Oct. 9, 1923. 1,469,932

A. A. ADAMS

COUNTER

Original Filed March 5, 1914

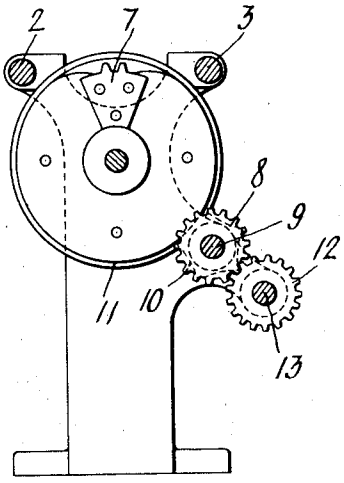


FIG. 2

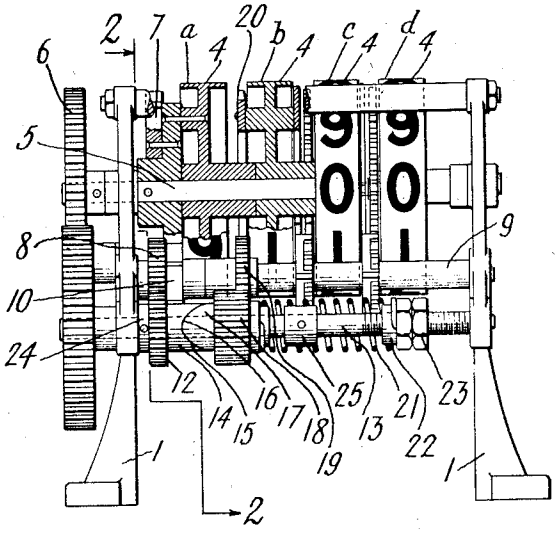


FIG. 1

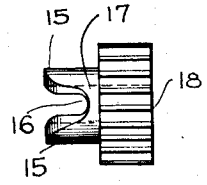


FIG. 3

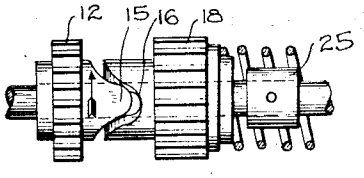


FIG. 4

Frank A. Emery and Arthur A. Adams, Inventors

By their Attorney

Jesse G. Holton

Patented Oct. 9, 1923. 1,469,932

UNITED STATES PATENT OFFICE.

ARTHUR A. ADAMS, OF BROOKLINE, AND FRANK A. EMERY, OF WELLESLEY HILLS, MASSACHUSETTS.

COUNTER.

Application filed May 15, 1917. Serial No. 168,791.

To all whom it may concern:

Be it known that we, ARTHUR A. ADAMS and FRANK A. EMERY, citizens of the United States, and residents, respectively, of Brookline and Wellesley Hills, both in the Commonwealth of Massachusetts, have invented certain new and useful Improvements in Counters, of which the following is a specification.

This invention relates to counters and with respect to certain more specific features thereof to counters of the rotatable wheel type, wherein adjacent wheels are relatively movable.

It is one of the objects of the invention to provide a counter which shall be simple in construction, durable and inexpensive to manufacture.

Another object resides in the provision of a counting device capable of operation at high speeds and having reliable, efficient and durable means for transmitting power from one to another of the counter wheels.

Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly consists in various features of construction, combinations of elements and arrangements of parts which will be exemplified by the construction hereinafter set forth and the scope of the application of which will be indicated in the following claims. The present application is a division of one for improvements in weighing machines, Serial No. 822,560, filed by applicants on March 5, 1914.

In the accompanying drawings wherein is shown one of various possible embodiments of the invention;

Fig. 1 is a view in front elevation with certain of the counter wheels in section to more clearly disclose the construction.

Fig. 2 is a sectional view, the section being taken on the line 2—2 of Fig. 1.

