the department key 44 marked with M is depressed. Key M, when depressed causes the machine to start (group slide 50d affects a starting device) and group slide 50b rocks the group link 58b backwards in the machine, whereby cam 64 is positioned immediately above recesses 78e-104e positioned between two protrusions on coupling plates 78-104. Since key M, as well as all the keys 44 has a starting function none of keys 38, 40, 42 in the first bank will be depressed in the present example to the effect that none of these keys, at a later point of time during the machine cycle, can prevent the raising of coupling plates 78-104. In the present example slide 66 is in a neutral position (register position), which means that whirligig 70 takes up a position, according to FIG. 3a, wherein a cam 76 is positioned immediately above protrusions 78c-104c. After the machine has been started coupling plates 78-104 are released for an upwards movement. In this movement certain coupling plates will be stopped by teeth 64a and 76a. Coupling plates 78, 80, 86, 90, 92, 94, 98, 100 and 102 are stopped by remaining teeth 64a on cam 64, and coupling plates 80 and 82 are stopped by remaining teeth 76a on cam 76, and consequently only coupling plates 84, 88, 96 and 104 receive an upwards movement. Coupling plates 84 and 88 control as described in detail above, coupling of totalizer shaft 2 and 4 with the racks during the accumulation operation and coupling plates 96 and 104 control the lateral position of totalizer shaft 2 during the zeroizing operation and during the accumulation operation, respectively.

After coupling plates 84, 88, 96 and 104 have been raised all of totalizer shafts 2, 4, 6 are moved to the intermediate position by means shown in FIG. 6, and the selector racks move totalizer shaft 6 laterally in order to position the totalizer wheels which are represented by the depressed selector key 44 directly below the racks. This lateral movement has been described more in detail in the above mentioned U.S. patent. In the present example only totalizer shaft 6 is moved laterally, and takes up a position representing the depressed selector key M (see FIG. 1a). During the movement of the selector racks, coupling slide 146 receives a movement in order to raise totalizer shaft 2, 4 or 6 towards the amount racks via coupling links 124, 126, 128. However, in the present example none of these shafts will be raised to engagement with the racks as none of coupling plates 78, 80, 82 could be raised. During the movement of the selector racks also racks 224, 226 will be moved towards each other in order to make their brackets 224a, 226a squeeze around protuberance 96a, whereby totalizer shaft 2 is moved laterally to a position which is represented by coupling plate 96. During the movement of the racks towards each other support plate 232 and thereby racks 224, 226 are moved downwards in FIG. 1b.

Before the amount racks are moved the totalizer shafts which should not be in engagement with these racks during the zeroizing operation are restored to their lower positions by the devices shown in FIGS. 4 and 5. Consequently, in the present example all of the totalizer shafts 2, 4 and 6 are restored.

Following the zeroizing movement of the racks, totalizer shafts 2, 4 and 6 are again raised to the intermediate position by the devices shown in FIG. 6, and the devices shown in FIG. 7 restore the totalizer shafts (none in the present example) which had been in engagement with the racks during the zeroizing operation to the intermediate position. Racks 224, 226, which earlier during the machine cycle have moved away from each other, again receive a movement towards each other, and their brackets 224b, 226b squeeze around protuberance 104d. However, in the present example, totalizer shaft 2 will not be moved laterally, as it already prior to the zeroizing operation had obtained a position which is represented by coupling plate 96 as well as coupling plate 104. Support plate 232 together with racks 224, 226 receive a movement upwards in FIG. 1b before the beginning of the last mentioned movement. Thereafter, coupling slide 136 receives a longitudinal movement by curve 140 and brings along coupling links 130, 134 which had been raised by coupling slides 84 and 88 whereby these links in turn bring along their shafts 156 and 154, 162 causing totalizer shafts 2 and 6 to raise towards the racks. Simultaneously, the devices in FIGS. 4 and 5 restore totalizer shaft 4 to its lower position, whereafter the racks perform accumulation in one of the totalizers of totalizer shafts 2 and 6, i.e. in totalizer 8 and in the totalizer selected by key M. Thereafter, totalizer shafts 2 and 6 are moved to their lower positions i.e. in engagement with the tens transfer means, by the devices according to FIG. 7. The machine cycle is thereafter finished by restoring certain of the above described devices to the home position, such as restoring coupling plates 84, 88, 96 and 104, (by hook 118), while certain other of above described devices are restored in the first part of the following machine cycle.

In order to be able to follow the functions of the different devices described above, in detail and time-wise, reference is made to the timing diagram in FIG. 9.

