March 29, 1966 L. F. DALLEN 3,243,111

TWO INPUT COUNTER UNIT

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Fig. 1.

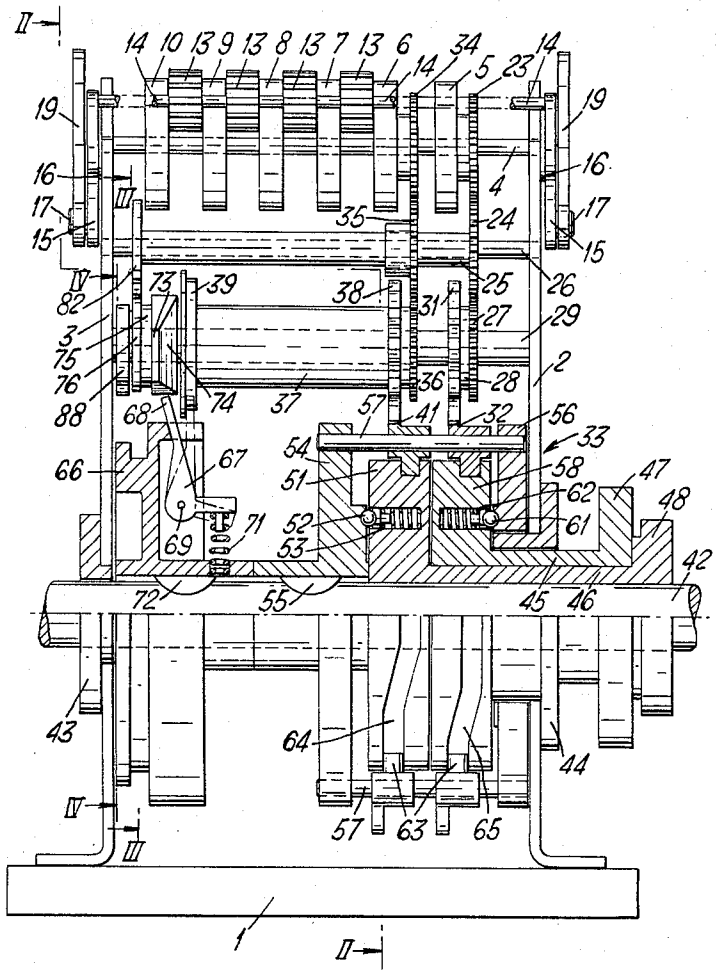

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Fig. 2.

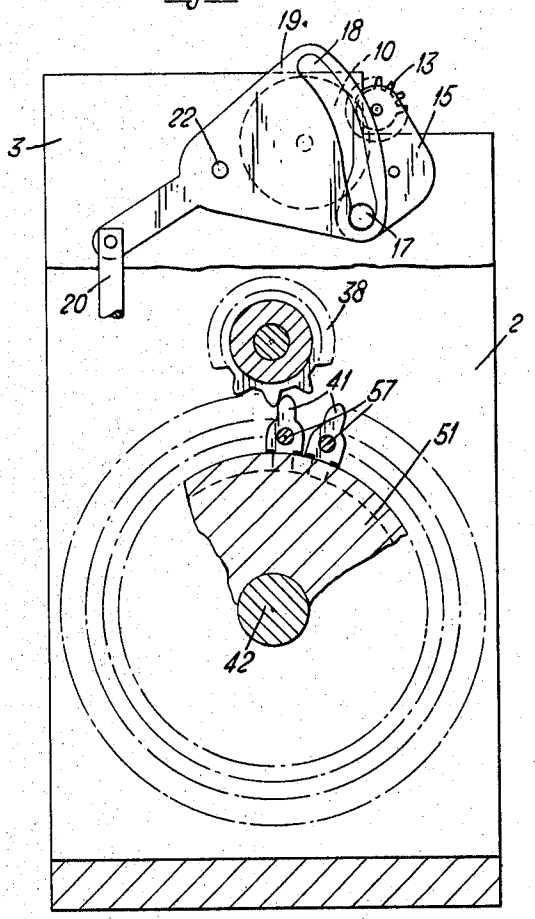

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Fig. 3.

