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PREDETERMINING COUNTER

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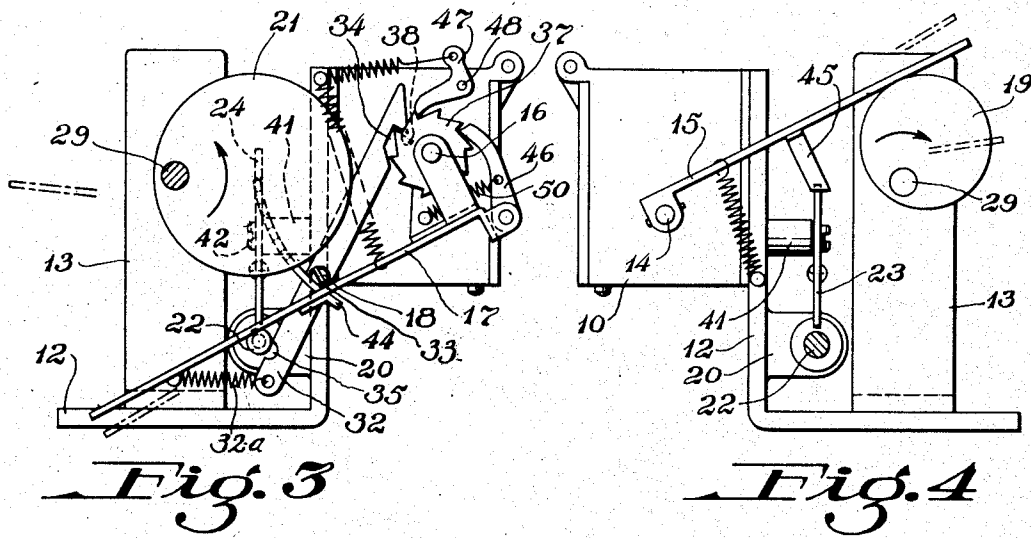
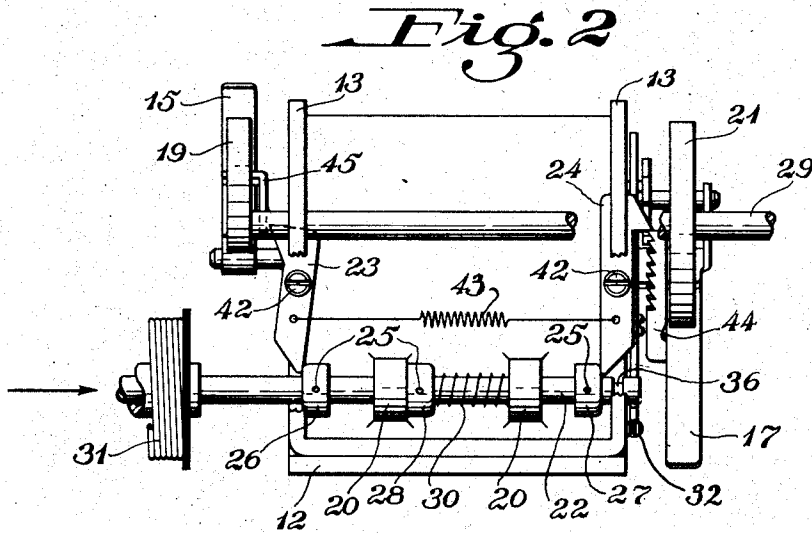
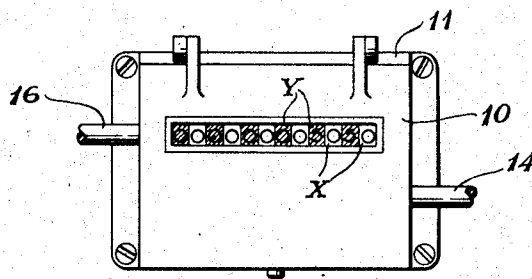


Fig. 1

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PREDETERMINING COUNTER

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3 Claims. (Cl. 235—132)

This invention relates to an improved counting mechanism of the predetermining counter type, and more particularly to devices of this kind which are capable of continuous automatic operation.