An operation performed by the machine has been described above and shown in the drawings, viz. the one initiated by key M when this is depressed. When depressing another selector key 44 of the same category as key M in either the second or the third bank an operation similar to the one described above as an example will be initiated, i.e. accumulation will be performed in one of the totalizers on totalizer shaft 6 and in totalizer wheels 8a on totalizer shaft 2. When a key 44 is depressed, for example key R which is of another category than key M, an operation will be initiated, causing accumulation in one of the totalizers on totalizer shaft 6 and in totalizer wheels 8b on totalizer shaft 2 since group link 58a is affected instead of group link 58b, whereby a cam 64 with a different configuration of teeth than the one of cam 64 of group link 58b will affect coupling plates 78-104. The present system includes, as is apparent from FIG. 1, selector keys 44 of three different kinds of FIG. 1, selector keys 44 of three different kinds as three group slides 50a, b and c are ar-

ranged, whereby keys 44 of two kinds are positioned in the third bank and keys 44 of only one kind are positioned in the second bank. It is to be noticed that it is possible to have keys 44 of more than three different kinds, for example six, if desired.

Keys 38, 40, 42 in the first bank in the present system are; a total key 38, a subtotal key 40 and a zeroizing total key 42. When any of these keys is depressed the teeth 48a of cam 48 will prevent the upwards movement of certain coupling plates 78-104 whereby a certain kind of machine operation is initiated. Total key 38, subtotal key 40 and zeroizing total key 42 can be affected with the slide 66 in neutral position.

Slide 66 can, after a latch (not shown) has been released, be moved from the neutral position in FIGS. 1b, 2a, 2b, 3a and 3b and be set for zeroizing or reading of certain totalizers. Consequently, whirllig 70 is in a position where, via cams 76, it allows the coupling plates 78-104, which control zeroizing and reading respectively of the totalizers in the machine, to be raised. In this case also a key in the first, second or third bank must be depressed in order to initiate start of the machine.

It should be apparent from the above description that coupling plates 78-104 control coupling and decoupling of the totalizers and direct totalizer shaft 2 laterally during different points of time in the machine cycle and that the configuration of the coupling plates is not changed thereby but only their positions. These positions are determined by three different, separate means, viz. partly by selector keys 44, via group link 58 and cams 64, partly by function keys 38, 40, 42 in the first bank, via cams 48, and partly by zeroizing-reading slide 66, via cams 76 on whirllig 70. The means, which can be reprogrammed to give the machine a system suitable for a specific customer are thus cams 48, 64 and 76, which can easily be removed from their holders 46, 62, 70a and replaced by cams with a different number or other location of teeth 48a, 64a, 76a.

It should be observed that what has been described above, namely selection and controlling of totalizers and controlling of zero-stops are a couple of examples of functions which can be performed by the devices according to the invention. Other functions, such as directing the stop mechanism of the racks and activating the transaction counters in the machine can also be brought about with the devices according to the invention.

The system for totalizer selection and controlling, described in main above, is a common system. However, as should be evident from the above description, a multiplicity of different operational systems can be established, wherein the placing and function of the keys differ from the placing and function of the keys according to the present visualized examples.

Specific embodiments of the invention have been illustrated but the invention is not limited thereto since many modifications may be made by one skilled in the art and the appended claims are intended to cover all such modifications as fall in the true spirit and scope of the invention.

We claim:

1. Apparatus for performing operations in a business machine comprising
coupling members which are settable to at least two positions;

function selection means comprising at least two separate means;

a first function selecting means which can be set to two positions;

a second function selecting means which can be set to more than two positions;

a first programmable means coupled to said first function selecting means;

a plurality of second programmable means each of which is coupled to said second function selecting means, the number of said second programmable means corresponding to the number of positions to which said second function selecting means can be set;

said programmable means each provided with a pattern of parts which are turned against said coupling members and can affect them; and

whereby any of said first function selecting means initiates a function selecting operation cycle when it is activated so that the programmable means coupled to this first function selecting means affects the coupling members to be set in one of said two positions.

2. The apparatus of claim 1, wherein the programmable means are arranged to directly affect the coupling members.

3. The apparatus of claim 2, wherein the pattern of parts on each programmable means consists of a cam whose placing and number of teeth form its program.

4. The apparatus of claim 3, wherein all the coupling members can be affected by any of the programmable means.

5. The apparatus of claim 4, wherein the programmable means which is coupled to each first function selecting means is arranged on its function selecting means.

