Mar. 20, 1923. 1,448,946.

J. C. SCHAFFER.

CONTROL INSTRUMENT.

FILED AUG. 19, 1918. 3 SHEETS—SHEET 1.

FIG. 1

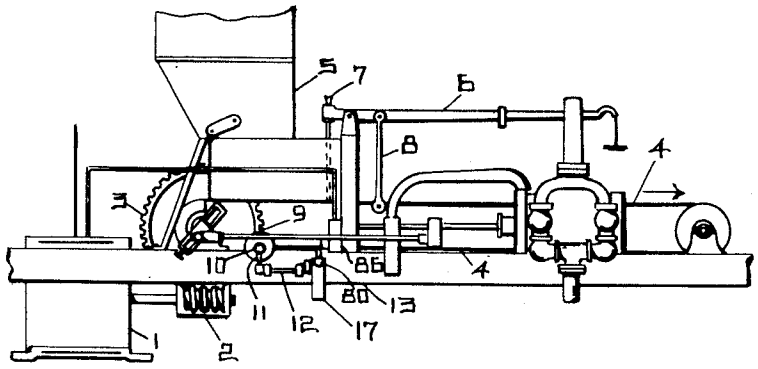
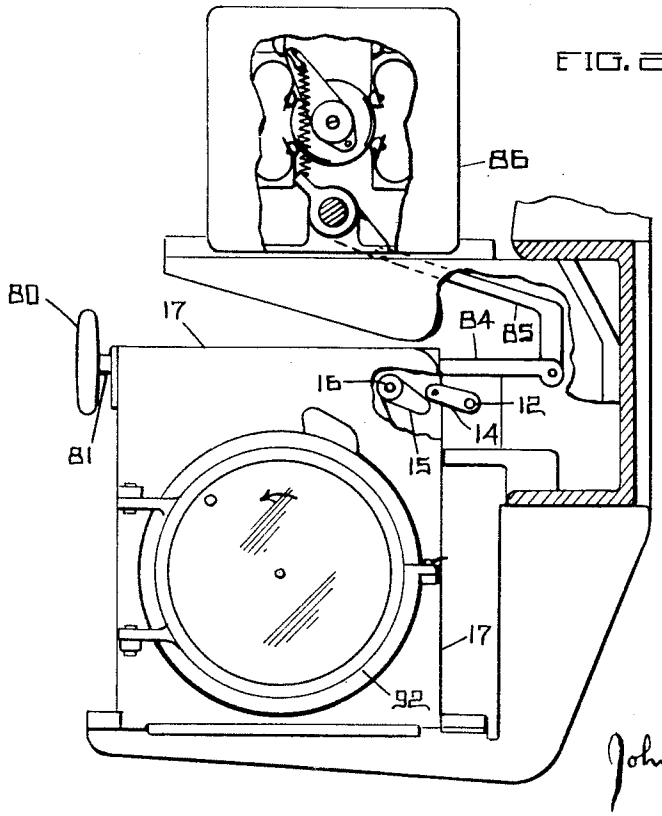


