United States Patent

Krause et al.

[15] **3,682,379**

[45] **Aug. 8, 1972**

[54] **TENS TRANSFER MECHANISM**

[72] Inventors: **Hans-Juergen Krause; Johannes Rindsfuesser**, both of Berlin, Germany

[73] Assignee: **The National Cash Register Company**, Dayton, Ohio

[22] Filed: **Nov. 9, 1970**

[21] Appl. No.: **87,737**

[52] **U.S. Cl.** .....**235/137 A**

[51] **Int. Cl.** **G06c 7/10**

[58] **Field of Search** .....235/133, 137 R, 137 A, 138

[56] **References Cited**

UNITED STATES PATENTS

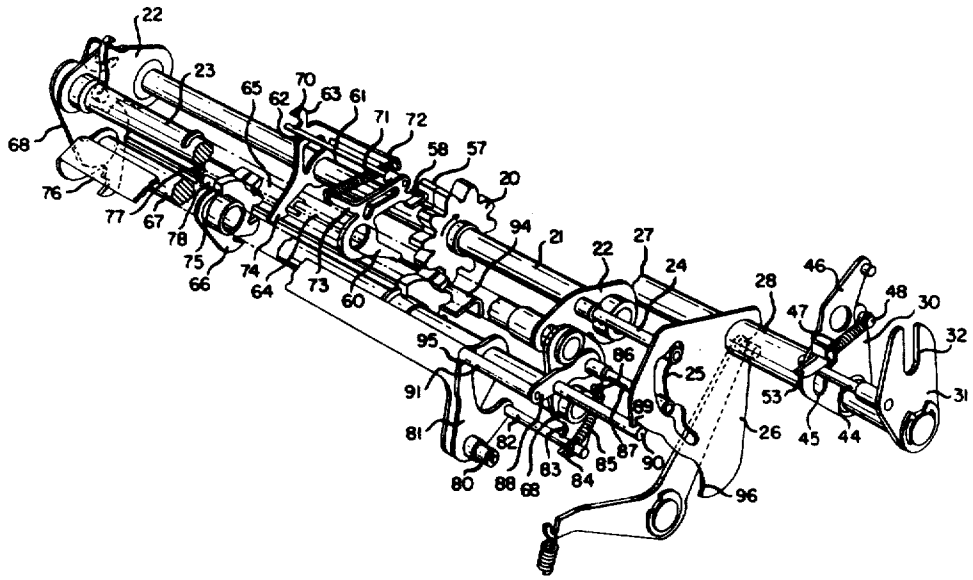
2,628,778	2/1953	Goldberg	235/133 R
3,420,438	1/1969	Englund et al.	235/137 R
3,441,211	4/1969	Placke	235/133 R
3,472,450	10/1969	Gang	235/137 R

Primary Examiner—Richard B. Wilkinson
Assistant Examiner—Stanley A. Wal
Attorney—Louis A. Kline, Wilbert Hawk, Jr. and Richard W. Lavin

[57] **ABSTRACT**

A tens transfer mechanism for use in a totalizer mechanism in which the primary and secondary transfer operations occur simultaneously and the restoring of the transfer segments occurs at the beginning of the succeeding machine operation, thus allowing a total operation to occur during a single machine operation. A bail member is included to operate a plurality of transfer segments, whereby the transfer segments are restored to the home position and are released for operation during the same operation of the bail member.

7 Claims, 17 Drawing Figures



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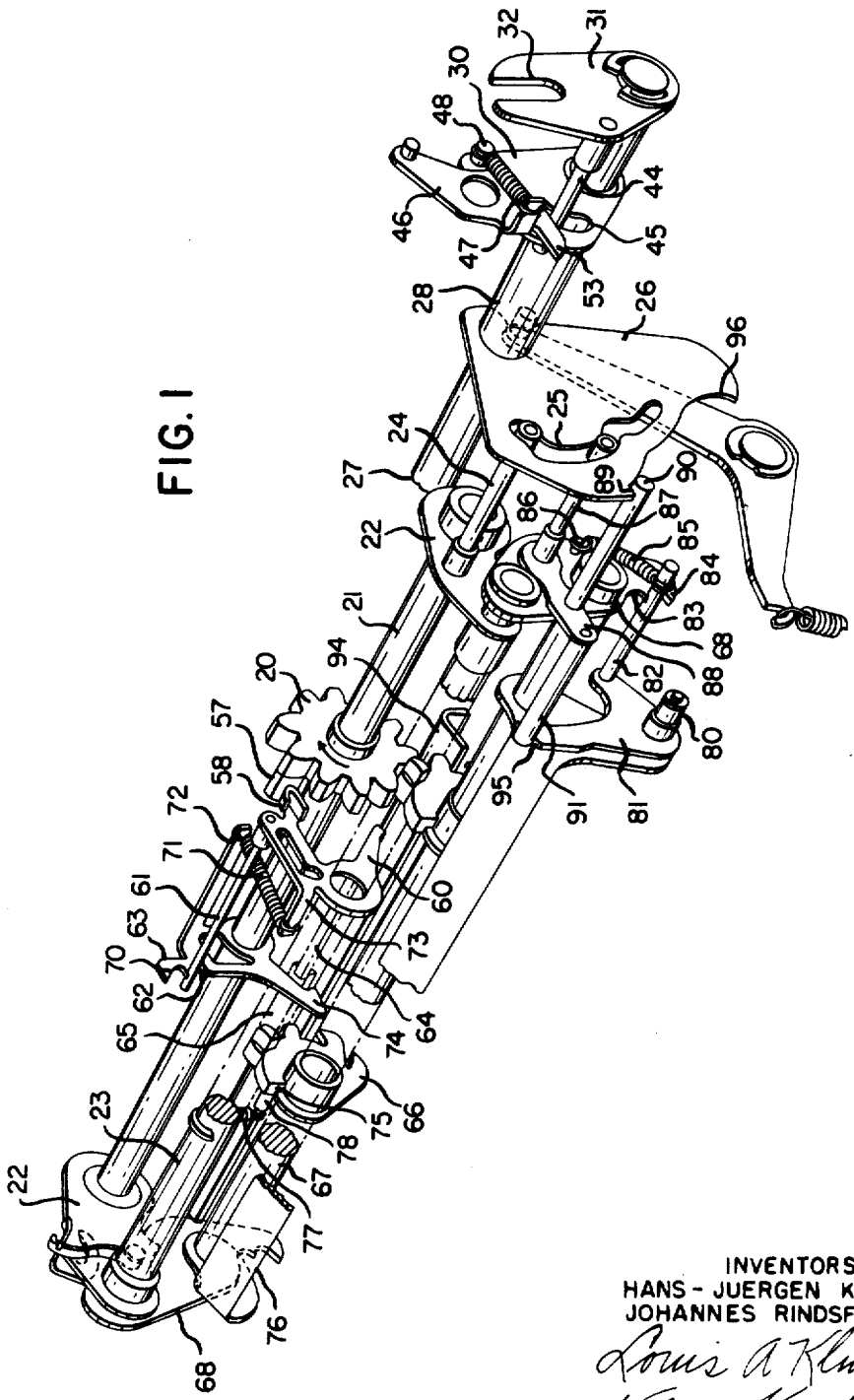
SHEET 1 OF 7

