April 29, 1969 D. L. PLACKE 3,441,211

TRANSFER RESTORING MEANS

Filed July 24, 1967 Sheet 1 of 3

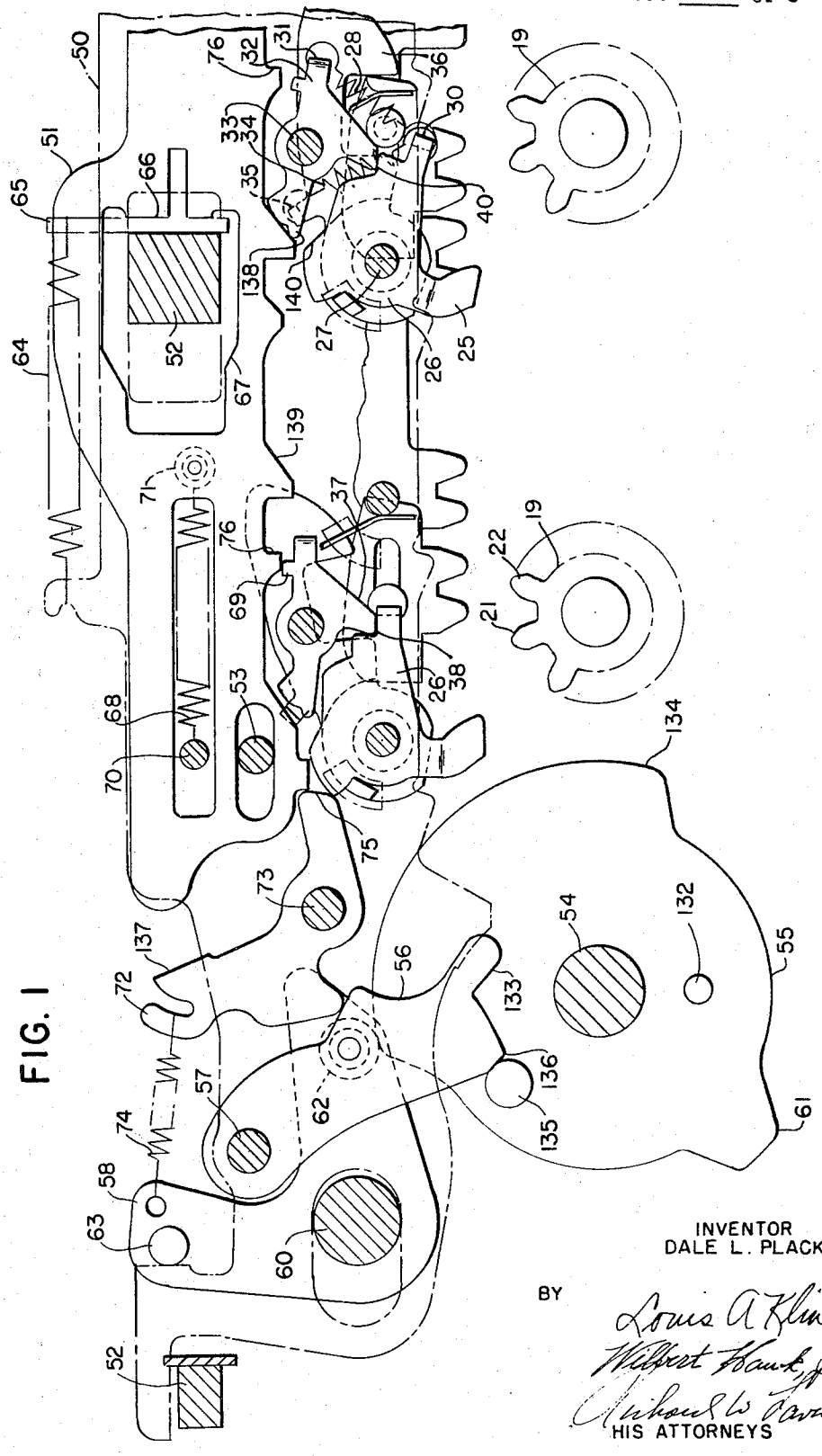

FIG. 1

