

Sept. 3, 1940.

H. J. MUMMA

2,213,346

TOTALIZING DEVICE

Filed Jan. 17, 1938

2 Sheets-Sheet 1

FIG_1_

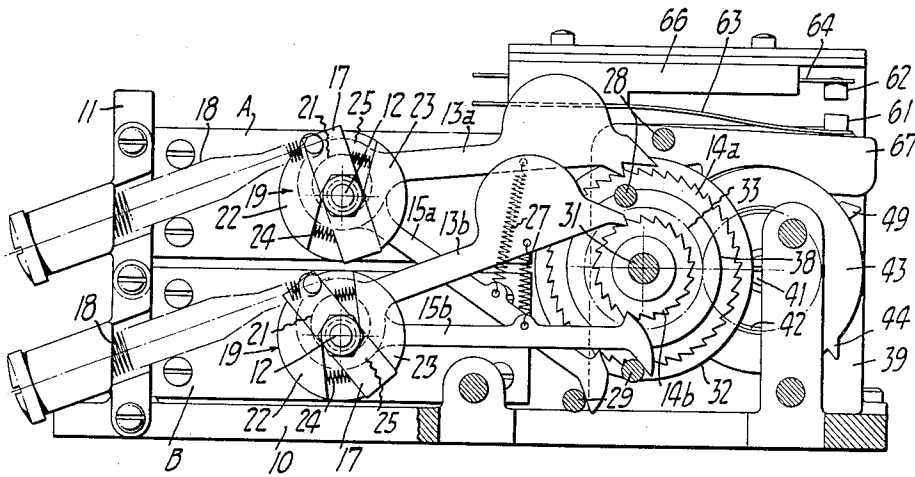
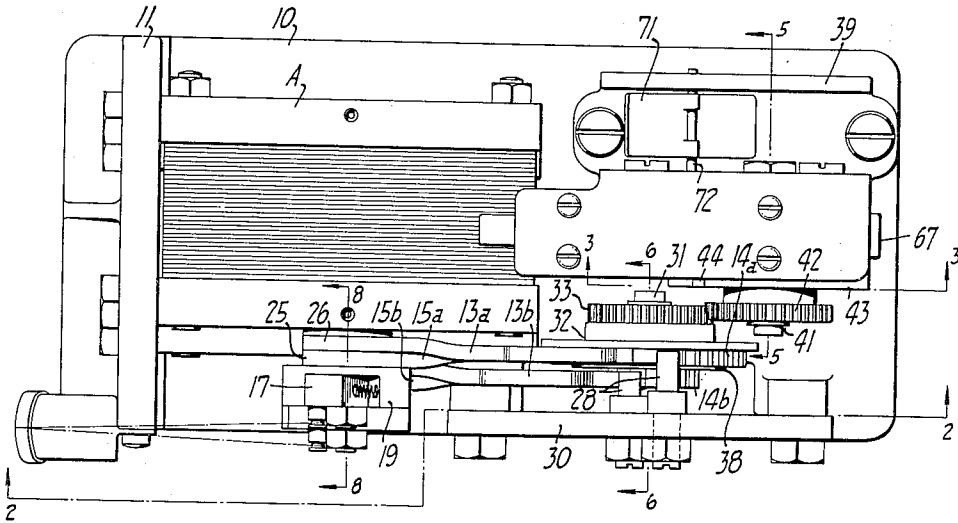


