No. 867,049. PATENTED SEPT. 24, 1907.

A. J. KIRCHNER.

REGISTER.

APPLICATION FILED APR. 30, 1906.

Fig. 1.

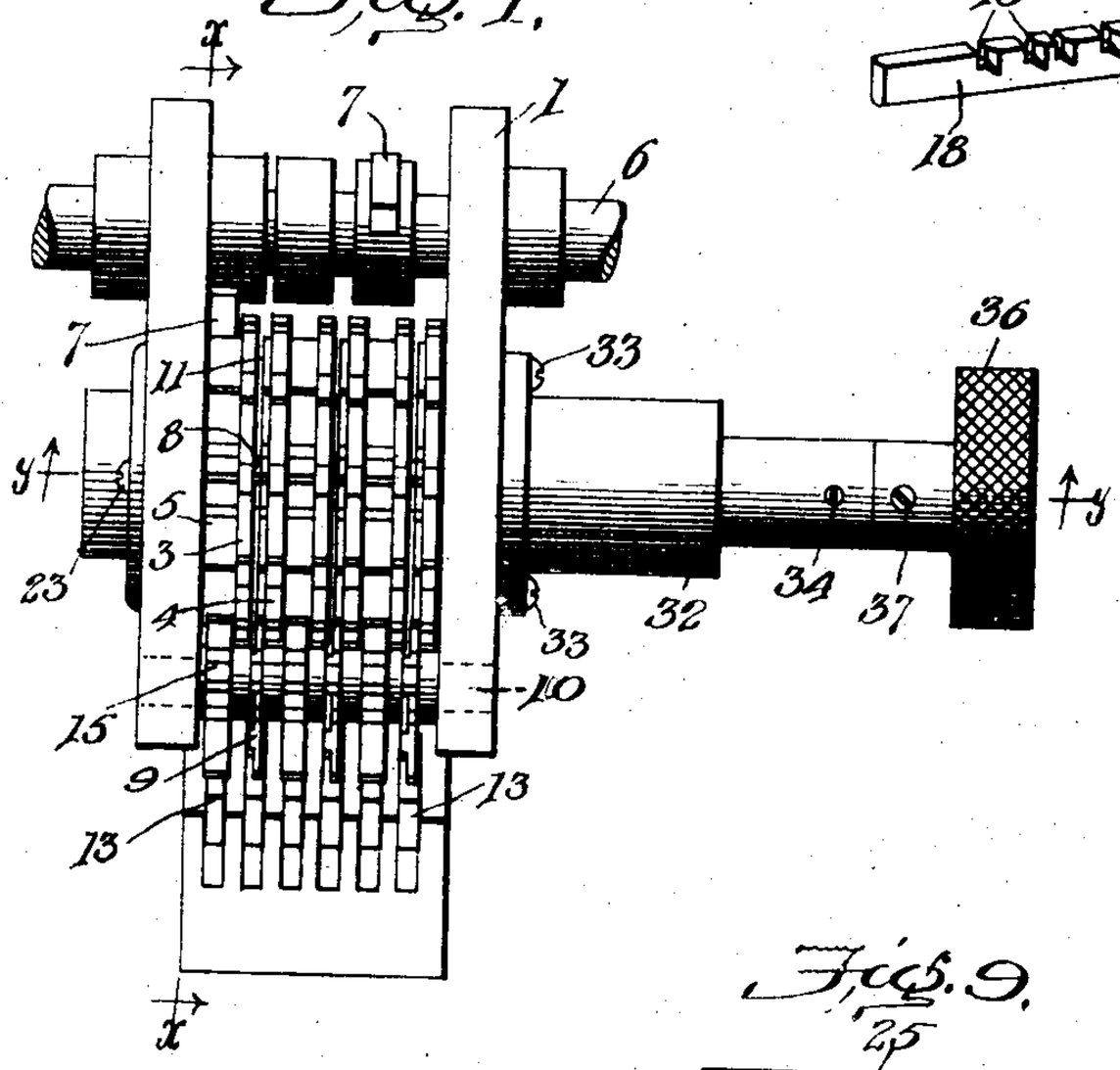


Fig. 7.