Fig. 3 is a view in elevation of a portion of the yielding device interposed between counter wheels.

Fig. 4 is a view of the yielding device, a portion of which is shown in Fig. 3, the arrow indicating the direction of movement and the parts being shown in the relative positions which they assume during the yielding or lagging moment.

Referring more particularly to the drawings, wherein similar reference characters refer to similar parts throughout the different views, spaced standards 1 are shown connected by rods 2 and 3 to provide the supporting frame of the indicator or counter. A series of register wheels 4 is mounted on a shaft 5 which in turn is journaled in bearings in the standards 1. It is, of course, to be understood that the present counter device is to be used in connection with exterior actuating mechanism although the same has not been shown as the invention resides in the counter per se. The shaft 5 may be considered as the main driving or indicator shaft having fixed thereon the main driving gear 6.

The counter wheels designated generally at 4 may be more specifically termed a units wheel *a*, a tens wheel *b*, a hundreds wheel *c*, and a thousands wheel *d*. The units wheel is fast on the indicator shaft and is adapted to operate comparatively at a very high rate of speed. At each complete rotation of the units wheel of the indicator the tens wheel is rotated one-tenth of a rotation, and to this end there is employed a transfer device comprising a double toothed arm 7 fast on the units wheel and adapted to engage a pinion 8 loose on a shaft 9 journaled in the standards 1. To prevent this pinion from rotating excepting at the times when it is engaged by said double-toothed arm, the pinion is provided with a star wheel extension 10 having portions peripherally curved to conform to the contour of a disc 11 fast on the face of the units wheel. The periphery of this disc is smooth and uninterrupted excepting opposite to the double toothed arm As a result the pinion is held stationary by said disc excepting at the times when it is engaged by said toothed arm under usual operating conditions. The speed of rotation of the units wheel *a* is so high that the intervals when the pinion is not engaged by said arm are so short that the pinion is almost continuously rotated. If the tens wheel were advanced positively from the units wheel driven pinion the transfer mechanism would be quickly worn out by the frequency of the beats of the toothed arm on the pinion. To avoid this the transfer is provided with a yielding transmission comprising a second pinion 12 loosely journaled on a shaft 13 which in turn is journaled in the bearing brackets or standards 1 and is driven by the pinion 8.

Pinion 12 has a hub 14 projecting from one face thereof provided with cam teeth 15 and notches 16 engaging similar notches and teeth, respectively, on a hub 17 projecting from one of the faces of a wide faced pinion 18 loose on the shaft 13. This wide faced pinion meshes with a pinion 19 loose on the shaft 9 which in turn meshes with a gear 20 fast on the tens wheel *b*. The wide faced pinion is free to slide axially on its shaft but is urged to the left in Fig. 1 to maintain engagement of the hub teeth, by a helical spring 21 on the shaft 13 confined between the wide faced pinion and a nut 22 threaded on said shaft. This nut is held by a suitable lock nut 23. To prevent the pinion 12 from sliding against the side of the standard 1 there is provided a collar 24 fast on the shaft. To limit the sliding movement of the wide faced pinion to the right in Fig. 1, the shaft 13 has pinned thereto a collar 25 adapted to be engaged by the hub of the wide faced pinion.

In the operation of the device in transmitting a tenth of a rotation to the tens wheel on each complete rotation of the units wheel each time the latter rotates its toothed arm engages the pinion 8 and turns the same one-fifth of a rotation. This movement is transmitted through the wide faced pinion and the pinion 19 to the gear attached to the tens wheel *b*, which is of double diameter whereby one-tenth of a rotation is imparted to the tens wheel. In transmitting the quick successive turning movements from the pinion 12 to the wide faced pinion the latter lags somewhat and there is a relative rotation between the two pinions due to the relative wiping of the inclined cam faces of the teeth on their cooperating hubs, while one of them moves axially from the other under the yielding of the spring 21. When the indicator stops, however, the spring presses the hub teeth of the pinion 18 closely into engagement with the hub teeth of the pinion 12, as shown in Fig. 1. In the course of this movement the pinion 18 rotates slightly and catches up or recovers the movement which it loses by virtue of its lag. Consequently, the tens wheel will be so related with the units wheel that the numerals to be read will all be in one line. The wide faced pinion never slides on this shaft sufficiently to permit the cooperating teeth on the opposed hubs to move completely past one another. This is due to the presence of the stop 25 on the shaft. As a result there is never any loss encountered by transmission. In practice it is found that the wide faced pinion experiences a rapid reciprocating axial movement in transmitting rotation from the units to the tens wheel.