FIG. 2



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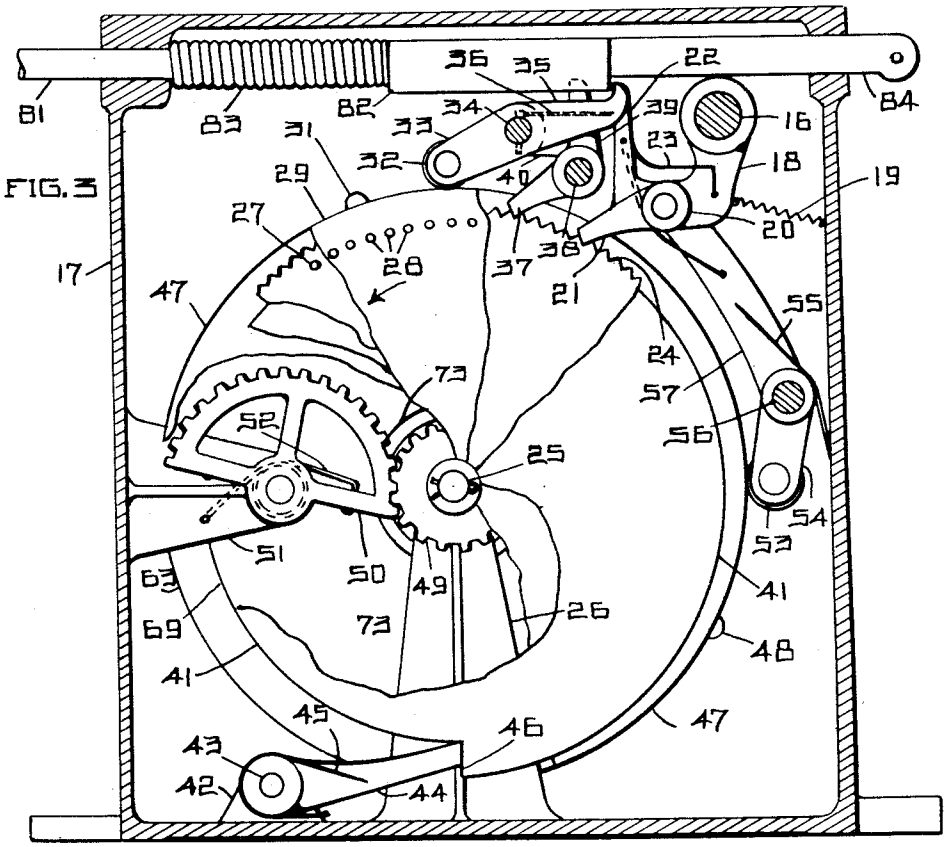


FIG. 3

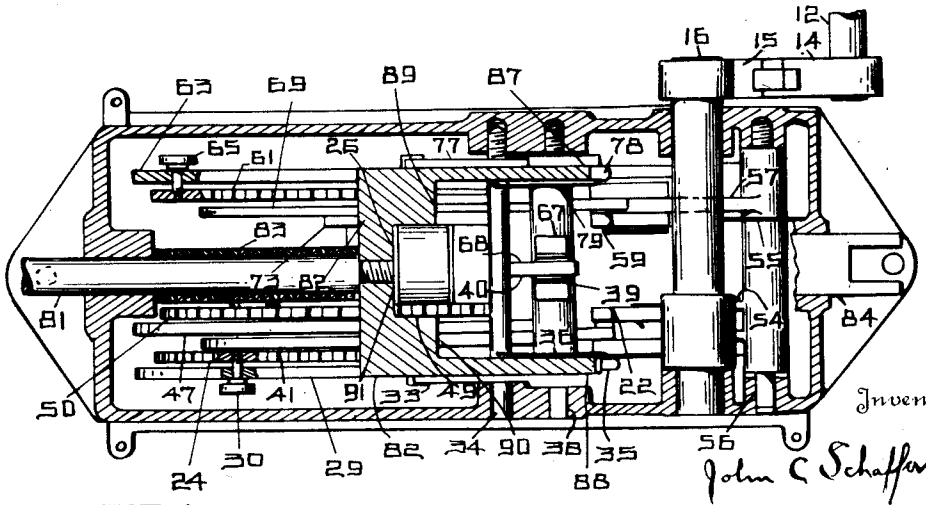


FIG. 4

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CONTROL INSTRUMENT.

FILED AUG. 19, 1918. 3 SHEETS—SHEET 3.

