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REVOLUTION COUNTER FOR A CONCRETE MIXING TRUCK

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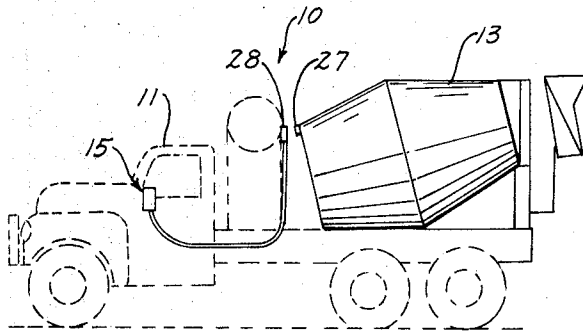


Fig. 1

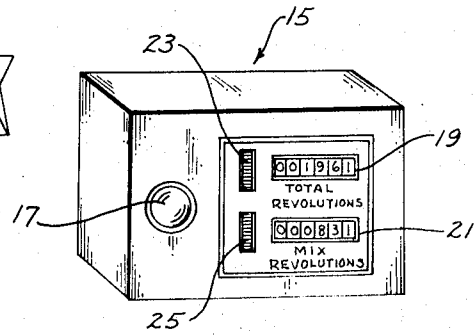


Fig. 2

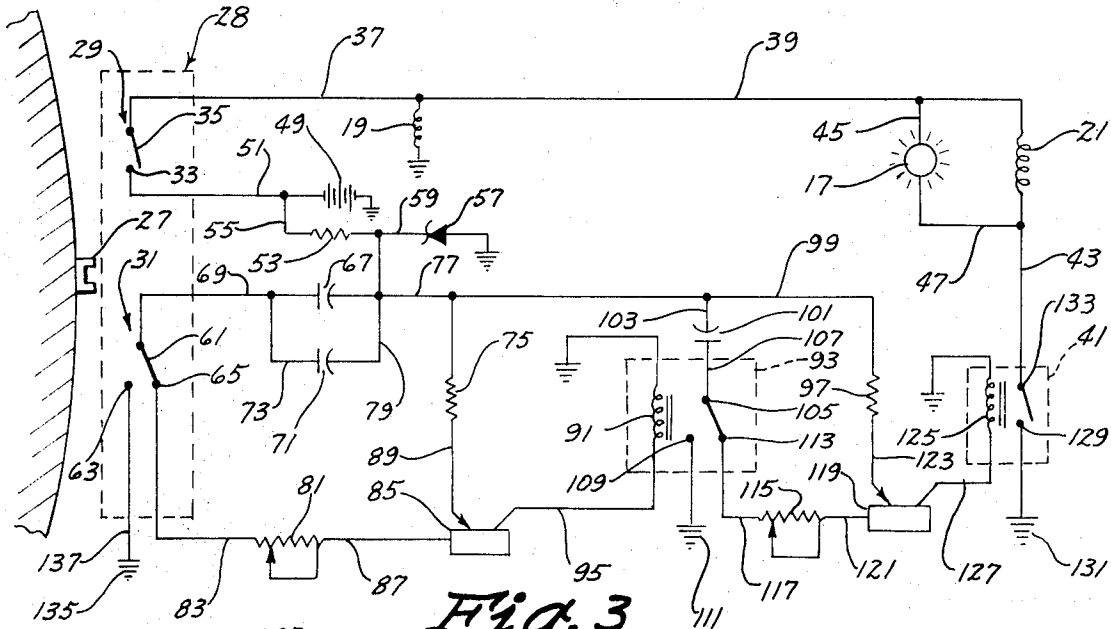


Fig. 3

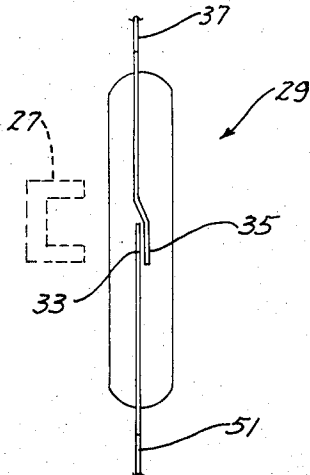


Fig. 4

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REVOLUTION COUNTER FOR A CONCRETE MIXING TRUCK

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8 Claims

ABSTRACT OF THE DISCLOSURE

A revolution counter for a concrete mixing truck which selectively records the mixing drum revolutions and also records those revolutions of the concrete mixing drum which occur within a preset drum speed range.