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FIG. 2

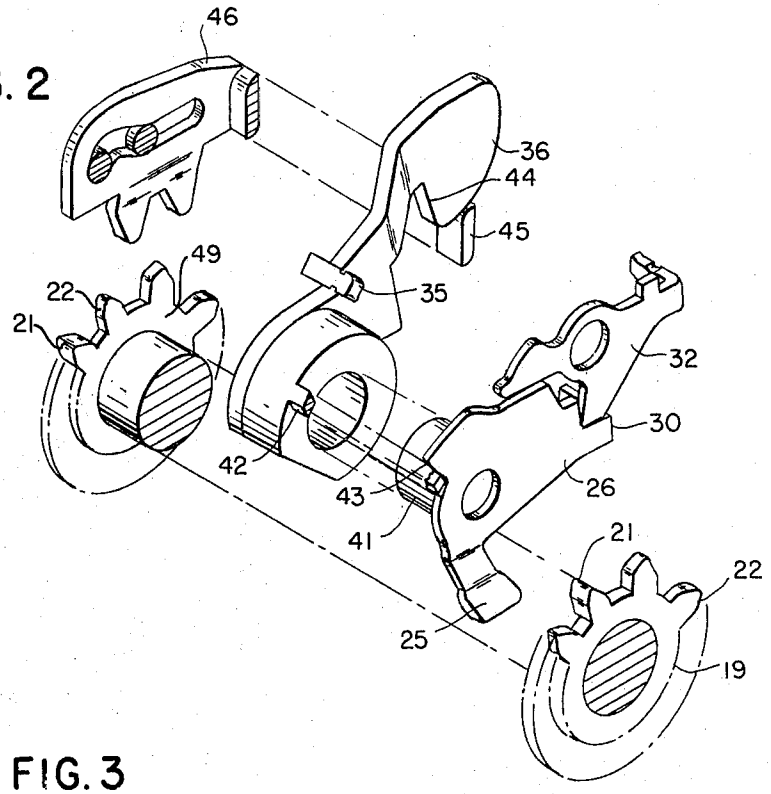
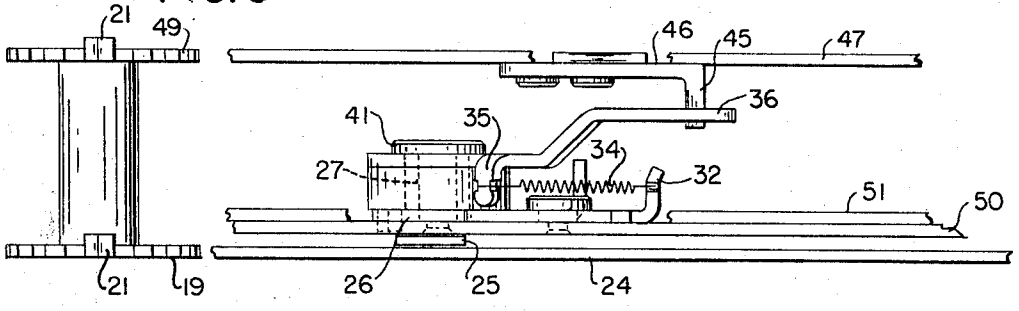


