Jan. 18, 1927. 1,614,712

F. J. CANNON

COUNTING DEVICE

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Fig. 1.

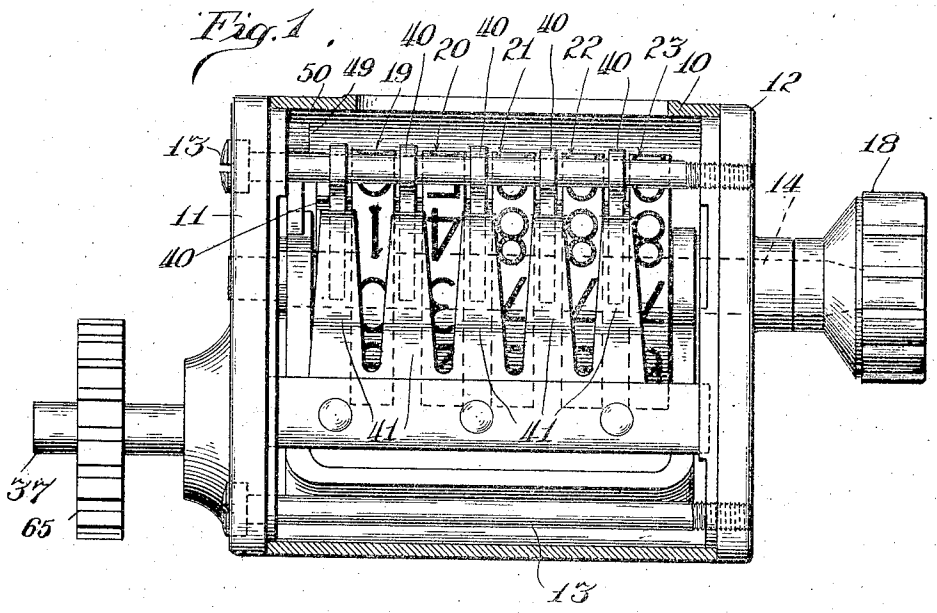

Fig. 2.

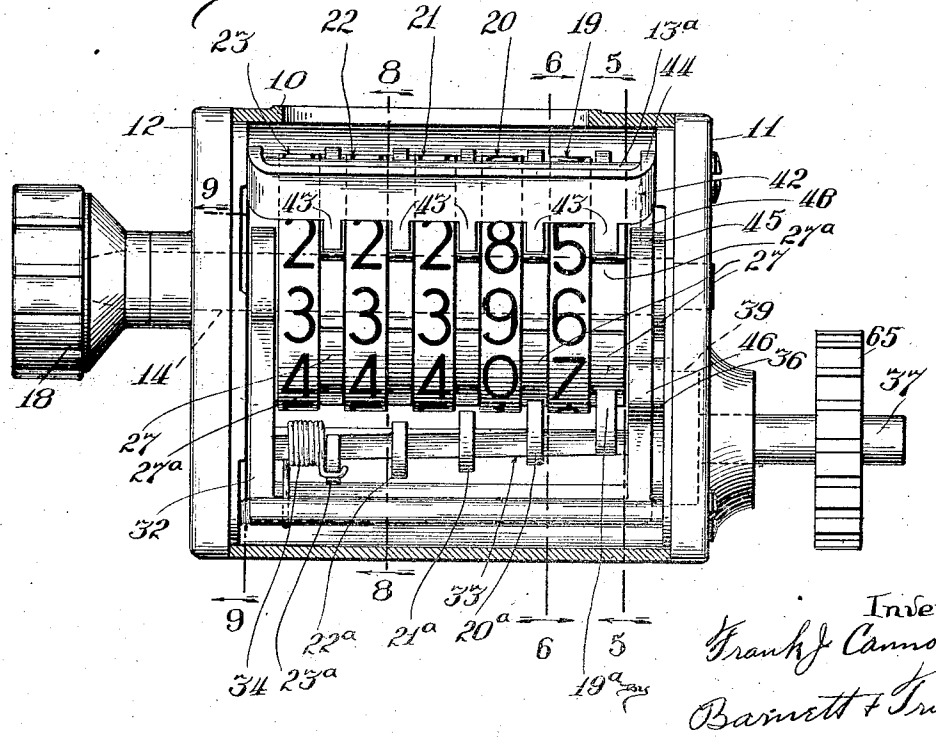

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Fig. 4.

