

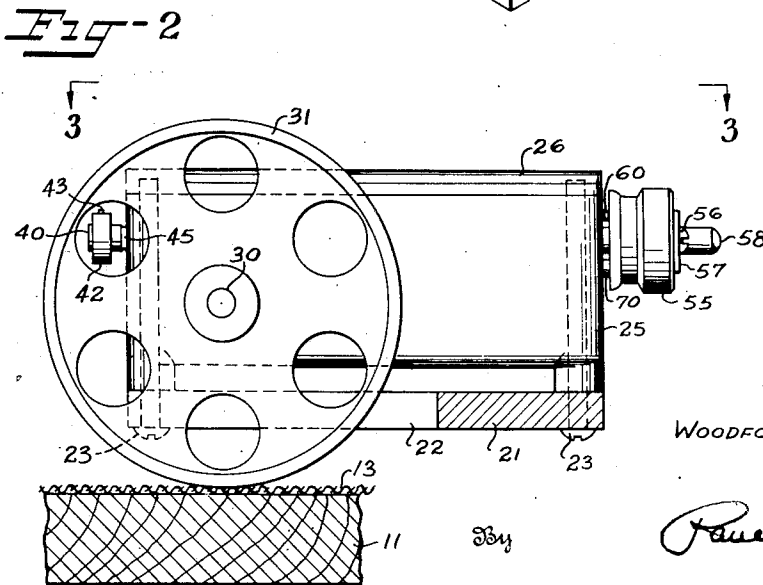
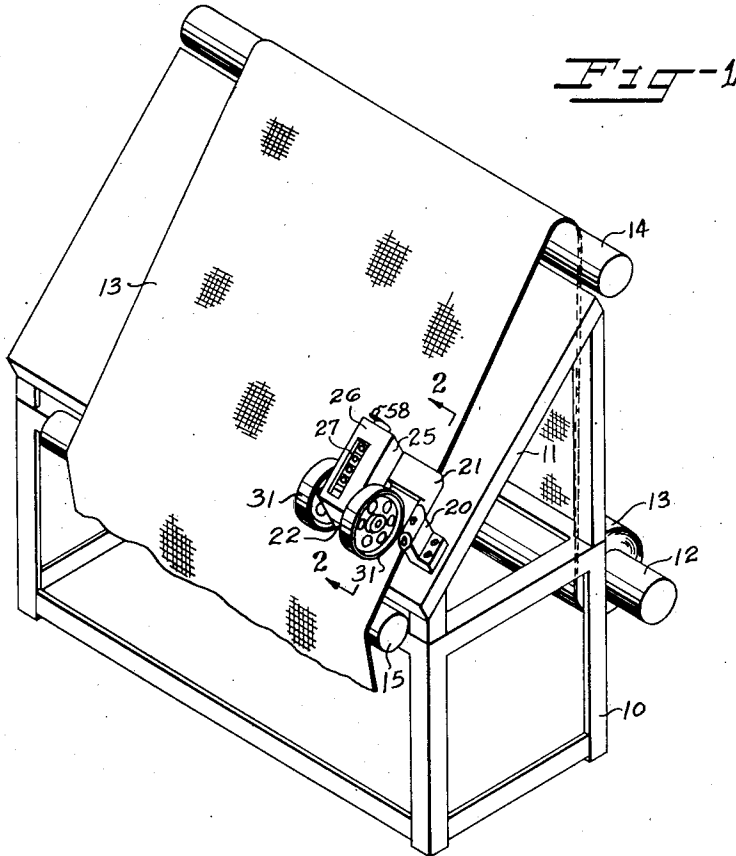
April 26, 1949.