FIG_2_

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2 Sheets-Sheet 2

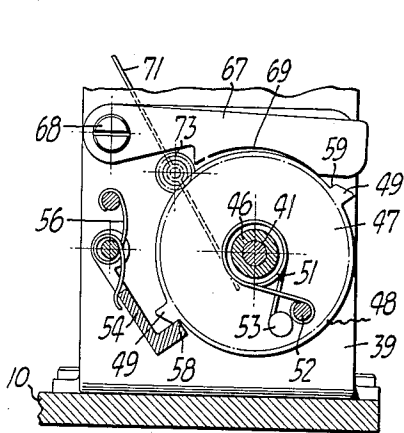


FIG. 4

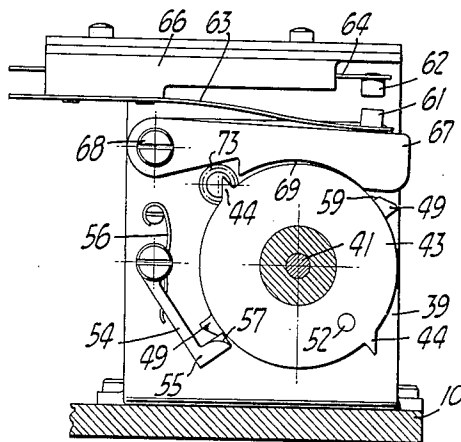


FIG. 3

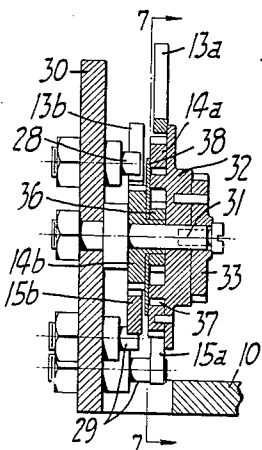


FIG. 6

FIG. 7

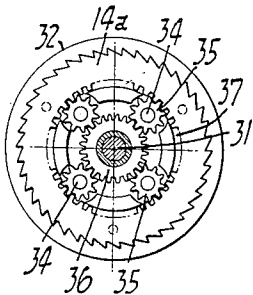


FIG. 5

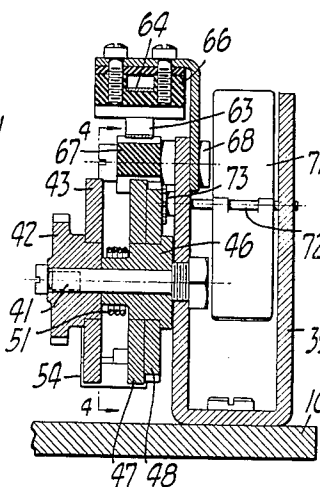
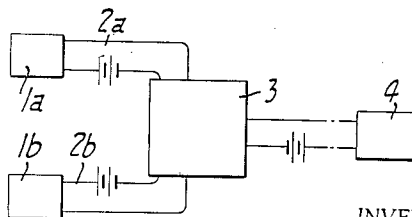
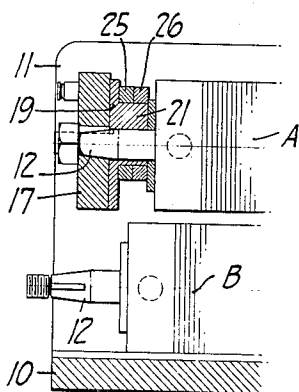


FIG. 8



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UNITED STATES PATENT OFFICE

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TOTALIZING DEVICE

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Application January 17, 1938, Serial No. 185,406

5 Claims. (Cl. 235—91)

This invention relates generally to devices for effecting a response in accordance with the summation or total of a plurality of received impulses. More specifically it relates to devices adapted to receive electrical impulses from two different sources and to effect a response after a predetermined number of impulses have been received.

Devices of the above character can be referred to as totalizing devices, and are useful for many commercial applications. One useful application is in packing plants of the citrus industry. Here citrus fruit may move along two separate paths into engagement with electrical contacting means, and instead of merely independently recording the number of articles passing along the two paths, it is frequently desirable to make a composite record in accordance with lots or groups, of a given number. In other words the device in such a system must afford a response, such as the closing of electrical contacts, after the count of the citrus fruit passing along both paths has reached a predetermined total. There are many other industrial applications for apparatus of this kind, including for example the counting of operations from two or more appliances to afford a total or summation count.