FIG. 1



INVENTORS
HANS - JUERGEN KRAUSE &
JOHANNES RINDSFUESSER

Louis A Klein

BY Wilbert Hawk Jr.
Richard W Jarvis

THEIR ATTORNEYS

FIG. 2

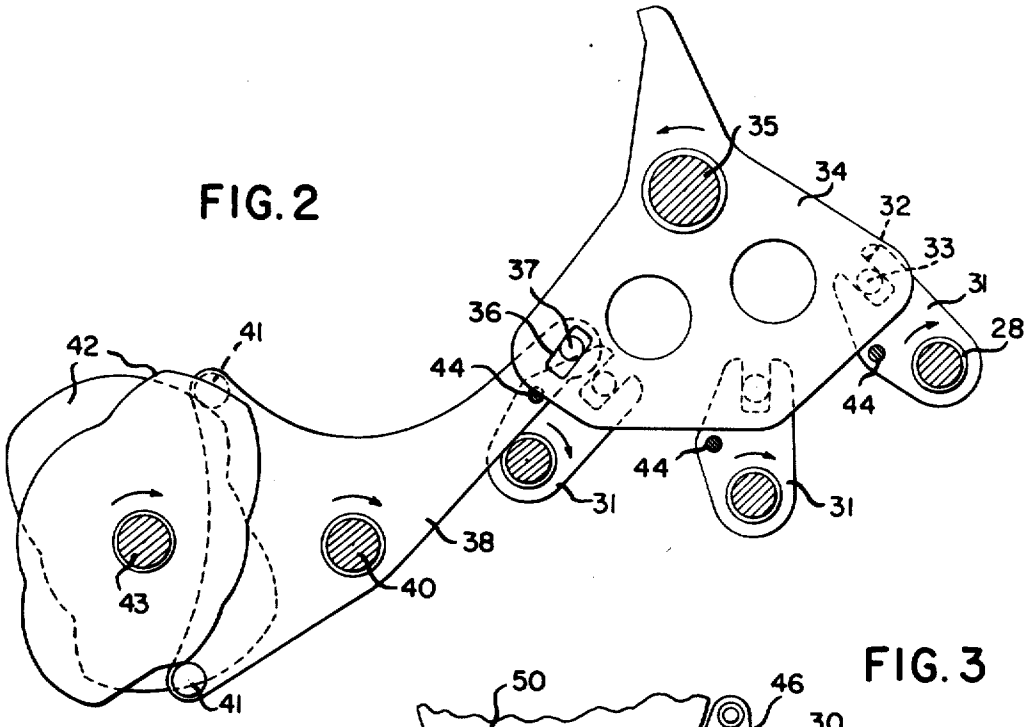


FIG. 3

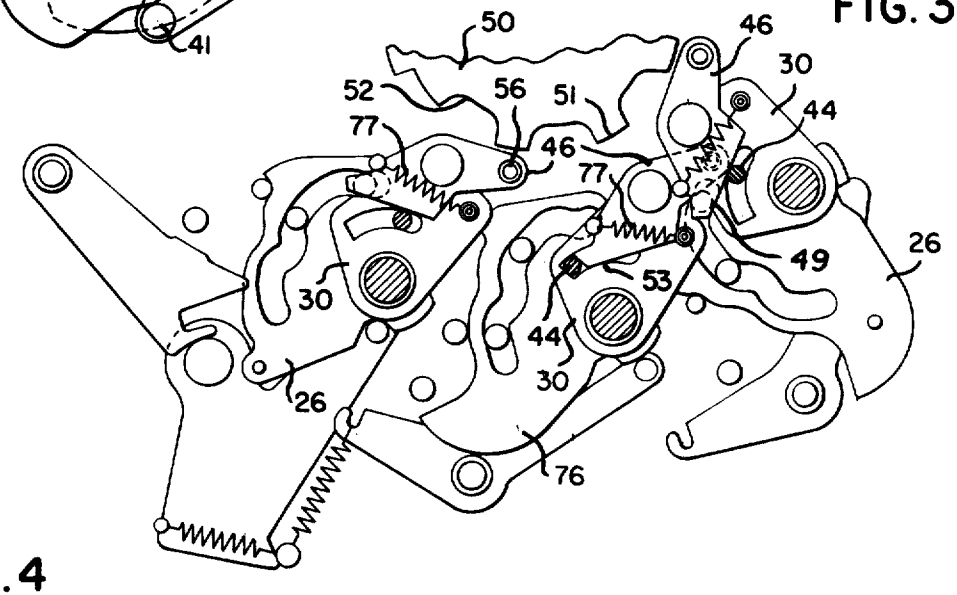
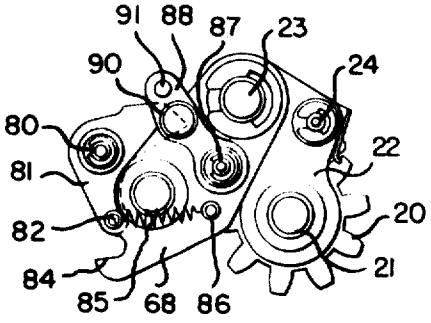


FIG. 4



INVENTORS
HANS-JUERGEN KRAUSE &
JOHANNES RINDSFUESSER
Louis A Klein
BY Wilbert Hawk, Jr.
Richard W Jarvis
THEIR ATTORNEYS

FIG. 5

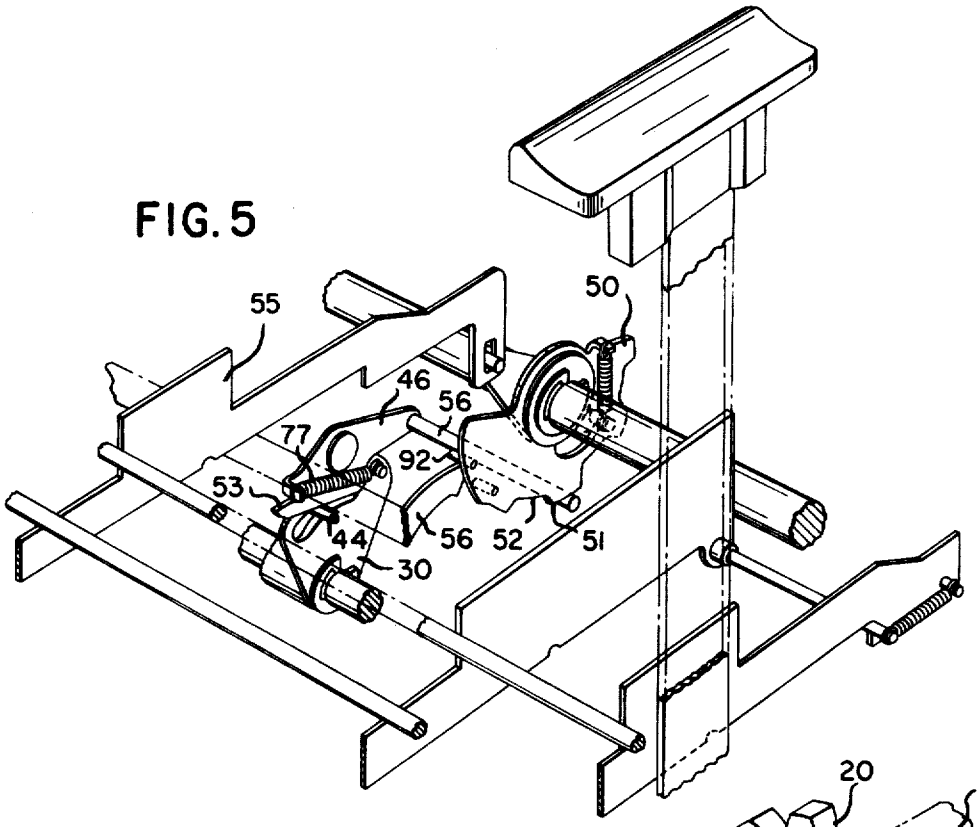
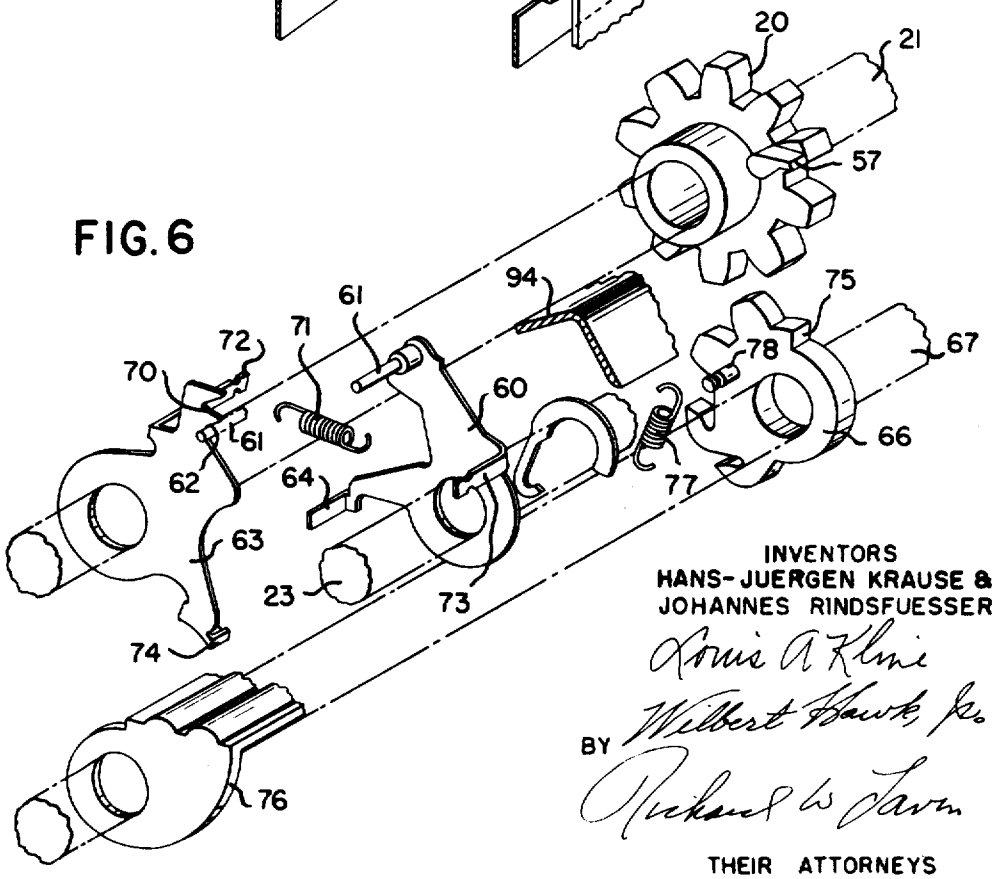