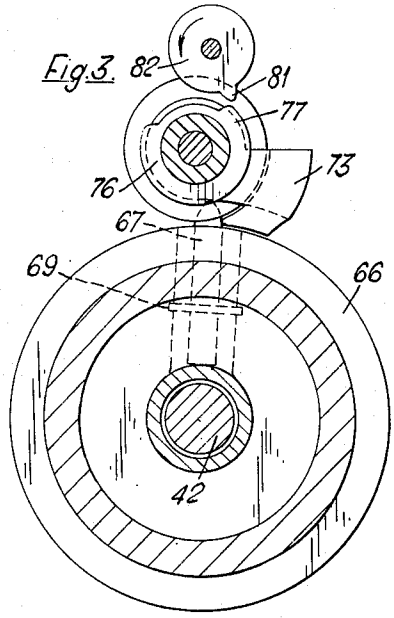
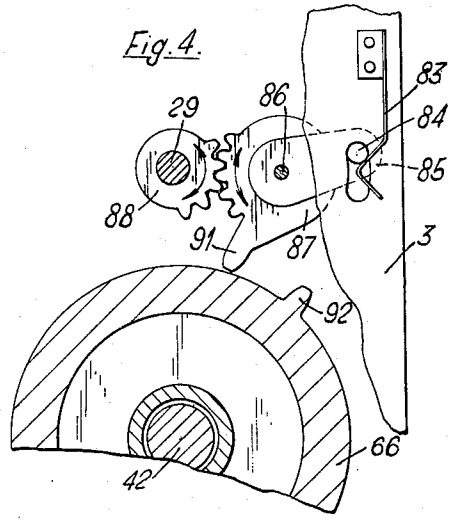


Fig. 4.



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3,243,111

TWO INPUT COUNTER UNIT

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6 Claims. (Cl. 235—138)

Counter units having number wheels which register a count are known, and in some units it is desirable to be able to supply a count input to at least two number wheels of the unit, rather than to follow the more normal course of supplying an input to only the endmost number wheel of a series of such wheels.

The requirement of being able to supply a count input to at least two of the number wheels arises, for example, in respect of counter units which register currency values. In a unit for registering pence and shillings and tens of shillings, it may be required separately to acuate the number wheel allocated to shillings and the number wheel allocated to pence, but it will be appreciated that a transfer action from the pence number wheel to the shillings number wheel is necessary once for each revolution of the pence number wheel. Analogous considerations arise in connection with number wheels registering cents and dollars.

It is an object of the invention to provide a counter unit wherein count inputs can be fed to at least two number wheels directly and independently of one another without disturbing the otherwise usual transfer action.

It is another object of the invention to provide such a counter unit which is simple in construction and is yet reliable in use.

These and other objects and advantages of the invention will become apparent to those skilled in the art from the following detailed description of the invention when read with reference to the accompanying somewhat diagrammatic drawings which are given by way of example and in which:

FIG. 1 is an elevational view, partly in section, of a counter unit having number wheels by which pence, unit shillings, tens of shillings, pounds, tens of pounds and hundreds of pounds can be registered;

FIG. 2 is a sectional view, partially broken away, along the line II—II of FIG. 1;

FIG. 3 is a sectional fragmentary view, along the line III—III of FIG. 1; and

FIG. 4 is a sectional fragmentary view, along the line IV—IV of FIG. 1.

The counter unit illustrated comprises a base **1** carrying two spaced apart parallel side walls **2** and **3**. A shaft **4** is mounted between the side walls **2** and **3** and carries six number wheels **5**, **6**, **7**, **8**, **9** and **10** which are freely rotatable thereon. Wheel **5** serves for registering pence, wheel **6** shillings, wheel **7** tens of shillings, wheel **8** pounds, wheel **9** tens of pounds and wheel **10** hundreds of pounds.