It is an object of the invention to provide a device of the above character, which will not be unduly complicated in mechanical structure, and which will operate reliably and with a high degree of accuracy.

Another object of the invention is to provide a device of the above character in which electrical contacts are actuated in accordance with a summation count, and the actuation carried out in a positive manner with retention of the contacts in closed position for an appreciable period of time.

Additional objects of the invention will appear from the following description in which the preferred embodiment of the invention has been set forth in detail in conjunction with the accompanying drawings:

Fig. 1 is a top plan view of a totalizing device incorporating my invention.

Fig. 2 is a cross-sectional view taken along the line 2—2 of Fig. 1.

Fig. 3 is a cross-sectional view taken along the line 3—3 of Fig. 1.

Fig. 4 is a cross-sectional view taken along the line 4—4 of Fig. 5.

Fig. 5 is a cross-sectional view taken along the line 5—5 of Fig. 1.

Fig. 6 is a cross-sectional view taken along the line 6—6 of Fig. 1.

Fig. 7 is a cross-sectional view taken along the line 7—7 of Fig. 6.

Fig. 8 is a cross-sectional view taken along the line 8—8 of Fig. 1.

Fig. 9 is an electrical wiring diagram of a typical system making use of my totalizing device.

The device as illustrated in the drawings makes use of ratcheting mechanism, operated by electrical impulses. The ratcheting mechanism causes operation of a response member, such as a pair of electrical contacts, after the total of the impulse as received has attained a predetermined figure. Thus mounted upon the base plate 10, there is an upright 11, carrying a pair of magnetic actuating devices A and B. Magnetic devices of this character are well known in the art, and need not be described in detail. Briefly, they may consist of a stationary magnetic field, in conjunction with a magnetic armature. The armature is carried upon a rocker shaft 12, which is suitably journaled, and which projects from one side of the magnetic field. When current is applied to the windings of such a device, shaft 12 is turned a limited amount in one direction, as for example in a clockwise direction as viewed in Fig. 2.

The ratcheting mechanism associated with the magnetic device A, includes a ratcheting pawl 13a, ratchet wheel 14a, and locking pawl 15a. Similarly the device B is associated with pawl 13b, wheel 14b, and pawl 15b. In order to operatively connect the pawls to the shafts 12, each shaft carries a bar 17, which is biased to rotate in one direction, by the tension spring 18. Also carried by each shaft 12 but journaled with respect to the same, there is an eccentric wheel 19, carrying the eccentric collar 21. The face of wheel 19 carries a pair of projecting blocks or lugs 22 and 23, forming abutment surfaces for engagement with bar 17. Small compression springs 24 are interposed between bar 17 and lugs 22 and 23, to cushion the impact of bar 17 with these lugs, when the bar is rotated in a clockwise direction as viewed in Fig. 2, responsive to energization of the corresponding magnetic device. Also springs 24 ensure a certain amount of lost motion of shaft 12, before bar 17 is engaged with lugs 22 and 23, to rotate the eccentric wheel 19. The pawls 13a and 15a carry rings 25 and 26 which are journaled upon the eccentric collar 21. Thus as the eccentric wheel 19 is oscillated through a given angle by oscillation of bar 17, the corresponding pawls are advanced and retracted with respect to the ratchet wheel, to advance this wheel one notch. The ratcheting and locking pawls are nor-

mally biased into engagement with the ratchet teeth, as by means of interconnecting tension springs 27. The end portions of the pawls are adapted to wedge against pins 28 and 29, to prevent overtravel.