FIG. 6



INVENTORS
HANS-JUERGEN KRAUSE &
JOHANNES RINDSFUESSER
Louis A Klein
BY Wilbert Hawk, Jr.
Richard W Jarvis
THEIR ATTORNEYS

FIG. 7

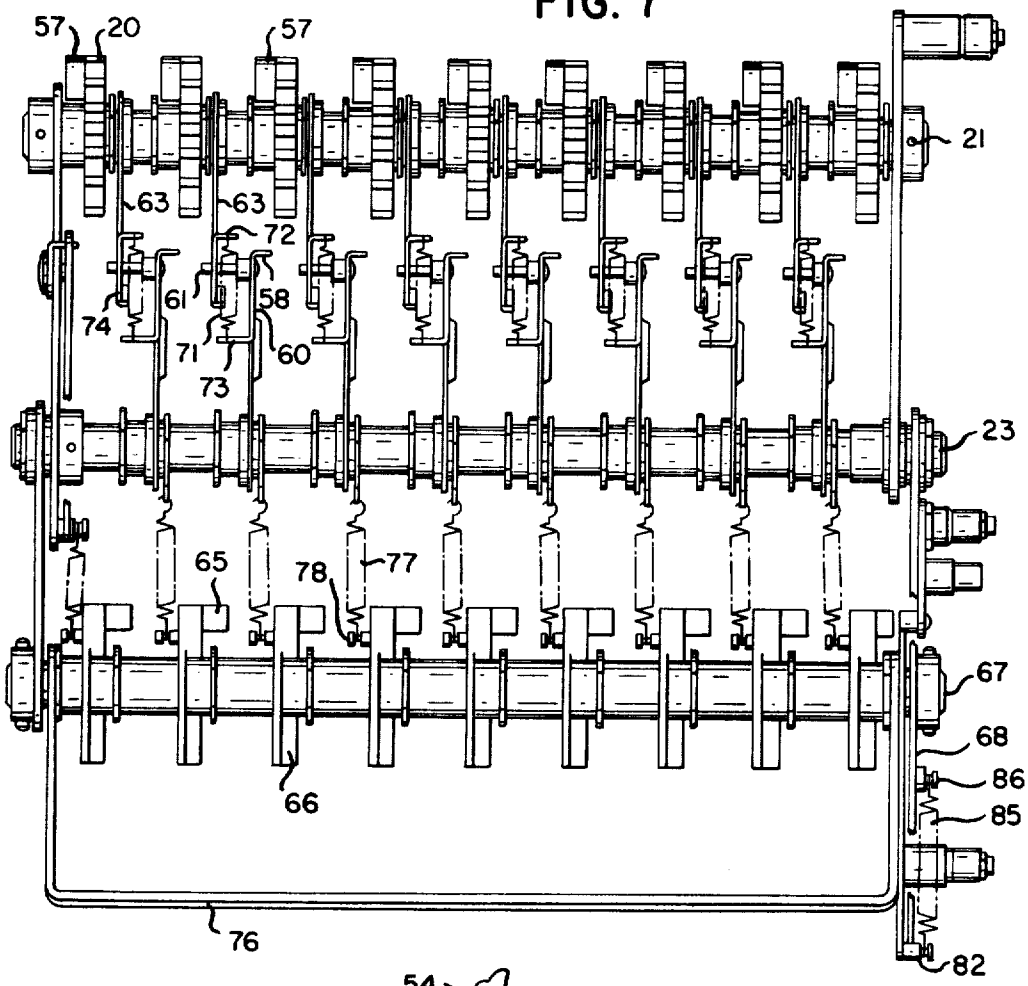
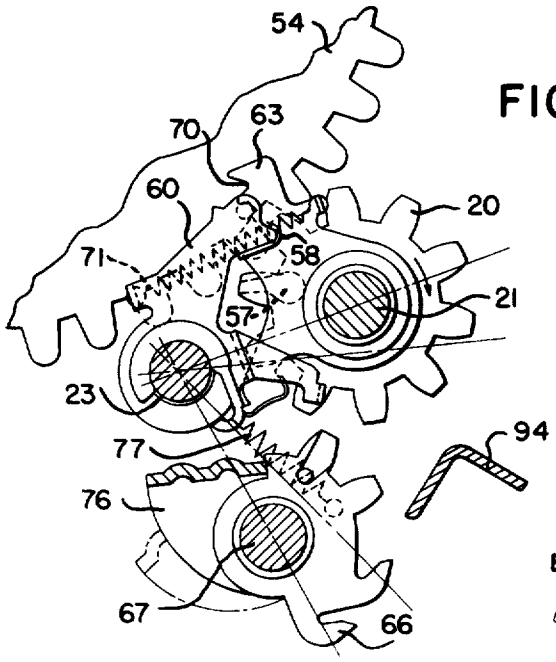


