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C. L. CARLSON

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SWITCH MECHANISM FOR COUNTERS

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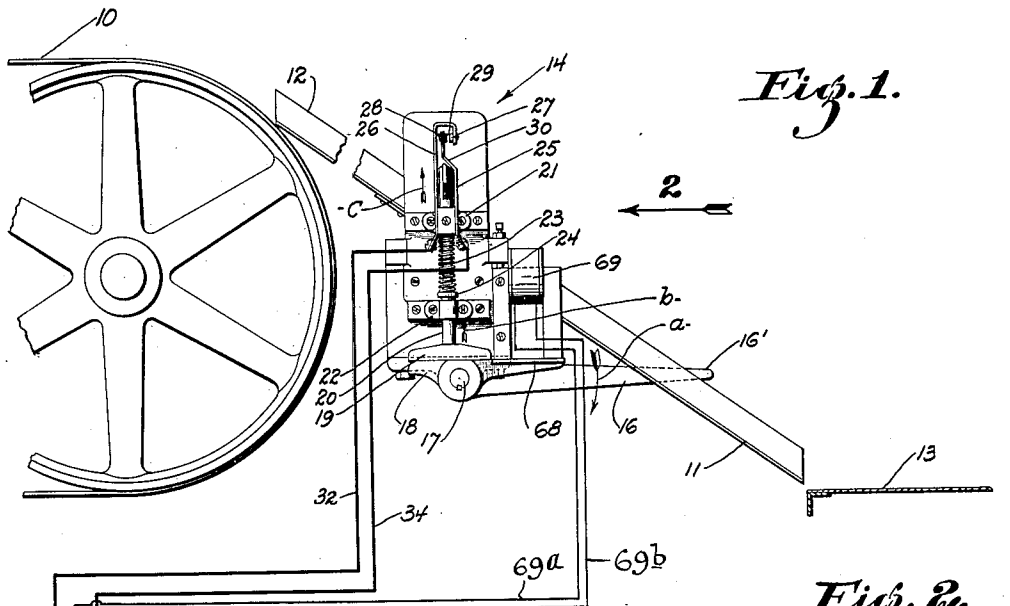


Fig. 1.

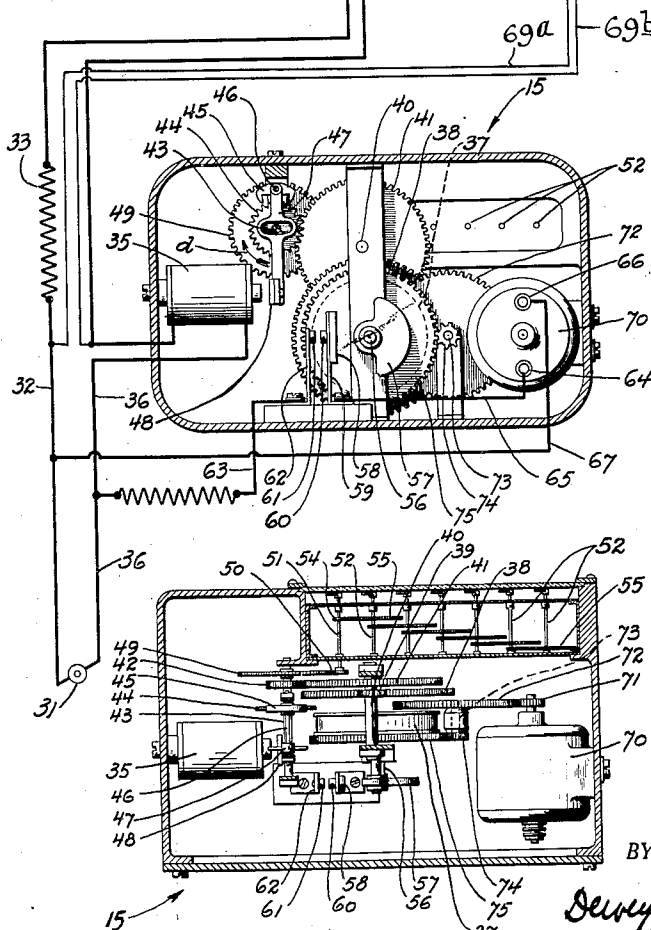


Fig. 2.

Fig. 3.

INVENTOR.
Chester L. Carlson.

BY
Dewey Strong, Townsend & Loftis
ATTORNEYS.