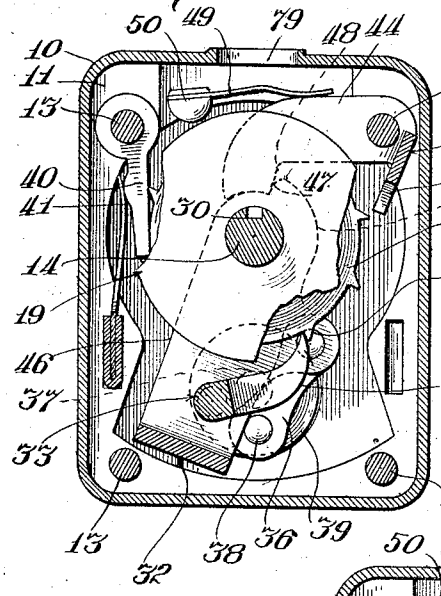


Fig. 3.

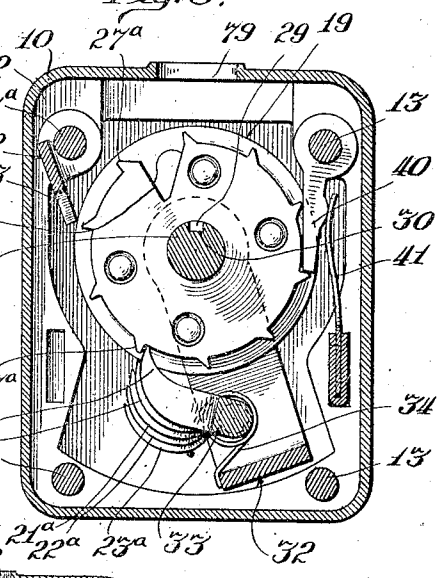


Fig. 5.

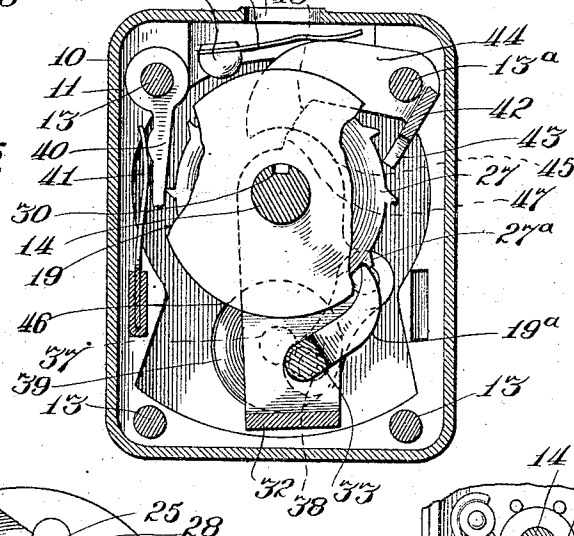


Fig. 6.

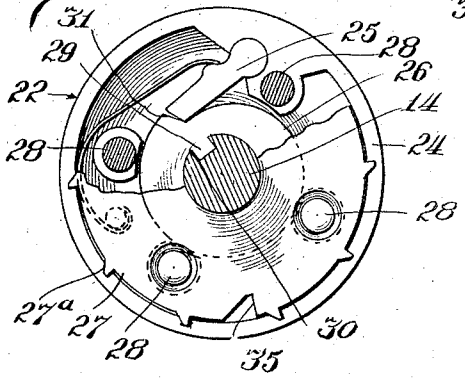
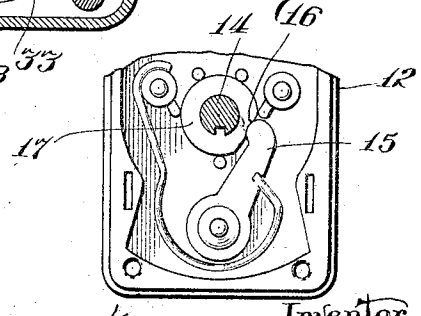


Fig. 7.



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UNITED STATES PATENT OFFICE.

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COUNTING DEVICE.

Application filed November 28, 1921. Serial No. 518,325.

My invention relates to counting devices having a plurality of relatively movable indicating members, provided with graduations on their dials and adapted to be moved intermittently from one position to another to indicate numerals of one or more digits.

The invention has for its principal object to provide improved means for preventing the accidental movement of the indicating members and to limit the movement of said members, when operated, to the amplitude of one graduation on their dials.

A more specific object of my invention is to provide an improved stop mechanism for the indicating members of counting devices of the general type having a plurality of indicating wheels arranged in axial alignment and adapted to be intermittently rotated by means of an oscillating ratchet member which moves into and out of engagement with ratchet teeth formed on each of said wheels. Devices of this general construction are usually provided with spring pressed locking dogs which drop back of one of the ratchet teeth of the operated indicating wheel when the wheel has moved the desired distance so as to prevent the frictional engagement of the oscillating member with the wheel, imparting a reverse movement to the wheel during the back stroke of the oscillating member.