W. A. KENNEDY  
ADDING AND SUBTRACTING INDICATING  
COUNTER MECHANISM

2,468,334

Filed Aug. 27, 1948

2 Sheets-Sheet 1



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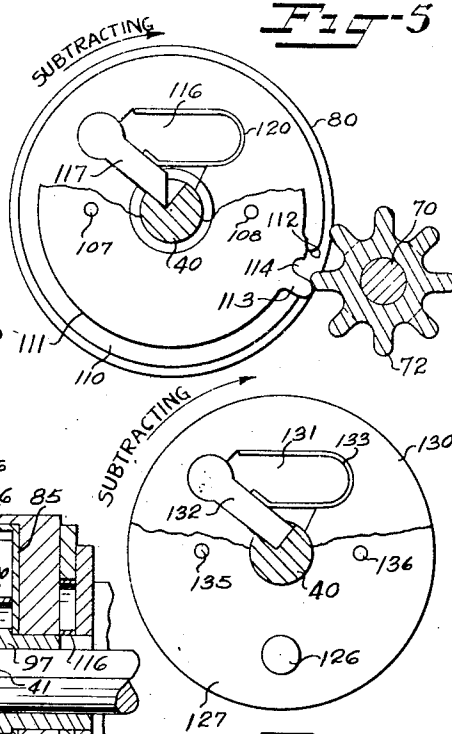
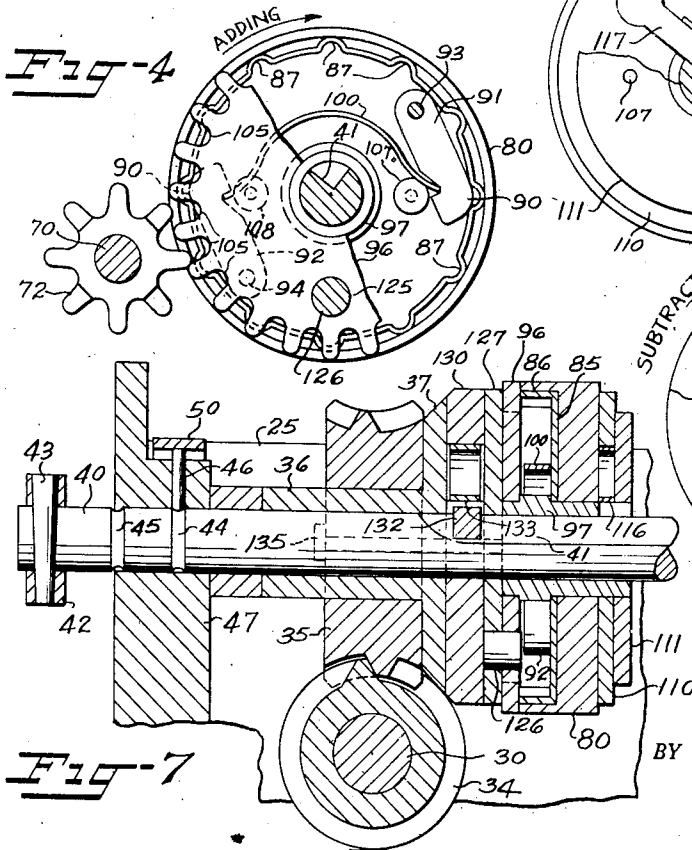
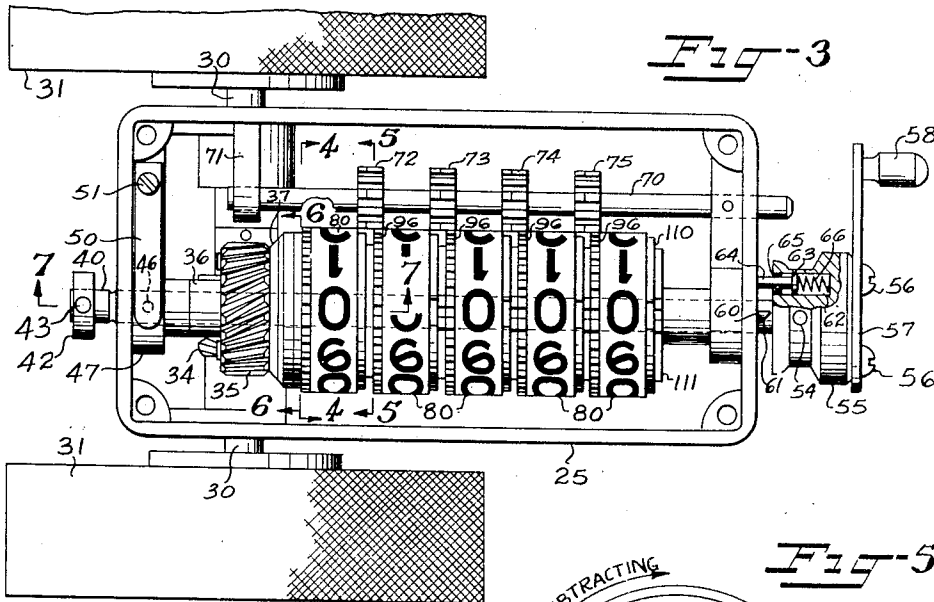
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2 Sheets-Sheet 2



## UNITED STATES PATENT OFFICE

2,468,334

ADDING AND SUBTRACTING INDICATING  
COUNTER MECHANISM

Woodford A. Kennedy, Charlotte, N. C.

Application August 27, 1948, Serial No. 46,401

6 Claims. (Cl. 235—144)

1

This invention relates to indicating counters such as are used in production manufacturing and more especially to a yardage counter for textile cloth.

