

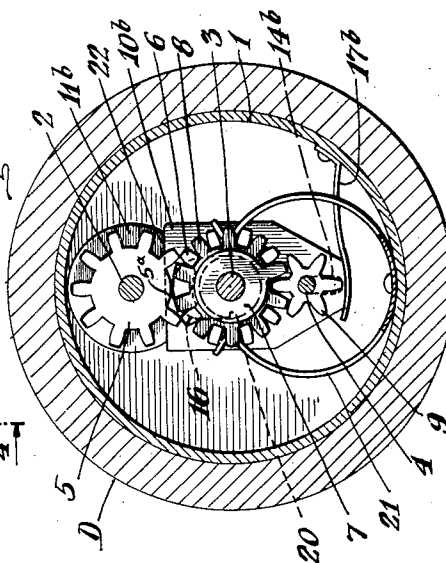
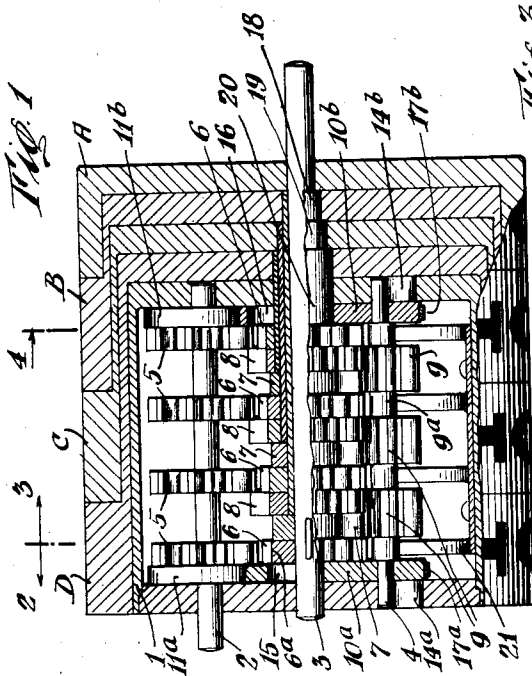
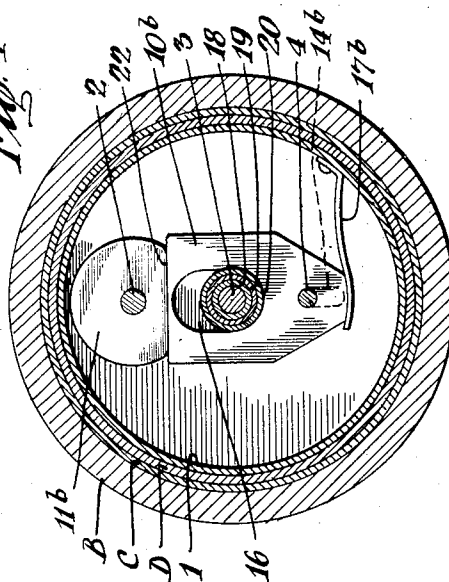
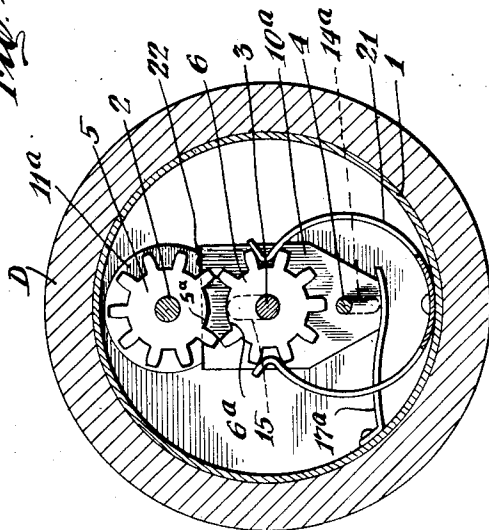
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COUNTER WITH TELESCOPED NUMBER WHEELS

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COUNTER WITH TELESCOPED NUMBER
WHEELS

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15 Claims. (Cl. 235-117)

This invention relates to counters, and it is the principal object of my invention to provide a counter having its number wheels telescoped over the casing containing the counting mechanism, so as to allow the making of the counter and its number wheels of any desired size, and not separated by any intermediary mechanism.

Another object of my invention is the provision of a counter in which the counting mechanism is arranged separately from the number drums, which can be set to zero position in one operation.