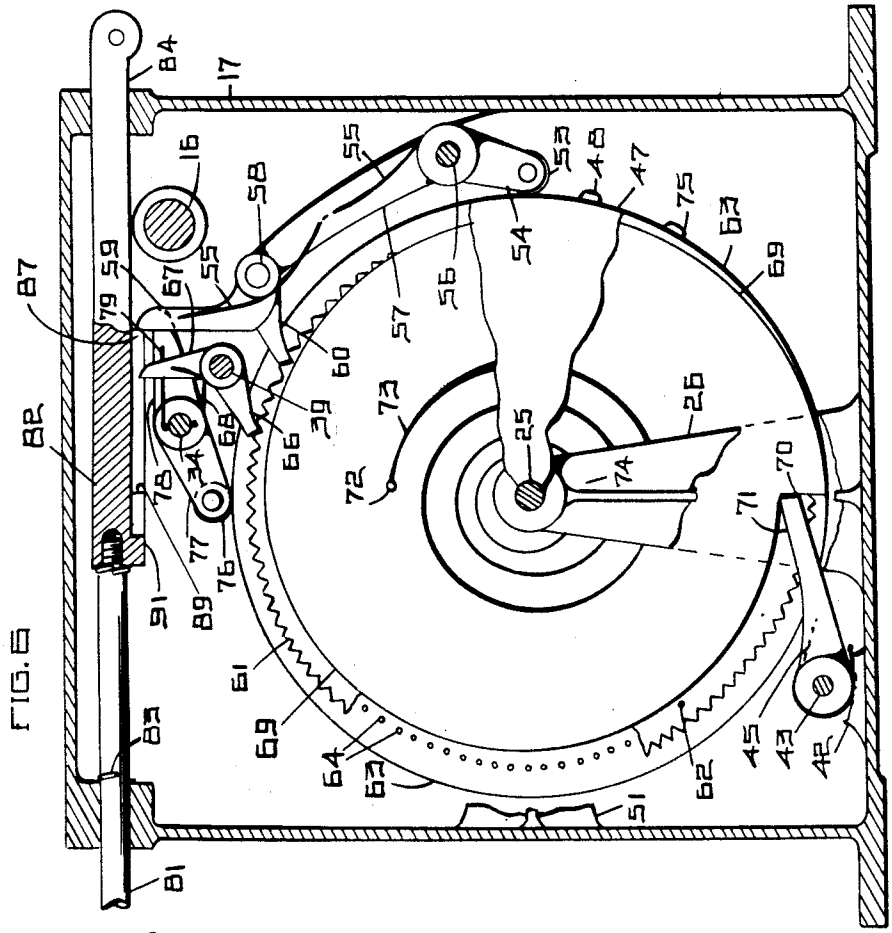


FIG. 6

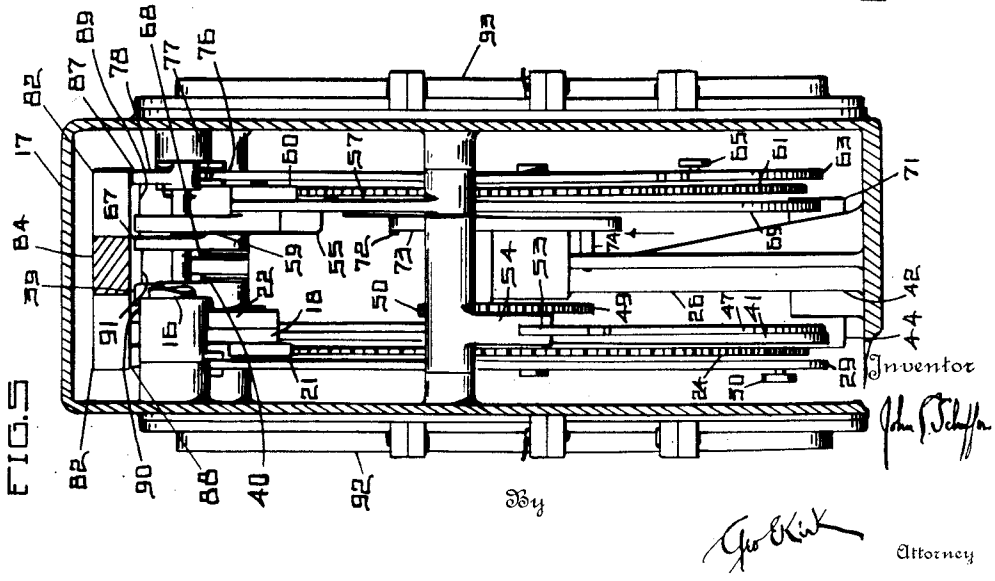


FIG. 5

Inventor

By

Attorney

Patented Mar. 20, 1923. 1,448,946

UNITED STATES PATENT OFFICE.

JOHN C. SCHAFFER, OF TIFFIN, OHIO, ASSIGNOR TO SCHAFFER ENGINEERING & EQUIPMENT CO., OF PITTSBURGH, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

CONTROL INSTRUMENT.

Application filed August 19, 1918. Serial No. 250,485.