FIG. 3



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TRANSFER RESTORING MEANS

Filed July 24, 1967 Sheet 3 of 3

FIG. 4

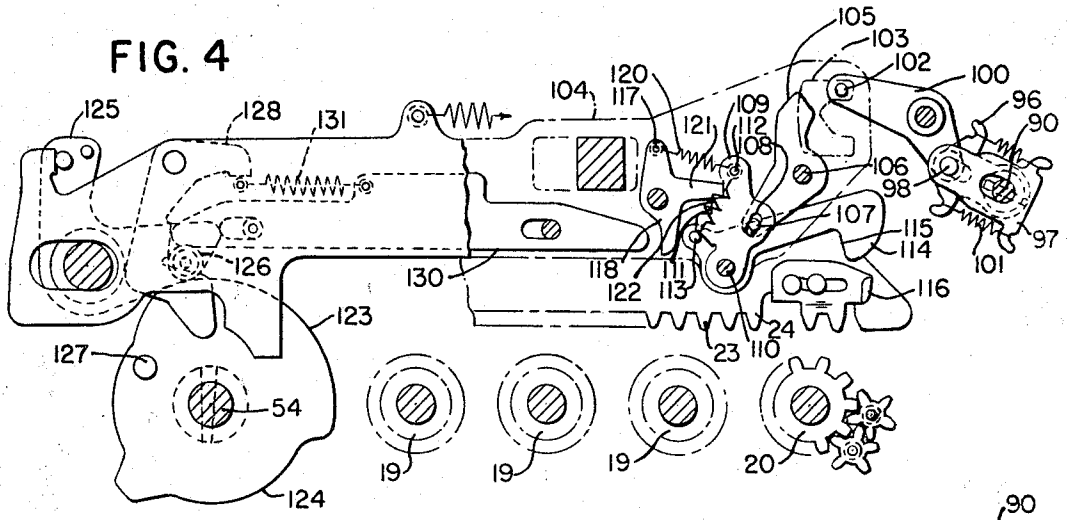


FIG. 5

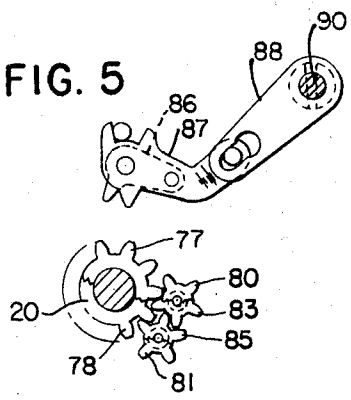


FIG. 6

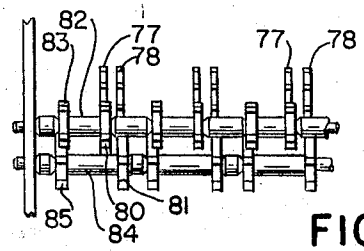


FIG. 8

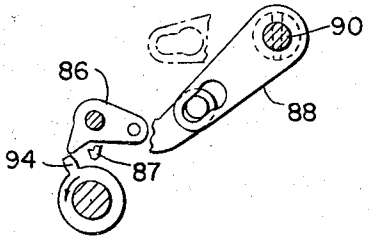


FIG. 7

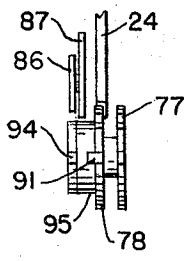


FIG. 10

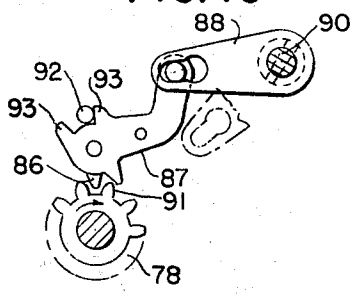
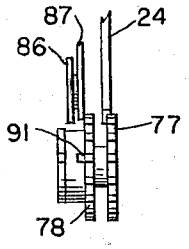


FIG. 9



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United States Patent Office 3,441,211 Patented Apr. 29, 1969

3,441,211

TRANSFER RESTORING MEANS

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Filed July 24, 1967, Ser. No. 655,650
Int. Cl. G06c 7/10
U.S. Cl. 235—133 4 Claims

ABSTRACT OF THE DISCLOSURE

A positive drive mechanism for restoring the tripped tens transfer mechanism in a cash register or accounting machine having an add-subtract totalizer mechanism. The mechanism includes a drive member which is operated during a machine operation to lock out all transfer mechanisms prior to an overdraft carry operation. On a subsequent machine operation, the drive member cams each of the tripped transfer mechanisms to their home position.

Cross reference to related application

Programmable Totalizer Control Mechanism, United States patent application Ser. No. 618,598, filed Feb. 27, 1967, by Louis E. Zurbuchen and Freeland R. Goldammer.

Background of the invention

The invention is directed to a mechanism for restoring tripped transfer mechanisms in a positive manner. Prior devices have used springs to restore the transfer mechanisms to their home position. An example of this type of construction is shown in United States Patent No. 2,628,778, issued Feb. 17, 1953, on the application of Maximilian M. Goldberg. Once the springs have become worn through use or clogged with dirt, the transfer pawls are not returned in time for the next machine operation. The mechanism of this invention is also associated with a machine having an add-subtract totalizer in which during a machine operation a transfer may occur between the highest order totalizer pinion and the lowest order totalizer pinion. It is important that prior to and during this operation the transfer pawls in the amount banks be prevented from being accidentally moved.

Therefore it is an object of this invention to provide a mechanism for restoring tripped transfer pawls in a positive manner.

It is a further object of this invention to prevent the transfer pawls from being moved during a predetermined machine operation.

