July 3, 1956 G. L. MANKE 2,753,116

INTERNAL TRANSFER MECHANISM

Filed Oct. 25, 1954

FIG. 1

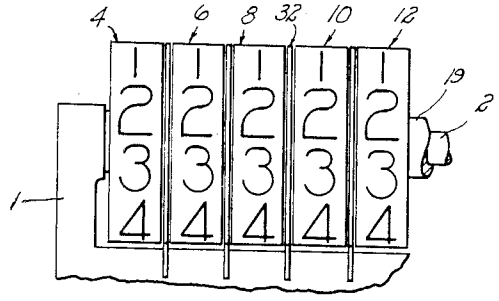


FIG. 2

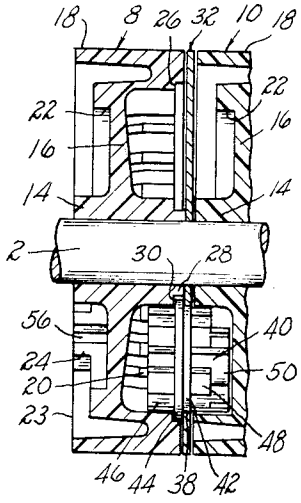


FIG. 3

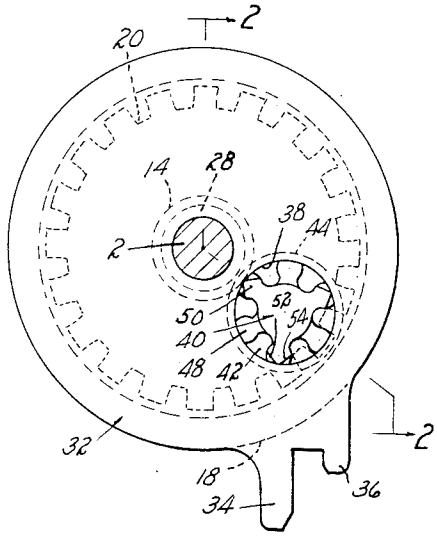


FIG. 4

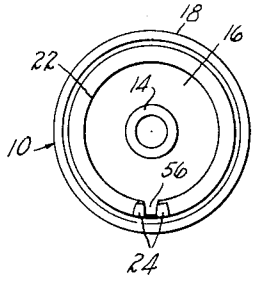


FIG. 5

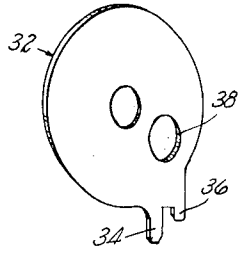
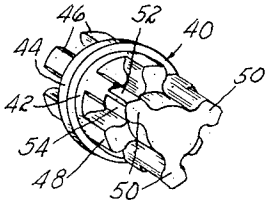


FIG. 6



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INTERNAL TRANSFER MECHANISM

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1 Claim. (Cl. 235—139)

This invention relates to counters of the internal transfer type, wherein the transfer mechanism is enclosed within the number wheels, and more particularly to an improved transfer mechanism for such counters.

A particular object of the invention is to provide an improved mounting arrangement and transfer pinion for a counter of the internal transfer type.

Another object is to provide an improved internal transfer mechanism for a counter which is particularly adapted for simplified fabrication at reduced cost and is particularly suited for ease and convenience of assembly.

Another object is to provide an improved economical transfer mechanism which is characterized by its rugged and simple construction and compact arrangement so that it may be employed effectively in counters having little available space for such mechanism.

Another object is to provide a novel form of internal transfer mechanism having improved smoothness and positiveness of operation for effecting transfer of count from one number wheel to the next.

Other objects will be in part obvious, and in part pointed out more in detail hereinafter.

The invention accordingly consists in the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereafter set forth and the scope of the application of which will be indicated in the appended claim.

In the drawing:

Figure 1 is a fragmentary front view of an exemplary counter in which is embodied an internal transfer mechanism constructed in accordance with the present invention;

Figure 2 is an enlarged sectional view of the counter of Figure 1 taken on the line 2—2 of Figure 3;

Figure 3 is a transverse sectional view of the counter of Figure 2 with the number wheel of lower order removed;

Figure 4 is a view of one side of a number wheel of the counter of Figure 1;

Figure 5 is a perspective view of a partition plate of the counter of Figure 1; and

Figure 6 is an enlarged perspective view of a transfer pinion of the counter of Figure 1.

Referring to the drawing, the invention is illustrated in connection with a counter which includes a frame **1** journaling a shaft **2** on which is rotatably mounted a plurality of number wheels **4**, **6**, **8**, **10**, **12** of successively higher orders. Each of the number wheels has a hub portion **14** from which extends an integral disc or web **16** having a peripheral flange **18**. On the outer surface of the flange **18** are inscribed consecutive numerals of any desired range, those in the present instance running from zero to nine.

In the operation of the counter, it will be understood that as a number wheel of lower order is turned through a complete revolution the adjacent higher order wheel is advanced one number and thus maintains the proper count. The lowest order wheel may be driven in any desired manner, for example, through sleeve **19** rotatably

mounted on shaft **2** and secured to number wheel **12**.