The structural qualities of concrete are affected by too much or too little mixing and, as a consequence, it has become important to determine how many mixing revolutions have taken place between the time that the concrete ingredients are deposited in the mixing drum and the time that the mixed concrete is discharged from the truck. Additionally, all revolutions of the concrete mixing drum are not mixing revolutions per se. Only those revolutions of the mixing drum which occur within a predetermined range of revolutions per minute are termed mixing revolutions. A generally accepted rate of rotation of the concrete mixing drum is from 5 to 12 revolutions per minute but this will depend upon the particular specifications. Any rate of revolution which does not occur within the predetermined range does not satisfactorily mix the concrete within the mixing drum and therefore such revolutions must not be counted.

It has been common heretofore to merely rotate the concrete mixing drum at an agitating speed, for example three r.p.m., while the truck is in transit and to mix the concrete for the prescribed number of revolutions at the prescribed speed under the supervision of an inspector at the job site. Obviously, this procedure is time-consuming and inefficient.

Therefore, it is a principal object of this invention to provide a revolution counter for a concrete mixing truck.

A further object of this invention is to provide a revolution counter for a concrete mixing truck which records those drum revolutions which occur within a predetermined speed range.

A further object of this invention is to provide a revolution counter for a concrete mixing truck which records the total revolutions and mixing revolutions of the concrete mixing drum.

A further object of this invention is to provide a revolution counter for a concrete mixing truck which includes a signal light thereby signalling the operator that the mixing drum is rotating within the mixing revolution rate.

A further object of this invention is to provide a revolution counter for a concrete mixing truck which permits the operator to determine the number of total revolutions and mixing revolutions from within the cab of the truck.

A further object of this invention is to provide a revolution counter for a concrete mixing truck which is economical of manufacture and durable in use.

These and other objects will be apparent to those skilled in the art.

This invention consists in the construction, arrangements, and combination of the various parts of the device, whereby the objects contemplated are attained as hereinafter more fully set forth, specifically pointed out in the claims, and illustrated in the accompanying drawings in which:

FIG. 1 is a side view of the concrete mixing truck and the revolution counter;

FIG. 2 is a front perspective view of the console which houses the mixing signal light and the revolution indicators;

FIG. 3 is a schematic view of the electrical circuitry of this invention; and

FIG. 4 is an end view of a reed switch means utilized in the electrical circuitry of FIG. 3.

The numeral 10 generally designates a concrete mixing truck having a cab 11 and a mixing drum 13 rotatably mounted at the rearward end of the truck. A console 15 is mounted in cab 11 and has a mix count signal light 17 provided thereon. Console 15 houses conventional totalizer means 19 and 21 which indicates the total revolutions of the mixing drum and the revolutions of the mixing drum which are "mixing revolutions," respectively. Totalizer means 19 and 21 are also provided with reset buttons 23 and 25, respectively, which are adapted to reset the totalizer means 19 and 21 to 0. It may also be desirable to use conventional tumbler lock key reset counters rather than reset buttons 23 and 25 to furnish additional safeguards against unauthorized tampering with the totalizers.

Drum 13 is provided with a magnet 27 secured thereto on its drum head which is adapted to pass adjacent sensor module 28 secured to the water tank standard. Module 28 includes reed switches 29 and 31 which are schematically illustrated in FIG. 3. Reed switch 29 is of conventional design such as described in United States Patent No. 3,249,713 and is adapted for closure of its leafs 33 and 35 upon magnet 27 passing thereby. Leaf 33 and 35 are preferably constructed of a tungsten material to prevent the leafs from becoming magnetized. Leaf 35 is connected to totalizer means 19 by means of lead 37 and a lead 39 extends from lead 37 to totalizer 21. Totalizer 21 is connected to a grounding relay means 41 by a lead 43. A lead 45 connects lead 39 and light 17 and a lead 47 connects light 17 to lead 43.