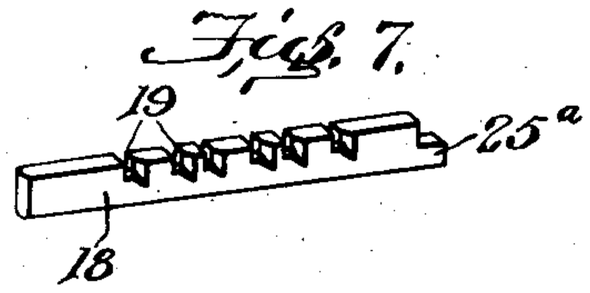


Fig. 2.

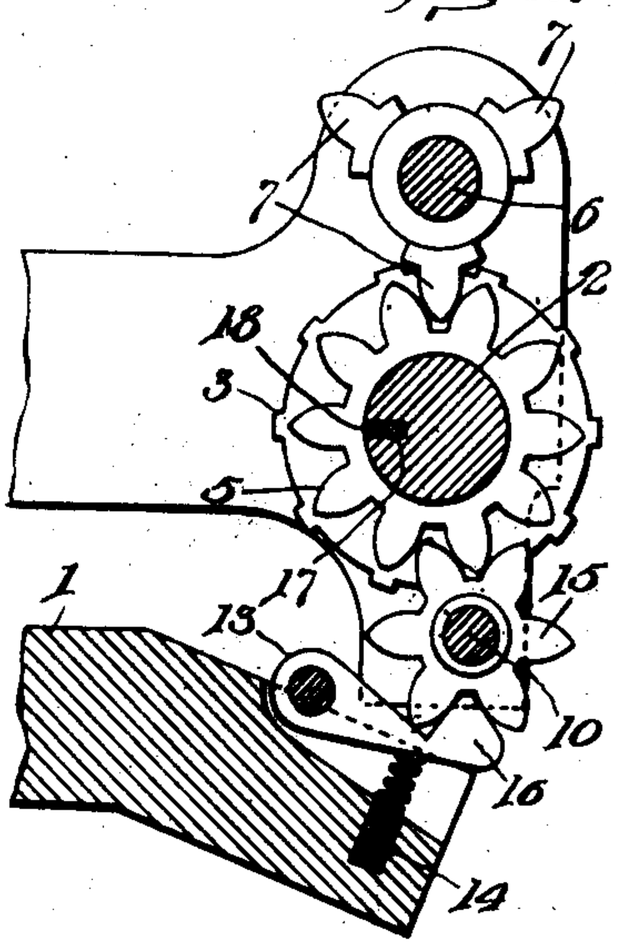


Fig. 9.

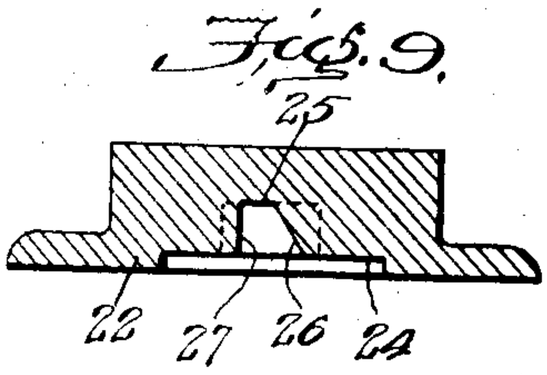


Fig. 5.

Fig. 3.