Prior to my invention, it has been customary to rely upon the spring pressure, forcing the above mentioned locking dogs against the indicating wheels to maintain the inactive wheels in their proper position during the rotation of an adjacent wheel and to also resist the inertia or coasting tendency of the operated wheel from carrying it beyond the point at which the graduations of adjacent wheels will register with each other. In devices of this construction, the spring for forcing the locking dogs against the indicating wheels, being preferably made relatively light so as to permit the various parts of the device to move freely and at the same time minimize wear of said parts, often permits the active or operated indicating wheels to coast beyond the point at which they are intended to stop. Such undesirable operation as this is particularly likely when the counting device is used in situations where the indicating wheels are moved rapidly or when they are operated with a sudden impulse. For example, by means of magnetically controlled actuating devices. With my invention I aim to overcome the above mentioned and other incidental objections by providing the counting mechanism of my device with a cam operated stop device which moves quickly to its wheel stopping position shortly after an indicating wheel begins to rotate and maintain such position until the indicating wheel has made its full movement, which stop device is especially adapted for use in counting devices of the above general construction, in which the oscillating member is operated by a continuously driven shaft.

The invention has for further objects the novel arrangement, construction and combination of parts and devices hereinafter described and claimed for carrying out the above stated objects and such other incidental objects as will appear from the following description.

A preferred embodiment of my invention is illustrated in the accompanying drawings wherein like characters of reference designate like parts and wherein—

Fig. 1 is a side view in elevation of my improved counting mechanism, the center portion of the casing being omitted in this figure.

Fig. 2 is a side view in elevation of the structure shown in Fig. 1, this figure showing the side of the mechanism opposite to that shown in Fig. 1.

Fig. 3 is a vertical section taken through the structure of Fig. 2 on lines 5—5 of this figure.

Fig. 4 is a vertical section taken on line 6—6 of Fig. 2, looking in the direction indicated by the arrows.

Fig. 5 is a view similar to Fig. 4 illustrating the movable part in a different operative position.

Fig. 6 is a side view partly in section, of one of the indicating wheels employed in my preferred construction, the sectional portion of this figure being taken on line 8—8 of Fig. 2, and

Fig. 7 is a fragmentary view, in section, of part of the counting mechanism, this view being taken on 9—9 of Fig. 2.

In the drawings, my improved counting device is illustrated as being of the general type in which a plurality of revoluble indicating wheels are moved intermittently from one position to another by means of a

ratchet member having an operative connection with a crank shaft whereby an oscillatory movement of the shaft or a complete revolution thereof will impart an oscillatory movement to the ratchet member. The particular manner in which the crank shaft operates will, of course, depend entirely upon the character of the operations being counted by the device and the manner in which the crank shaft of the device is connected to the movable part of the machine, the operations of which are being recorded.

Referring to the drawings, the counting device consists of a casing made up of a tubular center portion 10 and end pieces 11—12, clamped to opposite ends of the tubular portion by means of screw bolts 13. These bolts preferably extend through the end pieces 11 and have a threaded engagement with the end piece 12. The end pieces of the casing are provided with bearings for a shaft 14 which shaft is normally held against automatic rotation by a spring pressed dog 15 (Fig. 7) formed with a rounded end adapted to enter a relatively shallow notch 16 in a collar 17, fixed to the shaft 14. The shaft 14 may be manually rotated, for a purpose hereinafter described, by means of a knurled knob 18, secured to the outer end of the shaft.

A plurality of relatively movable indicating wheels 19, 20, 21, 22 and 23, having numbered graduations on their peripheries are revolubly supported on the shaft 14; the wheel 19 representing the units of a number and the other wheels representing tens, hundreds, thousands, and ten thousands, respectively. Each of the indicating wheels consists of a hollow shell 24 (Fig. 6) having a spring pressed dog 25 pivoted therein to bear against a cam member 26. A ratchet tooth gear 27 is secured to studs 28 of the shell 24 and provides a cover plate adapted to close the open side of the shell and hold the dog 25 and cam 26 in their proper positions. The cam 26 is formed with a feather 29 which, when the indicating wheel is fitted on the shaft 14, fits in a keyway 30 formed on the shaft. With this construction it will be apparent that the shell 24 may be rotated in one direction without imparting movement to the cam 26 or shaft 14 and that when the cam 26 is rotated in the opposite direction, for example, by turning the knob 18 on the shaft 14, the shoulder 31 of the cam will engage the dog 25 and thereby produce a corresponding rotation of the shell 24.