The transfer is made from the tens wheel to the hundreds wheel by a toothed arm, star wheel, pinion and disc, and the transfer is similarly made from the hundreds to the thousands wheel. Since the hundreds and thousands wheels are turned infrequently as compared to the tens wheel, a yielding transmission mechanism therefor is not essential.

It will be noted that the construction of this indicator is such that the drive of the indicating wheels may be in either direction, according to the direction of rotation of the main drive gear 6, and that the shock of impulse in the intermittent transfer of power from the units wheel to the tens wheel is absorbed in the same fashion in both directions of rotation. Such an indicator is adapted for operation at high speeds in either direction of rotation and is particularly adapted for use on electric weighing machines such as originally shown in connection therewith in the application of which this is a division.

As many changes could be made in the above construction and as many apparently widely different embodiments of the invention might be made without departing from the scope thereof, it is intended that all matter set forth in the foregoing description or shown in the accompanying drawings shall be interpreted as illustrative and not in any limiting sense.

Having described the invention, what we claim is:

1. An indicator comprising a master wheel, and a wheel which is fractionally rotated periodically by the master wheel, means for relieving the shock of transmission impulse and justifying the wheels at the end of the transmission impulse, said means comprising a pair of interfitting cam faced elements mounted on a shaft and relatively yieldable rotatively and axially against a spring, a stop preventing complete disengagement of said pair of elements, a gear on each of said elements arranged in transmitting relation with the master wheel and the periodically rotated wheel respectively.

2. An indicator comprising a master wheel and a wheel which is fractionally rotated periodically by the master wheel, means for effecting such fractional periodic rotation, said means comprising gearing between the two wheels and a clutch, the clutch including two interfitting but yieldable cam elements and a shaft on which the cam elements are mounted, a stop preventing complete disengagement of the cam elements, and a spring tending to press said cam elements into interfitting relation; so that during the period of transmission the cam elements may relatively yield axially and rotatively but subsequently the spring will reestablish the normal relation of the cam

elements which will be a rotatively advanced position of the cam elements on the mounting shaft.

3. An indicator comprising, in combination, a shaft having a plurality of character wheels thereon, one of the wheels being fixed with said shaft and another being rotatable on said shaft, a shock absorbing and aligning mechanism between the two specified wheels, said mechanism including two clutch elements and a shaft therefor, a gear on each clutch element, cam means on the clutch elements and a spring urging the clutch to closed position, a stop on the clutch shaft which prevents complete disengagement of the clutch elements, and means operative at a certain point in the rotation of the fixed wheel adapted to transmit an impulse of rotative movement to the gear on one clutch element whereupon the other clutch element may yield rotatively and longitudinally against the spring action which at the end of the impulse serves to restore the clutch elements to their previous relationship.

4. An indicator comprising in combination, a master character wheel, a plurality of driven character wheels, and transmission means having included therein a pair of interfitting cam-faced elements spring-pressed into engagement and so arranged and constructed as to be incapable of complete separation, said spring-pressed clutch elements being adapted to take up the shock of periodic transmitting impulses by relatively yielding rotatively and axially, and returning to their original relation at the end of the transmitting impulse in order to justify characters on the wheels of the indicator.

ARTHUR A. ADAMS.
FRANK A. EMERY.