The invention principally relates to improvements in counters, as they are for instance described in my patent application for counters, Serial No. 690,811, filed September 25, 1933 which has issued on Oct. 26, 1937 as Patent No. 2,097,065, which in principle disclose counters which operate in principle like the counters forming the object of this my present invention, in which I employ parts used in the aforesaid application and for the same purpose, as for instance cam operated slides disengaging the transfer shaft along longitudinal slots in the casing and gap gears returning the number wheels to zero position. In the former application I arranged the transfer mechanism of one number wheel to the other, between the number wheels, while in this present invention, I separate the number wheels from the zero-setting and transfer mechanism, which is arranged within a closed casing, while telescoped bushings transmit the working of the transfer mechanism towards the outside to the number wheels surrounding the transfer mechanism. The number wheels in my counter being separately displaceable in longitudinal direction of the operating mechanism, allow advantageously the use of an analogous mechanism with smaller or larger number wheels, for instance number wheels 5 and 10 times larger than the ones shown if for instance the numbers on said wheels are to be read from a considerable distance.

Furthermore, if the counter is to be used for exhibition purposes where a great number of persons desire to follow the counting operation from a distance, a careful selection of the size of the number wheels and the material of which they are made will allow a large reduction in weight and consequently cheapen the production, as even large number wheels may be made of light tin or aluminum with hollow spaces and openings or even card-board without materially increasing the weight of the mechanism which remains constant.

These and other objects and advantages of my invention will become more fully known as the

description thereof proceeds, and will then be more specifically defined in the appended claims.

In the accompanying drawing forming a material part of this disclosure:

Fig. 1 illustrates a counter constructed according to my invention in sectional front elevation.

Fig. 2 is a cross-section on line 2-2 of Figure 1.

Fig. 3 is a cross-section on line 3-3 of Figure 1.

Fig. 4 is a cross-section on line 4-4 of Figure 1.

As illustrated, the casing 1 of the counter carries freely movable thereon the telescoping number wheels A, B, C and D, number wheel C telescoping over the reduced part of wheel D, number wheel B over the reduced part of number wheel C, number wheel A over the reduced part of number wheel B, and all number wheels are freely rotatable relative to one another. The number wheel A is secured to a shaft 3 extending concentrically through the casing 1, and carrying the bushings 18, 19 and 20 having varying lengths and telescoping on shaft 3 loosely and freely movable. To bushing 18 number wheel B is secured, while bushing 19 carries attached thereto the number wheel C, and number wheel D is secured to bushing 20. As shown, the telescoping bushings extend on shaft 3 into the casing 1 in order to transmit the working of the transfer and zero setting mechanism towards the outside to the number wheels.

A shaft 2 (Fig. 1) above the shaft 3 within the casing 1 carries two cams 11a and 11b and four gap wheels 5 secured thereto, and a shaft 4 below shaft 3 in the casing 1 carries loosely three gears 9 which are distanced from one another on the shaft 4 by means of sleeves 9a.

The shaft 4 rests in the slides 10^a and 10^b, and its outer extending ends are displaceably borne in slots 14^a and 14^b in casing 1. Two springs, 17^a and 17^b press against the slides 10^a and 10^b and the gears 9 on the shaft 4 are in mesh with gears 8 and gears 7 on shaft 3, and gears 7 may also be called discs having one finger integral therewith. The shaft 3 is arranged in the center of the distance separating shafts 2 and 4, and carries the following combination of gears at the bushings, the varying lengths of which telescope: Assumed the counter has the position shown in Figure 1 in which all number wheels are in their zero position: A gap gear 6 is secured to shaft 3 and a transfer finger disc 7 is arranged next to gear 6 on shaft 3 and secured thereto. Each of the bushings 18, 19 and 20 carries a gear 8 having 10 teeth and a gap gear 6 and finger disc 7 with the exception of the

last bushing 20 which has no finger disc 7 as no further transfer is to be made there.

The position of finger disc 7 on shaft 3 and of gear 8 on bushing 18 relatively to gear 9 on shaft 4 is best shown in Figure 3 and is the identical assumed by finger disc 7 on bushing 18 and gear 8 on bushing 19 to the second gear 9 on shaft 4, and also the same with respect to index or finger disc 7 on bushing 19 and of gear 8 to bushing 20 to the third gear 9 on shaft 4.

It will therefore be sufficient to describe and explain the construction and operation of one gear 9 on shaft 4 for the understanding of the operation.