Summary of the invention

A mechanism for restoring actuated transfer members including a drive member mounted adjacent a transfer member and having a first portion which when positioned adjacent said transfer member prevents said transfer member from being actuated and a second portion which cams the transfer member, when actuated, to its home position.

Brief description of the drawings

FIG. 1 is a partial detailed side view of an amount bank showing the transfer mechanisms utilized in the present embodiment.

FIG. 2 is an exploded detailed oblique view of the transfer mechanisms including the totalizer pinions mounted in an adjacent amount bank.

FIG. 3 is a top detailed view of the mechanisms shown in FIG. 2.

FIG. 4 is a partial detailed side view of the lowest order amount bank showing the add-subtract totalizer pinion and the overdraft mechanism utilized in the present embodiment.

FIG. 5 is a partial detailed side view of the add-subtract totalizer pinions shown in engagement with their reversing gears.

FIG. 6 is a rear view of the add-subtract totalizer pinions shown in FIG. 5.

FIG. 7 is a partial detailed front view of the overdraft trip mechanism in a position to receive amounts into the negative totalizer pinion.

FIG. 8 is a partial detailed side view of the overdraft trip mechanism in a negative position.

FIG. 9 is a partial detailed front view of the overdraft trip mechanism in a position to receive amounts into the positive totalizer pinions.

FIG. 10 is a partial detailed view of the overdraft trip mechanism in a positive position.

Description of the preferred embodiment

Referring now to FIG. 1, there is shown a partial detailed view of an amount keybank of the transfer mechanism used in the present embodiment. The machine to which the present invention is directed is a cash register of the type disclosed in the co-pending United States patent application of Louis E. Zurbuchen and Freeland R. Goldammer, Ser. No. 618,598, filed Feb. 27, 1967. As is well known in this type of cash register, information set up on the keyboard of the machine by the depression of the required keys is entered into a number of totalizers. Each totalizer has a capacity of storing nine units. When additional amounts are added to the totalizer which total more than nine, a transfer operation occurs, in which one unit is transferred to the next higher order totalizer by the use of a transfer mechanism.

As seen in FIG. 4, the present machine includes three rows of totalizer pinions **19** and one row of add-subtract totalizer pinions **20**. Each of the pinions **19**, **20** utilized in the totalizers contains a tooth **21** (FIGS. 1 and 2), which is wider than the other teeth **22** of the pinions. As declosed more fully in the above-mentioned Zurbuchen and Goldammer United States patent application, Ser. No. 618,598, filed Feb. 27, 1967, one of the rows of totalizer pinions **19**, **20** is raised in an upward direction to engage the tooth portion **23** (FIG. 4) of the primary rack **24** (FIG. 3) of one of the amount rows. At this time, the primary rack has been moved to a position commensurate with the amount key that has been depressed in the amount bank. After the selected totalizer pinions have engaged portions **23** of the primary rack, the primary racks **24** of the machine are moved to the left, to their home position. This action rotates the engaged pinions **19**, **20** counter-clockwise, as viewed in FIG. 1, thereby adding the amount into the totalizer pinions. As the wide tooth **21** passes from the ninth position to the zero position, it engages and rocks clockwise an arm **25** of a transfer trip pawl **26** rotatably mounted on a stud **27** secured to a transfer pitman **50** mounted adjacent said trip pawl. The trip pawl **26** is normally urged counter-clockwise by a spring **28**, which is connected between a right-angle end portion **30** of the trip pawl and an end portion **31** of a transfer latch arm **32**, rotatively mounted on the stud **33**, which is also supported on the transfer pitman **50**. A second spring **34**, mounted between the end portion **30** and a right-angle stem portion **35** of a transfer arm **36**, urges the transfer arm **36** clockwise in a manner to be described more fully hereinafter.

The latch arm **32** has a finger **37**, which is normally positioned against a step **38** of the trip pawl **26** by the action of the spring **28**. Upon the clockwise rotation of the trip pawl **26** by the wide tooth of its associated pinion, the finger **37** of the latch arm is positioned in an upper step

portion 40 of the trip pawl, thereby holding the trip pawl in a trip position. This is the position of the right-hand trip pawl shown in FIG. 1.