Four transfer pinions **13** which are freely rotatable on a shaft **14** are provided for rotating number wheel **7**, **8**, **9** or **10** through one step when the preceding number wheel **6**, **7**, **8** or **9** respectively has rotated through a complete revolution. The arrangement of the transfer pinions is not shown in detail, since such transfer pinion arrangements are well known and are used in conventional step-by-step digital counting mechanisms.

The respective transfer pinions are driven by teeth provided on the respective succeeding number wheels. To enable resetting of the number wheels **5** to **10** to zero or to a predetermined position, the transfer pinions **13** are movable into a disengaged position, by means of the shaft **14**. For this purpose, the shaft **14** is mounted between rocker levers **15** which are pivoted to the

side walls **2** and **3** by studs **16**. Each rocker lever **15** carries a stud **17** which engages in a cam slot **18** (FIG. 2) of an actuating segment **19** which is manually operable by a pull rod **20**, each segment **19** being pivoted to the respective side wall **2** or **3** at **22**, the shape of the cam slot **18** being such that when the stud **17** is at one end of the slot **18** the transfer pinion shaft **14** is in such a position that the transfer pinions **13** engage the number wheels whereas when the stud **17** is at the other end of the slot **18** the transfer pinion shaft is in such a position that the transfer pinions **13** are disengaged from the number wheels.

When the transfer pinions **13** are disengaged from the number wheels, the number wheels may be rotated for resetting. Such rotation may be manually effected or may be effected by known resetting devices (not shown). Such known devices may comprise pawls which are brought into engagement with cams provided on the number wheels so as to rotate the cams and therewith the number wheels, into predetermined positions.

Number wheel **5** rigidly carries a toothed wheel **23** which meshes with a toothed wheel **24** fixed on a sleeve **25** rotatably disposed on a shaft **26** mounted between the side walls **2** and **3**. Toothed wheel **24** meshes with a toothed wheel **27** carried by a hub **28** which is freely rotatable on a shaft **29** mounted between the side walls **2** and **3**. The hub **28** also carries a toothed wheel **31** and this is positioned for engagement by tooth members **32** of a drum arrangement generally indicated by reference numeral **33**.

Number wheel **6** rigidly carries a toothed wheel **34** which meshes with a toothed wheel **35** freely rotatable on the sleeve **25**. Toothed wheel **35** meshes with toothed wheel **36** which forms part of a sleeve **37** of which a toothed wheel **38** and a toothed wheel **39** also form part, the sleeve **37** being freely rotatable on the shaft **29**. Toothed wheel **38** is positioned for engagement by tooth members **41** of the drum arrangement **33**.

The drum arrangement **33** comprises a shaft **42** which is rotatably mounted by means of a bearing **43** in the side wall **3**, which bearing directly engages the shaft **42**, and a bearing **44** in the side wall **2**, which engages an outer sleeve **45** of two concentric sleeves **45** and **46** disposed on the shaft **42**. Sleeve **45** carries a knob **47** for rotation thereof and sleeve **46** carries a knob **48** for rotation thereof.

Sleeve **46** carries a flange **51** in which at least one detent ball **52** is seated, the ball **52** being urged by a compression spring **53** into detent engagement with a flange **54** fixed to the shaft **42** by a key **55**. Another flange **56** is fixed to the flange **54** by a plurality of spacing rods **57**. The sleeve **45** carries a flange **58** in which at least one detent ball **61** is seated, the ball **61** being urged by a compression spring **62** into detent engagement with the flange **56**.