After cloth has been drawn through various processes of manufacture, it is necessary that the cloth be inspected. During the inspection of the cloth, the cloth is drawn across a table, usually by mechanical means, and a yardage counter engages the cloth and is caused to register the length of the cloth as it passes by the yardage counter. Due to the fact that the cloth is usually drawn across the inspection table by mechanical means, it often happens that some areas of the cloth may be faulty to the extent that the cloth will pass over the table faster than it may be inspected, and as a result, it is necessary that the cloth be pulled reversely across the inspection table and reinspected at this particular area.

In order to insure that the correct length of the cloth be indicated on the counter, it is necessary when the cloth is caused to move reversely over the inspection table, that the yardage counter subtract an amount equivalent to the length of the cloth that is reversely moved over the table. Although most counters have been able to reverse their rotation according to the direction in which the cloth passes by the counter, it has heretofore been impossible to insure that the counter subtracts the correct amount as the cloth is passed reversely over the table inasmuch as parts of the counter often would slip during reverse movement of the counter and would thus not indicate the correct overall length of the cloth upon forward movement of the cloth being resumed.

It is therefore an object of this invention to provide a counter which will indicate multiples of a particular unit of length as the cloth is passed by the same and to provide positive means whereby upon reverse movement of the cloth past the counter, the counter will subtract the exact amount equivalent to the length of cloth passed reversely by the same, thereby insuring that the exact length of the cloth which has passed by the counter will be indicated on the counter.

It is another object of this invention to provide a counter having a plurality of conventional counter wheels therein and having conventional means for moving the counter wheels in one direction and also having conventional resetting means associated therein and to provide a shaft having a longitudinally extending groove therein and on which the counter wheels are rotatably mounted and a pinion rotatably mounted on the shaft and having a dog-carrying disk integral

2

therewith and disposed between the pinion and the first of the counter wheels.

The disk has a dog therein, which, upon reverse rotation of the pinion, will engage the longitudinally extending groove in the shaft thereby causing the shaft to be positively rotated by the pinion, and inasmuch as the conventional reset pawls of the counter wheels normally engage the longitudinally extending grooves for the resetting operation, the dog in the disk connected to the pinion will cause the shaft to rotate in such a manner that the groove in the shaft will remain ahead of the reset pawls in the conventional counter wheels, thereby eliminating resistance to rotation of the counter wheels which has heretofore not been possible. If the shaft does not turn with the counter wheels upon reverse rotation of the same, conventional pawls which induce rotation to the counter wheels in an adding operation would merely slip by the counter wheels upon reverse rotation of the pinion due to resistance by frictional contact between the counter wheels and the shaft on which they are mounted.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which

Figure 1 is an isometric view of an inspection table showing the yardage counter mounted thereon;

Figure 2 is an elevation with parts in section and being taken substantially along the line 2—2 in Figure 1;

Figure 3 is a top plan view of the yardage counter shown in Figure 2, and with the observer standing on the right-hand side of Figure 1, but showing the same removed from the inspection table and omitting the cover therefrom;

Figure 4 is a vertical sectional view with parts broken away and being taken along the line 4—4 in Figure 3;

Figure 5 is a vertical sectional view with parts broken away and being taken along the line 5—5 in Figure 3;

Figure 6 is a vertical sectional view with parts broken away and being taken along the line 6—6 in Figure 3 and showing the main features of this invention;

Figure 7 is an enlarged vertical sectional view with parts broken away and being taken along the line 7—7 in Figure 3.

Referring more specifically to the drawings, the numeral 10 indicates the framework of a conventional inspection table having an angu-

larly disposed table top 11 mounted on the upper end thereof (Figure 1) and suitably mounted adjacent the rear of the framework 10 in Figure 1 is a roller 12 on which the fabric cloth material 13 to be inspected is disposed. This cloth material 13 extends upwardly and passes over a suitably mounted idler roll 14 and then passes across the top surface of the table top 11 and then passes over an idler roll 15 disposed at the front edge of the table top 11. The cloth 13 then passes downwardly to a suitable take-up means, not shown.

Suitably secured to the upper surface of the table top 11 is an upwardly extending bearing block 20 in which a portion of a support bracket 21 is oscillatably mounted. This bracket 21 has a plate portion 22 integral therewith (Figures 1 and 2) on which is mounted a casing 25 for a counter having a cover 26 secured on the upper end thereof by screws 23 which slidably penetrate the plate 22 and also slidably penetrate the casing 25. The cover 26 has a window 27 therein through which the numerals on the counter wheels, to be later described, may be observed.