Predetermining counters, which will count a predetermined number of times and, upon being manually reset, again count to that total are well known in the art. One example of such a counter is described and claimed in U. S. Patent No. 2,040,026, dated May 5, 1939, entitled "Counters," and issued to Harvey L. Spaunburg. While these counters have certain elements of value and are capable of successful operation, they are nevertheless limited in their applications. In all of the known devices of this type, the resetting of the predetermining wheels must be accomplished manually. This obviously prevents continuous automatic operation. In certain installations, however, it is desirable, if not an absolute necessity, to employ automatic continuous counters. For instance, the prior art counters cannot be adapted to the automatic measuring of predetermined lengths of materials such, for example, as is disclosed in a copending application Serial No. 363,810, dated November 1, 1940, and assigned to the assignee of the present invention.

It is an object of this invention to provide a continuous counter wherein the resetting of the predetermining and counting wheels may be accomplished automatically. A further object is the provision of means for automatically resetting the predetermining wheels to a designated predetermined setting after the counting wheels of the counter have counted off the designated predetermined number. A still further object is the provision of means for counting to a designated predetermined number of counts, automatically resetting the predetermining wheels to the designated predetermined number, and continuing this operation indefinitely. A further object is the provision of means for measuring continuous lengths of materials. Other objects will be readily apparent from the description hereinafter given.

The above objects are accomplished according to the present invention by the discovery of a novel counting apparatus comprising, in combination, a predetermining counter comprising a set of adjustable predetermining wheels, a set of counting wheels, a counter shaft for actuating said counting and predetermining wheels, and a reset shaft for actuating said predetermining and counting wheels; means for actuating the counter shaft; means for actuating the reset shaft; and

a counter and reset mechanism for simultaneously actuating the reset shaft and locking the counter shaft whenever a designated predetermined setting on the predetermining wheels has been counted off on the counting wheels and for simultaneously actuating the counter shaft and locking the reset shaft whenever the designated predetermined setting has been replaced on the predetermining wheels.

More specifically, the invention provided in accordance with the preferred embodiment of the present invention combines a predetermining counter comprising a set of adjustable predetermining wheels, a set of counter wheels, a counter shaft for actuating said counting and predetermining wheels, and a reset shaft for actuating said predetermining and counter wheels, a counter eccentric follower pivotally attached to the counter shaft, a reset eccentric follower pivotally mounted on the reset shaft, a counter eccentric, and a reset eccentric mounted on a rotatable shaft, means for rotating said shaft, a counter and reset mechanism comprising a reciprocating shaft having counter and reset dog collars mounted thereon, means for actuating said reciprocating shaft whenever a designated predetermined setting on the predetermining wheels has been counted off on the counting wheels and whenever the designated predetermined setting has been replaced on the predetermining wheels, counter and reset dogs actuated by said counter and reset dog collars, said dogs locking one of the eccentric followers out of contact with its eccentric and simultaneously positioning the other eccentric follower into contact with its eccentric.

In the drawing, which shows a preferred embodiment of the invention:

Figure 1 represents a front elevation of any well-known operable predetermining counter having a set of counting and predetermining wheels;

Figure 2 is an elevation of the mechanism employed for actuating the counting and resetting mechanism;

Figure 3 is an end elevation of Figure 2 showing the resetting mechanism, and

Figure 4 is an end elevation of Figure 2 showing the counting mechanism.

In the drawing wherein like reference characters denote similar and like parts, a predetermining counter designated in its entirety by 10 positioned in casing 11, a counter support 12, and an eccentric shaft support 13 attached to the counter support 12, constitutes the main

framework of the apparatus. The framework may be conveniently constructed of any material such as wood, metal, or plastic so long as a substantially rigid structure is provided.

In the embodiment of the invention herein disclosed, a predetermining counter of the type fully described and claimed in U. S. Patent 2,040,026 is diagrammatically shown. Since the internal workings of the counter are not per se a part of the present invention, it is not deemed necessary to give a detailed description thereof, and only those parts of the mechanism will be described as are necessary for a complete understanding of the present invention.