FIG. 8



INVENTORS
HANS-JUERGEN KRAUSE &
JOHANNES RINDSFUESSER

BY

THEIR ATTORNEYS

FIG. 9

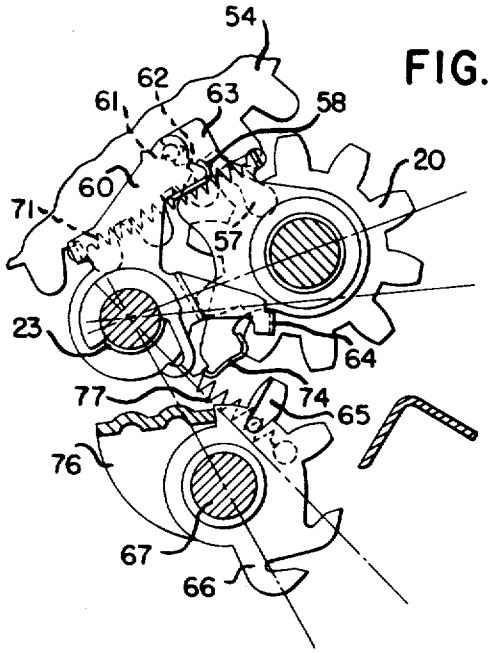


FIG. 10

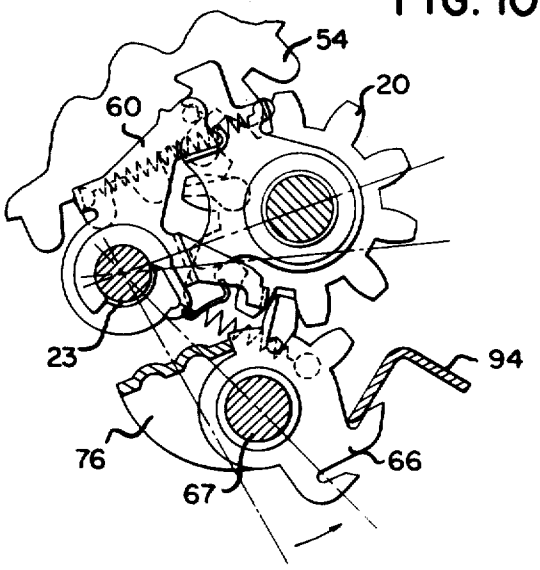
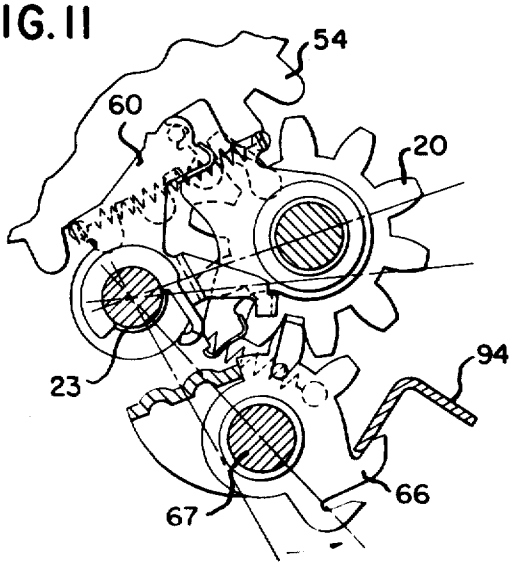


FIG. 11



INVENTORS
HANS-JUERGEN KRAUSE &
JOHANNES RINDSFUESSER

BY Louis A. Klein
Wilbert Hauke, Jr.
Richard S. Faust

THEIR ATTORNEYS

FIG. 12

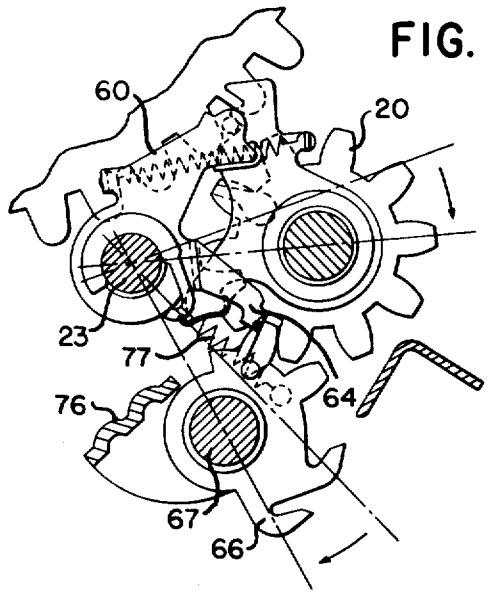


FIG. 13

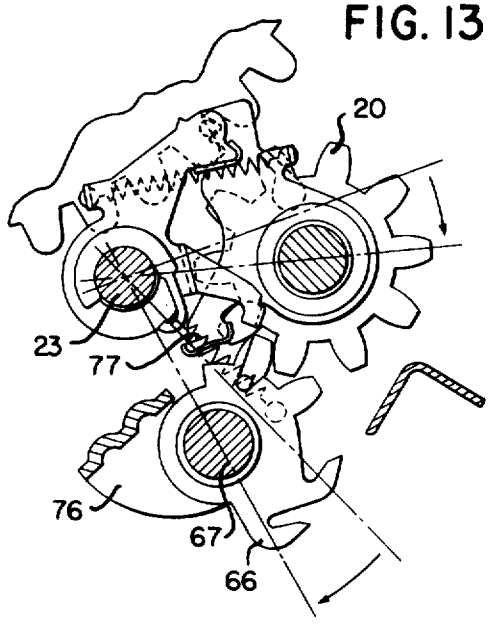
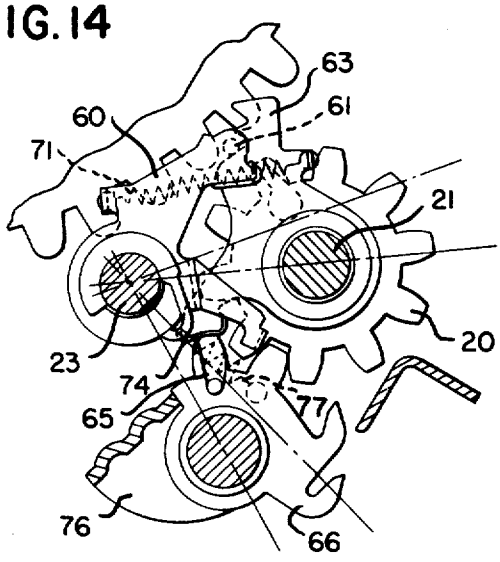