Referring now to FIGS. 2 and 3, there are shown an exploded view and a top view of the transfer mechanism. As shown, the transfer arm 36 is rotatively mounted on a hub portion 41 of the trip pawl 26, which in turn is mounted on the stud 27. A stud portion 42 of the transfer arm is positioned adjacent a stop portion 43 of the trip pawl 26. Under the action of the spring 34, the transfer arm follows the movement of the trip pawl 26. Thus the clockwise rotation of the trip pawl 26 by the action of the wide tooth 22 results in the clockwise rocking of the transfer arm. This positions a hook portion 44 of the transfer arm in the path of a right-angle extension 45 of a transfer segment 46 located on the primary rack 47 of the next higher amount row. At this time, the primary rack may not have returned to its home position. If this is the case, upon returning to its home position, the right-angle extension 45 cams the hook 44 of the transfer arm counter-clockwise against the action of the spring 34. As soon as the extension 45 passes under the hook 44, the spring 34 rocks the hook 44 clockwise over the extension 45.

As shown in FIGS. 1 and 3, in addition to the primary rack 24 and the transfer elements 26, 32, and 36, each amount bank also includes the transfer pitman 50 and a transfer restoring slide 51. The pitman is slidably supported on a pair of rack support bars 52. The transfer restoring slide is slidably mounted on a pair of studs 53, one of which is shown in FIG. 1. The studs 53 are supported by the transfer pitman 50.

Secured to a cam shaft 54, located below the transfer pitman 50, is a transfer cam 55. Associated with the cam is a transfer cam arm 56, rotatably mounted on a stud 57 secured to the transfer pitman 50, and a transfer pitman cam arm 58 rotatably mounted on a shaft 60, which is supported within the machine. As the cam 55 is rotated clockwise during a machine operation, a high portion 61 of the cam engages a cam roller 62, mounted on the pitman cam arm 58, rocking the cam arm counter-clockwise. Movement of the cam arm 58 allows a stud 63, mounted on the cam arm, to move the transfer pitman 50 to the left, as viewed in FIG. 1. This movement of the pitman is against the action of a spring 64, mounted between the pitman and a stationary comb 65.

Since the studs 27 and 33 are mounted on the pitman 50, movement of the pitman also carries the transfer trip pawl 26, the transfer latch arm 32, and the transfer arm 36 in the same direction. If at this time the hook 44 (FIG. 2) of the transfer arm has engaged the extension 45 of the next higher order transfer segment 46, the movement of the transfer arm 36 moves the transfer segment in a direction which adds one unit to the totalizer pinion 49 which is engaged with the transfer segment.

Movement of the pitman 50 also carries the transfer restoring slide 51 to the left until the edge 66 of the slot 67 contacts a rear portion of the comb 65. Further movement of the pitman tensions a spring 68, mounted between a stud 70, secured to the pitman 50, and a second stud 71, mounted on the restoring slide 51. Movement of the transfer pitman cam arm 58, in actuating the pitman 50, also rotates a transfer restoring arm 72, rotatably mounted on a stud 73, due to the action of a spring 74, connected between the restoring arm and the cam arm. Counter-clockwise rotation of the restoring arm 72 positions its tail 75 against the transfer restoring slide 51, thereby preventing further movement of the slide to the left, as viewed in FIG. 1.

Further clockwise rotation of the cam 55 moves the high portion 61 of the cam away from the cam roller 62. This allows the spring 64 to move the transfer pitman to the right, which positions a lower extension 76 of the pitman over a high portion 69 of the transfer latch arm 32, thus preventing any movement of the latch arm from occurring while the pitman is moving towards and in this position. This action thus locks the transfer trip mechanism in their positions while an overdraft operation occurs.

As previously described, the machine is equipped with an add-subtract totalizer 20 (FIG. 4), which is usually referred to as a crossfooter. The crossfooter consists of a plurality of sets of plus and minus totalizer pinions, there being one set for each amount row. Amounts entered into the plus or minus pinions are subtracted from the amounts contained in the other pinion. When the amount entered exceeds the amount existing on the other pinion, an overdraft occurs. Reference should be made to the United States patents, No. 1,791,907, issued Feb. 10, 1931, on the application of Bernis M. Shipley, and No. 2,175,346, issued Oct. 10, 1939, on the application of Maximilian M. Goldberg, for a full disclosure of the operation and construction of the crossfooter. As disclosed in these patents, whenever an overdraft occurs in the operation of the crossfooter, a "one" is added to the cents amount row in order to constitute either a true negative amount or a true positive amount in the crossfooter. A brief description of the mechanism for adding a "one" in the cents amount bank will now be given.