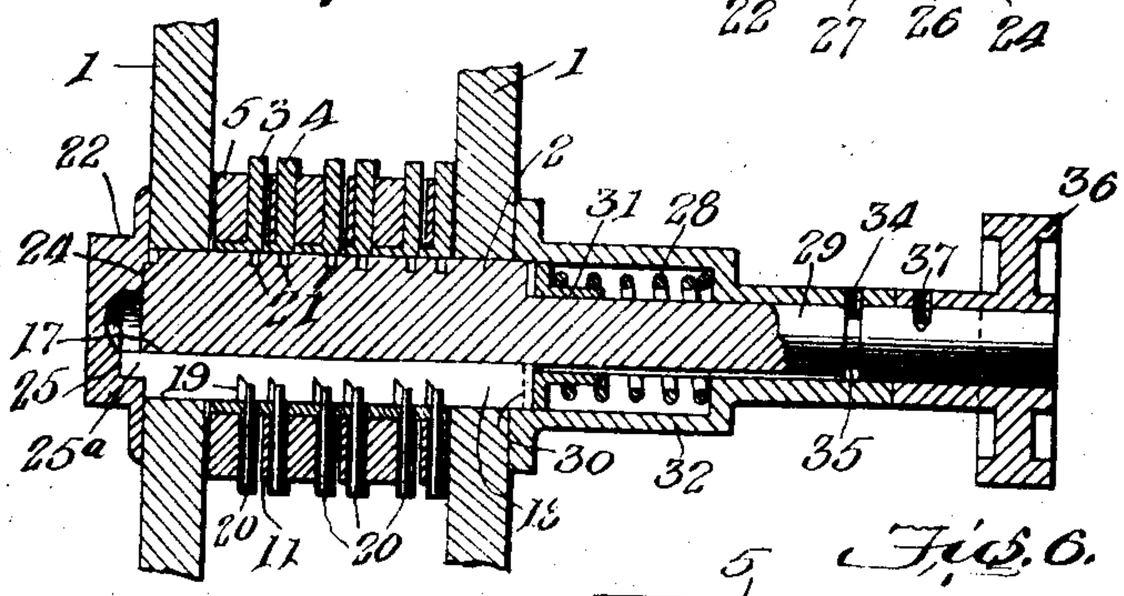


Fig. 4.

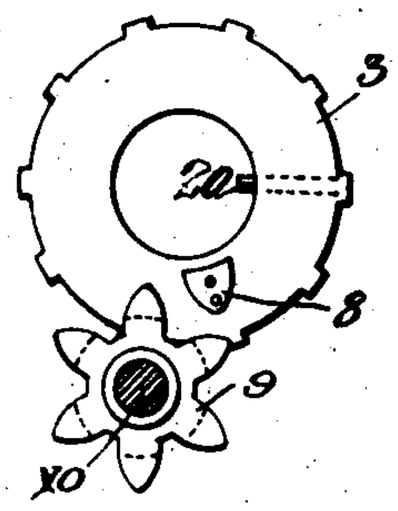


Fig. 6.

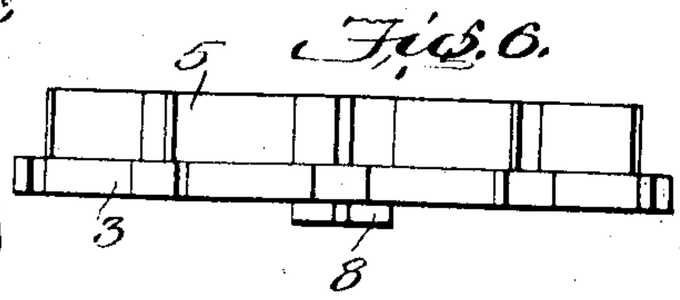
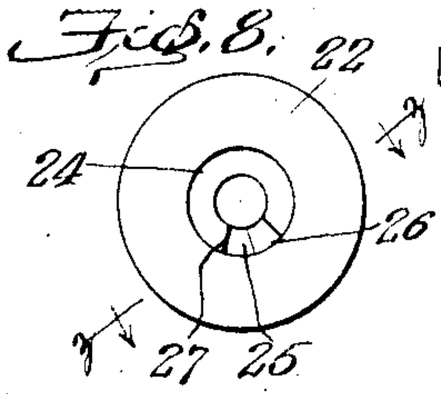


Fig. 8.



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UNITED STATES PATENT OFFICE.

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REGISTER.

No. 867,049. Specification of Letters Patent. Patented Sept. 24, 1907.

Application filed April 30, 1906. Serial No. 314,374.

To all whom it may concern:

Be it known that I, ALBERT J. KIRCHNER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Registers, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to registers, and more particularly to that class of registers in which provision is made for resetting the register wheels to zero.

The object of the invention is to provide a construction which shall be simple, efficient and highly compact, and so organized that a single rotation of the shaft on which the register wheels are mounted will reset all of said wheels to zero.

To these ends my invention consists in certain novel features which I will now proceed to describe, and will then specifically point out in the claims.