UNITED STATES PATENT OFFICE

CHESTER L. CARLSON, OF CROCKETT, CALIFORNIA

SWITCH MECHANISM FOR COUNTERS

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This invention relates to counting mechanism and particularly pertains to electrically operated means for consecutively counting articles.

5 In connection with the operation of various machines, and especially in connection with conveyor mechanisms along which articles pass at equal intervals or at random it is desirable to provide means for accurately
10 counting the articles as they pass a given point and to register the number of articles counted, and it is the principal object of the present invention to provide simple and accurate means for bringing about this result.

15 The present invention contemplates the use of a counting lever disposed in the path of travel of articles successively passing a given point, said lever acting under influence of the passing articles to operate the registering
20 device, and being further provided with means whereby the lever will not accidentally operate the registering device except when definitely operated by an article passing a given point.

25 The invention is illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a diametrical view in section and elevation showing the present invention.

30 Fig. 2 is a view in elevation showing the trip mechanism as viewed in the direction of arrow 2 in Fig. 1.

Fig. 3 is a view in plan showing the registering mechanism of the present invention.

35 Referring more particularly to the accompanying drawings, 10 indicates an endless conveyor belt by which articles are carried. In the present instance this belt delivers the articles in succession onto a chute 11 which
40 is formed with side flanges 12 for limiting the lateral movement of the articles; and for directing the articles onto a platform or other conveyor belt 13.

15 The present invention is designed to operate at some point along the path of travel of the articles and for convenience it is here shown as being installed in connection with the chute 11. The invention broadly considered comprises a trip mechanism 14 and a
0 registering mechanism 15 electrically oper-

ated thereby. The trip mechanism 14 comprises a counting arm 16 extending through an opening 11' in the floor of chute 11. This arm projects a distance through the floor so
55 that it will be encountered by an article sliding down the chute, and will be depressed thereby. The trip lever is mounted to oscillate around the axis of a shaft 17 to which it is keyed.

This shaft carries a lifting cam 18 which
60 is here shown as extending radially from the shaft 17 upon the opposite side from the lever 16. A cam shoe 19 rests upon the face of the cam and is carried at the lower end of a push
65 rod 20. This push rod is mounted in bearings 21 and 22 to reciprocate in a plane at right angles to the longitudinal axis of the shaft 17. A spring 23 is mounted on the shaft and
70 acts between bearing 21 and a shoulder 24 on the shaft to hold the shoe 19 in constant contact with the cam 18.

Carried upon the bearing 21 or adjacent thereto are a pair of contact fingers 25 and
75 26. These fingers are normally spaced a distance from each other and are dielectrically mounted so that a flow of current will only
80 pass through them when they are in contact. The fingers 25 and 26 are formed with contact points 27 and 28 normally spaced a distance from each other to form a circuit break-
85 ing gap 29. Spring finger 25 is formed with an inclined length indicated at 30, against which the upper end of the push rod 20 may act as it is moved upwardly by swinging
90 movement of the cam 18, so that the contact finger 25 will be swung outwardly to bring the contact points 27 and 28 into engagement and complete an electric circuit in a manner
95 which will be hereinafter described.

The finger 26 is electrically connected with
100 a source of electric supply 31 by a conductor 32. For the purpose of the present installation, impedance 33 is placed in series with the circuit at a break in conductor 32. The contact finger 25 is connected with a con-
105 ductor 34 leading to a magnet coil 35 mounted within and forming a part of the registering mechanism 15. This coil is provided at its other pole with a conductor 36 leading to the source of supply 31, and it will therefore be

evident that by completing a circuit through the contact fingers 25 and 26 the magnet 35 will be energized. This magnet may be used to operate any desired type of registering mechanism, but is here shown as operating a registering mechanism of the spring motor type.

Referring more particularly to the registering mechanism generally indicated at 15 in Fig. 1 and the plan view of the same mechanism as shown in Fig. 3, it will be seen that a spring motor 37 is provided. This motor acts through a gear 38 to drive a gear 39 carried on a supplemental shaft 40. This shaft is mounted parallel to and disposed above the spring motor. The shaft 40 in the present instance carries a large gear 41 in mesh with a pinion 42 on an escapement shaft 43. The escapement shaft 43 is provided with a toothed escapement wheel 44 which rotates with the shaft and is limited and controlled by the escapement pawls 45. These pawls are rigidly connected and mounted to oscillate around a common intermediate pivot 46. An operating arm 47 is rigidly secured to the pawl for producing their oscillation. This arm carries an armature 48 at its free end which will be influenced by the magnet 35 when this magnet is energized, thus producing the escapement action.