The indicating wheels of the device are rotated intermittently and are so associated that those at the left of the unit wheel 19 are rotated the amplitude of one graduation on their peripheries for each complete revolution of the next adjacent wheel at the right thereof. The indicating wheels are rotated intermittently by means of an oscillating mechanism consisting of a yoke 32 and a pivoted ratchet member 33 carried by the yoke. The ratchet member 33 is formed with a plurality of fingers 19^a, 20^a, 21^a, 22^a, and 23^a, one for each indicating wheel, and is held up in its operative position by a spring 34. The fingers of the ratchet member 33 are formed so that when the finger 19^a is bearing against the outer surface of the ratchet gear 27 of the indicating wheel 19, the other fingers of the ratchet member will clear the teeth of the other indicating wheels so that an oscillatory movement of the yoke and ratchet members will impart an intermittent revoluble movement to the unit indicating wheel 19 only. The ratchet wheel 27 of each of the indicating wheels is formed with a recess 35 adapted, when a wheel moves the amplitude of nine graduations on its periphery, to receive a finger of the ratchet member 33 and thereby permit the adjacent finger to the left thereof to engage the ratchet gear of the adjacent indicating wheel. With this construction it will be apparent that when the unit indicating wheel 19 has been moved the amplitude of nine graduations on its periphery, the ratchet finger 19^a will enter the recess 35 of the indicating wheel 19 and permit the ratchet finger 20^a to engage with a tooth 27^a of the indicating wheel 20. A forward movement of the yoke 32, under such conditions, will move both indicating wheels 19 and 20 the amplitude of one graduation. The back stroke of the yoke 32 will withdraw the finger 19^a from the recess 35 and as a result moves the finger 20^a out of contact with the ratchet gear 27 of the indicating wheel 20, whereupon the unit indicating wheel 19 will again receive nine successive movements before another movement is imparted to the indicating wheel 20. The same operation is carried out in connection with the other indicating members.

The yoke 32 and ratchet member 33 are connected by means of a link 36 to a crank shaft 37; the crank of the shaft being provided by a pin 38 which extends outwardly from the disc shaped end 39 of the shaft 37.

In order to prevent reverse movement of the indicating wheels, a plurality of dogs 40 are pivoted on one of the bolts 13 at one side of the device and forced against the ratchet gears 27 of the indicating wheels by means of a spring member 41. When one or more indicating wheels are moved from one position to another, the dogs 40 arranged opposite the wheels being moved, will snap back of the ratchet teeth 27^a, as shown in Fig. 5, when the indicating wheels being operated have moved one full step.

The spring pressed dogs 40, while providing an effective stop for preventing reverse movement of the indicating wheels do not

provide satisfactory means for resisting the tendency of the indicating wheels to be accidentally moved by their frictional engagement with an adjacent wheel or to prevent an indicating wheel from coasting beyond the point at which it is intended to stop, such for example as may result from a rapid or sudden operation of one or more of the indicating wheels. In order to provide an effective stop for the forward movement of the indicating wheels and thereby prevent the numerals of adjacent wheels from being out of alignment, I provide a positively operated stop device which moves into and out of the path of travel of the ratchet teeth 27^a so as to provide an abutment which will limit the movement of an indicating wheel being operated and which will hold the inactive indicating wheels in their proper positions. This stop mechanism preferably consists of a rocking member 42 pivoted on a screw bolt 13 so as to stand on the opposite side of the indicating wheels to that engaged by the pivoted dogs 40. The member 42 is formed with downwardly projecting portions 43 which are adapted to extend into the space intervening between the peripheries of the adjacent wheels and to be rocked, at a predetermined time during the operation of an indicating wheel, into the path of travel of the ratchet teeth 27^a whereby a ratchet tooth of the indicating members being operated will abut against one of the projections 43 of the stop mechanism when the indicating wheels have moved one full step. The rocking movement of the member 42 is effected by means of an arm 44 formed on the rocking member and adapted to bear at its outer end against a cam 45 formed on the upper end of the upstanding portion 46 of the yoke 32. The angularity of the cam surface 47 of the cam 45 and the lower edge 48 of the arm 44 is such that when the oscillating yoke 32 is in its neutral position, as shown in Fig. 6, the projections 43 of the rocking member 42 stand out of engagement with the ratchet teeth 27^a of the indicating wheels. As soon as a forward movement is imparted to the yoke 32 to move one or more of the indicating wheels, the arm 44 of the rocking member 42 is raised to the position shown in Fig. 5 (which figure shows the yoke in a position intermediate its extreme forward and reverse strokes), thereby moving the projections 43 of the member 42 into the path of travel of the ratchet teeth 27^a of the indicating wheels, in which position the said projections remain until the yoke 32 makes its full forward and back strokes. When the yoke 32 reaches its extreme back stroke the edge 48 of the arm 44 rides down on the cam surface 47 of the cam 45 and thereby permits the projections 43 to move quickly out of engagement with the ratchet gear teeth of the indicating wheels to the position shown in Fig. 6. The arm 44 is held in contact with the cam 45 by means of a spring 49 which is attached at one end to a stud 50 on the casing and bears against the upper edge of the arm 44.