FIG. 14



INVENTORS
HANS-JUERGEN KRAUSE &
JOHANNES RINDSFUESSER

BY Louis A Klein
Wilbert Hawk Jr.
Richard W Jarvis

THEIR ATTORNEYS

FIG. 15

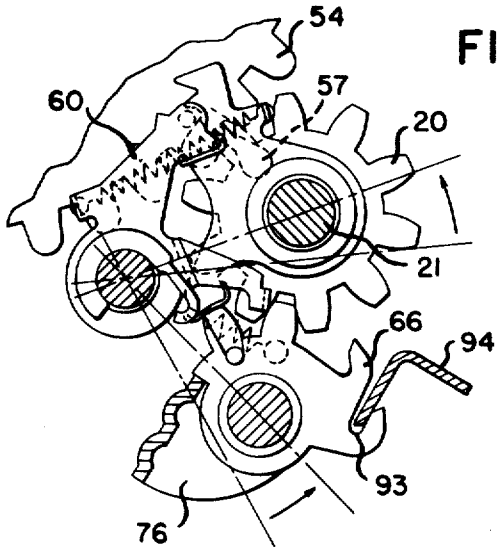


FIG. 16

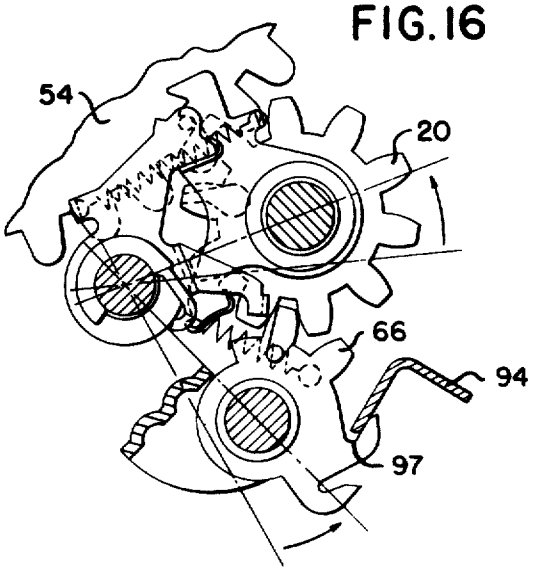
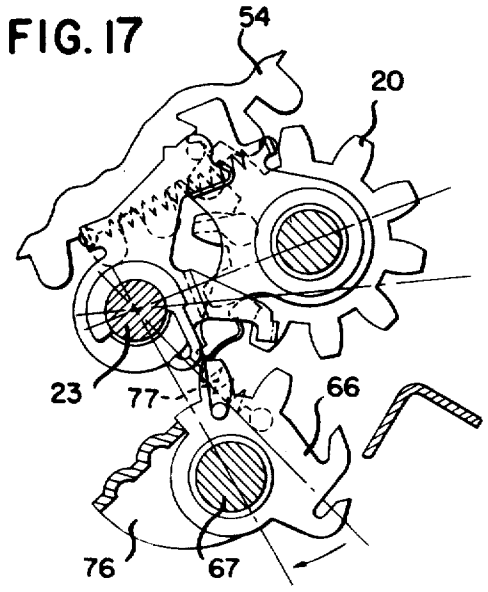


FIG. 17



INVENTORS
HANS-JUERGEN KRAUSE &
JOHANNES RINDSFUESSER

BY Louis A Klee
Wilbert Hawk, Jr.
Robert J. Patch

THEIR ATTORNEYS

TENS TRANSFER MECHANISM

BACKGROUND OF THE INVENTION

In today's check-out operation, found in many businesses, fast operational speed of the cash register is required. In order to shorten this time of operation, a novel totalizer-engaging mechanism has been developed, wherein a total operation occurs during a single machine operation. Prior to this development, a total operation required two machine operations, during which time the tens transfer operation and the restoring of the tripped transfer mechanisms occurred. It is therefore an object of this invention to provide a tens transfer mechanism which can be operated through primary and secondary transfer operations and can be restored to its home position during a total operation of a cash register which occurs during a single machine operation. It is another object of this invention to provide a mechanism for restoring tripped tens transfer mechanisms without the necessity of disengaging and re-engaging the totalizer wheels and the transfer mechanism as a distinct functional operation. It is a further object of this invention to provide a mechanism for allowing the entering of a tens transfer into the next higher order during and by the restoring of the tripped transfer mechanisms. It is another object of this invention to provide an aligning means associated with the tens transfer mechanisms to maintain the totalizer wheels in a set position during portions of the machine operation.

SUMMARY OF THE INVENTION

A tens transfer mechanism including a transfer pawl tripped by a totalizer wheel, a transfer segment normally engaged by the transfer pawl when in an untripped position and disengaged when in a tripped position, and a bail member mounted adjacent said transfer segment and engaging said segment to restore those segments operated during the previous machine cycle while conditioning the segments for operation in the present machine cycle and subsequently releasing the segments to operation by the transfer pawls, whereby primary and secondary transfer operations will occur simultaneously. An aligner member cooperating with the transfer segment aligns the totalizer wheels when the totalizer wheels are moved into engagement with the adding segment.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of the totalizer mechanism showing portions of the tens transfer mechanism elongated for clarity.

FIG. 2 is a side detailed view of the cam drive for operating the totalizer mechanisms.

FIG. 3 is a partial detailed side view of the totalizer-selecting mechanism used in the present embodiment.

FIG. 4 is a detailed side view of a portion of the totalizer-selecting mechanism.

FIG. 5 is a perspective view of the control device set by the operation of certain of the transaction keys in the present embodiment.

FIG. 6 is an exploded perspective view of the tens transfer mechanism.

FIG. 7 is a top view of the totalizer wheels and the tens transfer mechanism, showing the various elements in an exploded arrangement.

FIG. 8 is a detailed side view of the tens transfer mechanism showing the position of the transfer segment being rocked clockwise by the bail, thereby cocking the segment for operation and restoring all previously tripped transfer segments.

FIG. 9 is the same view as FIG. 8 except that the transfer pawl has been tripped by the wide tooth of the totalizer wheel as a result of the amount's being added to the totalizer wheel.

FIG. 10 is the same view as FIG. 8, showing the transfer segment rocked into engagement with the totalizer wheel and the aligning bar, with the transfer pawl in an untripped position.

FIG. 11 is the same view as FIG. 10, showing the transfer segment engaged with the totalizer wheel and the aligning bar but with the transfer pawl in a tripped position.

FIG. 12 is the same view as FIG. 8, except that the totalizer wheels and the segment have been rocked from engagement with the adding segment, and the bail has been disengaged from the transfer segment. The transfer pawl is in a tripped position.

FIG. 13 is the same view as FIG. 12 with the totalizer wheel disengaged from the adding segment.

FIG. 14 is the same view as FIG. 12 after the transfer segment has added one unit to the totalizer wheel.

FIG. 15 is the same view as FIG. 14 but with the totalizer engaged with the adding segment and held in alignment by the transfer segment and the aligning bar.

FIG. 16 is the same as FIG. 15, but the transfer segment is in an untripped position.

FIG. 17 is the same view as FIG. 14 but showing the transfer segment disengaged from the totalizer wheel, thus allowing the adding segment to rotate the totalizer wheel.

DESCRIPTION OF THE PREFERRED EMBODIMENT

The invention is directed to a tens transfer mechanism utilized in a cash register of standard construction, which includes a plurality of amount key banks. As is well known in the art, mounted in each amount key bank is a rack member which is settable to a position by engaging the stem of the depressed key in the amount bank. An adding segment which engages a rack member is also set to a position commensurate with the key depressed. During an add operation, totalizer wheels are brought into engagement with the adding segments after the segments have been set by the depressed key. When the rack member and the adding segment are returned to their home position, the amount represented by the key depressed is added into the totalizer wheels. The totalizer wheels are then disengaged from the adding segment.

As disclosed in the co-pending United States patent application titled "Totalizer Control Mechanism," Ser. No. 87,767 filed in the names of Hans-Juergen Krause and Johannes Rindfuesser, the co-inventors in this present application, the engagement and disengagement of the totalizer wheels during an add, sub-total, or total-taking operation occur during a single machine operation. At the end of the machine operation, the rack members in each of the amount banks are in an adjusted position and are returned to their home position during the first part of the next machine operation. By this construction, the operation of the cash register

is considerably shortened. The present invention is utilized with this type of totalizer operation and concerns the tens transfer operation, which allows a total or sub-total operation to occur during a single machine operation.

As is well known in the art, the tens transfer mechanism functions to add "one" to the next higher order totalizer wheel when, during an adding operation, a value is added to the lower order totalizer wheel which moves the totalizer wheel from its ninth position to its zero position. This movement of the totalizer wheel will trip the tens transfer mechanism, which, at a subsequent time in the machine operation, will rotate the next higher order totalizer wheel one position. This is known as a primary transfer operation. If, as a result of the primary transfer operation, the next higher totalizer wheel is moved from its ninth position to its zero position, a secondary transfer operation is effected. The present invention allows both of these transfer operations to occur simultaneously.

Referring now to FIG. 1, there are shown the totalizer-engaging mechanism and the tens transfer mechanism utilized in the present embodiment. Included in the totalizer-engaging mechanism are a number of totalizer wheels **20** secured to a shaft **21** mounted between a pair of plate members **22**, which in turn are secured to a shaft **23** rotatably mounted within the frameworK (not shown) of the machine. Secured to the right-hand plate member **22** is a roller stud **24**, the end of which is positioned within a cam slot **25** located in a totalizer-engaging plate **26** rotatably mounted on a shaft **27** and secured to a hub member **28**, the other end of which is secured to an operating plate **30**. Secured to the end of the shaft **27** is a driving arm **31**, which contains a slot **32**, within which is positioned a stud **33** (FIG. **2**) mounted on a control plate **34**. As shown in FIG. **2**, the driving arm **31** is one of three such arms engaged by the control plate **34**, which in turn is rotatably mounted on a shaft **35**. Each driving arm **31** controls a totalizer line, as disclosed in FIG. **1**, there being three totalizer lines in the machine.