The spacing rods **57** slidably carry the tooth members **32** and **41**, the said tooth members having pegs **63** which engage in cam tracks **64** and **65** formed in the cylindrical peripheries of the flanges **51** and **58** respectively. The cam tracks **64** and **65** are so shaped that depending on the extent through which the knobs **47** and **48** are turned relative to the shaft **42** the number of tooth members **32** and **41** which have such an axial position as to be engageable with the toothed wheels **31** and **38**, respectively, on rotation of the entire drug arrangement **33** by the shaft **42**, can be varied. Accordingly, knob **47** serves for setting the number of pence which will be registered on number wheel **5** for one revolution of shaft **42** and knob **48** serves for setting the number of shillings which will be registered on number wheel **6** for one revolution of shaft **42**.

It will be noted that a transfer pinion is not provided for effecting a transfer between number wheel **5** and number wheel **6** when number wheel **5** has turned through one revolution. The reason for this is that difficulties would be encountered if a transfer to number wheel **6** had to take place at the same time as a rotation of number wheel **6** by its direct input toothed wheel chain **34, 35, 36, 38, 41**. Instead, an arrangement having a storage action is provided for rotating number wheel **6** by one step, subsequent to any rotation of number wheel **6** by the toothed wheel chain **34, 35, 36, 38** and **41** from the drum arrangement **33**, if during rotation of number wheel **5** from the drum arrangement **33**, the number wheel **5** completed a revolution, that is to say moved from an indication of eleven pence to an indication of zero pence (1 shilling, it should be noted, equalling 12 pence).

This delayed rotation of number wheel **6** by one step is effected through the toothed wheel chain **39, 38, 36, 35, 34**. For this purpose, toothed wheel **39** is rotated through one tooth space and this is done by means of an actuating drum **66** in which a lever member **67** having a single tooth **68** is mounted. The lever member **67** is pivoted on a shaft **69** in the drum **66** and is urged by a compression spring **71** into its position shown in full lines in FIG. 1, that is to say the position in which its tooth **68** lies out of a path of engagement with the toothed wheel **39**. The drum **66** is keyed to the shaft **42** by a key **72**, for rotation therewith.

It will be understood that for the lever member **67** to be effective for engaging the toothed wheel **39** as it moves into the range thereof during one revolution of the shaft **42**, the lever member **67** has to be moved into the position shown in broken lines in FIG. 1. Such movement of the lever member **67** is effected when during the preceding part of one revolution of the shaft **42** the number wheel **5** rotates from an indication of eleven to an indication of zero. In this case, a cam **73** which is rotatably mounted on the shaft **29** and which has an oblique face **74** is encountered by the lever member **67** so as to deflect the lever member **67** to the right as viewed in FIG. 1, if the cam **73** has been moved into its effective position.

The cam **73** is mounted on a hub **75** which carries a wheel **76** having a step **77** (see FIGS. 1 and 3) and this step **77** is engageable by a single tooth **81** on a wheel **82** which is fixed to the sleeve **25**. The sleeve **25** is rotated by toothed wheel **24** during rotation of the number wheel **5** and the tooth **81** on wheel **82** is so positioned as to engage the steps **77** of wheel **76**, whereby to rotate the wheel **76**, during rotation of number wheel **5** from an indication of eleven to an indication of zero. Rotation of wheel **76** rotates the cam **73**, which is rigid therewith, and thus positions the cam **73** for engagement by the tooth **68** at the appropriate point in the rotation of the drum **66** by the shaft **42**. On such engagement of the cam **73** by the tooth **68**, the tooth **68** slides along the face **74** of the cam **73** and is thereby deflected into the position shown in broken lines in FIG. 1, that is to say into engagement with the toothed wheel **39**, this causing the number wheel **6** to be driven through one step through the chain of toothed wheels **39, 38, 36, 35**, and **34**.

Since drive of the number wheel **6** by this chain of toothed wheels is to be effected after any drive of the number wheel **6** by the drum arrangement **33** has been completed, the lever member **67** is provided in the drum **66** at a region which, in terms of rotation, lags behind the regions of the drum arrangement **33** in which the toothed members **32** and **41** are provided.