The finger of the finger disc 7 is placed just before one tooth of the gear 9 on shaft 4. If now the shaft 3 is rotated anti-clockwise, as shown in Figures 1 and 3, and the finger disc 7 leaves gear 9, and number wheel A which is secured to shaft 3 on the outside of the casing 1 will be compelled to participate in this rotation to display any of the numbers 0 to 9. With a further rotation of shaft 3, and before the same has executed a full revolution, finger of the disc 7 will come into engagement with gear 9 on shaft 4 and will rotate the same for one tooth. At this moment, if the rotation is for instance as stated above anti-clockwise, the gear 8 on bushing 18 (Fig. 3 and Fig. 1) will participate in the same for one tooth, and as gear 8 is also in mesh with gear 9, which is as wide as both the finger disc 7 and gear 8, a transfer operation will take place.

Gear 8 is secured to bushing 18 which also carries number wheel B and thus at each rotation of gear 8 for one tooth, number wheel B will be taken along to change the score on the respective number wheel.

At the start of the counting operation all number wheels or drums will display zero, and upon the rotation of the shaft 3 for a full revolution the number wheel A will again display the zero, and consequently, if the transfer mechanism is constructed and operated as described above, the gear 8 moves forward or advances for one of its ten teeth, the number wheel B will display the number 1 as it is secured to bushing 18 which carries also gear 8, and thus the number 10 will then appear on the number wheels B and A.

Gear 8 and its finger disc 7 on bushing 18 will participate in their step by step advancement, and thus during a revolution of shaft 3 ten times, bushing 18 will have made one full revolution, and the finger disc 7 on bushing 18 will engage the second gear 9 on the shaft 4 so that gear 8 on bushing 19 will be rotated or advanced for one tooth and in the aforescribed manner number wheel C will display the number 1, as number wheel C is secured to bushing 19 so that the number 100 can be read on the number wheels C, B and A.

The number wheel D is rotated if the finger on disc 7 on bushing 19 comes into engagement with the third gear 9 on shaft 4 so that the gear 8 of bushing 20 participates in the movement and also number wheel D, as gear 8 and number wheel D are secured to bushing 20.

In order to allow a convenient and rapid setting of the number drums or wheels to zero after any score display, I employ the following mechanism.

As mentioned above, shaft 3 and bushings 18, 19 and 20 carry a gap gear 6, having 9 teeth and one gap 6^a, secured thereto (Fig. 2). An upper shaft 2 within casing 1 carries the two cams 11^a

and 11^b and four gap gears 5 secured thereto, and the gap gears 5 have each 9 teeth and one gap 5^a.

In Figures 1 and 2 is shown how the gap gears 5 on shaft 2 and gap gears 6 on shaft 3 and the bushings 18, 19 and 20 confront or face one another when the number wheels are in zero position.

As mentioned above, the gap gears 6 are secured one to shaft 3 and one on each bushing just as the finger discs 7 and gears 8 and therefore these gears 6 must participate in the transfer movements, and thus, when the number wheels display any of the numbers except 0, the gap 6^a will have or assume a position at any point along the circumference of gear 6.

If now a number wheel is zeroized gap 6^a is located exactly in alignment with the center line of shaft 2 but if not zeroized, a tooth will be exactly in alignment with the center line of shaft 2 and the gap 6^a faces any point of gear 6, and shaft 2 is turned, gears 5 will engage gears 6 until gap 6^a of the gears 6 again assumes its position in alignment with the center line of shaft 2 and the number wheels are zeroized. If the turning operation is continued, the gears 5 will always turn idly in the gaps 6^a, and therefore the number wheels will be zeroized with one revolution. In order to bring the gaps 6^a back, only one revolution of shaft 2 will be required, when the number wheels for instance are in their remotest position from the zero, and it will be understood, that in cases where the number wheels are closer to zero, the shaft 2 will zeroize the number wheels already with a one-half or even one-quarter revolution of shaft 2.

The gaps 5^a of gears 5 serve the purpose of allowing the gap gears 6 during the mechanical transfer operation to pass the gears 5 without meshing with the same.

In order to be able to carry the number wheels into their zero position, all gears 9 on shaft 4 must be uncoupled from the fingers of discs 7 and gears 8 on shaft 3 and bushings 20, 19 and 18.

If the number wheels display any other number than 0, one tooth of the gears 6 will be exactly in alignment with the center line of shaft 2 and upon the revolving of shaft 2 one tooth of gears 5 will have to move for about 20 to 30° until this tooth engages one tooth of gear 6.