The predetermining counter 10 attached to the counter support 12 by any convenient means is adapted to be operated through a counting shaft 14 by any suitable means such, for example, by spring load counter eccentric follower 15. The oscillations of the follower 15 carries a series of counting wheels X, and predetermining wheels Y previously set in a relationship designating a predetermined number to count the oscillations of the counter eccentric follower 15 until the predetermined number of oscillations has been counted in the manner fully described in U. S. Patent 2,040,026. After the predetermined number has been counted off, the mechanism may be manually reset by rotating a reset shaft 16, wherein the predetermined number will appear on the predetermining wheels Y and the counting wheels X will be simultaneously positioned at zero.

The resetting of the counting and predetermining wheels is in all cases, no matter what the original setting might have been, accomplished by rotating the reset shaft 16 through a fixed angularity. This one factor is of vital importance in developing this new and improved automatic counting device. In the embodiment of the invention herein disclosed and in the known prior art predetermining counters, the resetting of the predetermining wheels to the original setting is accomplished in ten distinct movements of the resetting shaft, usually requiring one complete rotation of this shaft. While other operable makes of predetermining counters may require more or less oscillations for resetting, the principle herein disclosed can be employed so long as the number of movements for a complete resetting remains constant.

Since the prior art counting devices count to a designated predetermined number and then automatically stop until manually reset, continuous automatic operation is not possible. It was discovered, however, that the resetting operation could be successfully accomplished by a mechanism similar in construction to that employed for the counting except, instead of having the counter operate continuously from the counting shaft 14, have it, at the proper time, actuate the reset shaft 16 through a spring loaded reset eccentric follower 17. This could be accomplished since no matter what the original setting on the predetermining wheels, the resetting operation always required a fixed number of oscillations of the reset shaft. Since, in the embodiment of the present invention, it requires ten consecutive oscillations of the reset shaft to reset the predetermined number on the predetermining wheels, and correspondingly replace the zeros on the counting wheels, it was discovered that by setting the predetermining wheels to ten less than that actually required, and after this number has been counted off on the counting wheels

to disengage the counting mechanism and engage a reset mechanism for the remaining ten counts. By this means, the actual number required will be counted off and at the same time the predetermining wheels of the counter will be set at the designated predetermined number and the counting wheels will be at zero, thus in a position to recount the designated predetermined number without stopping or manually resetting the counter. Obviously, such an apparatus will have many useful applications, all of which will be readily apparent to those skilled in the art.

The following is a detailed explanation of one embodiment of the invention. It is, however, not intended that the invention should be limited thereto, and other modifications, while not specifically disclosed, are contemplated as coming within its scope. The counter support 12 is rigidly fastened to the back of the casing 11 of the predetermining counter 10 by any well-known means. The eccentric shaft support 13 is conveniently U shaped and substantially of the same length as the counter support 12. Openings are provided in the vertical legs of the eccentric shaft support substantially near the top thereof and in which is journaled an eccentric shaft 29.

Securely fastened to the vertical leg of the counter support 12 by any well-known means are bearing blocks 20, 20. These blocks provide a support for a reciprocating shaft 22 which simultaneously actuates a counter dog 23 and a reset dog 24 in a manner more fully described hereinafter. The reciprocating shaft 22 is fitted in the openings in the bearing blocks 20, 20 so that it is free to reciprocate therein with a horizontal motion. The reciprocating shaft has mounted thereon by means of pins 25, 25 a counter dog collar 26, a reset dog collar 27, a stop 28, and a coil return spring 30, one end of which bears against the left-hand bearing block, while the other end is positioned against the stop 28.

The reciprocating shaft 22 is actuated by means of a solenoid 31 which, in turn, is energized by the predetermining counter whenever the predetermined setting on the predetermining wheels has been counted off on the counting wheels by the counter eccentric follower 15. The solenoid 31 upon becoming energized forces the reciprocating shaft to compress the coil return spring 30, the magnitude of movement of the reciprocating shaft being controlled by the compression of the spring and the positioning of the stop 28 against the left-hand bearing block 20.