To all whom it may concern:

Be it known that I, JOHN C. SCHAFFER, a citizen of the United States of America, residing at Tiffin, Seneca County, Ohio, have invented new and useful Control Instruments, of which the following is a specification.

This invention relates to control instruments or automatic resetting devices.

This invention has utility when embodied in an adjustable counter or tally device.

Referring to the drawings:

Fig. 1 is a fragmentary side elevation of an apparatus having the instrument of the invention incorporated therewith;

Fig. 2 is a view on an enlarged scale, at right angles to the showing in Fig. 1, of the instrument and its connection to the apparatus controlling switch; as well as tally drive;

Fig. 3 is a still further enlarged showing of the instrument, side view, with parts broken away showing the units or first set tally drive;

Fig. 4 is a view from above, with parts broken away, showing the actuators and release mechanisms;

Fig. 5 is an end view, with parts broken away, also showing the general grouping of the actuators and release mechanisms in the instrument housing; and

Fig. 6 is a side view, similar to Fig. 3, but showing the hundreds or second tally drive of the instrument.

The electric motor 1 through speed reduction gearing 2, 3, drives the conveyor belt 4 for moving material from hopper 5 at a definite quantity or weight per lineal foot of the belt 4, as controlled by scale beam 6 connected to gate 7 in adjusting material flow from the hopper 5. This material, say hydrated lime, on the belt 4, operates through link 8 engaged under the upper reach of the belt 4. The lower reach of this belt 4 passes over idler pulley 9 carrying eccentric 10 operating through link 11 to rock shaft 12 carried by the apparatus frame 13.

This shaft 12 carries an arm 14 movable to oscillate arm 15 on shaft 16 extending into the instrument housing 17 and there carrying depending arm 18, normally drawn back or recovered from its drive travel by helical spring 19 (Fig. 3). Carried by the arm 18 on pivot pin 20 is actuator 21 as a forwardly and downwardly projecting pawl, while integral therewith there is an upstanding pawl-throw-out dog 22. Spring 23 coacting between the dog 22 and the arm 18 tends yieldably to maintain the pawl 21 thrown into engagement with ratchet or first tally or registering member or disk 24 mounted on shaft 25 carried by bracket 26 centrally in the housing 17. This disk 24 may be provided with an opening 27 the same radial distance from the shaft 25 as the annular series of openings 28 in relatively adjustable control member or disk 29. This graduated indicator disk 29 may have its angular position as to the disk 24 shifted and when the desired opening 28 in disk 29 is in register with the opening 27 in the disk 24, pin 30 may be inserted to maintain such selected relation. With the number of openings 28 in disk 29 running say to 100, there is thus possible a selection of any opening thereunder to determine the adjustment of the tally registering disk 24.

The adjustment brings about a control, for the disk 29 has a peripheral projection 31 in the path of roller 32 carried by arm 33 on shaft 34. Integral with arm 33 is arm 35 as a release dog. Spring 36 engaging dog arm 35 and extending through the shaft 34 precludes movement of arms 33, 35, along the shaft 34, and thus keeps the roller 32 in the plane of the disk 29 to be oscillated by the projection 31 on each rotation of the disk 29. The spring 36 insures recovery of the arm 33 and maintains the roller 32 against the disk 29.

In the step-by-step counter-clockwise actuation of disk 24 by the pawl 21, there is a holding against clockwise or recover travel by the pawl 37 loosely mounted on shaft 38 carried by housing 17 parallel to the shaft 34 also carried by the housing 17. Integral with the pawl 37, is upstanding dog 39 engaged by spring 40 extending therefrom to coil about the shaft 38 and extend under the shaft 34, thus yieldably maintaining the pawl 37 in engagement with the disk 24, as a stationary holding pawl while the actuator pawl 21 is recovering from its driving strokes.

Fixed with the disk 24 on the shaft 25 is

spiral cam disk 41 of the zero stop mechanism, for determining the definite position for starting. The housing 17 has in its lower portion a bracket 42 carrying shaft 43 upon which is loosely mounted a dog 44 normally held by spring 45 against the periphery of the disk 41 to impinge against abutment 46 of disk 41 in clockwise travel of disk 41, but permitting unlimited counter-clockwise rotations of said disk 41.