It will be appreciated that as soon as the number wheel **5** turns from an indication of eleven to an indication of zero, the cam **73** is moved into an operative position for subsequent engagement by the tooth **68**. Since this engagement takes place only after the drive of the number wheels **5** and **6** from the drum arrangement **33** has been

completed, it is necessary to ensure that the cam **73** remains in its operative position until the said engagement has taken place. This is ensured by a detent spring **83** (see FIG. 4) which engages a peg **84** on a detent lever **85** rotatably mounted on a shaft **86** extending between the side walls **2** and **3**.

The detent spring **83** has a bi-stable overcentre action with respect to the peg **84**. The detent lever **85** is rigid with a member **87** having a series of teeth by which it meshes with a member **88** having a series of teeth, the member **88** being rigid with the toothed wheel **76**, hub **75** and cam **73**. Due to the meshing of the toothed members **87** and **88**, the detent action provided by the spring **83** is effective for holding the cam **73** in its inoperative position, prior to engagement of the tooth **81** of wheel **82** with the step **77** of wheel **76**, and for holding it in its operative position subsequent to this engagement.

After rotation of the drum **66** past a position in which the tooth **68** is caused to engage the toothed wheel **39**, the cam **73** is returned to its inoperative position. For this purpose the toothed member **87** is provided with an extension **91** (see FIG. 4) which is engaged by a single fixed tooth **92** on the drum **66** during subsequent rotation of the drum **66** through the remainder of its revolution.

In use of the counter unit, the number of pence to be added to the indication given by the number wheels is set by turning knob **47** to an appropriate position, and the number of shillings to be added to the indication given by the number wheels is set by turning knob **48** to an appropriate position. The set pence and shillings amounts are then added to the indication given by the number wheels by rotation of the shaft **42** through one revolution. During the first part of this revolution the actual adding of the set pence and shillings amounts to the indication given by the number wheels takes place and during a later part of the revolution, any transfer from the pence number wheel **5** to the shillings number wheel **6**, occasioned by number wheel **5** having passed through an indication of eleven, is affected.

In the embodiment described, the invention has been applied to a counting-unit for currency values involving pence and shillings. Of course, the invention is equally applicable to counting-units for currency values based on a decimal system or to counting-units for other purposes, where it is desired to provide for direct operation of at least two number wheels of the counting unit while allowing a delayed transfer action from one of the said two number wheels to the other.

It should be clearly understood that the embodiment described is given by way of example only and that modifications, additions and omissions are possible without departing from the spirit of this invention.

I claim:

1. A counter unit comprising a plurality of rotatable number wheels, first means for driving one of said plurality of number wheels for registering a desired count thereby, second means for driving another one of said plurality of number wheels for registering a desired count thereby, means for imparting a rotation to said other number wheel when said one number wheel passes through a predetermined position, means for rendering said rotation imparting means operative only after the driving of the said other number wheel by the said second driving means has been effected, said rotation imparting means comprising a lever, a tooth member on said lever, a toothed wheel, rotatably mounted cam means for engagement by said lever to move said tooth member into position for engaging said toothed wheel, a rotation-imparting member rigid with said cam means, said cam means being rotatable from an inoperative position into an engagement-effective position by said rotation-imparting member, a wheel, and a tooth thereon, said rotation-imparting member being arranged for engagement by said tooth of said wheel which is rotatable in sequence with rotation

of said one number wheel, whereby on rotation of said one number wheel through said predetermined position, said tooth of said rotatable wheel engages said rotation-imparting member and rotates said cam means into the engagement-effective position.