The escapement shaft 43 also carries a gear 49 in mesh with a pinion 50. This pinion is mounted on a primary indicator shaft 51 as shown in Fig. 3, and a plurality of secondary indicator shafts 52 are geared to the primary shaft 51 by a gear train comprising a plurality of pinions 54 and gears 55, thus producing means for decimal counting and registering of the successive impulses of the magnet 35, which of course result directly from the making of contact between the contact fingers 25 and 26 as actuated by the depression of counting lever 16.

A spring motor has been provided in the registering device in order to insure constant and uniform tension on the escapement mechanism and constant and uniform driving of the registering shafts 51 and 52. It is evident, however, that this motor will in the course of time unwind and become inoperative, and in order to obviate this objection electrically actuated means for automatically winding the spring motor have been provided. This means comprises an electrically driven motor 70 fitted with a driving pinion 71 in mesh with a gear 72. The gear 72 is on a shaft 73 carrying a pinion 74. The pinion 74 is in turn in mesh with the gear 75 fastened to the shaft 56 of the spring motor. It will thus be evident that by driving the electric winding motor 70, the spring motor will be wound.

In order to insure that the winding motor will operate automatically when the spring motor loses its tension, a cam 57 is fixed on

the shaft 56 of the spring motor. This cam is here shown as being substantially semi-circular in formation and having an arcuate face concentric with the axis of shaft 56. Disposed in the path of travel of the cam 57 at one point therealong is a shoe 58 mounted on the back of a spring contact finger 59, the position of the shoe and finger being such as to cause the finger to be deflected when the shoe 58 is engaged with the cam 57. This deflection is sufficient to bring a contact point 60 carried by the finger 59 into engagement with a contact point 61 carried by a finger 62. The finger 62 is electrically connected with the lead wire 36 of a generator 31 by a conductor 63. The finger 59 is electrically connected with pole 64 of the winding motor 70 by conductor 65. The opposite pole 66 is electrically connected with lead wire 32 of the generator 31 by a conductor 67.

In the operation of the counting lever 16, it has been found that some times the lever will chatter as it springs back to its original position under influence of the expansion spring 23. This might at times cause additional contacts to be made between the fingers 25 and 26 with the result that inaccuracy in counting will take place. In order to obviate this a radially extending armature 68 is fixed on the shaft 17 and is normally influenced by a magnet 69 to be held rigidly against the poles thereof. The magnet is consistently energized from a source of supply through wires 69^a and 69^b suitably connected to wires 32 and 36. This magnetic influence is sufficient to hold the parts against accidental movement, but is not sufficient to withstand the action of an article passing along the chute 11 from depressing the lever 16, the result being that the lever will be depressed by the article and will swing back to its normal position after the article has passed over it and remain motionless as held by the magnet 69.

In operation of the present invention, articles are delivered from the endless conveyor 10 to the chute 11. In the present case it will be assumed that these articles are sacks of granular material, such as sugar, and that they travel in single file down the chute 11 so that they will pass over the lever 16 in succession. As the article travels down the chute it will encounter the projecting end portion 16' of the counting lever 16. This will cause the lever to swing downwardly in the direction of the arrow *a* as indicated in Fig. 1, and will in turn cause the cam 18 to swing upwardly in the direction of the arrow *b* in the same figure.

It will be noted that the cam 18 is curved at its end so that it will gradually move upwardly against the under face of the cam shoe 19. This will cause the push rod 20 to be shoved upwardly in the direction of the arrow *c* as indicated in Fig. 1 and will thus

cause the upper end of the push rod 20 to strike the inclined face 30 of the contact finger 25. This will cause the contact finger to swing horizontally so that the contact point 28 at the end of the finger will bear against the contact point 27 on finger 26, thus closing the gap 29.

When the contact points 27 and 28 are in engagement with each other an electric circuit will be completed from the generator 31 through lead wire 32 to the contact finger 26, then across the contact points 27 and 28 to the finger 25 and then along conductor 34 to the magnet coil 35. The current after passing through the coil will return through lead wire 36 to the generator. When this circuit has been thus completed the coil 35 will be energized and will attract the armature 48 carried by the free swinging end of the escapement lever 47. This lever as has been previously described is pivotally mounted upon pivot 46 and is rigidly secured to the escapement pawls 45. When the escapement lever 47 swings in the direction of the arrow —d— the escapement wheel 44 will be released to rotate the distance represented by one tooth of the escapement wheel. This rotation will be brought about by the spring motor 37 acting through the gear train provided to impart motion from the shaft 56 of the spring motor to the shaft 44 of the escapement wheel. Rotation of the shaft 44 will in turn impart motion through gears 49 and 50 to the counter shafts 51 and 52 of the registering mechanism. As soon as the article passes over the end 16' of the lever 16 the downward pressure of the spring 23 will act through the shoe 19 and against the cam 18 to swing the lever 16 upwardly to its original position.

