L. KRUG.

REVOLUTION COUNTER.

APPLICATION FILED JAN. 29, 1920.

1,425,982. Patented Aug. 15, 1922.

Fig. 1.

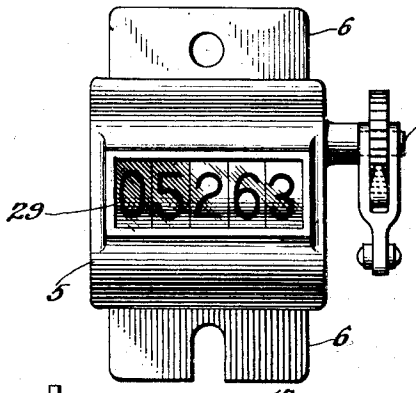


Fig. 2.

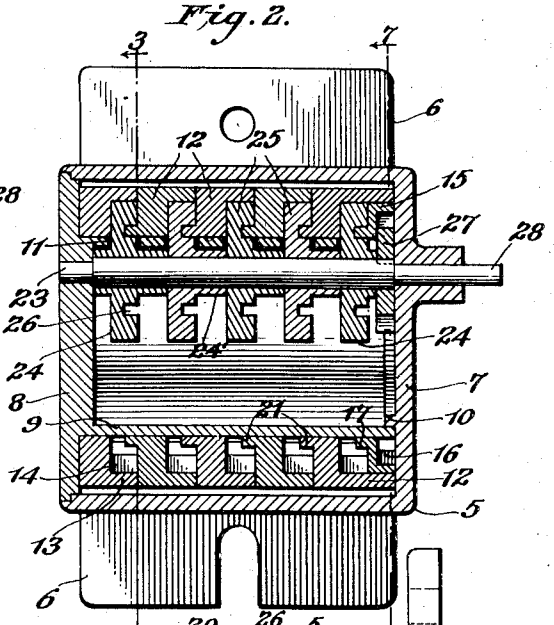


Fig. 4.

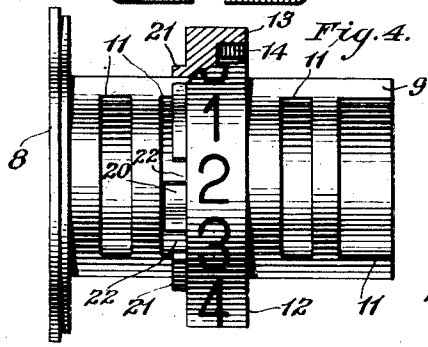


Fig. 3.

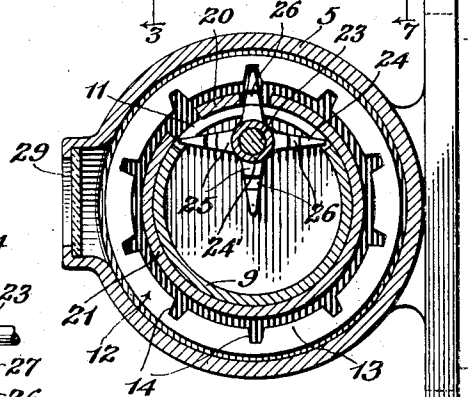


Fig. 5.

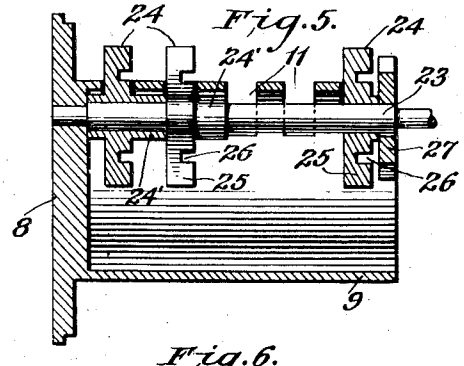


Fig. 6.

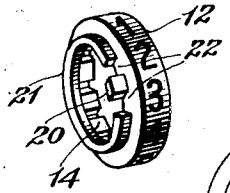


Fig. 7.