6. The apparatus of claim 4 wherein the second function selecting means normally is locked against movement between positions.

7. The apparatus of claim 5, wherein all of the programmable means which are coupled to the second function selecting means are arranged around the periphery of a means rotatable by the second function selecting means.

8. The apparatus of claim 1, wherein the functions of the apparatus consist of selection and controlling of at least one totalizer shaft provided with at least one totalizer.

9. The apparatus of claim 8, wherein the function selecting means consist of totalizer controlling means arranged in groups.

10. The apparatus of claim 8, wherein a first group of the coupling members, when in their first position, is arranged to control the movement of at least one totalizer shaft in relation to totalizer actuators in the machine and that a second group of the coupling members, when in their first position, is arranged to control the axial movement of at least one totalizer shaft.

11. The apparatus of claim 8, wherein in a first group of coupling members at least one coupling member when in its first position, is arranged to control the position of the totalizer shaft before the zeroizing movement of totalizer actuators, and at least one coupling member, when in its first position, is arranged to control the position of the totalizer shaft before an adding movement of the totalizer actuators.

12. The apparatus of claim 11, wherein the coupling members in the first group are twice as many as the number of totalizer shafts.

13. The apparatus of claim 8, wherein the totalizer controlling means consist of at least one group of totalizer selection keys, one group of mode of operation keys and one reading-zeroizing slide, whereby the group of totalizer selection keys, via slides and the programmable means which are detachably attached to the slides, affects the coupling members whereby the group of mode of operation keys, via the programmable means which are detachably attached directly to the mode of operation keys, affects the coupling members, and whereby the reading-zeroizing slide, via one of several programmable means which are detachably attached to the rotatable means also affects the coupling members.

14. The apparatus of claim 1, wherein the functions consist of inactivating zero-stops for actuators in the machine.

15. The apparatus of claim 1, wherein the functions consist of activating stop mechanisms for actuators or activating counters in the machine.

16. The apparatus of claim 14, wherein the zero-stops are positioned in the amount banks of the machine and that they are prevented from interfering with the totalizer actuators of the machine by a testing device when at least one of the coupling members is in the first position.

17. The apparatus of claim 1, wherein the programmable means are easily accessible in the machine without modifications in the same.

18. Apparatus for performing operations in a business machine comprising

coupling members which are settable to at least two positions;

function selecting means comprising at least two separate means;

a first function selecting means which can be set to two positions;

a second function selecting means which can be set to more than two positions;

a first programmable means coupled to said first function selecting means;

a plurality of second programmable means each of which is coupled to said second function selecting means, the number of said second programmable means corresponding to the number of positions to which said second function selecting means can be set;

said programmable means each being provided with a pattern of parts which are turned against said coupling members and can affect them; and

whereby any of said first function selecting means initiates a function selecting operation cycle when it is activated so that the programmable means coupled to this first function means and one of the programmable means coupled to the second function selecting means, affects the coupling members to be set in one of said two positions.

19. The apparatus of claim 18, wherein the programmable means are arranged to directly affect the coupling members.

20. The apparatus of claim 18, wherein the pattern of parts on each programmable means consists of a cam whose placing and number of teeth form its program.

21. The apparatus of claim 18, wherein all the coupling members can be affected by any of the programmable means.

22. The apparatus of claim 18 wherein the second function selecting means normally is locked against movement between positions.

23. The apparatus of claim 18, wherein all of the programmable means which are coupled to the second function selecting means are arranged around the periphery of a means rotatable by the second function selecting means.

24. The apparatus of claim 18, wherein the functions of the apparatus consist of section and controlling of at least one totalizer shaft provided with at least one totalizer.

25. The apparatus of claim 24, wherein the function selecting means consist of totalizer controlling means arranged in groups.

26. The apparatus of claim 24, wherein a first group of coupling members, when in their first position, is arranged to control the movement of at least one totalizer shaft in relation to totalizer actuators in the machine and that a second group of the coupling members, when in their first position, is arranged to control the axial movement of at least one totalizer shaft.

27. The apparatus of claim 24, wherein in a first group of coupling members at least one coupling member when in its first position, is arranged to control the position of the totalizer shaft before the zeroizing movement of totalizer actuators, and at least one coupling member, when in its first position, is arranged to control the position of the totalizer shaft before an adding movement of the totalizer actuators.

28. The apparatus of claim 27 wherein the coupling members in the first group are twice as many as the number of totalizer shafts.