Since the relation of each pair of number wheels of successive order is the same as that of any other pair, only number wheels **8**, **10** will be described in detail. The inside surface of the peripheral flange **18** of each number wheel is formed with gear teeth to provide an internal driven gear **20** on the side of the number wheel **8** adjacent the number wheel **10** of lower order. On the opposite side of each number wheel the flange **18** is annularly grooved and the disc relieved to form an annular flange or lip **22** which serves as a locking ring integral with the number wheel, and somewhat axially recessed from the adjacent edge **23** of peripheral flange **18**. Integral with flange **22** and axially projecting from the side thereof is a two-tooth internal segmental gear **24**, the sides of the teeth of which are even with the edge **23** of flange **18**.

On the driven gear side of number wheel **8** the inner corner of flange **18** is relieved to provide an axially facing annular shoulder **26**. A sleeve **28** of reduced diameter extends axially from hub **14** and forms an axially facing shoulder **30** thereon transversely aligned with shoulder **26**. The outer end of sleeve **28** extends slightly beyond the edge of flange **18**.

Rotatably mounted on shaft **2** is a support or partition plate **32** of thin stiff sheet material disposed between the adjacent number wheels. The partition plate **32** is axially supported by the peripheral flanges of the number wheels and by the hubs of number wheels **8** and **10**, and has fingers **34**, **36** which engage the frame **1** and prevent the partition plate from rotating during operation of the counter.

In accordance with the invention the plate has a circular aperture **38**, the peripheral surface of which serves as a bearing for an internal transfer pinion **40** by which number wheels **8** and **10** are operatively connected. The transfer pinion **40** is relatively wide, and has a cylindrical hub or sleeve **42** intermediate its ends which serves as a journal by which the transfer pinion is rotatably supported in aperture **38**. Adjacent the journal the transfer pinion has a cylindrical collar **44**, one side of which serves as a shoulder engaging the partition plate and the other side of which engages shoulders **26** and **30** to prevent the transfer pinion **40** from shifting axially and maintain its axis of rotation parallel to the axis of shaft **2**.

One end of the transfer pinion extends within the flange **18** of number wheel **8** and has a plurality of teeth **46**, in this instance six in number, which mesh with driven gear **20**. On the other side of the partition plate the transfer pinion extends within the peripheral flange of number wheel **10** and has teeth **48**, radially aligned with teeth **46**, which mesh with segmental gear **24**. The end of the transfer pinion adjacent teeth **48** is slightly spaced from web **16** of number wheel **10** to avoid friction and has a mutilated portion having three tooth-like projections **50** radially aligned with alternate teeth **48**. The radial extremities of projections **50** are relieved to provide surfaces **52**, **54** with which the inside surface of locking ring **22** slidably engages to prevent rotation of the transfer pinion and thereby prevent rotation of the higher order number wheel **8** except during a transfer operation. A notch **56** in locking ring **22** radially aligned with the space between the teeth of segmental gear **24** accommodates one of the projections **50** and permits transfer pinion to rotate simultaneously with the meshing of teeth **48** and segmental gear **24**. Thus with this arrangement, during each revolution of the lower order number wheel **10**, transfer pinion **40** is rotated the proper amount, in this instance one-third of a revolution, to advance the higher order number wheel **8** the proper fraction of a revolution, in this instance one-tenth, for accurate counting.

The construction and arrangement of the transfer mechanism above described has several very definite advantages over the prior art. First the parts can be fabricated with increased economy because the bearing aperture 38 in the partition plate can be punched at the same time the partition plate is stamped, and requires no further machining. Also, since the transfer pinion is journaled exclusively within the aperture 38, no additional supporting structure such as a shaft or the like need be provided for the pinion to rotate on, and this eliminates drilling a hole in the pinion as well as forming and attaching any such additional supporting structure to the partition plate. Additionally the task of assembling these intricate parts of the counter is substantially simplified because the number wheels can conveniently be assembled in a stack on shaft 2 with the lowest order wheel on the bottom, each transfer pinion in turn being dropped into its partition plate bearing and properly positioned thereby for smooth meshing with the number wheels before being covered by the adjacent higher order number wheel as the stack is assembled. The entire transfer mechanism is extremely compact and thus requires very little space within the number wheels. Finally, when the counter is assembled the transfer pinion is supported securely yet with a minimum of rotational friction, and thus smooth operation of the counter and effective transfer even at high speeds is insured.

As many changes could be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

It is also to be understood that the language used in the following claim is intended to cover all of the generic and specific features of the invention herein described and all statements of the scope of the invention which, as a matter of language, might be said to fall therebetween.

I claim:

In a counter, two number wheels of different order rotatably mounted in coaxial side-by-side relationship, an annular internal driven gear on the wheel of higher order, an internal annular locking ring and an internal segmental driving gear on the wheel of lower order, a transfer pinion having a first toothed portion engageable with said annular internal driven gear, a second toothed portion engageable with said internal segmental driving gear, and a mutilated portion engageable with said internal annular locking ring, and means for supporting and retaining the transfer pinion in operative position comprising a partition plate fixed between the number wheels having a circular hole therein, a cylindrical bearing surface on the transfer pinion disposed between the said first and second toothed portions having a radius at least as great as the radius of the ends of the teeth of one of the toothed portions whereby the pinion may be inserted endwise into the circular hole of the partition plate, said circular hole being dimensioned to radially journal the said cylindrical bearing surface, a collar on the pinion along the side of the cylindrical bearing surface opposite the inserted end of the pinion, said collar having one side abutting the partition plate, and a surface on the adjacent number wheel abutting the other side of the collar to retain the pinion axially in journaled position.

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