The casing 25 has a transverse shaft 30 rotatably mounted therein on the opposite ends of which knurled wheels 31 are fixedly mounted and these wheels 31 are adapted to engage the cloth 13 as it passes over the table top 11, the cloth being adapted to pass between the wheels 31 and the table top 11. The transverse shaft 30 has a worm 34 fixedly mounted thereon which engages a worm gear 35 mounted on a tubular hub portion 36 of a disk 37 which is a part of the invention to be later described.

The tubular hub portion 36 is rotatably mounted on a longitudinally extending shaft 40 disposed within the casing 25 and rotatably mounted in thickened bearing portions in the end walls of the casing 25. This longitudinally extending shaft 40 has a longitudinally extending keyway 41 therein which terminates a substantial distance from the left-hand end of the shaft 40 in Figure 7 and is adapted to be engaged by the conventional reset pawls of the counter wheels to be later described.

The left-hand end of the shaft 40 in Figure 7 has a collar 42 fixedly mounted thereon as by a tapered pin 43 and this shaft 40 also has peripheral grooves 44 and 45 therein which are adapted to be independently engaged by the lower end of a pin 46 slidably mounted in an inwardly projecting bearing portion 47 of the left-hand end wall of the casing 25 as observed in Figure 3. The upper end of the pin 46 is adapted to be engaged by a leaf spring member 50 which extends over the inwardly projecting portion 47 and is secured as by a screw 51 to the casing 25 (Figure 3).

Referring to Figures 2 and 3, it may be observed that the longitudinally extending shaft 40 extends from the left-hand end of the casing 25 to the right-hand end of the casing and penetrates the right-hand vertical wall of the casing 25 in which the shaft 40 is rotatably mounted. The shaft 40 extends outwardly beyond the right-hand side of the casing 25 in Figures 2 and 3 and has fixedly secured thereon, by a pin 54, a collar 55 having secured to the right-hand end thereof, as by screws 56, a crank arm 57 having a handle 58 secured on the outer end thereof. The right-hand side of the casing 25 in Figures 2 and 3 has a pin 60 secured therein and projecting outwardly therefrom, the lower side of which, in Figure 3, is cut at an angle indicated at 61.

The collar 55 has a cavity 62 therein in which

the head portion 63 of an outwardly extending pin 64 is mounted for sliding movement in cavity 62 and this cavity is restricted at its outer end by a washer 65 which is pressed into the outer end of the cavity 62. A compression spring 66 engages the head portion 63 of the pin 64 at one end thereof and the other end of the compression spring engages the right-hand end of the cavity 62 in the collar 55, thus urging the pin 64 outwardly against the right-hand side of the casing 25 in Figures 2 and 3.

Upon revolving the collar 55 and the associated shaft 40 in a direction where the handle 58 moves away from the observer in Figure 3, the pin 64 being positioned on the same radius as the pin 60 engages the angularly cut surface 61 of the pin 60 and is thus urged into the bore 62 for a substantial distance to where the pin 64 will pass over the outer end of the pin 60 thus permitting the shaft to be rotated in one direction as desired, which is necessary in a subtracting operation as will be later described.

However, it is necessary upon moving the collar 55 in the opposite direction, that the pin 64 engage the side of the pin 60 remote from the surface 61 to thus prevent the shaft 40 from being rotated during the time the shaft 40 is in the longitudinal position shown in Figures 2, 3 and 7. This necessity arises due to the fact that a dog in the apparatus, to be later described, would interfere with rotation of the shaft 40 and would damage the counter mechanism in a manner to be later described, during a resetting operation, unless the shaft 40 were moved from left to right in Figures 3 and 7 to where the pin 46 in Figure 7 would engage the peripheral groove 45 instead of the peripheral groove 44 in the shaft 40.

Rotatably mounted in parallel spaced relation to the longitudinally extending shaft 40 in the casing 25 is a shaft 70, one end of which is fixedly mounted in the right-hand wall of the casing 25 and the other end of which is fixedly mounted in a bearing block 71 integral with the upper wall of the casing 25 as observed in Figure 3. This shaft 70 has Geneva pinions 72, 73, 74 and 75 rotatably mounted thereon which are spaced apart from each other. Attention is called to the fact that the Geneva pinions 72, 73, 74 and 75 each has every other tooth extending from one side to the other side thereof all the way across, whereas the other teeth extend only half way from one side to the other side thereof.