Leaf 33 is connected to a 12 volt direct current battery 49 by a lead 51. The numeral 53 designates a 180 ohm voltage limiter which is connected to lead 51 by a lead 55. Limiter 53 is connected to a voltage reference means 57 (IRIZF 6.8 T10) by a lead 59.

Reed switch 31 is substantially identical to reed switch 29 except that switch 31 has a leaf 61 which is movable between leaf 63 and contact 65. Leaf 61 normally engages contact 65. Leaf 61 is connected to a 200 mfd. charging capacitor 67 by a lead 69 which is connected to a 200 mfd. charging capacitor 71 by a lead 73. Capacitor 67 is connected to a 47 ohm emitter current limiter 75 by a lead 77. Capacitor 71 is connected to lead 77 by a lead 79 and lead 79 is also connected to lead 59.

Contact 65 is connected to a 50K ohm high range adjustable potentiometer 81 by a lead 83 and potentiometer 81 is connected to a transistor 85 (IR TRO4-C) by a lead 87 and transistor 85 is connected to limiter 75 by a lead 89. Transistor 85 is connected to a coil 91 of a time transfer relay 93 by a lead 95. Lead 77 is connected to a 47 ohm emitter current limiter 97 by a lead 99 and lead 99 is connected to a 200 mfd. charging capacitor 101 by a lead 103. Capacitor 101 is connected to switch 105 in relay 93 by a lead 107. The numeral 109 designates a contact in relay 93 which is grounded at 111. The numeral 113 designates a contact in relay 93 which is connected to a 50K ohm low range adjustable potentiometer 115 by a lead 117. Switch 105 is movable between contacts 109 and 113 and is normally in contact with contact 113. Potentiometer 115 is connected to a transistor 119 (IR TRO4-C) by a lead 121 and transistor 119 is connected to limiter 97 by a lead 123. Transistor 119 is connected to a coil 125 in relay 41 in a lead 127. The numeral 129 designates a contact in relay 41 which is grounded at 131.

Lead 43 is connected to switch 133 in relay 41 and switch 133 is in a normally open position as illustrated in FIG. 3. Potentiometer 81 is calibrated in terms of seconds and for this example, is calibrated to a time of 5 seconds. Potentiometer 115 is an adjustable potentiometer which may be calibrated in terms of seconds and for this example, is calibrated to a time of 7 seconds.

In operation, the mixing drum 13 would be charged with the necessary ingredients and the totalizers 19 and 21 would be reset to 0 at the mixing plant. The mixing drum is then caused to be rotated while the truck is in transit to the job site. Obviously, the rotation of drum 13 will cause the magnet 27 to pass adjacent to the switches 19 and 31 thereby successively actuating the same. As the magnet 27 passes switch 29, the magnetic attraction of the magnet 27 causes leaf 35 to contact leaf 33 thereby closing the switch 29 which causes battery 49 to be operatively electrically connected to the totalizer means 19, thus causing each rotation of the drum 13 to be recorded on the totalizer means 19. As soon as the magnet 27 has passed from an area adjacent the switch 29, the leaf 35 will move out of contact with leaf 33 thereby opening the circuit from the battery 49 to the totalizer 19.