When all of the indicating wheels are in their normal position of rest (Fig. 4), the numbered graduations on the indicating wheels are in alignment and may be seen through a window 79 formed in the top of the casing 10 of the counting mechanism. In the above position of the indicating wheels, the projections 43 of the locking mechanism 42 stand out of engagement with the ratchet teeth 27^a of the indicating wheels, as shown in Fig. 3. While the parts are in this position, all of the indicating wheels may be reset by rotating the knob 18 so as to bring the shoulder 31 of the cam 26 of each of the indicating wheels into engagement with the pivoted dogs 25 of said wheels. When the shoulder 31 of each of the cams 26 is in engagement with the pivoted dogs 25, the zero graduations and likewise the other numbered graduations of all of the indicating wheels are in alignment. The unit indicating wheel 19 is moved the amplitude of one graduation on its periphery for each complete revolution of the crank shaft 37 or, if desired, by an oscillation of said crank shaft through an angle of approximately 180 degrees. In the event that the mechanism is operated by oscillating the said shaft 37, the oscillation of the shaft through an angle of 180 degrees from the position shown in Fig. 4 moves the unit wheel the amplitude of one graduation on its periphery. The return oscillation will return the ratchet member to its former position so that the finger 19^a will engage the next succeeding tooth of the ratchet wheel 27^a.

While I have described my invention in a preferred embodiment, it will be obvious that modifications might be made without departure from the spirit of my invention. I therefore wish it understood that I do not wish to limit myself to the exact structural features shown and described except in so far as specific limitations appear in the appended claims.

I claim:

1. In a counting device, the combination with a plurality of revoluble indicating members adapted to be rotated with relation to each other, an oscillating member provided with ratchet fingers adapted to engage with means on the indicating members to impart an intermittent revoluble movement to one or more of said indicating members and provided with a cam surface, of stop mechanism for said indicating members comprising a rocking member engaging said cam surface and adapted to be rocked into the path of travel of said finger engaging means

of the operated indicating members during the initial movement of said indicating members.

2. In a counting device, the combination with a plurality of relatively movable indicating members provided with ratchet teeth, and operating means adapted to engage the toothed portion of said indicating members to move one or more of said members intermittently, of stop mechanism operated by the movement of said operating means adapted to move intermittently to engage the indicating members not operated and to move into the path of travel of a ratchet tooth of the indicating member operated during the initial movement of said member, for the purpose described.

3. In a counting device, the combination with a plurality of revoluble indicating members, of oscillating means for moving one or more of said indicating members intermittently and formed with a cam, spring-pressed stop mechanism for preventing reverse movement of said indicating members, and stop mechanism adapted to prevent accidental movement of the indicating members not operated and to limit the forward movement of the operated indicating members comprising a rocking member normally out of engagement with the indicating members and adapted to be rocked by said cam into engagement with each of said indicating members.

4. In a counting device, the combination with a revoluble indicating member provided with a toothed portion for engagement with operating mechanism, oscillating ratchet mechanism for engaging said indicating member intermittently, of stop mechanism for limiting the movements effected by said ratchet mechanism comprising a rocking member normally disengaged from the indicating member when said member is at rest, and a cam operated during the initial forward movement of said oscillating member to move said stop mechanism into the path of travel of a tooth of said toothed portion of the indicating member.

5. In a counting device, the combination with a plurality of revoluble indicating members provided with ratchet gears for engagement with operating mechanism, and oscillating ratchet mechanism for operating said indicating members intermittently, of stop mechanism for limiting the movements effected by said ratchet mechanism comprising a rocking member normally disengaged from the indicating members when said members are at rest, and a cam operated during the initial forward movement of one or more of said indicating members to move said stop mechanism into engagement with the indicating members not operated and into the path of travel of the teeth of said ratchet gears.

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