By referring to Figure 3 there may be observed a plurality of conventional counter wheels, each of which bears the reference character 80 and since all of the counter wheels are identical, like reference characters will apply to all parts, as a description of one of the counter wheels will equally apply to the structure of the other counter wheels, except that since the Geneva pinions have received separate reference characters, it might be stated that the Geneva pinion 72 engages the proximate sides of the first and second counter wheels 80 from the left-hand side of Figure 3, the first counter wheel 80 being adapted to impart step by step rotation to the second counter wheel through the Geneva pinion 72. The Geneva pinion 73 engages the proximate sides of the second and third counter wheels from the left in Figure 3 so the second counter wheel will impart step by step rotation to the third counter wheel from the left in Figure 3 through the Geneva pinion 73. The Geneva pinion 74 engages the proximate sides of the third and fourth counter wheels 80 from the left in Figure 3 so the third counter

wheel will impart step by step rotation to the fourth counter wheel through the pinion 74 and the pinion 75 engaging the proximate sides of the fourth and fifth counter wheels from the left in Figure 3 will cause the fourth counter wheel to impart step by step rotation to the fifth counter wheel all by means to be later described.

Although the counter wheels 80 are conventional in all respects, such as shown in Kennedy et al. Patent Number 2,224,396 of December 10, 1940, a complete description of the same follows in order to clearly define the cooperating functions between the counter wheels 80 and the invention. The numerals on the counter wheels 80 in Figure 3 are shown inverted to provide a clearer conception of the other views of the apparatus, because the point of view is that of an observer standing on the right-hand side of Figure 1 and looking down on the apparatus.

The right-hand sides of the counter wheels 80 in Figure 3 are counterbored as shown in Figure 4 and have secured in the counterbored portions, as by a pressed fit, a disk 95 (Figures 4 and 7) having an out-turned ring 96 having a plurality of radially disposed formed notches 97 in the same. The notches 97 are adapted to be engaged by corner portions 98 of ratchet pawls 91 and 92 (Figure 4) which are pivotally mounted on pins 93 and 94, respectively, which project inwardly from a disk 96 loosely mounted on a hub portion 97 of the counter wheels 80 and covering the open end of the counterbores therein. The corner portions 98 of the ratchet pawls 91 and 92 are urged into engagement with the notches 97 in the out-turned ring 96 by a leaf spring member 100 the opposite ends of which engage the proximate sides of the ratchet pawls 91 and 92 and the medial portion of which is curved to pass by the shaft 40.

Each of the disks 95 on the counter wheels 80 has a plurality of equally spaced notches 105 in its periphery which are adapted to be engaged by both the broader and the narrower teeth of the corresponding Geneva pinions 72, 73, 74 and 75. It is thus seen that when the disk 95 is rotating in a clockwise manner in Figure 4, the pawls 91 and 92 being imbedded in the notches 97, will be locked in these notches and the direction of rotation would thus cause the disk 95 to propel the disk 85 and the wheel 30 along with it.

Pins 107 and 108, which secured the plate 35 to the counter wheel 80, also serve to secure a disk 110 to the right-hand side of the counter wheel 80 and also secure a disk 111 to the counter wheel 80, said disk 110 having a notch 112 therein and the disk 111 having a projection 113 thereon having a notch 114 therein coinciding with the notch 112. These notches 112 and 114 are adapted to engage the Geneva pinions 72, 73, 74 and 75 depending upon which of the wheels 80 are disposed adjacent the same, the pinions, having alternate broad and narrow teeth therein, the notches 112 and 114 engaging the long teeth and rotating the associated Geneva pinion and allowing the short teeth to move into one of the notches in the disk 96 on the proximate side of the adjacent counter wheel 80 to thus impart a one-step movement in the next succeeding counter wheel.

The disk 110 has a substantially T-shaped cavity 116 therein in the left-hand end of which is loosely pivoted a reset pawl 117 in Figure 5. The free end of the pawl 117 is adapted to be pressed into the longitudinally extending keyway

41 in the shaft 40 by means of a leaf spring member 120 disposed in the other end of the T-shaped cavity 116.

This completes the description of the conventional counter wheels; however, the disk 96 of the first counter wheel from the left in Figure 3 has a bore 125 therein in which a pin 126 projecting from a disk 127 is adapted to be inserted.

Mounted between the disks 127 and 37 (Figures 6 and 7) is a disk 130 which is very similar to the disk 110 (Figure 5) heretofore described. The disk 130 has a T-shaped cavity 131 in the left-hand end of which is loosely pivoted a dog 132, the free end of which is adapted to be pressed to fall into the longitudinally extending keyway 41 in the shaft 40 by means of a leaf spring member 133 disposed in the other end of the T-shaped cavity 131. The disks 127, 130 and 37, as well as the worm gear 35 are secured integral with each other by longitudinally extending pins 135 and 136 which are secured therein as by a pressed fit.

The disks 127, 130 and 37 and the spring pressed dog 132 are the main features of this invention.