Carried by the base plate 10 there is an upright bracket 30 (Fig. 6) upon which is mounted the stud shaft 31. This shaft serves to carry the ratchet wheels 14a and 14b, together with planetary gearing whereby the increments of movement of the two ratchet wheels are automatically totaled. Thus journaled upon the shaft 31 there is a wheel 32, which is fixed with respect to a concentric gear 33. Projecting from one face of the wheel 32, are the studs 34, upon which the sun gears 35 are journaled. Ratchet wheel 14b is also journaled upon stud shaft 31, and fixed to this wheel to rotate together with the same, there is a center gear 36. The teeth on center gear 36 mesh with the teeth on pinions 35, as shown in Fig. 7. Ratchet wheel 14a is in the form of a ring, provided with internal gear teeth 37. These teeth also mesh with the sun gears 35, as shown in Fig. 7.

It will be apparent that if one of the ratchet wheels, say wheel 14b, is held stationary, while the other is advanced by increments determined by the pitch of the ratchet teeth, wheel 32 carrying the sun gears 35 will also be advanced by corresponding angular increments. Similarly if wheel 14a is held stationary while ratchet wheel 14b is advanced by increments, wheel 32 is advanced by a corresponding increment. Furthermore if both wheels 14a and 14b are advanced simultaneously by increments, corresponding to the pitch of the ratchet teeth, both such movements are imparted to wheel 32, so that the corresponding increment of movement of wheel 32 will be twice the increment of movement imparted by one ratchet wheel when the same is advanced one tooth. While one ratchet wheel is larger than the other, compensation for this difference is made by the difference in the ratios of drive afforded because of the different diameters of teeth 37 and gear 36. The assembly of sun gears 35 and the ring shaped ratchet wheel 14a, is held together by the retention disc 38.

Gear 33 is connected to means adapted to effect a response after the gear 33 has rotated a predetermined amount. The response in this instance is in the nature of actuation of electrical contacts, and the parts constituting this means are carried by an upstanding bracket 39, mounted upon the base plate 10 (see Figs. 3 to 5 inclusive). Stud shaft 41 is carried by bracket 39, and journaled upon this shaft there is a gear 42, meshing with the teeth of gear 33. Mounting upon and fixed to rotate with the gear 42, there is a cam wheel 43, the periphery of which is provided with cam lugs 44. Also independently journaled upon the shaft 41 there is a hub 46, to which is fixed a cam wheel 47 and a gear 48. Mounted upon the periphery of cam wheel 47, are the cam lugs 49.

Acting between the cam wheels 43 and 47, there is a coiled spring 51, having its one end attached to the wheel 43 by pin 52, and its other end attached to wheel 47 by pin 53. It will be evident that if the cam wheel 47 is held stationary while wheel 43 is rotated, the coiled spring 51 is tensioned.

Latching means is provided to retain the wheel 47 stationary, while wheel 43 rotates through a predetermined distance. Thus pivotally mounted upon the bracket 39, there is a latch 54, the

end 55 of which is continuously urged by spring 56 into engagement with the peripheries of cam wheels 43 and 47. That part of the latch which engages the periphery of wheel 43, is provided with a curved face 57 (Fig. 3) whereby when this face is engaged by one of the lugs 44, the latch is swung outwardly and tripped. That portion of the latch which engages the periphery of wheel 47 is formed with an abrupt shoulder 58 (Figs. 3 and 4), for engagement with the abrupt shoulders 59 formed on lugs 49. It will be evident that when one of the lugs 49 is engaged with the latch 54, the wheel 47 is locked in stationary position, and that the engagement of the same with latch 54 is not disrupted until the latch is tripped by rotation of cam wheel 43, to bring one of the lugs 44 into engagement with curved face 57. It has been pointed out that gear 42 which is connected with the cam wheel 43, meshes with gear 33. Therefore it will be evident that gear 43 is rotated predetermined amounts dependent upon the number of impulses received by the ratcheting means, and that such rotation causes cam wheel 43 to trip latch 54, to permit rotation of cam wheel 47 through a fraction of a revolution, under the urge of spring 51.