The reciprocating shaft 22 is held in position against the tension of the spring during the resetting operation by means of a reset lock lever 32, which is provided with an opening 33 substantially in the center thereof, and which fits over and is free to oscillate on the reset lock lever supporting pin 18. One end of the reset lock lever is pointed and has a recess 34 cut therein directly in back of the pointed end, while the other end is provided with a semi-circular recess 35. The reset lock lever is positioned so that the semi-circular recess rests on the oscillating shaft 22 whenever the counter is counting, but whenever the counter is resetting, the semi-circular recess is positioned in a groove 36 cut in the reciprocating shaft 22. The reset lock lever remains in position locked into shaft 22 during the resetting operation held by the tension of the spring 32a after which the semi-circular recess is automatically disengaged from the

groove of the reciprocating shaft by action of pin 38, said shaft being returned to its normal position by the tension in the coil return spring 30.

So long as the semi-circular recess of the reset lock lever is engaged in the groove of the oscillating shaft, the predetermining counter is resetting, but whenever the semi-circular recess rests on the ungrooved periphery of the reciprocating shaft, the counter is counting. The operating mechanism for engaging and disengaging the reset and counting means is accomplished through a reset ratchet wheel 37 which is rotatably mounted on the reset shaft. Since, in the present embodiment of the invention, it requires ten consecutive operations of the reset eccentric follower to completely reset the counter, and further, since it is convenient to accomplish this resetting in one complete revolution of the reset shaft, the ratchet is divided into ten equal parts, each tooth covering an angularity of 36°. Rigidly fastened to the ratchet and rotatable therewith is a reset lock lever release pin 38.

The reset lock lever 32, which is free to pivot about the lock lever support pin 18, rests on the oscillating shaft or in the groove cut therein, depending on the particular stage of operation of the counter. As soon as the designated predetermined number has been counted off on the counting wheel, the reciprocating shaft assumes a position which compresses the coil return spring. In this position, the semi-circular recess of the reset lock lever engages in the groove of the reciprocating shaft and holds this shaft out of its normal position against the tension in the coil return spring. This movement causes the pointed end of the reset lock lever to pivot about the reset lock lever support pin, thus causing the reset lock lever release pin to fall into opening 34 of the reset lock lever.

The reciprocating shaft 22 which is actuated by the solenoid 31 causes the reset dog 24 and counter dog 23 to take up a new position. These dogs are mounted on posts 41, 41 by bolts 42, 42, said posts, in turn, being rigidly attached to the vertical leg of the counter support 12 by any convenient means. The dogs are free to oscillate about the bolts 42, 42 and are spring loaded by spring 43 which maintains the dogs in cooperative relationship with each other. The dogs provide the means for maintaining the eccentric followers in position with their corresponding eccentrics or for holding the eccentrics out of contact with their corresponding eccentric followers. In the normal or counting position, as shown in the drawing, the counter eccentric follower 15 is in contact with the counter eccentric 19, and the reset eccentric follower 17 is held out of contact with the reset eccentric 21 by the reset dog 24 which engages in one of the teeth of a ratchet 44 which is attached to the reset eccentric follower by any convenient means such as by being spot-welded thereto. A ratchet with a large number of teeth is provided to give the ratchet dog an opportunity to become caught just as soon as said dog is shifted. Unless such means are provided, the dog might fall on a flat surface of the holding means and not become immediately engaged, thus causing the reset eccentric follower to make an additional oscillation. When the reset and counter dogs are out of their normal position, the reset eccentric is positioned in contact with the reset eccentric follower and the counter eccentric follower is held out of con-

tact with the counter eccentric by spot welded lug 45 through dog 23.

Counter and reset eccentrics 19 and 21 are fastened one at each end of an eccentric shaft 29 which is in turn journaled in the openings in the vertical legs of the eccentric shaft support 13. The eccentrics 19 and 21 may be rotated by any well-known means such as a gear or pulley mounted on the eccentric shaft (not shown).