In the accompanying drawings, Figure 1 is a plan view of a structure embodying my invention in one form; Fig. 2 is a sectional view of the same, taken on the line *x x* of Fig. 1 and looking in the direction of the arrows; Fig. 3 is a sectional view, taken on the line *y y* of Fig. 1 and looking in the direction of the arrows; Fig. 4 is a view of the opposite side of the register and transfer wheels from that shown in Fig. 2; Fig. 5 is a detail perspective view of one of the transfer wheels, detached; Fig. 6 is an edge view of one of the register wheels, detached, the same being shown on an enlarged scale; Fig. 7 is a detail perspective view of the key bar, detached; Fig. 8 is a face view of the cam which controls the key bar, detached; and Fig. 9 is an enlarged detail sectional view of the same, taken on the line *z z* of Fig. 8 and looking in the direction of the arrows.

In the present instance, the construction chosen for purposes of illustration is a printing counter, a group of three of which is shown to illustrate the invention, and more particularly the compactness of structure which it renders possible by permitting the bringing together immediately side by side of the wheels of the same and of different counters or registers. The invention is, however, adapted for use in connection with other forms of registering or counting mechanism.

The mechanism is shown as mounted in a bracket or support 1, in which the shaft 2 has its bearings and is free to rotate. On this shaft are mounted the register wheels, two being shown in the case of each register in the present instance, a units wheel 3 and a tens wheel 4. The units wheel is provided on one of its faces with a ten toothed gear 5, formed on or secured thereto, by means of which gear the register is actuated. In the present instance, I have shown mounted in the bracket or support 1 an actuating shaft 6, carrying an actuating member 7 for each register, said actuating member being shown in the form of a one toothed gear, so that, each time the shaft 6 is rotated, the said actuating member, meshing with the gear 5, will advance the units wheel 3 one step. On the opposite side of the units wheel there is formed or secured a single tooth 8, by means of which there is driven a transfer wheel 9, mounted on a shaft 10 parallel with the shaft 2. The transfer wheel 9 meshes with a ten toothed gear 11 on the face of the tens wheel 4 which is adjacent to the units wheel. It will be seen that at the completion of each revolution of the units wheel the tooth 8 will, through the transfer wheel 9, advance the tens wheel one step. It will be observed that the bodies of the teeth of the transfer wheel 9 are of a width such as to mesh with both the tooth 8 and the gear 11 as they lie side by side. It will be further observed that the outer portion of each tooth, on the side thereof nearest the tooth 8, is rabbeted or cut away, as indicated at 12, for a reason which will be hereinafter explained.

In order to hold the register wheels in position after each movement thereof, suitable detent pawls 13 are employed. These pawls are pivoted in slots in the bracket or support 1, and are backed by springs 14. There is a detent pawl for each register wheel, and, in the case of the units wheel, there is mounted on the shaft 10 a detent wheel 15, meshing with the gear 5 of the units wheel. The pawl 13 has a V-shaped tooth 16, which fits between the teeth of the detent wheel 15 and holds the same, and the units wheel which is geared to it, against accidental displacement, yielding, however, when normal force is applied to operate the register. In the case of the tens wheel, and of other wheels of higher order, if employed, the transfer wheel is engaged by the detent pawl, so that said transfer wheel also serves as a detent wheel.

It will be understood, of course, that during the counting operations of the register the shaft 2 is stationary, serving merely as a support for the register wheels. Said shaft also forms the means for resetting to zero the register wheels, when rotating in a direction opposite to the normal direction of rotation of the register wheels. To this end, said shaft is provided with a longitudinal groove 17, in which fits so as to slide longitudinally therein a key bar 18, shown in detail in Fig. 7 of the drawings. This bar lies within the groove 17, with its outer edge flush with the outer surface of the shaft 2, and, in connection with each register, there is formed in said outer edge a plurality of notches or recesses 19, corresponding in number with the wheels of the register, in the present instance, two notches for each register. Each register wheel is provided with a pin 20, and the shaft 2 is provided with a circumferential groove 21 to accommodate the pin of each wheel, said pin extending inward and fitting within the cir-

cumferential groove when the wheels are in position on the shaft. It will be understood, of course, that the groove 17, prior to the placing therein of the key bar 18, serves to permit the register wheels to be placed in position on the shaft by receiving and permitting the passage of the pins 20 as the wheels are slipped lengthwise of the shaft to their final positions. It will also be seen that when the bar 18 is in such a position that its notches 19 register with the grooves 21, the wheels are free to turn upon the shaft. When, however, the bar 18 is in such a position that said notches do not register with said grooves, then the turning of the shaft will cause said bar to come into contact with the pins 20, and will carry the register wheels around with the shaft.