Rotation of cam member 47 after reception of a predetermined number of impulses by the ratcheting mechanisms, is one form of response which can be utilized to produce any further responses or recordings desired. For example such rotation can be utilized to operate a simple counting recorder, by some suitable form of mechanical interconnecting means. Generally however it is desirable to utilize the motion of cam member 47 to operate electrical contacts, whereby a recording, counting or other mechanism can be operated at a remote point, by electrical impulses. Thus I have shown a pair of electrical contacts 61 and 62, carried by the spring fingers 63 and 64, which in turn are mounted upon the insulating block 66. Below finger 63 there is a lever 67, having a pivotal mounting 68 to the bracket 39. This lever can be of suitable insulating material, such as a molded phenolic condensate product. The lower face 69 of lever 67 has an arcuate contour, and overlies the periphery of cam wheel 47. When latch 54 is engaged with one of the lugs 49, the other lug 49 is in the proximity of lever 67 (see Fig. 3). When latch 54 is tripped, the motion imparted to cam wheel 47 is sufficient to carry wheel 47 through more than one-quarter of a revolution, whereby one of the lugs 49 passes beneath lever 67, in engagement with arcuate surface 69, to cause lever 67 to be raised to close contacts 61 and 62.

It is desirable to provide means to govern movement of cam wheel 47, upon tripping latch 54, in order to avoid possible injury to the parts, and in order to afford a longer period of engagement of contacts 61 and 62. Thus a simple form of governing means is employed, making use of air vanes or paddles 71, carried by the rotatable shaft 72 (Fig. 5). One end of shaft 72 carries a pinion 73, which meshes with the teeth of gear 48. Thus upon releasing latch 54 spring 51 must drive the paddles 71, as well as the cam wheel 47, thereby causing the rate of movement of the cam wheel to be retarded.

Fig. 9 diagrammatically illustrates a typical system in which the device as described above, can be employed. 1a and 1b represent contacting devices, independently operated, and connected by the separate circuits 2a and 2b to the device 3, corresponding to the totalizing device

disclosed herein. 4 represents a recorder, which may have provisions for making a permanent printed record, and which is connected to the totalizing device by an electrical circuit controlled by opening and closing of contacts 61 and 62. Assuming that the device 3 is adjusted to close contacts 61 and 62 after say 25 impulses have been received, all such impulses may be received by circuit 2a, or by the circuit 2b, or part from one circuit and part from another. In any event after a certain total number of impulses have been received, contacts 61 and 62 are closed to transmit a single impulse to the recording mechanism 4.

To review in greater detail operation of the device 3, electrical impulses received by the electro-magnetic devices A and B, effect operation of the pawls to turn wheels 14a and 14b by predetermined increments. Such motion is totalized to cause corresponding angular motion of the gear 33. Motion of the gear 33 is transmitted to gear 42 and cam wheel 43, whereby cam wheel 43 is turned to tension the spring 51. When cam wheel 43 has turned a predetermined amount, in this instance about one-half revolution, one of the lugs 44 trips latch 54, to permit rotation of cam wheel 47, thus causing one of the lugs 49 on this wheel to raise lever 67, and close contacts 61 and 62. Cam wheel 47 rotates less than one-half revolution, but sufficiently far to clear lever 67. During reception of the next group of impulses, cam wheel 47 is again engaged by latch 54, so that the cycle is repeated.

It will be apparent that the device described above has no undue mechanical complications, and that the assembly is capable of long useful service, without mechanical failure. Impulses can be received at a relatively high rate, without causing any inaccuracy. Furthermore as previously explained the impulses received by the two magnetic devices A and B may not be synchronized or may overlap, without affecting the accuracy with which the impulses are totalized. A wide variety of useful applications are possible, and in general the device can be applied wherever it is desired to totalize a number of impulses received independently from more than one source, to afford a response when the number of impulses received reaches a predetermined total. It is a simple matter to adapt the device to automatic subtraction in place of addition, arranging one of the ratcheting mechanisms to turn its ratchet wheel in an opposite direction, whereby the advance of wheel 32 will be a function of the difference between the number of impulses received by the two mechanisms.