Next along the shaft 25 from disk 41 is transmission member or integer element 47 as a disk fast with the disks 24, 41, which has a peripheral projection 48 similar to projection 31. In sets of counters, which are duplicated, or further multiplied for greater number range, this disk 47 has transmission coaction.

Fast with the disks 24, 41, 47, is pinion 49 on the shaft 25 adjacent the bracket 26. In mesh with this pinion 49 is gear segment 50 mounted on bracket 51 carried by the housing 17. A spring 52 engages the segment 50 and coils about its hub in extending to engage the bracket 51, thus yieldably holding the segment in engagement with the pinion 49. This accordingly serves as a reset device for a multiple rotation tally or registering member, for after one rotation of the disk 24, the further rotation of pinion 49 therewith merely pushes the last tooth of the segment 50 to have it come back against the pinion 49 for a continuation of such operation as long as the disk 24 is held. However, the spring 52 is in action, so at once the disk 24 is released, this spring 52 swings the segment 50 back to the starting position in Fig. 3. This counter-clockwise travel of the segment 50, which had been wound clockwise, gives a clockwise reset travel to the disk 24 and connected members until the dog 44 impinges against abutment 46 as the zero stop.

However, in the integration above the calibration numbers on the tally disk 24, there may be tally transmission to a succeeding set, say by the disk 24 at each rotation and carrying therewith the disk 47, having the projection 48, through roller 53 oscillate arm 54 carried by shaft 56 in the housing 17. Integral with the arm 54 is the upwardly extending overhanging arm 57 carrying a bearing pin 58 axially approximating alignment with the bearing pin 20 carried by the arm 18 (Figs. 3, 6). A spring 55 engages the housing 17 and arm 57 for yieldably holding the roller 53 in contact with the disk 47. This spring 55 extends on upward to engage upright dog 59 mounted on the bearing pin 58. Integral with this dog 59 is pawl 60 forwardly and downwardly extending to the second tally or registering member or disk 61, with which it coacts as an actuator. This disk 61 is mounted on the shaft 25 upon the opposite side of the bearing 26 from the first set of disks or members 29, 24, 41.

This disk 61 is provided with an opening 62 analogous to the opening 27 in the disk 24. Adjacent the disk 61 and on the side thereof remote from the bearing 26 is an adjustable control member or second disk 63 having an annular series of openings 64 corresponding to the openings 28 of the disk 29. A pin 65, corresponding to the pin 30 (Figs. 4, 5) may fix the relation of the disks or members 61, 63 of this second set. When the instrument has 100 openings in each control disk 29, 63, any number less than 10,000 may be taken as the definite number of counts for which the instrument is adjusted, 9,999 being the maximum. For instance if it be desired to count 7,437 oscillations of shaft 12, which might mean that many feet travel of the belt 4 at say 5 lbs. per foot lime hydrate thereon, the hundreds disk 63 would be set at "74" and the first disk 29, have the pin therein register through opening "28". The dog 59 and pawl 60 are similar to the dog 22 and pawl 21, but if this latter be construed as left hand, then the former are right hand.

Analogous to the holding pawl 37 and dog 39 associated with the tally disk 24, is holding pawl 66, also mounted on the shaft 38, which has upstanding dog 67 provided with engaging spring 68 coiling about the shaft 38 and extending below the adjacent shaft 34 for yieldably holding the pawl 66 in engagement with the second tally disk 61 during the recover strokes of the actuator pawl 60.

Fast with the disk 61 is spiral cam disk 69 on the shaft 25 toward the bearing 26 from the disk 61. This disk 69 is provided with clockwise stop-effecting abutment 70 at zero point, being engaged by a dog 71 mounted on the shaft 43 and normally yieldably held to ride against the periphery of the disk 69 by the spring 45. The common spring 45 serves for the two similar dogs 44, 71. The counter clockwise rotations of this disk 69, in the event of higher integration sets, may be continued, but with this the final set, as herein shown, there is not an exceeding of a single rotation of this disk 69. Accordingly the reset does not require any escapement such as shown for the first set herein with the segment 50. Pin 72 in disk 69 holds one end of spiral torsion receiving spring 73, while the other end thereof is connected to pin 74 fast in the bearing 26. In the counterclockwise driving of the second set including disks 69, 61, 63, the spring 73 is wound up as long as the pawls 66, 60, hold. In the event of their release, the second set is at once swung about in a resetting clockwise travel to the zero or starting position for a recounting operation. It is to be noted the winding of this second reset device

occurs after the previous reset device has been wound up.