The control plate **34** contains a slot **36**, within which is positioned a stud **37** secured to one end of a cam follower arm **38** rotatably mounted on a shaft **40**. A pair of rollers **41**, mounted on the arm **38**, engage a pair of cam plates **42** secured to the main cam shaft **43**. Rotation of the main cam shaft **43** during a machine operation rocks the cam follower arm **38** first clockwise about the shaft **40** and then counter-clockwise. The clockwise movement of the cam follower arm **38** results in the clockwise movement of the driving arms **31**.

As viewed in FIGS. **1**, **2**, and **3**, secured to each of the driving arms **31** is a rod **44**, which extends through a slot **45** in the operating plate **30**. Rotatably mounted on the operating plate **30** is a sensing arm **46**, which is urged counter-clockwise about its pivot point by a spring **47** secured between the arm **46** and a stud **48** mounted on the operating plate **30**. As more fully disclosed in the co-pending United States patent application of Krause and Rindfuesser cited previously, the counter-clockwise movement of the sensing arms **46** under the action of the spring **47** is controlled by a selecting disk **50** (FIGS. **3** and **5**), which is rotated during a machine operation to present either a high control surface **51** or a low control surface **52**, or both, to the sensing arm **46** during a machine operation, whereby, upon sensing a low control surface **52**, the arm **46** is rotated counter-clockwise a sufficient distance to allow a lower stop portion **53** of the arm **46** to engage the rod **44**. This engagement will allow, during a clockwise movement of the driving arm **31**, the rod **44** to pick up the operating arm **30** and rock it clockwise, which movement is transmitted to the engaging plate **26** and, through the cam slot **25** and the stud **24**, to the plate member **22**, which results in the rocking of the totalizer shaft **21** counter-clockwise about the shaft **23**, thereby allowing the totalizer wheels to be engaged with the adding segment **54** (FIG. **8**) in the amount bank.

Clockwise rotation of the arm **31** results in the disengagement of the totalizer wheels **20** from the adding segment **54**. As disclosed fully in the previously cited co-pending United States patent application of Krause and Rindfuesser, the selecting disk **50** (FIGS. **3** and **5**) is controlled by a detect **55** and a finger member **56** operated by certain of the transaction keys during a machine operation. Thus, during an add, sub-total, or total operation, the selecting disk **50** is rotated to position one of the control surfaces **51**, **52** adjacent a stud **49** mounted on the sensing arm **46**, which will control the timing of the engaging of the three totalizer lines of the machine with the adding segments **54** in the amount banks. The cam plates **42** will rock the driving arms **31** clockwise to engage the totalizer wheels with the adding segments between 150° and 180° of revolution of the cam shaft **43** and between 320° and 350° of the cam shaft revolution. The driving arm **31** will be rocked counter-clockwise to disengage the totalizer wheels between 270° and 300° and between 80° and 115° of the cam shaft revolution. Depending on what transaction key has been depressed determines the timing of the engagement of the totalizer wheels under the control of the driving arms **31**. Thus, in a sub-total operation, the totalizer wheels are disengaged and then re-engaged during the first 180° of revolution of the cam shaft **43** and are then disengaged and then re-engaged during the second half of the cam shaft revolution. Reference should be made to the previously cited co-pending United States patent application of Krause and Rindfuesser for a full disclosure of the timing operation of the totalizer-engaging mechanism disclosed in FIG. **1**.

As shown in FIG. **1**, each totalizer wheel has a wide tooth **57** (FIG. **6**) mounted thereon. Positioned in the plane of rotation (FIG. **7**) of the wide tooth **57** is a projection **58** of a tens transfer pawl **60** rotatably mounted on the shaft **23**. There is one tens transfer pawl **60** for each totalizer wheel **20**. When the totalizer wheel **20** is rotated by the adding segment **54** in a manner well known in the art, so that the totalizer wheel passes from "nine" to "zero" in a clockwise direction as viewed in FIG. **1**, the wide tooth **57** will engage the projection **58** and rock the transfer pawl **60** counter-clockwise about the shaft **23**. A stud **61**, mounted on the pawl **60**, extends into a lower notch **62** of a retaining and restoring pawl **63** rotatably mounted on the shaft **21**. The stud **61** is positioned in the notch **62** when the transfer pawl **60** has not been tripped by the wide tooth **57**.

The transfer pawl **60** has an extension **64**, which in the untripped position is positioned adjacent a tooth

portion 65 (FIG. 1) of the next-higher-order tens transfer segment 66, which in turn is mounted on a shaft 67 secured between a pair of support plates 68, which are rotatably mounted on the shaft 23. The pawl 63 has an upper notch 70, into which the stud 61 is positioned whenever the pawl 60 is tripped by the wide tooth 57. A spring 71, mounted between a bent-over ear 72 of the pawl 63 and a bent-over ear 73 of the pawl 60, normally urges the stud 61 into one of the notches 62, 70 of the pawl 63. The pawl 63 also has a foot portion 74, which is positioned adjacent the next-highest-order transfer segment 66, the foot portion 74 being moved into the path of movement of the segment 66 upon the tripping of the pawl 63 by the wide tooth 57.

Each of the tens transfer segments 66 (FIGS. 1 and 6) has a surface portion 75, which is urged into engagement with a bail member 76 by means of a spring 77 secured between a stud 78, mounted on the segment 66, and the shaft 23. The bail member 76 is rotatably mounted on the shaft 67. Secured to the right-hand portion of the bail member 76 is a stud 80 (FIGS. 1 and 4), on which is mounted a release lever 81 having a stud 82, which extends to a position engaging either an upper notch 83 or a lower notch 84 in the right-hand support plate 68. The stud 82 is urged into engagement with the notches by a spring 85, mounted between the stud 82 and a stud 86, mounted on the plate 68.

As shown in FIGS. 1 and 4, mounted on the right-hand support plate 68 is a roll member 87, to which is rotatably mounted an operating member 88. The end of the roll member 87 is positioned within a portion of the cam slot 25 in the engaging plate 26. As will be described more fully hereinafter, whenever the engaging plate 26 is rocked clockwise about the shaft 27, the cam slot 25, acting on the roll member 87, rocks the support plate 68 and the shaft 67 about the shaft 23, which controls the shifting of the transfer segment 66. This movement of the engaging plate 26 is also transmitted through a stud 90, mounted on the operating member 88, to the operating member. The operating member 88 will be rocked at the end of the movement of the plate 26. A stud 91, mounted on the operating member 88, engages the release lever 81 when the member 88 is rocked counter-clockwise by the movement of the engaging plate 26.

There will now be described an operation of the tens transfer mechanism with respect to two consecutive add operations followed by a total-taking operation. As is well known in the art, the first add operation is initiated by depression of the add transaction key (not shown) after the appropriate amount keys have been depressed. As is disclosed fully in the previously cited co-pending United States patent application of Krause and Rindfuesser, the detent 55 (FIG. 5) will not move, and the selecting disk 50 will present a high surface 51 (FIG. 3) to the stud 49 of the sensing arm 46, thus preventing the rod 44 from actuating the operating plate 30. During the first half of the revolution of the cam shaft 43, the adding segments 54 (FIG. 8) are restored to their zero position. At the beginning of the second half of rotation (180° to 255°) of the cam shaft 43, the amount rack members (not shown) are differentially set by engaging the stem of the amount keys in a manner well known in the art. This operation also sets the adding segments accordingly. At 245°, the finger member 56 (FIG. 5) is rocked to engage a stud 92 mounted on the selecting disk 50, thereby rotating the disk counter-clockwise to position a low control surface 52 to the stud 49 on the sensing arm 46, thus allowing the spring 77 to move the lower stop portion 53 of the arm 46 to a position engaging the rod 44. At 320°, the cam plates 42 (FIG. 2) rock the driving arms 31 clockwise, thereby allowing the rod 44 to also rock the operating plate 30 (FIG. 1) clockwise. This movement is transmitted to the engaging plate 26, whose clockwise rotation rocks the plate members 22, by means of the roller stud 24, counter-clockwise about the shaft 23 to engage the totalizer wheels with the adding segments 54.