The pins 20 are so arranged relatively to the characters on the register wheels as to bring the same characters into alinement when the key bar has engaged all of the pins, and by arresting the motion of the shaft at the proper time, all of the wheels may be readily returned to zero. This is effected by means of a suitable cam 22, located at one end of the shaft 2, being secured in position on the bracket or support 1 by means of screws 23, or in any other suitable manner. This cam is provided with a flat annular cam surface 24, against which the end 25^a of the key bar bears, and on which it travels during the greater part of its rotation. When the bar is in this position, it is moved over so that its notches 19 do not register with the circumferential grooves 21, and rotation of the shaft therefore causes the bar to pick up the wheels.

25 indicates a depression in the cam 22, said depression lying between the ends of the flat annular portion 24, and being therefore in the path of the end 25^a of the key bar 18. This depression has on one side an inclined wall 26, and on the other side a right-angled wall 27. The bar 18 is pressed toward the cam by a spring hereinafter described, and when the rotation of the shaft 2 brings the bar opposite the depression 25, the bar is forced into the depression by the spring, said bar then moving over so that its notches 19 register with the grooves 21, leaving the wheels 10 free to revolve on the shaft 2 after they have thus been returned to zero. Continued rotation of the shaft 2 in the original direction will not affect the wheels, because, when the bar in its rotation approaches the pins, its end drops into the depression in the cam, thus bringing the notches into line with the pins, so that the wheels remain stationary. The normal position of the shaft is that in which the bar engages the depression of the cam, the right-angled wall 27 preventing rotation of the shaft in one direction, while the inclined wall 26 acts as a detent to hold the shaft in normal position, but at the same time, when sufficient force is employed for the purpose, permits the shaft to rotate, and at the same time forces the bar over into position to engage the pins of any of the wheels which may not be in zero position. In practice, in setting the wheels to zero the shaft 2 is rotated in the proper direction for one full rotation, thereby returning all of the wheels to zero, whereupon the end of the bar drops into the recess 25 and thereby indicates that the resetting parts are in proper position to permit the register to operate. The spring which forces the key bar into contact with the cam is preferably a spiral spring 28, coiled around the shaft, as shown in Fig. 3. In this particular construction the shaft has a reduced portion 29, around which the spring is coiled. This reduction forms a shoulder 30, beyond which the adjacent end of the bar 18 projects.

A collar 31, mounted to slide longitudinally on the reduced portion 29 of the shaft 2, is forced against the end of the bar 18 by means of the spring 28. This portion of the shaft, the spring and the collar, are inclosed and protected by a housing 32, secured to the bracket or support 1 by means of screws 33, or in any other suitable manner. Longitudinal displacement of the shaft may be prevented by means of a screw or threaded pin 34, passing through the housing and projecting into a circumferential groove 35 in the shaft.

The shaft is provided at its outer end with an operating knob or handle 36, which may be secured in position by a set screw 37.

It will be noted that, in returning or resetting the register wheels to zero, said wheels, in turning, also turn the transfer wheels with which they mesh. Thus, in the case of the two wheel counters chosen for purposes of illustration, the transfer wheel 9 of the tens wheel 4 rotates in unison with said tens wheel in returning to zero. But if it happens that at this time the units wheel happens to be at zero, then its single tooth 8, having just operated the transfer wheel, must lie immediately adjacent thereto, as shown in Fig. 4. With the units wheel in this position, if the teeth of the transfer wheel were of the same width or thickness throughout their length, when the transfer wheel is turned by the tens wheel in returning the latter to zero, the teeth of the transfer wheel would engage the single tooth 8 of the units wheel, and would turn this latter back from zero to nine. Thus, when the tens wheel reached zero, the units wheel would be displaced from zero position, and it would require two rotations of the resetting shaft, instead of one, to reset the counters to zero. It is to avoid this difficulty, and insure the resetting of all of the wheels to zero by a single rotation of the shaft, that the teeth of the transfer wheel are cut away or rabbeted at their outer ends, as shown at 12. For it will be seen from an inspection of Fig. 4 that, with the parts in the position shown, rotation of the units wheel 3 will always properly actuate the transfer wheel, while rotation of the transfer wheel will in no way affect the units wheel, since the cut away or rabbeted end portions of the teeth of the transfer wheel will permit the thin extremities thereof to pass the single tooth 8 of the units wheel without engaging the same and therefore without displacing the units wheel.