The disk 63 has a peripheral projection 75 similar to the projections 31, 48. This projection 75 when it comes to roller 76 riding on the periphery of the disk 63, lifts arm 77 on the shaft 34. Integral with arm 77 is dog 78 similar to the dog 35. A spring 79 normally yieldably holds the roller 76 against the disk 63, while by passing through shaft 34, precludes movement therealong, similarly to the spring 36.

The counting mechanisms in their sequence have been given consideration up to the member to be operated, or the release means. For effecting driving of the apparatus or belt 4 of Fig. 1, handle 80 (Figs. 1, 2) may be grasped and pulled away from the housing 17, thus through rod 81 and block 82 compressing spring 83 (Fig. 3), while extension arm 84 protruding from the opposite side of the housing 17 may be connected by link 85 to throw switch 86 for starting the motor 1. In this pull of the block 82, its downward projection 87 is engaged by the dog 78, the similar dog 35 slightly clearing projection 88, so that while the dog 78 is holding, oscillations of the dog 35 by the projection 31 are idle. When the projection 75 oscillates the dog 78, the spring 83 immediately thrusts the block 82 so that the dog 35 is now working by holding the block 82 through the projection 88. This travel may be as little as $\frac{1}{32}''$ for the block 82, so it does not disturb the switch 86. Assuming the set of the instrument to be that of the instance heretofore given, this tripping out of the dog 78 has occured at "74". Accordingly when the disks 24, 29 come to position "37", the projection 31 instead of oscillating idle dog 35, will oscillate the dog 35 as a working dog, thereby permitting the compressed helical spring 83 to come into action for a quick and complete throw of the switch 86 in effecting stopping of the apparatus conveying material from the hopper 5, but also throwing out the two sets of pawls. Lateral projections 89, 90 (Fig. 4) on the underside of the block 82, respectively engage dogs 59, 22, for pulling or rather tilting the actuator ratchets 60, 21, clear respectively of the tally disks 61, 24; while central projection 91 from the underside of this block 82 tilts the dogs 67, 39, for throwing the holding pawls 66, 37, out of the disks 61, 24. In this single quick movement of the block 82, besides throwing the switching stopping operation of the apparatus, the tally disks 61, 24, are each fully released and the two resetting means, which have been automatically wound, rotate the two sets of disk members back, each the less than single full rotation to bring each to its zero or stop position as determined by the respective abutments 70, 46.

The device is thus automatically reset, so that for a repetition of this determined count operation over the great range of adjustments, it is only necessary to again pull the handle 80. Were it desired to change the adjustment, opening of door 92 permits access for the first set change, while opening of the opposite door 93 permits access to the housing 17 for changing the selected adjustment of the hundreds or second set. At a setting of less than one hundred, of course the dog 35 initially holds the block 82.

As the shaft 12 oscillates, the shaft 16 also oscillates to cause actuator 21 to give the step by step driving of the disk 24 as held by pawl 37, to wind the reset segment 50 and its spring 52. As the numbers run beyond one hundred, projection 48 as a transmission device drives actuator pawl 60 and tally disk 61 is rotated to wind up its reset spiral spring 73. As the hundreds are tallied off, the projection 75 rocks the dog 78 so that the compression spring 83 pushes the block 82 against the dog 35. As the less than hundreds, or rather units and tens are tallied off, the projection 31, tilts the dog 35 for the full release of the block 82, with simultaneous stopping of the apparatus by throwing the switch 86, but also full freeing of the tally disks 24, 61 from the pawls 21, 37, and 60, 66, so that each of the reset means brings the instrument elements back to the zero positions as determined by the dogs 44, 71, impinging against the abutments 46, 70.

The range of utility of the instrument for accurate measurements or counting over very wide ranges, permitting ready adjustment for similar or different repeats, lends materially to automatic operations involving great accuracy. Upon the completion of any duty, the instrument is automatically in readiness for a repeat.