As the magnet 27 passes switch 31, the magnetic attraction of the magnet causes leaf 61 to come into contact with leaf 63 thereby connecting the capacitors 67 and 71 with the battery 49 since the circuit will be completed through ground 135, lead 137, leaf 63, leaf 61, lead 69, lead 73, capacitors 67 and 71, lead 79, lead 59, limiter 53, lead 55, lead 51 and battery 49. This circuit will be momentarily completed while the magnet 27 moves past the switch means 31 and the capacitors 67 and 71 will be charged during the momentary period that this circuit is complete. As soon as the magnet 27 passes from the immediate area of switch 31, leaves 61 and 63 will separate and leaf 61 will engage leaf 65 thereby causing the electrical energy in the capacitors 67 and 71 to be discharged to the transistor 85 inasmuch as a circuit is completed between leaf 65, lead 83, potentiometer 81, lead 87, transistor 85, lead 89, limiter 75, lead 77, lead 79, capacitors 67 and 71, lead 73, lead 69 and leaf 61. Potentiometer 81 is calibrated to control the time that it takes the capacitors 67 and 71 to discharge and this time is preferably adjusted to a 5 second period for purposes of this example. The triggering of transistor 85 will cause relay 93 to be actuated so that switch 105 moves into engagement with contact 109 for a period of 5 seconds thereby completing a circuit from the ground 111 through the capacitor 101 and the battery 49 thus causing the capacitor 101 to become charged. When the 5 second period has elapsed, relay 93 is deactivated which causes switch 105 to move out of engagement with contact 109 and to move into engagement with contact 113 thereby completing a circuit from the capacitor 101 to the transistor 119. The completion of a circuit between capacitor 101 and transistor 119 causes the capacitor 101 to be discharged through the potentiometer 115 which is calibrated for 7 seconds for this example thereby triggering transistor 119 for this 7 second period. The activation or triggering of transistor 119 causes a circuit to be established from transistor 119 through the coil 125 of relay 41 which causes the switch 133 to be closed upon contact 129 for the 7 second period. The activation of relay 41 will cause totalizer 21 and light 17 to be activated providing magnet 27 is passing switch 29 thereby closing the same during the 7 second period that relay 41 is operating. Thus, potentiometer 81 set for a 5 second period and potentiometer 115 set for a 7 second period, relay 41 will be in an open or deactivated position for a period of 5 seconds after magnet 27 has passed switch 31 and then will be closed for a 7 second period thereafter. Thus, totalizer means 21 will only be actuated when magnet 27 passes switch 29 during this 7 second period. For purposes of this example, a mixing revolution can be generally defined as any revolution between 5 and 12 revolutions per minute. When the drum

13 is rotating at 5 revolutions per minute, one revolution will obviously take 12 seconds. Also, when the mixing drum 13 is rotating at 12 revolutions per minute, one revolution of the drum 13 will take 5 seconds. It can therefore be seen that when the mixing drum 13 is rotating at a rate of speed of 5 to 12 revolutions per minute, magnet 27 will cause switch 29 to be closed during that period that the relay 41 is closed which will cause that revolution to be recorded on the totalizer means 21. If the mixing drum 13 is rotating at a speed greater than 12 revolutions per minute, magnet 29 will close switch 29 at a time prior to relay 41 being activated and this revolution would not be recorded as a mixing revolution. Likewise, when the mixing drum 13 is rotating at a rate of speed less than 5 revolutions per minute, magnet 27 will not pass 29 to close the same at a time when the relay 41 is activated which will prevent these revolutions from being recorded as mixing revolutions. The equipment and the circuitry of FIG. 3 has been described as being adapted to sense only those revolutions falling within the 5 to 12 revolutions per minute range. However, it is obvious that the potentiometers 81 and 115 can be adjusted to alter the time of the activation of relay 41 in the event that a different range of revolutions is required to be sensed. While the circuitry of this invention is ideally suited for the concrete mixing truck environment, it can be appreciated that the same could be utilized in an environment where it is desired to record the number of revolutions falling within a particular range.

Thus it can be seen that the device accomplishes at least all of its stated objectives.

Some changes may be made in the construction and arrangement of my revolution counter for a concrete mixing truck without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims, any modified forms of structure or use of mechanical equivalents which may be reasonably included within their scope.