I claim:

1. In a device of the character described, a pair of mechanisms each responsive to impulses, a member, means for advancing said member by either one or both of said mechanisms, whereby the extent of advancement of said member is a function of the total number of impulses received by both said mechanisms, spring means adapted to be tensioned by advancement of said member, a pair of electrical contacts adapted to be moved between open and closed positions, means for applying the force of said spring means to effect operation of said contacts, latch means for retaining said spring means ineffective, and means operated by advancement of said first-named member a predetermined distance, for releasing said latch means.

2. In a device of the character described, a pair of mechanisms adapted to be actuated by

impulses, a member mounted for rotation, means for rotating said member by either one or both of said mechanisms, whereby the extent of rotation of said member is a function of the total number of impulses received by said mechanisms, a rotatable cam member, a pair of electrical contacts adapted to be operated between open and closed positions by rotation of said cam member, a latch for retaining said cam member against rotation in one direction, a second cam member rotatable together with the first named member, a spring interposed between said cam members, whereby as the second cam rotates said spring is tensioned to apply torque to the other cam member, said second named cam member serving to release said latch after said shaft has rotated a predetermined amount, whereby rotation of said first named cam member under the urge of said spring causes actuation of said contacts.

3. In a device of the character described, a pair of mechanisms adapted to be actuated by separate impulses, a rotatable member, means serving to connect said member with said mechanisms whereby said member is rotated by either one or both said mechanisms by an amount which is a function of the total number of impulses received by said mechanisms, a pair of cam members, the first of said cam members being rotatable independently with respect to said first member and the second cam member being rotatable together with the first member, said first cam member when rotated serving to effect actuation of said contacts, latch means serving to engage said first cam member to prevent rotation of the same in a direction to actuate said contacts, spring means interposed between said first and second cam members, said spring means being tensioned by rotation of said second cam member while said first cam member is retained stationary, said second cam member serving to trip said latch after said shaft is rotated a predetermined amount, and governing means to retard movement of first cam member, after tripping of said latch.

4. In a device of the character described, a pair of ratcheting mechanisms, each of said mechanisms including a ratchet wheel and an associated pawl, magnetic means for actuating said pawls in accordance with electrical impulses, a rotatable member associated with the ratchet wheels, planetary gearing cooperatively interconnecting said ratchet wheels and connecting both said ratchet wheels to said member, whereby when either one of said ratchet wheels is advanced by increments while the other wheel remains stationary, said member is rotated a corresponding increment, and whereby advancement of both said ratchet wheels simultaneously through a given increment, causes rotation of said member through twice the increment of one ratchet wheel, a pair of electrical contacts adapted to be actuated between open and closed position, cam means serving when rotated to effect actuation of said contacts, spring means acting between said first member and said cam, to effect rotation of said cam, said spring means being tensioned when said cam is held stationary, latch means for retaining said cam stationary while said first member is rotated to tension said spring means, means including a second cam rotated by said first member to effect tripping of said latch means, after said first member has rotated a predetermined amount, and means for

retarding the rate of rotation of said first named cam after tripping of said latch means.

5 5. In a device of the character described for use with totalizing means of the type including a member adapted to be rotated and mechanism responsive to impulses from a plurality of sources for rotating said member, a pair of electrical contacts adapted to be actuated between open and closed position, cam means serving when ro-
10 tated to effect actuation of said contacts, spring means acting between said member and said

cam, to effect rotation of said cam, said spring means being tensioned when said cam is held stationary, latch means for retaining said cam stationary while said member is rotated to tension said spring means, means including a sec- 5
ond cam rotated by said member to effect tripping of said latch means, after said member has rotated a predetermined amount, and means for retarding the rate of rotation of said first-named cam after tripping of said latch means. 10

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