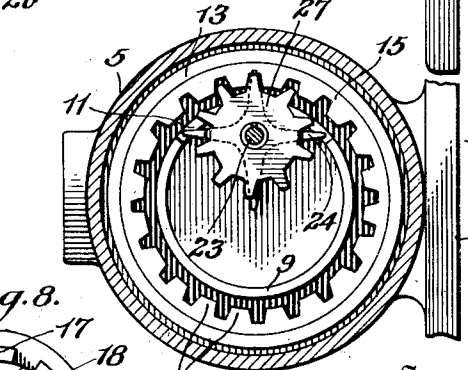
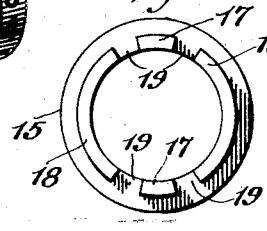


Fig. 8.



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UNITED STATES PATENT OFFICE.

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REVOLUTION COUNTER.

1,425,982. Specification of Letters Patent. Patented Aug. 15, 1922.

Application filed January 29, 1920. Serial No. 354,798.

To all whom it may concern:

Be it known that I, LUDWIG KLUG, a citizen of the German Republic, and a resident of the borough of Manhattan, city of New York, and county and State of New York, have invented a new and useful Revolution Counter, of which the following is a full, clear, and exact description.

This invention relates to revolution counters, and has for its primary object to provide a mechanism for automatically registering the number of revolutions of a wheel or other part of a machine, which will be positive in its operation and absolutely accurate.

It is a more particular object of my invention to provide a device of the above character having a series of revoluble digit wheels and carrying wheels to transmit movement from one digit wheel to another, said carrying wheels normally coacting with the adjacent digit wheels in such manner as to provide a positive locking means, and prevent the casual rotation of one wheel relative to the other.

My invention also contemplates a very simple and compact arrangement of the several cooperating elements so that the mechanism can be mounted in a case or housing of relatively small size and will present a neat appearance when mounted upon a machine in connection with which the device is to be used.

With the above and other objects in view the invention consists of the improved form, construction and relative arrangement of the several parts, as will be hereinafter more fully described, illustrated in the accompanying drawings, and subsequently incorporated in the subjoined claims.

In the drawings, wherein I have disclosed one satisfactory embodiment of the invention, and in which similar reference characters designate corresponding parts throughout the several views:

Figure 1 is a front elevation of the improved revolution counter,

Figure 2 is a vertical, longitudinal, sectional view,

Figure 3 is a section taken on the line 3—3 of Figure 2,

Figure 4 is a detail elevation of the drum with one of the digit wheels mounted thereon,

Figure 5 is a longitudinal, sectional view through the drum, the digit wheels and certain of the carrying wheels being removed,

Figure 6 is a detail perspective view of one of the digit wheels, and,

Figure 7 is a section taken on the line 7—7 of Figure 2.

Figure 8 is a detail elevation of one of the parts.

Referring in detail to the drawings, 5 designates a case or housing, which is formed upon one side with the oppositely extending attaching flanges 6. The housing 5 is closed at one end by the wall 7, while the opposite end of said housing is adapted to be closed by a removable plate 8.

A drum 9 is integrally formed at one of its ends with the removable plate 8, and at its other end is adapted to engage over a shoulder 10, formed upon the wall 7 when the drum is inserted within said housing. The wall of the drum 9 is provided with a plurality of spaced circumferentially extending slots 11, the purpose of which will be presently explained.

On the drum 9 a plurality of digit wheels 12 are loosely mounted for relative rotation. Each of these wheels is formed with an annular flange 13, projecting laterally from one side thereof, said flange being formed internally with the spaced teeth 14. The digit wheel 12 at the right, or the unit wheel is provided with a flange 13 of greater width than the flanges on the remaining digit wheels, so as to afford a smooth or untoothed annular portion projecting beyond the teeth 14. Within this projecting portion of the flange on the unit wheel a ring or annulus 15 is loosely fitted. This annulus is provided with internal gear teeth 16 in a similar manner to the several digit wheels, though in greater number. Preferably, the annulus 15 is provided with twenty teeth. From the opposite side face of this annulus and at diametrically opposite points the lugs 17 project, and a concentric shoulder 18 is also formed upon the annulus, said shoulder being spaced from the opposite side edges of each lug so as to thereby provide the spaces or recesses 19.