It will be seen that the construction is such that the register wheels are all returned to zero, no matter what their position may be, by a single rotation of the resetting shaft. It will further be seen that the same rotation of said shaft is all that is necessary, there being no longitudinal movement of the shaft required as a preliminary thereto, since the cam automatically shifts the key bar at the proper time. It will also be observed that the exterior of the shaft is smooth and cylindric, and free from any projections extending outward therefrom. Furthermore, since the register wheels do not require any lateral projections to engage with projections from the shaft, or any spaces or recesses to accommodate such projections, said wheels can be made very

thin or narrow, and can be brought close up to each other, and even in immediate contact with one another. By reason of this construction, a very compact register or group of registers is obtained, which is highly desirable in many cases, as, for instance, in the case of fare recorders or the like, where a large number of printing counters are grouped together in a comparatively small space.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described, for obvious modifications will occur to a person skilled in the art.

Having thus fully described my invention, what I claim as new and desire to secure by Letters Patent, is:—

1. In a register, a revoluble resetting shaft, and a key bar adapted to slide longitudinally therein, in combination with register wheels mounted to rotate on said shaft, said wheels and key bar having coöperating projections and recesses, and a fixed cam controlling the longitudinal movement of the key bar, whereby said recesses and projections are moved out of alinement when said shaft is rotated and are caused to register when the wheels are set at zero, substantially as described.

2. In a register, a revoluble resetting shaft, and a key bar adapted to slide longitudinally therein, in combination with register wheels mounted to rotate on said shaft, said wheels and key bar having coöperating projections and recesses, a fixed cam against which said key bar bears, and a spring holding said key bar in contact with said cam, said cam acting to cause said recesses and projections to register when the wheels are reset to zero, substantially as described.

3. In a register, a revoluble resetting shaft provided with circumferential grooves, and a key bar mounted to slide longitudinally in said shaft and provided with recesses adapted to register with said grooves, in combination with register wheels mounted to rotate on said shaft and provided with projections lying in said grooves and adapted to be engaged by the key bar, and means actuated by the rotation of said shaft for moving said key bar to cause its recesses to register with said grooves and projections, substantially as described.

4. In a register, a revoluble resetting shaft provided with circumferential grooves, and a key bar mounted to slide longitudinally in said shaft and provided with recesses adapted to register with said grooves, in combination with register wheels mounted to rotate on said shaft, said wheels having projections extending into said grooves and adapted to be engaged by the key bar, and means actuated by the rotation of said shaft for automatically shifting said key bar to cause its recesses to register with said projections, and grooves when the wheels are reset to zero, substantially as described.

5. In a register, a revoluble resetting shaft provided with circumferential grooves, and a key bar mounted to slide longitudinally in said shaft and provided with recesses adapted to register with said grooves, in combination with register wheels mounted to rotate on said shaft, said wheels having projections extending into said grooves and adapted to be engaged by the key bar, and means for automatically shifting said key bar to cause its recesses to register with said projections and grooves when the wheels are reset to zero, said means comprising a fixed cam and a spring acting to hold the key bar in contact therewith, substantially as described.

6. In a register, adjacent wheels having respectively a single tooth and a full gear on their adjacent sides, and a transfer gear meshing therewith, said transfer gear having the outer portions of each tooth rabbeted or cut away on the side adjacent to the single tooth, whereby said single tooth drives the transfer gear when the register is actuated in one direction as a counter, and whereby said transfer gear does not affect the single tooth when the register wheels are actuated in the opposite direction in resetting them to zero, substantially as described.

In testimony whereof, I affix my signature in presence of two witnesses.

ALBERT J. KIRCHNER.

Witnesses:
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D. B. WHISTLER.