Swinging with the lever 16 is the armature lever 68 and as the counter lever 16 reaches its original inoperative position the armature lever 68 will move in close proximity to the poles of the magnet 69. This will cause the armature 68 to be forcefully drawn against the poles and to be there held until another article passes along the chute and depresses the lever 16.

It will thus be apparent that at each time an article passes over the end of lever 16 an electrical circuit will be made through the coil 35 to permit the escapement of the escapement wheel 44 and to allow the escapement shaft 43 to rotate a distance equal to the distance between two teeth of the wheel. This will indirectly produce a fractional rotation of the primary counting shaft 51 with resultant decimal rotations of the other counting shafts 52.

When the spring motor 37 is sufficiently unwound so that the cam 57 carried on the shaft 56 of said motor is in contact with the shoe 58 on the spring contact finger 59, this contact finger will be deflected so that contact points 60 and 61 will be brought in engage-

ment. The result will be that an electric circuit will be established from lead wire 32 through conductor 67 to one pole of the motor 66, and then from the other pole of the motor 64 to the conductors 65 after which the circuit will be completed through the contact finger 59 and 62 and the return wire 63 connecting with lead wire 36. When the spring motor has been sufficiently rewound the cam 57 will move out of engagement with the shoe 58 and break the circuit through the winding motor 70.

It will thus be seen that by the arrangement here shown simple and effective means are provided for automatically counting successive articles passing along a chute, whether travelling in equal spaced or timed relation or whether passing along the chute at random, and that by means of the present device the registering mechanism will act continuously and automatically.

While I have shown the preferred form of my invention as now known to me, it is to be understood that various changes may be made in its construction without departing from the spirit of the invention as defined in the appended claims.

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

1. A device of the class described, comprising a pair of switch contacts, yieldable means normally holding said contacts out of engagement with each other, an actuating member for momentarily bringing said contacts into engagement with each other and being thereafter restored to its original position by the yielding means, and magnetic means for holding said actuating member in its initial position until again positively actuated.

2. An electric switch comprising a pair of contacts movable with relation to each other, an actuating member adapted to be operated to momentarily bring the contacts in engagement with each other, means for restoring said actuating member to its initial position whereby the contacts will be disengaged, and magnetic means acting to prevent the independent operation of said actuating member by a rebounding thereof and against accidental displacement.

3. An electric switch comprising a fixed contact and a movable contact, a reciprocating rod adapted to move said movable contact into engagement with the fixed contact, a cam adapted to reciprocate said rod, an actuating lever moving the cam, yieldable means normally restoring the actuating lever to its initial position after closing the switch, an armature moving in unison with said actuating lever, and a magnet acting upon the armature to normally hold the lever in its initial inoperative position and prevent a rebound thereof when it is returned to its inoperative position by said yieldable means.

4. In a device of the class described, the combination of a passageway along which articles pass in succession, an oscillatory counting lever projecting into the path of the articles so as to be actuated by the same, a cam connected with the counting lever, a push rod having a shoe engaged by the cam, normally spaced contact fingers arranged to be moved to closed position by the push rod, a spring for returning the push rod and the counting lever to normal position after operation by an article, and magnetic means of sufficient strength to maintain the lever in its normal position until positively actuated by an article, whereby rebound of the said spring is prevented.

5. In a device of the class described, the combination of a passageway along which articles pass in succession, an oscillatory counting lever projecting into the path of the articles so as to be actuated by the same, a cam connected with the counting lever, a push rod having a shoe engaged by the cam, normally spaced contact fingers arranged to be moved to closed position by the push rod, a spring for returning the push rod and the counting lever to normal position after operation by an article, an armature connected with the counting lever, and a normally energized magnet arranged to engage the armature and being of sufficient strength to maintain the lever in its normal position until positively actuated by an article, whereby rebound of the spring and chattering of the lever are prevented.

CHESTER L. CARLSON.

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