Each of the digit wheels is also formed with a single lug 20, projecting laterally from one side thereof, and with the shoulder 21, which is likewise spaced from the opposite side edges of said lug to provide spaces or recesses 22.

As will be clearly seen from reference to Figure 2 of the drawings, the digit wheels, when assembled upon the drum 11, have their opposed side faces in close contact with each other, the lug 20 and shoulder 21 of one wheel extending within the flange 13 on the adjacent wheel and in spaced relation to the teeth 14 on said flange.

A shaft 23 is journaled in the wall 7, and the plate 8 of the case or housing, and extends through the drum 11. This shaft is arranged in spaced parallel relation to the axis of the drum and adjacent to the wall thereof. Upon the shaft 23 a series of carrying wheels 24 are loosely mounted for free rotation relative to each other. Each of these wheels is formed with a hub extension or sleeve 24', whereby the wheels are held in proper spaced relation and against relative longitudinal movement on the shaft. Each carrying wheel 23 is preferably formed with four radially projecting teeth 25, and, as seen in Figures 3 and 5 of the drawing, these teeth project through the respective slots or openings 11 in the drum, and extend between the opposed faces of the adjacent digit wheels 12, one tooth of each carrying wheel being disposed between the adjacent teeth 14 of one digit wheel. The teeth 25 of each carrying wheel are provided in one side face thereof with grooves or channels 26, through which the shoulders 21 on the digit wheels may freely move. In each case, the teeth 25 of the carrying wheel located at opposite sides of that tooth which is engaged with the teeth 14 of one digit wheel project through the ends of the slot 11 in the drum, and are disposed closely adjacent to the inner face of the shoulder 21 on the next digit wheel at the right. Thus it will be apparent that when this latter wheel is rotated, the wheel at the left thereof will be locked against casual movement by the oppositely projecting teeth 25 of the carrying wheel. In this manner, the whole series of digit wheels are securely held against a shifting rotative movement on the drum, so that the digits on the peripheral faces of these wheels will be maintained in proper alignment with each other to facilitate the easy reading thereof.

Upon the right hand end of the shaft 23 between the wall 7 of the housing and the first of the carrying wheels a pinion 27 is keyed or otherwise fixed for rotation with said shaft. This pinion, which is provided with ten teeth, is in constant meshing engagement with the teeth 16 of the annulus 15, and thus imparts a continuous rotation to said annulus. Upon the projecting end 28 of the shaft a gear or other suitable drive means is secured, whereby the mechanism may be operatively connected to the driven part of a machine. It is, of course, understood that the shoulder 18 on this annulus moves through the slots 26 in the teeth of the first carrying wheel, as these teeth are successively brought into operative engagement with the first of the digit wheels.

In the operation of my invention as above described, it will be understood that in each revolution of the shaft 23 a half revolution is imparted to the annulus 15, and one of the lugs 17 thereon, which are wider than the shoulder 18, is thus caused to engage against the side of the tooth 25 of the first carrying wheel, which is operatively engaged between the teeth 14 of the first digit wheel. Thus a step rotation is imparted to this digit wheel to expose the next higher numeral on its peripheral face in the sight opening 29 of the case or housing 5. This operation is repeated in each revolution of the shaft 23 until the zero on the first digit wheel is exposed through the sight opening. In this latter step rotation of the digit wheel the lug 20 thereon engages against the side of the tooth on the second of the carrying wheels 24, and thus imparts a step rotation to the second digit wheel to expose the numeral 1 thereof in the sight opening. In this operation, the next adjacent tooth 24 of the carrying wheel moves up through the slot 11 in the drum and also through the space or recess 22 between the lug 20 and the shoulder 21 on the digit wheel until the groove 26 in said tooth is in line with the shoulder. These operations are continued and in every revolution of one of the digit wheels a step rotation is automatically imparted to the next adjacent digit wheel at the left.

As above explained the disposition of the teeth on the carrying wheels with relation to the digit wheels serves to securely lock the several digit wheels against a casual rotative movement on the drum which might be occasioned either by vibration or by frictional adherence between the contacting faces of the adjacent digit wheels.