#### Method of operation

As heretofore stated, this counter has three basic functions, the first being that of counting in a normal manner, in which instance the counter wheels 80 rotate on the shaft 40 and the shaft remains stationary, the counter wheels being caused to rotate in step by step relation in a clockwise direction in Figure 4 and in a counterclockwise direction in Figure 5. The second function is that of reverse rotation of the counter wheels 80 in a subtracting operation in which instance the shaft 40 is caused to rotate in a clockwise direction in Figures 5 and 6 and in a counterclockwise direction in Figure 4 as will be presently described, the purpose of this reverse rotation of the counter wheels being to subtract an amount equivalent to the length of the material drawn reversely past the counter mechanism.

The third of these functions is that of resetting the counter wheels which is a conventional function of the counter wheels and in which instance the counter wheels are caused to rotate in a counterclockwise direction in Figure 5 as the free ends of the reset pawls 117 are engaged by the keyway in the shaft 40, the shaft being manually rotated as will be later described.

In the normal function of this counter mechanism, which is that of providing a visible count of the length of cloth 13 passing by the knurled wheels 31, the knurled wheels 31 are caused to rotate in a clockwise direction in Figure 2, thus causing the shaft 30 and the worm 34 in Figure 7 to also rotate in a clockwise direction. Now, as the worm 34 rotates in a clockwise direction it transmits rotation to the worm gear 35 (Figure 7) to where the upper portion of the worm gear 35 moves away from the observer. This will cause rotation of the parts in Figures 5 and 6 around the shaft 40 in a counterclockwise direction and will cause rotation of the parts in Figure 4 around the shaft 40 in a clockwise direction.

The disks 37, 130 and 137 being integrally connected with the worm gear 35, will rotate about the shaft 40 in a counterclockwise direction in Figure 6 and the pin 126, being integral with the disk 127 and projecting into the bore 125 in the disk 96, will thus transmit rotation to the disk 96 in a clockwise direction in Figure 4, thus caus-

ing the first of the wheels 80 from the left in Figure 3 to rotate constantly with rotation of the worm gear 35. It has already been described how upon rotation of the disk 96, the pins 93 and 94 which are integral therewith will cause the ratchet pawls 91 and 92 to rotate in a clockwise direction in Figure 4, thus imparting rotation to the first counter wheel 80 from the left in Figure 3.

In the instance of the first counter wheel 80 the notches 105 in the disk 96 are superfluous in that they have no function but are merely carried by the first of the disks 96 inasmuch as this first counter wheel 80 is conventional in all respects with the exception of the bore 125 in the disk 96. However, the disk 111 on the opposite side of the counter wheel 80; that is the right-hand side of the first counter wheel in Figure 3, has the disk 111 thereon and the notch 114 in the disk 111 engages the alternate longer teeth of the Geneva pinion 72 to impart rotation to the same, whereby the narrow teeth as well as the broad teeth will engage the notches 105 in the disk 96 associated with the second of the counter wheels 80 from the left in Figure 3 thus imparting a step in the rotation of the same with each revolution of the first of the counter wheels 80.

A step in rotation is then imparted successively to the third, fourth and fifth counter wheels from the left in Figure 3 in a like manner, it being understood that the second of the counter wheels would impart one step in rotation of the third counter wheel through the Geneva pinion 73 with each revolution thereof and the third of the counterwheels would impart a step in rotation with each revolution thereof to the fourth of the counter wheels 80 through the pinion 74 and the Geneva pinion 75 would impart a step in rotation to the fifth of the counter wheels 80 with each revolution of the fourth of the counter wheels 80.

Now, as these counter wheels 80 are caused to rotate in a counterclockwise direction in Figure 5, it is obvious that the free ends of the conventional reset pawls 117 would merely slide over the keyway 41 in the shaft 40 and would thus permit the associated sleeve 97 to rotate about the shaft 40. This completes the description of the normal adding function of these counter wheels 80.

Now, as the cloth 13 is moved in the reverse direction, across the table top 11 in Figure 1; that is, from the lower edge of the table toward the upper edge of the table, the knurled wheels 31 would be caused to rotate in a counterclockwise direction in Figure 2, thus imparting rotation to the worm gear 35 whereby the lower half of the worm gear 35 would move away from the observer in Figure 7.

This would impart rotation to the disks 37, 130 and 127 in a clockwise direction in Figure 6, and, in this instance, the dog 132 would engage the keyway 41 of the shaft 40 to thus transmit rotation to the shaft 40 from the worm gear 35. There being a direct connection between the disk 127 and the disk 96 associated with the first counter wheel 80 from the left in Figure 3, by the pin 126, this would cause the disk to rotate in a counterclockwise direction in Figure 4. The dog 132 is so positioned relative to the reset pawl 117 in the first of the counter wheels 80 that the free end of the ratchet pawl 117 will not encounter resistance from the keyway 41 in the shaft 40 inasmuch as the free end of the dog 132 will engage the keyway 41 before the reset pawl 117 would do so.