Referring now to FIG. 4, there is shown a partial detailed side view of the cents amount bank. As disclosed previously, in addition to the three rows of pinions 19, there is mounted in the machine a line of crossfooter pinions indicated as 20. As shown more clearly in FIGS. 5 and 6, each set of crossfooter pinions consists of a plus totalizer pinion 77 and a minus totalizer pinion 78. Associated with each of these pinions is a set of reversing pinions 80, 81. The reversing pinion 80 engages the plus totalizer pinion 77, while the reversing pinion 81 engages the minus totalizer pinion 78. The reversing pinion 80 is secured to a shaft 82, on which is mounted a reversing gear 83, while the reversing pinion 81 is secured to a shaft 84, on which is mounted a reversing gear 85. As best seen in FIG. 6, both reversing gears 83, 85 engage each other. With this arrangement, whenever one of the plus or minus totalizer pinions is rotated, the other totalizer pinion is rotated in the opposite direction. Thus, to subtract from the crossfooter, one adds into the minus pinions. Reference should be made to the above-mentioned Shipley and Goldberg references for a complete disclosure of the operation of the crossfooter.

Referring now to FIGS. 7 through 10, there are shown detailed views of the plus and minus totalizer pinions 77, 78, located in the highest order amount bank. FIG. 7 is a front view of the crossfooter, showing the minus totalizer pinions 78 engaged by the primary racks 24, while FIG. 9 shows a plus totalizer pinion 77 engaged by the primary rack 24. As disclosed fully in the above-mentioned Shipley and Goldberg references, the line of crossfooter pinions 20 is shifted to position either the plus or the minus totalizer pinion so as to be engaged by the primary rack 24. This shifting of the crossfooter is determined by the transaction key depressed on the keyboard. Associated with the crossfooter is an overdraft trip mechanism which consists of trip pawls 86, 87 secured together and an overdraft arm 88, pinned to an overdraft shaft 90. The shaft 90 extends between the highest order amount bank and the lowest order amount bank.

The overdraft shaft 90 is normally in one of two possible positions and indicates whether the crossfooter contains a positive amount or a negative amount. If the crossfooter contains a positive amount, the overdraft shaft is in the "Plus," or positive, position (FIG. 10). If the crossfooter contains a negative amount, the overdraft shaft is in the "Minus," or negative, position (FIG. 9). If the amount in the crossfooter is positive, the plus totalizer pinion 77 contains the true amount, and the minus totalizer pinion 78 contains the nines complement of this amount to 999,999.99. If a sufficiently large amount is sub-

tracted from the crossfooter, an overdraft occurs. The amount in the crossfooter becomes negative, and the minus totalizer pinions contain the true negative amount after one cent has been added automatically to the totalizer pinion in the cents amount bank. This one cent is automatically generated when the overdraft shaft **90** rotates from its positive position to the negative position.

If an amount is added to the crossfooter and the negative amount again becomes positive, the overdraft shaft **90** turns from negative position to positive position. Again one cent is generated and added to the amount on the plus totalizer pinion to make the necessary one-cent correction. When an amount is added to either of the plus or minus totalizer pinions, they are rotated counter-clockwise, as viewed in FIG. 8. As seen in FIG. 9, when the totalizer pinion **77** travels from the ninth position to the zero position, a wide tooth **91**, located on the minus pinion **78**, rocks the overdraft trip pawl **87** counter-clockwise and the overdraft arm **88** and the overdraft shaft **90** clockwise. This moves the overdraft arm **88** from a negative position (shown in dotted lines in FIG. 10) to a positive position. The overdraft shaft is similarly moved from a negative position to a positive position. The movement of the trip pawl **87** is limited by a stud **92**, which is mounted between parallel abutments **93** located on the top portion of the trip pawl.

When an amount is entered into the minus pinions **78** (FIG. 7), the pinion is rotated counter-clockwise. When the minus pinion goes from the ninth position to the zero position, a tooth **94**, mounted on a wide hub portion **95** of the minus pinions **78**, engages the trip pawl **86** (FIG. 8) and rocks it clockwise. Since the pawl **86** is riveted to the pawl **87**, this action of the pawl **86** rotates the trip pawl **87** clockwise and the overdraft arm **88** and the shaft **90** counter-clockwise. This moves the overdraft arm **88** and the shaft **90** from a positive position (shown in dotted lines in FIG. 8) to a negative position.

Referring now to FIG. 4, the overdraft shaft **90**, mounted adjacent the cents amount bank, is shown with a toggle arm **96** pinned to it. A second toggle arm, **97**, rotatively mounted on the shaft **90**, is also mounted on a stud **98**, secured to a cents transfer trip arm **100**. A pair of springs **101**, connected between the toggle arms **96** and **97**, allows the toggle arms to act as a link connected between the shaft **90** and the trip arm **100**. Mounted on the front of the trip arm **100** is a stud **102**, which is positioned within a C-shaped slot **103**, located in the cents transfer pitman **104**. Depending on whether the shaft **90** is in a plus or a minus trip position, the stud **102** will be in the lower or upper portion of the slot **103**. As shown in FIG. 4, the shaft **90** is in the minus position. Upon the clockwise rotation of the shaft **90**, the cents transfer trip arm **100** is rocked counter-clockwise, thereby camming a latch-positioning arm **105** counter-clockwise, above a stud **106**, mounted on the pitman **104**. Counter-clockwise movement of the arm **105** allows a stud **107**, mounted on the arm and positioned in a slot **108** located in an overdraft latch **109**, which in turn is rotatively mounted on a stud **110** secured to the pitman **104**, to rock the overdraft latch clockwise. A spring **111**, mounted between a stud **112**, located on the latch **109**, and a stud **113**, mounted on the rear portion of a transfer arm **114**, rotates the transfer arm **114** clockwise, allowing the hook portion **115** to move behind the cents transfer segment **116** on the amount primary rack **24**, in the manner described previously. Also connected between the stud **112** and a stud **117**, located on a latch arm **118**, is a spring **120**. Upon the clockwise rotation of the latch **109**, the latch arm **118** is rocked cockwise, thereby positioning an extension **121** in a lower step **122** of the latch **109**, thus retaining the latch in the tripped position.

During the rotation of the cam shaft **54** (FIG. 4), a high portion **123** of the cam **124** rocks the pitman cam arm **125** counter-clockwise by engaging the cam roll **126** mounted on the cam arm. This engagement drives the pitman **104** to the left. This action also moves the transfer arm **114** to the left, thus shifting the transfer segment **116** to the left. As previously described, this movement adds "one" to the cents totalizer pinion **20**, which at this time is in mesh with the transfer segment.

Upon the subsequent rotation of the cam shaft **54**, a stud **127**, mounted on the cam **124**, engages a restoring cam arm **128**, rotatably mounted on the transfer pitman **104**. This engagement rocks the restoring cam arm counter-clockwise, resulting in movement of a restoring slide **130**, slidably mounted on the pitman **104**, to the right, which engages the latch arm **118** and rocks it counter-clockwise. This movement of the latch arm carries its extension **121** above the upper step of the overdraft latch **109**. At this time, the spring **120** rocks the latch **109** counter-clockwise, allowing the engagement of the latch with the stud **113** of the transfer arm **114**, which moves the transfer arm counter-clockwise to the position shown in FIG. 4. As the stud **127** on the cam **124** moves away from the restoring cam arm, the restoring slide **130** is moved to the left by the action of a spring **131** mounted between the slide and the pitman **104**. This allows the spring **120** to rotate the latch arm **118** clockwise until the extension **121** is positioned against the upper step of the overdraft latch **109**, as shown in FIG. 4.

After an overdraft operation has occurred, in the manner just described, a small stud **132** on the cam **55** (FIG. 1) engages the lower portion **133** of the transfer cam arm **56** and rocks it counter-clockwise, which action is transmitted to the transfer restoring arm **72**. The restoring arm is rocked clockwise a sufficient distance against the action of the spring **74** to allow the tail **75** of the arm to be moved from engagement with the restoring slide **51**. This allows the restoring slide to move to the left under the action of the spring **68**, thereby removing the lower edge **76** of the slide away from the transfer latch arms **32**. In this position, the transfer trip pawls **26** are free to accept transfers created by the operation of an overdraft line **90** (FIG. 4). Further clockwise rotation of the cam **55** (FIG. 1) allows a second high portion **134** of the cam to rock the transfer pitman cam arm **58** counter-clockwise, thereby shifting the transfer pitman to the left, which results in transfers being made in those keybanks which were tripped as a result of the overdraft operation in the manner described previously.

As the cam **55** continues its clockwise rotation, a second stud **135** (FIG. 1) mounted thereon engages a rear portion **136** of the transfer cam arm **56**. This engagement rocks the cam arm counter-clockwise and the restoring arm **72** clockwise a sufficient distance to allow a cam portion **137** of the restoring arm to engage the transfer restoring slide and drive it to the right, as viewed in FIG. 4. This movement of the restoring slide allows a number of cam surfaces **139**, located on the lower edge of the slide, to engage each of the trip transfer latch arms **32** and drive them counter-clockwise. This movement of the latch arms **32** allows a lower edge portion **138** of the arm to engage a cam portion **140** of its associated transfer trip pawl **26**, thereby positively rocking said trip pawl counter-clockwise. This action positions the finger **37** of the latch arm **32** adjacent the step **38** of the trip pawl **26**. The counter-clockwise rotation of the trip pawl also rotates the transfer arm **36** (FIG. 2) out of engagement with the extension **45** of the next highest order transfer segment **46**.

As the stud **135** moves past the cam arm **56**, the spring **74** rotates the restoring arm **72** counter-clockwise, allowing the restoring slide to move to the left under the action of the spring **68**, which action moves the cam surfaces **139** of the slide from engagement with the latch arm **32**. At this time, the spring **28** moves the finger **37** of the latch arm **32** against the step portion **38** of the trip pawl **26**. Thus the transfer mechanism is in its home position.

While there have been shown and described and pointed out the fundamental novel features of the invention as applied to the preferred embodiment, it will be understood that various omissions, substitutions, and changes in the form and details of the device illustrated and its operation may be made by those skilled in the art without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. In a cash register, the combination of

(a) a plurality of totalizer elements arranged in denominational order;

(b) means for selectively rotating said totalizer elements a predetermined distance;

(c) means for adding "one" to the next highest totalizer element when one of said totalizer elements is rotated a predetermined distance, including

(d) a control means mounted adjacent said totalizer element and adapted to be moved to an actuated position by said totalizer element upon movement of the totalizer element through said predetermined distance, the movement of said control means adding "one" to the next highest totalizer element;

(e) and means operated by said control means, when moved, for holding the control means in its actuated position;

(f) actuating means;

(g) a drive member mounted adjacent said holding means and operated by said actuating means for movement to a first position and a second position;

(h) means mounted on said drive member for blocking the movement of said holding means when said drive member is in said first position;

(i) and other means mounted on said drive member for actuating said holding means when said drive member is in said second position, whereby said holding means and said control means are returned to their home positions.

2. In a cash register, the combination of

(a) a plurality of totalizer elements;

(b) a drive member for rotating said totalizer elements a predetermined distance;

(c) a transfer mechanism for adding "one" to the next highest totalizer element when one of said totalizer elements is rotated a predetermined distance; said transfer mechanism including

(d) a transfer arm adapted to add "one" to the next highest totalizer element when actuated,

(e) a trip pawl connected to said transfer arm and mounted adjacent one of said totalizer elements, said trip pawl being adapted to be moved to a tripped position upon movement of said totalizer element through said predetermined distance, thereby actuating said transfer arm;

(f) and a latch arm mounted adjacent said trip pawl and adapted to be moved to an operated position by said trip pawl upon actuation of said trip pawl, said latch arm holding said trip pawl in its tripped position when operated;

(g) an actuating member;

(h) a slide member mounted adjacent said latch arm and adapted to be moved to a first and second position by said actuating member;

(i) blocking means mounted on said slide member adjacent said latch arm and adapted to prevent said latch arm from movement when said slide means is in said first position;

(j) and cam means mounted on said slide member adjacent said tripped latch arm and adapted to rotate said latch arm to home position when the slide member is moved to said second position, whereby said latch arm engages said trip pawl and rotates it to the home position.

3. The cash register of claim **2** in which said blocking means comprises a depending extension portion of said slide member, said extension portion being positioned so as to block rotation of said latch arm when said slide member is in said first position.

4. The cash register of claim **2** in which said trip pawl contains a cam portion positioned adjacent said latch arm, and said cam means comprises a depending extension portion located adjacent the latch arm when the latch arm is in a tripped position, said extension portion engaging said tripped latch arm and rotating it to its home position when said slide member is moved to said second position, whereby said latch arm engages the cam portion of said trip pawl, rotating said trip pawl to the home position.

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STEPHEN J. TOMSKY, *Primary Examiner.*

U.S. Cl. X.R.

137—90; 235—137