The gears 9 are uncoupled by means of the cams 11^a and 11^b on shaft 2 in the following manner: When the shaft 2 is rotated, the cams 11^a and 11^b will press against the slides 10^a and 10^b, and will displace these slides parallel to the center lines of all shafts and the shaft 4 resting at the ends of the slides 10^a and 10^b, will be displaced, and thus will uncouple the gears 9 on shaft 4 from all fingers of discs 7 and gears 8 on shaft 3.

Simultaneous with the 20 to 30° movement of the tooth of gears 5, the cams 11^a and 11^b, have partly uncoupled the gears 9 on shaft 4 for part of the fingers of discs 7 and of the teeth of the gears 8 and if now the tooth of gear 5 engages one tooth of gear 6 the gears 9 will be entirely uncoupled, and this operation is so timed that no jamming of the machine will be possible.

The cam faces 22 may have such an inclination, that they lift the slides, when turned for 20-30° to such an extent that the gears 9 are uncoupled.

In order to displace the slides 10^a and 10^b to such a degree, the slide 10^a has a slot 15 with which it glides on shaft 3 passing through the

same, while slides 10^b have a slot 16 and slides along bushing 20, while the projecting ends of shaft 4 are displaceable within the slots 14^a and 14^b in casing 1.

5 Springs 17^a and 17^b press the slides 10^a and 10^b against the cam faces 22 for engaging gears 9 at one revolution of shaft 2 again with the fingers of discs 7 and gears 9 on shaft 3.

10 Springs 21 hold the gears 6 in position and the number wheels in alignment, and in case one gap 6^a of the gears 6 should be located above or below one of the springs 21 there will always be one spring still in contact with the teeth of the gears 6.

15 It will be clear that more number wheels could be used with my counter and in such case the bushing will have to be made thinner in order to enable a telescoping of a large number of gears on shaft 3.

20 It will be understood that I have described and disclosed one example of my invention only of the many possible ways to practically construct the same, and that I do not wish to limit myself to the exact construction shown, but I could make such changes in the general arrangement 25 and in the construction of the minor details of my counter as come within the scope of the appended claims without departure from the spirit of my invention and the principles involved.

30 As the operation of the various elements and their cooperation has been set forth in great detail in the specification, a specific description of the operation will be unnecessary as the same will be readily understood by reading the above description and by simultaneous reference to the 35 drawing.

40 It will be clear that if it is desired to use a counter without zeroizing mechanism, the spirit of my invention will experience no change, as in such a case it will simply be necessary to omit the elements used for the zeroizing operation and simply retain the transfer mechanism.

45 It will also be no deviation from the spirit of my invention if the number wheels are made so as not to telescope over the counting mechanism, but are arranged fixed to the bushings.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A counter including its transfer mechanism, 50 comprising a plurality of telescoping number wheels surrounding said transfer mechanism, said transfer mechanism separately constructed, but operatively connected with said number wheels, with the outer peripheries of the number wheels 55 forming a smooth, substantially drum-shaped body.

2. A counter comprising a casing, a transfer mechanism in said casing, and a plurality of telescoping number wheels of a suitable size surrounding said casing, an operating shaft to which 60 one of said number wheels is secured, and bushings on said operating shaft carrying said number wheels, said bushings representing a means to transmit the operation of the transfer mechanism to the number wheels surrounding said 65 mechanism.

3. In a counter including a transfer mechanism and having a plurality of telescoping bushings on its operating shaft, a plurality of freely rotating 70 telescoping number wheels, all but one of said number wheels individually secured to said bushings surrounding the transfer mechanism, one bushing for each of said number wheels except for the one fast on the shaft.

75 4. In a counter of the class described, a plu-

5 rality of telescoping number wheels, an operating shaft to which one of said number wheels is secured, and a plurality of telescoping bushings on said operating shaft to which the other of the individual number wheels are secured for transmitting the operation of the transfer mechanism 5 to the number wheels, and another shaft below the operating shaft and also parallel thereto, and a means on said shaft to transfer the rotary movement of one number wheel to the adjoining 10 number wheel on said bushings.

5. In a counter of the character described, a plurality of telescoping number wheels, a casing about which said number wheels freely rotate, and having end walls, a transfer shaft resting with 15 its ends in the end walls of said casing, gears loose on said transfer shaft, means to periodically transfer the rotation of one number wheel to the others, sleeves separating the individual gears on said shaft, an operating shaft above said transfer 20 shaft extending through said casing and carrying gears.