Now, if it were not for the dog 132 in the disk 130 being adapted to engage the keyway 41 in the shaft 40, the worm gear 35 would transmit rotation directly to the disk 96 on the first of the counter wheels 80 from the left in Figure 3, in which instance, the disk 96 would rotate in a counterclockwise direction in Figure 4. In this instance, the rotation between the disk 96 and the counter wheel 80 is dependent upon the pawls 91 and 92 remaining in engagement with the notches 87 in the disk 85 and it often happens that frictional resistance to rotation of the counter wheel 80 around the shaft 40 is great enough to where the resistance of the leaf spring member 100 would be overcome by the pawls 91 and 92 in such a manner that the ends of the same would be caused to move out of engagement with the notches 87 in the disk 85 and would thus partially rotate within the counter wheel 80 and as a result, the counter wheel 80 would not subtract the correct length of the material drawn reversely by the counter wheels 31 and consequently, when the cloth 13 is again drawn by the knurled wheels 31 in its original direction of travel, the overall length of the cloth would not be indicated correctly on the wheels 80.

During the time that the knurled wheels 31 are transmitting rotation in either direction to the counter wheels 80, as has heretofore been described, the shaft 40 is in the position shown in Figures 2, 3, 6 and 7. Now, when it is desired to reset the mechanism of these counter wheels, it is necessary that the shaft 40 be pulled from left to right in Figures 3 and 7 to where the peripheral groove 44 will be moved out of engagement with the lower end of the pin 46 in Figure 7 and the peripheral groove 45 will be moved into engagement with the lower end of the pin 46 in Figure 7. This not only causes the keyway 41 in Figure 7 to move out of engagement with the free end of the ratchet pawl 132, but also causes the pin 64 at the right-hand side of Figure 3 to be moved to the right to where the pin 60 would not interfere with manual rotation of the collar 55 in such a manner that the handle portion 58 would move towards the observer in Figure 3.

The shaft 40 would then be rotated in a counterclockwise direction in Figures 5 and 6 to where the keyway 41 would be moved into engagement with the free end of the reset pawls 117 associated with each of the counter wheels 80, thus transmitting rotation to the counter wheels 80 in such a manner as to reset the same in a conventional manner. The reason for the shaft 40 being moved longitudinally of the casing 25 in such a manner that the keyway 41 is moved out of engagement with the free end of the dog 132, is so that the shaft 40 will not transmit rotation to the disks 130, 127 and 37 thereby transmitting rotation to the worm gear 35 and thus to the knurled wheels 31, inasmuch as this would probably be too much of a load for the small dog 132 to carry and may cause breakage of the various parts associated therewith. It is obvious that the purpose of the pin 60 at the right-hand side of Figure 3 is to prevent reverse rotation of the shaft 40 while the free end of the dog 132 is in engagement with the keyway 41 in the shaft 40.

It is thus seen that I have provided an improved counter mechanism embodying a positive means for reverse movement of the counter wheels when it is required that reverse rotation be transmitted to the counter wheels automatically due to reverse movement of other mecha-

nism associated therewith such as that of moving a strip of cloth in a reverse direction during an inspecting operation as in the case of a yardage counter or the like. Obviously, there are many other applications for counters embodying the principle of a reversibly positively driven counter mechanism and the counter shown in the drawings is to be regarded only as a typical application of this feature.

In the drawings and specification there has been set forth a preferred embodiment of the invention, and although specific terms are employed, they are used in a generic and descriptive sense only, and not for purposes of limitation, the scope of the invention being defined in the claims.

I claim:

1. In a counter having a casing and a front cover provided with a transparent window and having a counter shaft with its ends rotatably mounted in the walls of the casing and having a longitudinally extending groove therein and having a plurality of counter wheels rotatably mounted thereon, said counter wheels having gears associated with the same and Geneva pinions and means for driving the said gear in the first of said counter wheels, whereby a predetermined amount of rotation of one counter wheel will impart a one-step rotation to the next adjacent counter wheel, each of the counter wheels having a pair of spring pressed pawls pivotally mounted on the gears associated with the counter wheels, said spring pressed pawls being pointed in a direction to transmit rotation to the counter wheels when the gears are caused to rotate in one direction, each of said counter wheels also being provided with a reset pawl adapted to engage the longitudinally extending groove in said shaft to transmit forward rotation to the shaft during a resetting operation, and whereby upon reverse rotation of the gears the reset pawl would normally engage the groove in the longitudinally extending shaft, thereby causing resistance to rotation of said gears, and whereby the spring pressed pawls may have sufficient tension thereon to be depressed by reverse rotation of the gears associated with each of the counter wheels thereby causing the gear to rotate reversely independently of the associated counter wheel, a disk disposed adjacent the first of the counter wheels, said disk having a spring pressed dog therein which is adapted to engage the longitudinally extending groove in the shaft, a positive connection between the driving means for the gears and the disk through the dog whereby the disk will impart rotation to the longitudinally extending shaft upon reverse rotation of the driving means to thus overcome the resistance encountered by the gears to such an extent that the first-named spring-pressed pawls will remain in contact with the counter wheels thereby causing direct rotation of the counter wheels with reverse rotation of the associated gear.