The reset eccentric follower is mounted on the reset shaft 16 and is free to oscillate thereon. The free end of the reset eccentric follower, which has a ratchet fitted thereon, is in cooperative relationship with a reset ratchet wheel 37. As the reset eccentric follower is actuated by the reset eccentric through a full stroke, the ratchet arm 46, which is attached to one end of the reset eccentric follower, rotates the ratchet and the reset shaft through one-tenth of a revolution. At the end of the return stroke, the ratchet arm 46 takes up a position engaging the next ratchet notch, the ratchet being held in place by a spring loaded ratchet stop 47 which is free to pivot about pin 48 mounted on the casing 11. The ratchet arm 46 is spring loaded by spring 50 to maintain the ratchet arm in contact with the teeth of the reset ratchet wheel 37.

After the ratchet wheel 37 has made one complete revolution, or, correspondingly, when the reset eccentric follower 17 has been oscillated ten consecutive times, the reset lock lever release pin 38 contacts with the pointed end of the reset lock lever 32, causing it to oscillate about the reset lock lever supporting pin 18, which in turn raises the semi-circular recess 35 from the groove of the oscillating shaft 29. The coil return spring thereupon positions the reciprocating shaft to its normal or counting position, actuating the counter and reset dogs, which in turn causes the counter eccentric to contact with the counter eccentric follower and simultaneously positions the reset eccentric follower out of contact with the reset eccentric. That is, the follower 17 has been moved out of contact with eccentric 21 so that dog 24 and ratchet 44 hold follower 17 out of contact with eccentric 21. Under these conditions, the predetermining number has been replaced on the predetermined wheels, and the counting wheels have been returned to zero. In setting the predetermining wheels, it is to be observed that the setting on the predetermining wheels should be ten less than the number actually required, since in the embodiment herein shown it requires ten successive oscillations of the resetting eccentric follower to completely reset the counter.

From the foregoing disclosure, it is believed that the operation of the automatic continuous counting mechanism herein described will be readily understandable to those skilled in the art. However, briefly, by way of repetition but without any intent to limit the invention thereto, the following explanation based on an automatic counter set to count off a predetermined number of 65 is given.

In the operation of the automatic counter, it is first necessary to set the predetermining wheels to ten less than the designated predetermined number to be counted off, or a setting of 55, as shown by Figure 1. All of the counting wheels are positioned at zero. As the eccentric shaft rotates, the counter and reset eccentrics likewise rotate therewith. As the counter eccentric follower, which is in contact with the counter eccentric, is oscillated, the reset eccentric follower

is held out of contact with the reset eccentric follower.

For each complete oscillation of the eccentric shaft, the counter eccentric follower oscillates through a complete stroke, and this causes the counting wheels to rotate through one division of the right-hand counting wheel X. In this position, the semi-circular groove of the reset lock lever is riding on the oscillating shaft and not in the groove cut therein, while the reset dog, through the toothed lug, holds the reset eccentric out of contact with the reset eccentric follower. When the counting wheels have counted off the number set on the counting wheels, namely 55, an electrical contact is made which energizes the solenoid and which in turn forces the reciprocating shaft out of its normal position against the tension of the coil release spring. This operation simultaneously releases the reset eccentric follower from the reset dog and positions it in contact with the eccentric follower and holds the counting eccentric out of position from the counter eccentric follower. The semi-circular recess in the reset lock lever thereupon becomes engaged in the groove of the reciprocating shaft, thus holding the shaft in position against the tension of the coil release spring. As the reset eccentric follower is successively oscillated about the reset shaft by the reset eccentric follower, the ratchet arm rotates the ratchet wheel one notch for each complete stroke of the reset eccentric follower. When the ratchet wheel has made one complete revolution, the trip pin forces the point of the reset lock lever to move about the reset lock lever supporting pin, thus raising the semi-circular recess from the groove of the reciprocating shaft. The coil release spring forces the reciprocating shaft to assume its normal or counting position, and the apparatus is ready to repeat the counting; i. e., the predetermining wheels are set at 55 and the counting wheels read zero.

In the use of this novel continuous counting device it will be readily apparent to those skilled in the art that other means for engaging and disengaging the counter and reset eccentrics may be employed. It is not intended to limit the invention to the embodiment herein disclosed, but the invention broadly contemplates within its scope an automatic counting device comprising, in combination, a predetermining counter comprising counting wheels, predetermining wheels, a counter shaft for actuating the counting and predetermining wheels, and a reset shaft for actuating the predetermining and counting wheels, and means for simultaneously actuating the counting shaft and locking reset shaft during the interval the designated predetermined number is being counted off on the counting wheels and for locking the counting shaft and simultaneously actuating the reset shaft whenever the predetermined setting is being replaced on the predetermining wheels.