6. In a counter of the class described, a plurality of telescoped number wheels, an operating shaft, a plurality of telescoped bushings on said 25 operating shaft, one finger disc secured to said operating shaft, and finger discs on each of said telescoped bushings with the exception of the last or outermost bushing, and a gear secured to each of said bushings, a transfer shaft below the 30 operating shaft, and a plurality of gears loosely mounted on said transfer shaft each of a width to have its teeth in the path of movement of the finger disc and periodically in mesh with said finger discs on bushings and operating shaft and 35 in constant mesh with the gears on said bushings during the counting operation to transfer the rotary movement of one number wheel to the adjoining number wheel with the said number wheels surrounding the operating mechanism in 40 close contact to one another.

7. In a counter of the character described, a plurality of telescoped number wheels, an operating shaft for said number wheels, a finger disc 45 on said operating shaft, a plurality of telescoped bushings on said shaft, gears on said telescoping bushings, a finger disc on each of said telescoping bushings with the exception of the last or outermost bushing, a transfer shaft below said operating shaft, gears on said transfer shaft, one 50 of said gears periodically meshing with the finger disc of the operating shaft, and with the adjoining gear on the innermost telescoping bushing, the finger disc of said innermost telescoping bushing in mesh periodically with the second gear on 55 the transfer shaft, and also in constant mesh with the gear on the bushing adjoining the innermost bushing and so forth according to the number of number wheels, said aforesaid arrangement of the mechanism providing a means for separately constructing but operatively connecting 60 the number wheels to the transfer mechanism.

8. In a counter transfer mechanism as described, a series of operatively connected telescoped number wheels, surrounding the transfer 65 mechanism, all of said number wheels having the same outside diameter, and each of said number wheels having a reduced, inner, tubular wall, said walls angularly bent and nested, and varying in length and diameter with the exception of the 70 first number wheel with which the counting operation is started, said telescoping number wheels telescoping into one another over the reduced and nested tubular walls, with the outside diameters of all the number wheels in alignment, no 75

space being left between two adjoining number wheels, and said number wheels removable in longitudinal direction of the transfer mechanism, said telescopic arrangement of the number wheels providing a means for exchanging the number wheels.

9. A counter including a transfer mechanism, and comprising a plurality of nested telescoped number wheels, said transfer mechanism arranged separately but operatively connected with the telescoped number wheels and said telescoped number wheels surrounding the transfer mechanism in close contact with one another, the outer peripheries of the number wheels forming a smooth, substantially drum-shaped body.

10. In a transfer mechanism for counters with nested telescoped number wheels, the combination of a spindle with a plurality of telescoped bushings on said spindle, said bushings representing means for transmitting the operation of the transfer mechanism to the telescoped number wheels surrounding said mechanism.

11. A counter including a transfer mechanism and comprising a plurality of telescoping nested number wheels separately constructed but operatively connected with said transfer mechanism surrounding said transfer mechanism, and bushings and gears for operatively connecting said telescoped number wheels to said transfer mechanism.

12. In a transfer mechanism for counters separate from the number wheels of said counter but operatively connected thereto, a spindle horizontally arranged, telescoped bushings on said spindle, a transfer mechanism arranged on said spindle and bushings, said telescoped bushings extending to the outside of the transfer mechanism on the spindle of the counter, and the number wheels nested and individually secured to said bushings, except the first number wheel, said telescoped bushings constituting means to transmit

rotary movement of one number wheel to the other towards the telescoped number wheels surrounding said transfer mechanism.

13. A counter having a transfer mechanism and a series of nested number wheels separately constructed, but operatively connected with the transfer mechanism telescoped and nested in such manner that the number wheel of the highest order will first surround the transfer mechanism and the other number wheels following in the order of their numerical value, as shown and described, the outer peripheries of all number wheels forming a smooth, substantially drum-shaped body.

14. In a counter, a series of telescoped nested number wheels and a transfer mechanism surrounded by said wheels, the arrangement of the number wheels separate from the transfer mechanism but operatively connected therewith the outer peripheries of all number wheels forming a smooth, substantially drum-shaped body.

15. In a counter transfer mechanism, a means for arranging the nested number wheels separately constructed but operatively connected to the transfer mechanism, a casing having a front and a rear plate, a spindle journaled in the front plate with one end and passing through the rear plate of the casing, a plurality of telescoped bushings on said spindle, also extending through the rear plate of the casing, the outermost of said bushings journaled in said rear plate, finger discs and gears secured on said spindle, and telescoped bushings as described, a transfer shaft below the operating shaft or spindle parallel thereto, said transfer shaft located in bearings of the front and rear plate of said casing, means on said transfer shaft and bushings to transfer the rotary movement of one number wheel to the adjoining number wheel, and a means in said casing to keep the number wheels in alignment.

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