From the foregoing description considered in connection with the accompanying drawing, the construction, manner of operation and several advantages of my improved revolution counter will be readily understood. The several parts of the device are of simple form, and owing to the compact arrangement of the digit wheels and the carrying wheels, the operation of the mechanism is rendered positive and reliable under all conditions.

Another important and practical feature of my invention resides in the mounting and arrangement of the wheel carrying drum 9. By mounting this drum on the removable end plate 8 of the case or housing, the entire mechanism may be easily and quickly removed and the individual digit wheels and carrying wheels readily assembled or disassembled for the purpose of inspection

or repair. Of course, while I have indicated in the drawing only five of the digit wheels, it will be apparent that the multiple arrangement of these wheels might be increased or decreased as the particular purpose and use for which the invention is intended may require.

I have found the arrangement herein disclosed to give excellent results in practical use. In view of the simplicity of such arrangement, it is also apparent that the counter can be produced at comparatively small manufacturing cost.

While I have herein shown and described the preferred construction and relative arrangement of the various elements, it will be manifest that the device might also be exemplified in numerous other alternative constructions. Accordingly the privilege is reserved of resorting to all such legitimate changes as may be fairly embodied within the spirit and scope of the appended claims.

What I claim is:

1. A rotation counter or the like comprising digit wheels, carrying wheels having engagement to rotate the digit wheels, relatively-rotatable means between each digit and carrying wheel for avoiding casual rotation of the wheels, and means on each digit wheel for actuating the associated carrying wheel intermittently.

2. A rotation counter or the like comprising digit wheels, grooved carrying wheels, means on the digit wheels occupying the grooves of the carrying wheels to avoid casual rotation of the wheels, and means on the digit wheels to intermittently actuate the associated carrying wheels.

3. A transfer couple comprising digit and transfer means provided between them with a cooperating groove and shoulder engaging the groove to avoid casual rotation.

4. A rotation counter comprising carrying or transfer wheels, digit wheels engaging the carrying wheels at opposite sides and being in respectively driving and driven relation thereto, the driving carrying wheel having means to rotate the digit wheel step by step, said carrying wheel having parts overhanging said means, said driving digit wheel having means engaged by the overhanging parts to avoid casual rotation of the wheels.

5. In a revolution counter, a series of digit wheels independently revoluble about a common axis, carrying wheels having a common axis of rotation, each carrying wheel having teeth adapted to successively coact with one digit wheel to impart a step rotation thereto, each of said teeth having a groove in one side, means on an adjacent digit wheel to operatively engage the coacting tooth of the carrying wheel and move the first-named digit wheel one step, said second-named digit wheel having an annular shoulder to engage in the grooves of said teeth as they are successively brought in operative relation to the first-named digit wheel and thereby lock the carrying wheel while permitting of the free rotation of said second-named digit wheel.

6. In a revolution counter a series of digit wheels independently revoluble about a common axis, carrying wheels having a common axis of rotation, each carrying wheel having teeth adapted to successively coact with one digit wheel to impart a step rotation thereto, each of said teeth having a groove in one side, means on an adjacent digit wheel to operatively engage the coacting tooth of the carrying wheel and move the first-named digit wheel one step, said second-named digit wheel having an annular shoulder to engage in the grooves of said teeth as they are successively brought in operative relation to the first-named digit wheel and thereby lock the carrying wheel while permitting of the free rotation of said second-named digit wheel, the shoulder on the latter digit wheel having a recess therein through which the teeth of the carrying wheel may move into coacting relation with the first-named digit wheel.

7. In a revolution counter, a series of digit wheels independently revoluble about a common axis, a series of carrying wheels having a common axis of rotation, each carrying wheel having teeth adapted to successively coact with one digit wheel to impart a step rotation thereto, each of said teeth having a groove in one side, a lug projecting laterally from an adjacent digit wheel and adapted to engage said coacting tooth of the carrying wheel and thereby move the first-named digit wheel one step, said second-named digit wheel also having a laterally projecting shoulder of less width than the lug adapted for engagement in the grooves of said teeth on the carrying wheel as they are successively brought into coacting relation with the first-named digit wheel, whereby the carrying wheel is locked against casual rotation while permitting of the free rotation of said second-named digit wheel.

In testimony that I claim the foregoing as my invention, I have signed my name.

LUDWIG KRUG.