2. A counter unit comprising a plurality of rotatable number wheels, first means for driving one of said plurality of number wheels for registering a desired count thereby, second means for driving another one of said plurality of number wheels for registering a desired count thereby, means for imparting a rotation to said other number wheel when said one number wheel passes through a predetermined position, means for rendering said rotation imparting means operative only after the driving of the said other number wheel by the said second driving means has been effected, said rotation imparting means being arranged to act through part of the said second driving means, a rotatable member forming part of said rotation imparting means, a tooth member on said rotatable member, a toothed wheel arranged to act on said second driving means, said tooth member being adapted to be moved into and out of a position for engaging said toothed wheel, a lever and spring means, said tooth member being formed on said lever rockably mounted in said rotatable member and urged by said spring means into a position in which its path of travel with said rotatable member is clear of the said toothed wheel, rotatably mounted cam means for engagement by said lever to move said tooth member into a position for engaging said toothed wheel, means for moving said cam means into a position for engagement by said lever when said one number wheel passes through said predetermined position and for returning said cam means into an inoperative position after said cam means have caused said tooth member of the said lever to be effective on said second driving means, said cam means, on movement of said one number wheel through said predetermined position, being moved into said engagement-effective position, said cam means remaining in said position while said lever is brought into engagement therewith by rotation of said rotatable member a rotation-imparting member rigid with said cam means, said cam means being rotatable from the inoperative position into the engagement-effective position by said rotation-imparting member, a wheel, and a tooth thereon, said rotation-imparting member being arranged for engagement by said tooth of said wheel which is rotatable in sequence with rotation of said one number wheel, whereby on rotation of said one number wheel through said predetermined position, said tooth of said rotatable wheel engages said rotation-imparting member and rotates said cam means into the engagement-effective position.

3. A counter unit as defined in claim 2, and further comprising a toothed wheel rigid with said cam means, a rotatably mounted gear member, a lever arm carried by said gear member, a projection on said lever arm, and a flat spring engaging said projection, said cam means being disposed in engagement with said rotatably mounted gear member, said flat spring cooperating with said projection in an overcentre detent action to provide detent location for said cam means in each of its two positions.

4. A counter unit as defined in claim 3, and further comprising a projection on said rotatably mounted gear member, and a fixed tooth, said projection being engageable by said fixed tooth which is provided on said rotatable member, said fixed tooth being arranged after said lever, in terms of rotation of said rotatable member, for rotating said gear member to return said cam means to the inoperative position.

5. A counter unit as defined in claim 2, wherein said first driving means comprise a toothed wheel fixed to said one number wheel, a train of toothed wheels in engagement with said first-mentioned toothed wheel, and a rotatable member having a plurality of teeth adapted for being moved into and out of a position for engaging said toothed wheel train, and wherein said second driving means comprise a toothed wheel fixed to said other number wheel, a train of toothed wheels in engagement with said toothed wheel, and a rotatable member having a plurality of teeth adapted for being moved into and out of a position for engaging said toothed wheel train, and further comprising a driving shaft of the counter unit, a yoke arrangement fixed to said driving shaft, guide members and tooth members, said rotatable member of said first driving means and said rotatable member of said second driving means being mutually rotatably mounted relative to said yoke arrangement, said rotatable member of said rotation-imparting means being fixed to said shaft, said yoke arrangement including said guide members which extend parallel to said driving shaft and on which said tooth members each bearing one of said teeth are slidably disposed, a peripheral cam track on each of said rotatable members of said first and second driving means, a follower on each of said tooth members engaged by each cam track, said cam tracks being so shaped that, by rotation of said rotatable members relative to said yoke arrangement through a predetermined extent, a selected number of said tooth members allocated to each of said rotatable members of said driving means are moved axially along said guide members into and out of a position for engaging said toothed wheel train and detent means between each of said rotatable members of said driving means and said yoke arrangement to hold said rotatable members in desired set positions relative to said yoke arrangement.

6. A counter unit as defined in claim 5, wherein said movable teeth provided on said rotatable member of said first driving means and on said rotatable member of said second driving means are disposed at regions thereof which are in advance, in terms of the joint rotation of said rotatable members, of said movable tooth member provided on said rotatable member of said rotation-imparting means.

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