I claim:

1. In a revolution counter for a revolving member, a first and second switch means positioned adjacent said revolving member and operatively connected to an indicator means, means on said revolving member adapted to successively actuate said first and second switch means, a first control means operatively electrically connected to said second switch means and adapted to actuate a first relay means for a predetermined period of time upon the actuation of said second switch means, a second control means operatively electrically connected to said first relay means and adapted to actuate a second relay means for a predetermined length of time after said first relay means has been activated for its predetermined period of time, said second relay means being operatively electrically connected to said indicator means and said first switch means whereby said indicator means will be actuated only during the period said second relay means is activated and when said first switch means is caused to be closed by said means on said revolving member, said first control means including a battery and a first capacitor means which are connected to said second switch and which have a circuit completed there-through to cause said first capacitor means to be charged when said second switch means is actuated by said means on said revolving member, said first control means also including a first potentiometer, a first transistor, and a first resistor which are series connected to said first capacitor means and said second switch means when said second switch means is subsequently deactivated thereby causing said first capacitor means to furnish current to said first transistor through said first potentiometer, said first relay means being operated by the collector current of said first transistor, said second control means includ-

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ing a second capacitor which is series connected to said battery and said first relay means when said first relay means is activated by said first transistor thereby causing said second capacitor to be charged, said second control means also including a second potentiometer, a second transistor, and a second resistor which are series connected to said second capacitor and said first relay means when said first transistor has deactivated said first relay means thereby causing said second capacitor to furnish current to said second transistor through said second potentiometer, said second transistor being connected to said second relay means whereby said second relay means will be operated by the collector current of said second transistor.

2. The counter of claim 1 wherein said first and second switch means are each comprised of magnetically actuated reed switches, said means on said revolving member being comprised of a magnet adapted to cause the actuation of said first and second switch means when said magnet moves thereby during each revolution of the revolving member.

3. The counter of claim 1 wherein said first switch means is series connected to said battery and said second relay means whereby said battery will supply current to said second relay means when said first switch means is closed by said means on said revolving member.

4. The counter of claim 1 wherein said indicator means includes first and second counter mechanisms, said first switch means, said battery and said first counter means being series connected when said first switch means is closed by said means on said revolving member whereby said first counter mechanism will record each revolution of said revolving member, said second relay means being connected to said second counter member whereby said second counter member will only record those revolutions falling within a predetermined rate of revolutions range.

5. The counter of claim 4 wherein said first and second counter mechanisms include counter reset means.

6. The counter of claim 1 wherein said indicator means includes a signal means which is connected to said second relay means and which is energized only when said second relay means is actuated and said first switch means is closed.

7. In a revolution counter for a revolving member, a first and second switch means positioned adjacent said revolving member and operatively connected to an indicator means,

means on said revolving member adapted to successively actuate said first and second switch means,

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a first control means operatively electrically connected to said second switch means and adapted to actuate a first relay means for a predetermined period of time upon the actuation of said second switch means,

a second control means operatively electrically connected to said first relay means and adapted to actuate a second relay means for a predetermined length of time after said first relay means has been activated for its predetermined period of time,

said second relay means being operatively electrically connected to said indicator means and said first switch means whereby said indicator means will be actuated only during the period said second relay means is activated and when said first switch means is caused to be closed by said means on said revolving member, said control means including a battery, said indicator means comprising first and second revolution counter mechanisms,

said first switch means, said battery and said first counter mechanism being series connected when said first switch means is closed by said means on said revolving member whereby said first counter mechanism will record each revolution of said revolving member, said second counter mechanism being operatively connected to said second relay means whereby said second counter mechanism will only record those revolutions falling within a predetermined rate of revolutions range,

a visual signal means electrically connected to said second counter mechanism which is only actuated when said second counter mechanism is recording.

8. The counter of claim 7 wherein said revolving member is a concrete mixing drum rotatably mounted on a truck, said visual signal means being positioned in the operator's cab of the truck so as to indicate to the operator when the mixing drum is rotating at a speed falling within said-predetermined rate of revolution range.

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235—103; 324—68