What is claimed and it is desired to secure by Letters Patent is:

1. A counter including a plurality of register members, driving means for actuating one register member and then another for summation, and means connected to be automatically thrown in by the members effecting release of the driving means and coacting upon such release of the driving means from the members for automatically resetting the members, whereby successive summations may be taken care of in sequence directly by the counter.

2. A counter including a plurality of adjustable register members, driving means for the members for actuating one register member and then another for summation and two means engaging the members when driven to a tally position, one of said means being wound in one direction and the other in the opposite direction for automatically

releasing and resetting the members, whereby an adjusted summation may occur successively directly by the counter action.

3. A counter including an adjustable control disk, a rotation drive receiving disk connectible to the control disk, a rotation effecting resetting spring coacting for reversing the direction of rotation travel of the disks as released by the control disk, driving means for the drive receiving disk, and a zero stop for the spring reset disks at the limit of reverse travel thereof.

4. A counter embodying adjustable control members for limiting registering, registering members connected to be driven rotatively in the same direction and released by the control members, and rotation effecting resetting means normally acting independently upon the members for the same direction of resetting rotation travel for both of said members.

5. A counter embodying a plurality of sets of adjustable control members for limiting registering and registering members connectible thereto, driving means for the sets, and independent rotation effecting resetting means for each set of said members.

6. A counter embodying a registering member and an adjustable control member connectible thereto as one set, and a second registering and control member connectible thereto as another set, driving means for the sets, and successively set automatic resetting means for the member sets.

7. A counter embodying a first registering disk, a first adjustable control disk connected thereto for limiting registering, a second registering disk, a second adjustable control disk connectible thereto for limiting registering, said disks being coaxially fixed, and a transmission device coacting from the first disks to actuate the second registering disk.

8. A counter embodying a first registering disk, a first adjustable control disk connected thereto for limiting registering and to form therewith a set, a second registering disk, a second adjustable control disk connected to the second registering disk for limiting registering and to form therewith a second set coaxially fixed with the first set to be set in the same angular direction as the first set, and a transmission device between the sets including a disk connected to one set and an actuator coacting between this disk and the other set.

9. A counter embodying a set comprising a registering disk, an adjustable control member therefor for limiting registering, an integer transmitting element, an actuator operable by the element, a second registering disk driven by the actuator and coaxially fixed with the first registering disk, and an adjustable control member for the second registering disk for limiting registering.

10. A counter embodying registering members relatively adjustable for limiting registering for the members to the reset position, rotation effecting reset means for recovering the members from the attained position to starting position, connections for winding the reset means from the members during actuator operation, and automatic release means connected to be operated automatically at a determined position of the counter for throwing out the actuators to permit resetting of the members.

11. A counter including a register member, driving means operable normally to actuate the member in one direction for a plurality of rotations, automatic release and reverse travel means coacting with the member for resetting the member and embodying set mechanism controlled by the driving means coacting in resetting through the number of driven rotations of such member, and a zero stop for the reverse travel of the member.

12. A counter including a register member, forward and recover rotation driving means therefor, said forward driving means being effective for a plurality of rotations of the member, and a zero stop disclosure means coacting between the recover driving means and the register member at the first angular position of said stop upon reverse rotation of the member thereto independently of the number of driven rotations.

13. A counter including a multiple rotation one direction operable register member, recover travel effecting means therefor provided with an escapement permitting the multiple rotations of the member in the one direction, and a zero stop for the recover travel of the member.

14. A counter including a plurality of register members, driving means therefor whereby they are driven successively, a zero stop for each member, and automatic mechanism for bringing said members simultaneously to their stops.

15. A counter embodying a register member, and resetting mechanism for the member including recover travel effecting means connected to the member to be rendered effective thereby and provided with an escapement permitting unlimited register member travel beyond the effective positioning of the means.

16. A counter embodying a register member, and resetting mechanism for the member including recover travel effecting means connected to the member to be rendered effective thereby and provided with an escapement permitting further travel of the register member therebeyond, and a zero stop for determining the limit of the member travel as actuated by the recover means.

In witness whereof I affix my signature.

JOHN C. SCHAFFER.