Other predetermining counters than the one shown herein may be employed so long as the counter has a set of predetermining wheels, a set of counting wheels, a counter shaft for actuating the counting and predetermining wheels, and a reset shaft for actuating the reset and counting wheels, and means for energizing a solenoid whenever the designated predetermined number has been counted off on the counting wheels. It is likewise essential that the counter employed be one capable of being reset by rotating the reset shaft through a fixed angu-

larity so that no matter what the original setting on the predetermining wheels, the resetting can be accomplished in the same number of oscillations of the reset eccentric follower. While the automatic predetermining counter herein disclosed requires ten consecutive oscillations for resetting, and accordingly must be set to a reading of ten less than actually required, other types of predetermining counters, which require more or less consecutive operations for resetting, may be employed, in which cases the initial setting on the predetermining wheels will be the designated number less the number of teeth in the resetting ratchet wheel.

The invention will have many uses, all of which will be readily apparent to those skilled in the art. By way of illustration but without any intent to limit the invention thereto, the novel counting device can be used to measure off predetermined lengths of blasting cap wire from continuous strands, as is more fully disclosed in application Serial No. 363,810, filed November 1, 1940.

As many apparently widely different embodiments of this invention may be made without departing from the spirit and scope thereof; it is to be understood that the invention is not limited to the specific embodiments thereof except as defined in the appended claims.

I claim:

1. A counter of the predetermined type for counting to a designated number related to a predetermined number and automatically resetting the counter to the designated predetermined number, comprising in combination a set of counting wheels, a set of predetermining wheels adjustable with respect to said counting wheels, a counting shaft, a reset shaft and means for actuating the counting shaft and mechanically disengaging the reset shaft until the designated predetermined number has been counted off on the counting wheels and thereafter actuating the reset shaft and mechanically disengaging the counting shaft until the designated predetermined number has been replaced on the predetermined wheels.

2. A counter of the predetermining type for counting to a designated number related to a predetermined number and automatically resetting the counter to the designated predetermined number, comprising in combination a set of counting wheels, a set of predetermining wheels adjustable with respect to said counting wheels, a counting shaft, a reset shaft, a counter eccentric follower mounted on the counting shaft, a reset eccentric follower mounted on the reset shaft, means for actuating the counter eccentric follower and mechanically disengaging the reset eccentric follower until the designated predetermined number has been counted off on the counting wheels, and thereafter actuating the reset eccentric follower and mechanically disengaging the counter eccentric follower until the designated predetermined number has been replaced on the predetermined wheels.

3. A counter of the predetermining type for counting to a designated number related to a predetermined number and automatically resetting the counter to the designated predetermined number and continuing these operations, comprising in combination a set of counting wheels, a set of predetermining wheels adjustable with respect to said counting wheels, a counting shaft, a reset shaft, a counter eccentric follower mounted on the counting shaft, a reset

eccentric follower mounted on the reset shaft, means for actuating the counter eccentric follower and mechanically disengaging the reset eccentric follower until the designated predetermined number has been counted off on the counting wheels and thereafter actuating the reset eccentric follower and mechanically disengaging the counter eccentric follower until the designated predetermined number has been replaced on the predetermining wheels, said means comprising a reciprocating shaft actuated by a solenoid whenever the designated predetermined number has been counted off on the counting wheels, to actuate counter and reset dogs which position the counting means out of

contact with the means for actuating the counter eccentric and simultaneously position the reset eccentric in contact with the means for actuating the reset eccentric, means for returning the reciprocating shaft to its normal position after the predetermined number has been replaced on the predetermining wheels, said means positioning the counter eccentric follower in contact with the means for actuating the counter eccentric follower and simultaneously mechanically disengaging and disengaging the reset eccentric follower from the means for actuating the reset eccentric follower.

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