2. In a counter having a rotatable shaft with a longitudinally extending groove therein and having a plurality of counter wheels rotatably mounted on the shaft and provided with consecutively appearing numerals on the periphery thereof, said counter wheels having a counterbore in one side thereof the inside periphery of which has a circular member disposed therein having a plurality of equally spaced notches in the inside periphery thereof, each of said counter wheels also comprising a disk member covering

the open end of the counterbore in the counter wheel and having a pair of pins thereon on which a pair of pawls are pivotally mounted, spring means urging the free ends of said pawls into engagement with the notches in the counterbores and said disks on which the pins are disposed being rotatably mounted on the shaft, each of said counter wheels having a spring pressed reset pawl mounted therein, the free end of which is adapted to be engaged by the longitudinally extending groove in the rotatable shaft in a resetting operation, said reset pawl engaging the keyway being pointed in a direction opposite to that of the pawls engaging the notches in the internal periphery of the bore, said shaft having a driven gear thereon, a dog-carrying disk integral with said gear and having means integral therewith for locking the dog-carrying disk in engagement with the first of the disks on which the conventional spring pressed pawls engaging the inner periphery of the counterbore are pivotally mounted, said dog-carrying disk having spring means therein for urging the free end of the dog in the said dog-carrying disk into engagement with the longitudinally extending groove in the shaft, whereby upon normal adding operation of the counter wheels the gear will transmit rotation to the first of the disks carrying the pawls which engage the internal periphery of the counterbore in the direction in which the pawls are pointed to move the counter wheels in an adding direction, and whereby upon reverse rotation of the driving gear, the disk on which the pawls are pivotally mounted which engage the internal periphery of the counterbore will rotate in a direction away from the direction in which the ratchet pawls are pointed and the spring means engaging said pawls associated with the counterbore will suffice to hold the pawls in engagement with the notches in the internal counterbore provided the shaft on which the counter wheel is rotatably mounted is caused to rotate in a like manner, the dog in the dog-carrying disk being caused to engage the longitudinally extending groove in the shaft upon rotation of the gear in a subtracting direction to thereby cause said shaft to rotate with the gear thus overcoming the usual point of resistance to rotation of the counter wheel in a subtracting direction and accordingly permitting the pawls pivotally mounted on the disk associated with the counterbore in the counter wheel to transmit subtracting rotation to the counter wheels.

3. In a structure according to claim 2, said rotatable shaft being adjustable longitudinally thereof and the longitudinally extending groove terminating a substantial distance from one end of said shaft whereby the rotatable shaft may be moved longitudinally in one direction, thus moving the longitudinally extending groove out of engagement with the dog in the dog-carrying disk and thereby taking the load off the dog in the dog-carrying disk during a resetting operation.

4. In a structure according to claim 3, spring pressed locking means for locking the longitudinally extending shaft in adjusted position whereby the dog in the dog-carrying disk may engage the longitudinally extending groove in the longitudinally extending shaft during subtracting rotation of the counter wheels.

5. In a structure according to claim 4, said rotatable shaft having means on one end thereof whereby rotation of said shaft in a resetting op-

11

eration will be restricted in the event that the longitudinally extending groove in the rotatable shaft is in engagement with the dog in the dog-carrying disk.

6. In a structure according to claim 3, said longitudinally extending shaft being rotatably mounted in a casing, said shaft extending outwardly from one of the walls of the casing, a collar fixedly mounted on the outwardly extending portion of the shaft, the proximate ends of said collar being disposed apart from the wall of the casing, an eccentrically mounted pin in the collar and spring means for urging said pin into

12

engagement with the wall of the casing, a pin projecting outwardly from the wall of said casing, said pin being tapered on one side thereof whereby upon rotation of the shaft in one direction the spring pressed pin will pass over the tapered side of the fixed pin and will thus permit free rotation of the shaft and whereby upon reverse rotation of the shaft the spring pressed pin will engage the other side of the fixed pin, thus locking the shaft against rotation.

WOODFORD A. KENNEDY.

No references cited.