This clockwise movement of the plate 26 also causes, by means of the cam slot 25 and the roll member 87, the rocking of the support plate 68 counter-clockwise and then clockwise about the shaft 23, thereby engaging (FIG. 15) and disengaging (FIG. 17) the transfer segments 66 and the totalizer wheels 20. This action also occurs during the clockwise movement of the plate 26 during the disengagement of the totalizer wheels from the adding segments. During this engaging movement, a lower notch 93 of the transfer segment 66 is engaged with a fixed aligning bar 94 (FIGS. 1, 6, and 15) while also engaged with the totalizer wheels. Thus the totalizer wheels 20 (FIG. 15) are in alignment during their initial engagement with the actuators. As the right-hand support plate 68 is rocked counter-clockwise about the shaft 67, the stud 82 on the release lever 81 is freed from engagement with the lower notch 84 in the support plate 68 and, under the urging of the spring 85, is moved into the upper notch 83, so that, during the clockwise movement of the plate 68, the surface 95 of the release lever 81 is positioned beneath the stud 91 on the operating member 88. Thus, at the end of the first cycle of operation of the cam shaft 43, the totalizer wheels 20 (FIG. 15) are engaged with the adjusted adding segments 54.

As fully described in the previously cited co-pending United States patent application of Krause and Rindfuesser, the completion of the adding operation occurs during the first part of the next succeeding machine operation, during which time the rack members in the amount banks are returned to their home position, which action adds the amount in the totalizer wheels in a manner well known in the art. To initiate the next add operation, the operator will index the new amounts into the amount keys and depress the add transaction key, which will start the next machine operation. Between 2.5° and 40° of this second machine cycle, the driving arm 31 will complete its clockwise movement to cause a lower shoulder 96 (FIG. 1) of the totalizer engaging plate 26 to engage the stud 80 mounted on the right-hand side of the bail 76, thereby rocking the bail clockwise about the shaft 67. This clockwise movement of the bail engages the surface 75 of the transfer segments 66, rocking said segments clockwise about the shaft 67 against the action of the spring 77 (FIG. 8). During this time, the adding segments 54 are rotated counter-clockwise to their zero position, thus rotating the totalizer wheels 20 clockwise, thereby adding the amount into the totalizer wheels. As is well known in the art, the extent to which each totalizer wheel 20 is rotated clockwise by movement of its adding segment

54 to zero position is determined by the setting of the adding segment. Since all of the totalizer wheels were positioned at zero at the commencement of the first machine operation, rotation of the totalizer wheels **20** is ineffective to trip any of the tens transfer mechanisms, which would normally occur at this time.

Between 80° and 115° of rotation of the main cam shaft **43** in the second machine cycle, the driving arm **31** (FIG. 1) rocks the operating late **30** counter-clockwise, which disengages the totalizer wheels **20** from the adding segments **54** (FIG. **14**). Before the totalizer wheels are disengaged from the adding segments, the transfer segments **66** are rocked counter-clockwise into engagement with the totalizer wheels **20** and the aligning bar **94** (FIG. **10**) and are then rocked, together with the totalizer wheels **20**, clockwise about the shaft **23** (FIG. **12**) but with the bail **76** in engagement with the segment **66** (FIG. **14**). As the engaging plate **26** (FIG. 1) completes its counter-clockwise movement, the stud **90**, located on the operating member **88**, is engaged by the upper shoulder **89** of the plate **26**, thereby rocking the operating member **88** counter-clockwise about the roll member **87**. This movement is transmitted by the stud **91** to the release lever **81**, which is rocked clockwise about the stud **80**, thereby camming the stud **82** from the upper notch **83** to the lower notch **84** of the support plate **68**. This action rocks the bail **76** counter-clockwise from engagement with the transfer segment **66** (FIG. **12**), which releases the segment **66** to the action of the spring **77**. At this time, the transfer segments **66** are held by the extension **64** of the transfer pawls **60** which have not been tripped by the wide tooth **57** of the associated totalizer wheels **20**. Thus no transfers are effected, and, when the transfer segments **66** are again rocked into engagement with the aligning bar **94** (FIG. **16**), as will be described hereinafter with respect to a total-taking operation, the upper notch **97** of the segment will be engaged with the bar.

Between 180° and 260° of revolution of the cam shaft, the rack members in each of the amount banks and their associated adding segments are again differentially set in accordance with the amount set up by the depressed amount keys at the commencement of the second machine cycle. As described previously, with respect to the first add operation, between 320° and 350°, the totalizer wheels **20** (FIG. 1), under the control of the driving arm **31** and the operating plate **30**, are rocked into engagement with the adding segments **54** (FIG. **12**), with the transfer segment **66** held by the extension **64** of the transfer pawl **60** against the action of the spring **77**.

At the beginning of the third machine cycle, the operator depresses the "Total" transaction key on the keyboard of the machine, which initiates a machine operation. Between 2.5° and 40° of rotation of the main cam shaft, the bail **76** is rocked clockwise about the shaft **67** to normally restore the transfer segment **66**, which would have been tripped during a previous transfer operation. At this time, since there was no previous transfer operation, the segments **66** have been held by the extension **64** of the pawl **60**, as described previously. The clockwise rotation of the bail **76** will now engage the segments **66** against the action of the spring **77** (FIG. **8**). Between 0° and 75°, the rack members and the adding segments **54** will be moved to their zero position, which action adds the amount set up in the amount banks during the second machine operation to the amount transferred to the totalizer wheels during the second machine operation. It is at this time that the primary and secondary tens transfer operation will occur.

In order to describe the operation of the tens transfer mechanism, it is to be assumed that, in one of the amount banks, an amount has been entered into the totalizer wheels which, when added to the amounts now being entered, will cause the respective totalizer wheels to pass from "nine" to "zero" during the entry of the second amount and thereby trip the tens transfer pawl **60** associated with said amount bank. It is also assumed that the next higher denominational order totalizer wheel is standing at "nine" and will not receive an entry from its adding segment.

As the adding segment **54** (FIGS. **8** and **9**) moves counter-clockwise towards its home position, the engaged totalizer wheel **20** is rotated clockwise (FIG. **9**) and, as described above, will pass from the "nine" position to the "zero" position. As this occurs, the wide tooth **57** engages the projection **58** of the transfer pawl **60**, rocking the pawl counter-clockwise about the shaft **23**. This action trips the pawl. The counter-clockwise movement of the pawl **60** removes the stud **61** from the lower notch **62** (FIG. **6**) of the restoring pawl **63** to the upper notch **70** by the action of the spring **71**. This movement positions the foot portion **74** of the pawl **63** in the path of the counter-clockwise rotation of the tooth portion **65** of the transfer segment **66** in the next-highest denominational amount bank. The counter-clockwise movement of the pawl **60** also moves its extension **64** from out of the path of the segment **66** in the next-highest denominational amount bank.