29. The apparatus of claim 24, wherein the totalizer controlling means consist of at least one group of totalizer selection keys, one group of mode of operation keys and one reading-zeroizing slide, whereby the group of totalizer selection keys, via slides and the programmable means which are detachably attached to the slides, affects the coupling members whereby the group of mode of operation keys, via the programmable means which are detachably attached directly to the mode of operation keys, affect the coupling members, and whereby the reading-zeroizing slide, via one of several programmable means which are detachably attached to the rotatable means also affects the coupling members.

30. The apparatus of claim 18, wherein the functions consist of inactivating zero-stops for actuators in the machine.

31. The apparatus of claim 18, wherein the functions consist of activating stop mechanisms for actuators or activating counters in the machine.

32. The apparatus of claim 30, wherein the zero-stops are positioned in the amount banks of the machine and that they are prevented from interfering with the totalizer actuators of the machine by a testing device when at least one of the coupling members is in the first position.

33. The apparatus of claim 18 wherein the programmable means are easily accessible in the machine without modifications in the same.

34. The apparatus of claim 18 wherein the programmable means which is coupled to each first function selecting means normally is arranged on its function selecting means.

35. Apparatus for performing operations in a business machine comprising
5 coupling members which are settable to at least two positions;
function selecting means comprising at least two separate means;
10 a first function selecting means which can be set to two positions;
a second function selecting means which can be set to more than two positions;
a first programmable means coupled to said first function selecting means;
15 a plurality of second programmable means each of which is coupled to said second function selecting means, the number of said second programmable means corresponding to the number of positions to which said second function selecting means can be set;
20 said programmable means each being provided with a pattern of parts which are turned against said coupling members and can affect them; and
25 whereby any of said first function selecting means initiates a function selecting operation cycle when it is activated so that the programmable means coupled to this second function means affects the coupling members to be set in one of said two positions.

36. The apparatus of claim 35, wherein the programmable means are arranged to directly affect the coupling members.

37. The apparatus of claim 35, wherein the pattern of parts on each programmable means consists of a cam whose placing and number of teeth form its program.

38. The apparatus of claim 35, wherein all the coupling members can be affected by any of the programmable means.

39. The apparatus of claim 35, wherein the programmable means which is coupled to each first function selecting means is arranged on its function selecting means.

40. The apparatus of claim 35 wherein the second function selecting means normally is locked against movement between positions.

41. The apparatus of claim 35, wherein all of the programmable means which are coupled to the second function selecting means are arranged round the periphery of a means rotatable by the second function selecting means.

42. The apparatus of claim 35, wherein the functions

of the apparatus consist of selecting and controlling of at least one totalizer shaft provided with at least one totalizer.

43. The apparatus of claim 42, wherein the function selecting means consist of totalizer controlling means arranged in groups.

44. The apparatus of claim 42, wherein a first group of the coupling members, when in their first position, is arranged to control the movement of at least one totalizer shaft in relation to totalizer actuators in the machine and that a second group of the coupling members, when in their first position, is arranged to control the axial movement of at least one totalizer shaft.

45. The apparatus of claim 42, wherein in a first group of coupling members at least one coupling member when in its first position, is arranged to control the position of the totalizer shaft before the zeroizing movement of totalizer actuators, and at least one coupling member, when in its first position, is arranged to control the position of the totalizer shaft before an adding movement of the totalizer actuators.

46. The apparatus of claim 45, wherein the coupling members in the first group are twice as many as the number of totalizer shafts.

47. The apparatus of 42 wherein the totalizer controlling means consist of at least one group of totalizer selection keys, one group of mode of operation keys and one reading-zeroizing slide, whereby the group of totalizer selection keys, via slides and the programmable means which are detachably attached to the slides, affects the coupling members whereby the group of mode of operation keys, via the programmable means which are detachably attached directly to the mode of operation keys, affects the coupling members, and whereby the reading-zeroizing slide, via one of several programmable means which are detachably attached to the rotatable means also affects the coupling members.

48. The apparatus of claim 35, wherein the functions consist of inactivating zero-stops for actuators in the machine.

49. The apparatus of claim 35, wherein the functions consist of activating stop mechanisms for actuators or activating counters in the machine.

50. The apparatus of claim 48, wherein the zero-stops are positioned in the amount banks of the machine and that they are prevented from interfering with the totalizer actuators of the machine by a testing device when at least one of the coupling members is in the first position.

51. The apparatus of claim 35 wherein the programmable means are easily accessible in the machine without modifications in the same.

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