Between 80° and 115° of revolution of the cam shaft **43**, the shaft **67** (FIG. **11**) is rocked counter-clockwise about the shaft **23** in the manner described previously, thereby bringing the transfer segment **66** into engagement with the totalizer wheels **20**. Then both the totalizer wheels **20** and the engaged segment **66** are rocked clockwise about the shaft **23**, thereby disengaging the totalizer wheels **20** from the adding segments **54** (FIG. **13**). During this time, the bail **76** is rocked counter-clockwise about the shaft **67**, thereby releasing the next-higher-order segment **66** to the action of the spring **77** (FIG. **13**). The spring **77** rotates the segments **66** counter-clockwise (FIG. **24**) about the shaft **67**, which rotates the engaged totalizer wheel **20** in the next-higher amount bank clockwise about the shaft **21**. The segment **66** moves counter-clockwise until it engages the bail **76**, which movement is the equivalent of one tooth space of the totalizer wheel **20**. Thus a tens transfer is effected into the next-higher denominational order (FIG. **14**). The counter-clockwise rotation of the segment **66** also causes its tooth portion **65** to engage the foot portion **74** of the restoring pawl **63**, rocking the pawl clockwise about the shaft **21**, thus restoring the stud **61** of the transfer pawl **60** to the lower notch **62** of the pawl **63** by the action of the spring **71**.

As was described above, the next-higher-order totalizer wheel **20** was assumed to be standing in the "nine" position prior to the primary transfer operation, which operation caused it to move from "nine" to "zero,"

thus tripping its transfer pawl **60** in the manner described previously. Since at this time the bail **76** is not engaged with the transfer segment **66**, which is now being held by the extension **64** of the transfer pawl **60** (FIG. **12**), the tripping of the transfer pawl **60** releases the segment to add one unit into the totalizer wheel of the next-higher-order amount bank due to removal of the extension **64** from engagement with the segment **66**. Thus both the primary and secondary transfer operations will have occurred by 150° of revolution of the cam shaft **43**.

As disclosed fully in the previously cited co-pending United States patent application of Krause and Rindfuesser, in a total-taking operation, the driving arm **31** will pick up and rock the operating plate **30** and the totalizer-engaging mechanism clockwise between 150° and 180° of the revolution of the cam shaft, which moves the totalizer wheels **20** into engagement with the adding segments **54**, which are now standing in their zero position. Between 180° and 260°, the rack members of the amount bank and their associated adding segments will then move, which will rotate the totalizer wheels counter-clockwise (FIG. **15**) about the shaft **21** until the wide tooth **57** engages the projection **58** on the transfer pawl **60**. This engagement arrests the rack member and the adding segments **54** in positions corresponding to the total amount entered into the totalizer wheel. Between 270° and 300°, the driving arm **31** is rocked counter-clockwise to disengage the totalizer wheels **20**, which now stand at zero, from the adding segments **54**. During this time, the transfer segment **66** and the shaft **67** are rocked clockwise about the shaft **23**, thereby disengaging the segment **66** from the totalizer wheels (FIG. **17**). As disclosed previously, between 0° and 75° of the next machine operation, the adding segments are returned to their zero position while the bail **76** is rocked clockwise (FIG. **8**) about the shaft **67** to restore all of the tripped transfer segments **66** as described previously. It will thus be seen that, with this tens transfer construction, the total operation of a machine can occur during a single machine operation in which both primary and secondary transfer operations are concluded and while allows the restoration of the transfer segments to occur without interfering with the machine operation.

What is claimed is:

1. In a cash register having a plurality of amount banks of keys each of which includes a differentially settable actuator mechanism settable to a position representing amounts set up in the amount banks, a tens transfer mechanism for effecting primary and secondary transfers simultaneously which includes

a. a totalizer wheel rotatably mounted in each amount bank and adapted to be moved between an engaged position and a disengaged position with said differentially settable actuator mechanism;

b. a support member adapted to be moved between a first position and a second position;

c. a transfer segment rotatably mounted on said support member and positioned adjacent a totalizer wheel in the next-higher denominational amount bank, said transfer segment being moved between an engaged position and a disengaged position with the totalizer wheel when said support member is moved between said first and second positions;

d. a blocking member rotatably mounted adjacent said totalizer wheel and normally engaging said transfer segment when the segment is engaged with the totalizer wheel;

e. means mounted on said totalizer wheel to engage and rotate said blocking member when the totalizer wheel moves through its highest value-representing position, whereby said blocking member is disengaged from said transfer segment;

f. drive means normally engaging said transfer segment and adapted to rotate said segment, when released, in a direction to rotate the totalizer wheel in the next-higher amount bank to effect a tens transfer;

g. an actuator member rotatably mounted on said support member and adapted, when moved in one direction, to restore the transfer segment to its home position and to release said segment for rotation by said drive means when moved in the opposite direction;

h. and means for controlling the movement of said totalizer wheel and said support member whereby the transfer segment is restored when disengaged from the totalizer wheel in the next-higher denominational amount bank and is released for rotation when the totalizer wheel is disengaged from the actuator mechanism.

2. The mechanism of claim **1** in which

a. said support member comprises a shaft member;

b. means rotatably supporting said shaft member and said totalizer wheel;

c. and said controlling means includes a cam-operated drive means engaging said supporting means to selectively operate said supporting means whereby said shaft member and said totalizer wheel are moved in unison to said second position of the shaft member, thereby disengaging the totalizer wheel from the actuator mechanism.

3. The mechanism of claim **2** which includes an aligner member mounted adjacent said transfer segment and adapted to engage the segment when the segment is rotated to a position engaging the totalizer wheel, whereby both the transfer segment and the totalizer wheel are held in an aligned position.

4. The mechanism of claim **3** in which said actuator member comprises

a bail member rotatably mounted on said shaft member; and

second drive means engaging said bail member and actuated by said supporting means during the operation of said supporting means by said cam-operated drive means, whereby the bail member is rotated in one direction to restore the transfer segment to the home position and then release the transfer segment for movement when rotated in the opposite direction.

5. In a cash register having a plurality of amount banks of keys each of which includes a differentially settable actuator mechanism settable to a position representing amounts set up in the amount banks, a tens transfer mechanism for effecting primary and secondary transfers which includes

a. a totalizer wheel located in each amount bank and including a transfer actuator member mounted thereon, said totalizer wheel adapted for engaging

and disengaging movement with the actuator mechanism;

b. a rotatably mounted transfer segment adapted for engaging and disengaging movement with the totalizer wheel of the next-higher order;

c. a rotatably mounted lever member positioned adjacent said transfer actuator member and normally disabling the rotational movement of said transfer segment, said lever member being rotated by said actuator member when the totalizer wheel moves through its highest value-representing position, thereby enabling said transfer segment;

d. a bail member mounted adjacent said transfer segment and adapted for engaging and disengaging movement with the transfer segment whereby the transfer segment is rotated to its home position upon the engaging movement of the bail member nd is released for rotational movement with the totalizer wheel to effect primary and secondary transfers upon the disengaging movement of the bail member, rotational

e. and means for controlling the engaging and disengaging movement of said totalizer wheel, transfer segment, and bail member whereby the bail member is disengaged from the transfer segment after the lever member has been rotated by said actuator member.

6. The mechanism of claim 5 in which said totalizer wheel and said transfer segment are mounted for engaging and disengaging movement on the same pivot point and said controlling means includes an actuating member for moving said totalizer wheel and said transfer segment whereby the transfer segment and the totalizer wheel, when engaged, are moved about the pivot point to disengage the totalizer wheel from the actuator mechanism prior to the disengaging movement of the bail member.

7. The mechanism of claim 6 which includes a shaft member rotatably supporting said transfer segment and said bail member, said shaft member adapted to be moved by said actuating member whereby the transfer segment is engaged with and disengaged from said totalizer wheel.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,682,379 Dated August 8, 1972

Inventor(s) Hans-Juergen Krause and Johannes Rindsfuesser

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 11, line 18, "nd" should be -- and --.

Column 11, line 21, the comma should be a semicolon.

Column 11, line 21, delete "rotational"

Signed and sealed this 9th day of January 1973.

(SEAL)
Attest:

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents