Sept. 1, 1959 H. A. SEELE 2,902,554

TIMER MECHANISM

Original Filed Aug. 27, 1956

Fig. 1.

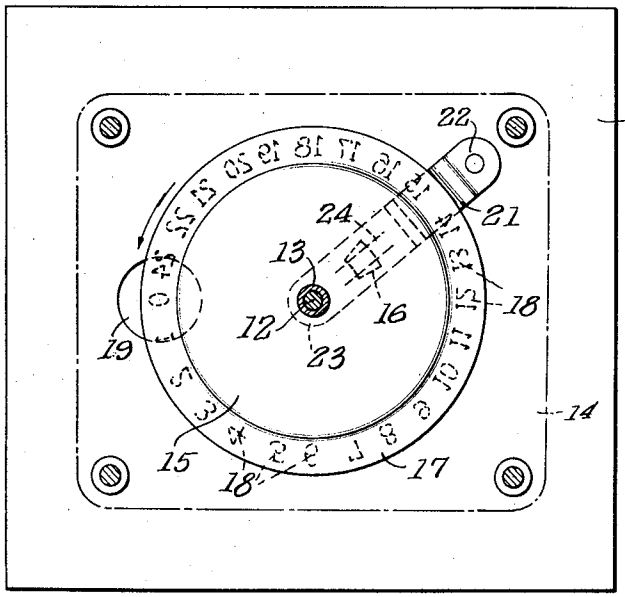


Fig. 3.

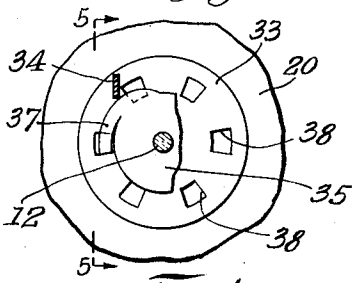


Fig. 4.

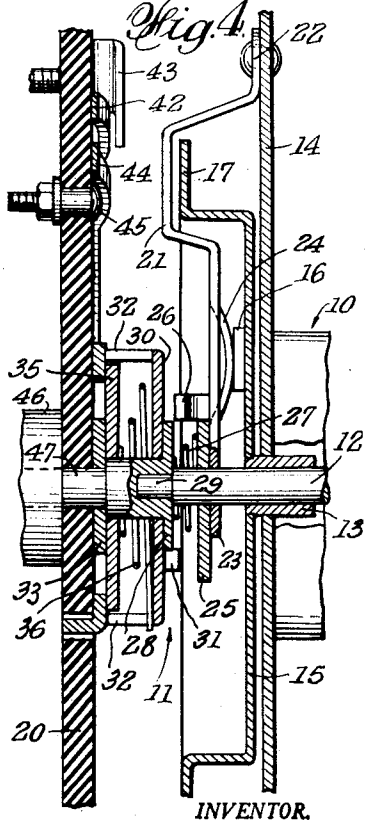


Fig. 2.

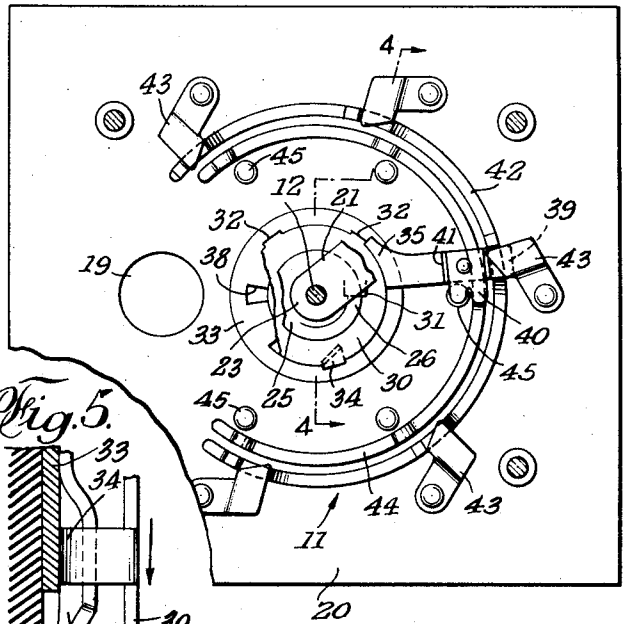


Fig. 5.

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TIMER MECHANISM

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Original application August 27, 1956, Serial No. 606,258. Divided and this application June 28, 1957, Serial No. 668,789

6 Claims. (Cl. 200—38)

This invention relates to a timer mechanism and is a division of my pending application, Serial No. 606,258, filed August 27, 1956.

In said application, there is disclosed automatic control means for sprinkler systems that operates in an efficient manner because the same is not merely timed to operate periodically, but rather according to sub-soil moisture—a condition that may vary according to drainage characteristics of the soil and evaporative effects of the sun and variable weather conditions. The system shown in said application embodies an automatic timer mechanism that, while time-operated, is under control of moisture-sensing means.

An object of the present invention is to provide time-controlled mechanism of the character referred to for enabling pre-setting the time of operation of watering means so the same may function at the time and for the period desired.

A more general object of the invention is to provide a timer mechanism to control the operation of a piece of equipment, for instance, a valve, switch, etc., and to institute and stop operation of such piece of equipment under the general control of a time motor.

The invention also has for its objects to provide such means that are positive in operation, convenient in use, easily installed in a working position and easily disconnected therefrom, economical of manufacture, relatively simple, and of general superiority and serviceability.

The invention also comprises novel details of construction and novel combinations and arrangements of parts, which will more fully appear in the course of the following description. However, the drawing merely shows and the following description merely describes, one embodiment of the present invention, which is given by way of illustration or example only.

In the drawing, like reference characters designate similar parts in the several views.

Fig. 1 is an elevational view, with the mounting means in cross-section, of a time-controlled mechanism according to the present invention.

Fig. 2 is a sectional view, with parts broken, of the mechanism shown in Fig. 1, the view being taken on a plane rearward of the front of Fig. 1.

Fig. 3 is a fragmentary sectional view, taken on a plane rearward of the front of Fig. 2.

Fig. 4 is an enlarged cross-sectional view as taken approximately on the line 4—4 of Fig. 2.

Fig. 5 is an enlarged cross-sectional view as taken approximately on the line 5—5 of Fig. 3.

The present timer mechanism is shown as comprising a clock motor **10** and switching means **11** under continuous control of said motor.

The clock motor **10** is generally conventional and, in this instance, may be electrically operated, although spring or other power operation may be used. In any case, said clock has two concentric output shafts, the fast shaft **12** making one revolution per hour and the slow shaft or sleeve **13** making one revolution per day or twenty-four

hours. These relative rates of rotation are exemplary and may be varied as desired. The back plate **14** of the clock is used for mounting the switch means **11**, the shaft **12** and sleeve **13** extending through said plate (Fig. 4). Said switching means **11** is operated by said fast and slow shafts.

Sleeve **13** carries a flanged disc **15** on the rear face of which is provided a cam **16**, it being clear that said cam makes one revolution around the axis of sleeve **13** in each twenty-four hours. The flange **17** of said disc, on its rear face, is provided with members **18** indicative of hours, the same being readable through a hole **19** provided in a dielectric back plate **20** of said means **11**. The location of the cam **16** can be determined by reading of the hour as seen through said hole **19**.

A bracket **21**, fastened at one end **22** to plate **14** and having its other end **23** apertured to pass shaft **12**, carries a rise **24** that is engaged by cam **16** once every twenty-four hours. Said bracket being resilient, the same is deflected rearward by cam **16**.

On the rearward side of bracket **21**, and slidably mounted on shaft **12** but keyed thereto to rotate with the shaft, is provided a clutch disc **25**, the same being provided with a rearwardly directed clutch tooth **26**. Disc **25** is biased forward by a spring **27**, said spring yielding to the action of cam **16** to press the clutch disc rearwardly.

A flanged hub **28** is provided, the same being an aligned extension of shaft **12** with which it has an aligning connection **29**.

On said hub **28** is rotatably carried a plate **30** which is formed with a forwardly directed clutch tooth **31** that is rearwardly clear of tooth **26** except when the cam **16** presses the bracket **21** rearwardly. When the clutch teeth are engaged, as shown in Fig. 2, rotation of clutch disc **25** is imparted to plate **30**. Said latter plate is provided with one or more rearwardly extending legs **32** that space said plate from a disc **33** mounted on the forward face of the back plate **20**. An additional leg is formed as a cam **34**.

In the space provided above, is disposed a contact arm **35** that is resiliently connected to plate **30** by a torsion spring **36**. Said arm is provided with a resilient lock tooth **37** that has successive abutting engagement with abutments **38** that are defined by holes formed in disc **33**. Said arm **35** is provided with a contact end **39** and inward of said end, the arm carries a bridging contact **40**, the same being insulated from the arm as by a block **41**.

It will be realized that spring **36** also biases arm **35** in a direction to engage tooth **37** with one of the abutments **38** and the rotation of plate **30** first builds up torsion in spring **36** and then, when said torsion becomes great enough, imparts rapid or sudden rotative movement of the arm **35**.

In connection with the contact end **39** of arm **35**, there is provided an arcuate contact bar **42** which is associated with a series of arcuately spaced contacts **43** that overstand said bar so that arm end **39** may assume a position bridging said bar and one of the contacts, as shown in Fig. 2.

In connection with bridging contact **40**, there is provided a second arcuate contact bar **44** with which is associated a series of arcuately spaced contacts **45**. Said contacts **45** are so located that, when arm end **39** is disposed in bridging engagement between bar **42** and a contact **43**, the bridging contact **40** will bridge across bar **44** and a contact **45**.

At hourly intervals, or such other intervals as may be desired, clutch tooth **26** will pass by clutch tooth **31**, and only when the cam **16** is in engagement with bracket rise **24** will said bracket be deflected to engage the clutch teeth to institute building up of torsion in spring **36**. When said torsion is high enough, the arm **35** will be moved from one position to the next, bridging between bar **42** and

contact 43, on the one hand, and bar 44 and contacts 45 on the other. It will be realized, of course, that spring 36 is ineffective until cam 34 engages the resilient lock tooth 37 (Fig. 5) to withdraw the same from engagement with an abutment 38.

After cam 16 leaves the rise 24, the clutch is disengaged. However, the electrical contacts made between bar 42 and its contacts 43 and bar 44 and its contacts 45 are retained.

The circumferential extent of cam 16, together with the effective width of rise 24, controls the circuit-closing operation of the clutch. Thus, this extent may be equal to one hour of the rotation of cam 16, thereby holding the clutch engaged during one revolution of clutch plate 35, so that successive circuits may be closed by the bridging contact end 39 while successive circuits may be made by contact 40.

The arm 35 is located by the lock tooth 37 engaging an abutment 38 and said arm retains this position until spring 36 is tensioned. Then, cam 34 withdraws said tooth, allowing the spring to snap the arm 35 to the next position, which is again locked by tooth 37. The rapidity of the break and make will be obvious.

The circumferential extent of cam 16 may be increased so that the clutch teeth 26 and 31 will retain engagement for more than one hour, i.e., for two or more revolutions of the hour or fast shaft.

A knob 46 on the end of an extension 47 of flanged hub 28 may be used as a manual control for overriding the clock-driven shaft 12. Thus, the switch means may be manually controlled, as desired.

While the foregoing has illustrated and described what I now contemplate to be the best mode of carrying out my invention, the construction is, of course, subject to modification without departing from the spirit and scope of the invention. It is, therefore, not desired to restrict the invention to the particular form of construction illustrated and described, but to cover all modifications that may fall within the scope of the appended claims.

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

1. A timing device comprising a clock having a fast shaft and a concentric slow shaft, electrical switch means with an operative connection to the fast shaft, a clutch with coupling means connected to the slow shaft and interposed in the connection for operating the switch means, a cam operated by the slow shaft, a cam operated member constituting the means to couple the clutch, means inducing an intermittent operation of the switch means, said clutch, when coupled, operating said latter means once for each revolution of the fast shaft, the means inducing the intermittent operation of the switch means including a rotational contactor, a latch, and a spring-biased member controlled by the clutch to both apply the biasing force of the spring on the contactor and to sequentially release the latch.

2. A timing device according to claim 1 in which the relative rotation of the fast shaft and the cam is such that the clutch is maintained coupled for more than one revolution of the fast shaft.

3. A timing device according to claim 1 in which the relative rotation of the fast shaft and the cam is such that the clutch is maintained coupled for at least two revolutions of the fast shaft.

4. A timing device comprising a clock having a fast shaft and a slow shaft, a clutch disc keyed to the fast shaft to rotate therewith, slidable thereon longitudinally of the shaft, a clutch operated member connectable with the clutch disc upon movement of the latter, a cam on the slow shaft, a resiliently mounted clutch disc-engaging arm in the path of said cam to be deflected thereby, once for each revolution of the slow shaft adapted to move the clutch disc to engaging position, the width of the cam in relation to the width of the clutch disc-engaging arm determining the duration of the clutch engagement, a movable contact arm, stationary contacts electrically cooperable therewith for opening and closing electrical contacts, a spring inter-connecting the contact arm and the driven clutch member, and means for resisting motion of the contact arm to produce snap action from the force of the spring.

5. A timing device as in claim 4 in which detents are provided for locking the contact arm in a plurality of different angular positions, thereby resisting motion of the contact arm to cause spring force to be built up by rotation of the fast shaft, and a detent retractor carried by the fast shaft for periodically releasing the contact arm to effect contact opening and closing by snap action.

6. A timing device as in claim 4 wherein the ratio between speeds of revolution of the slow shaft and the fast shaft is smaller than the ratio between the width of the cam on the slow shaft and the peripheral distance around the slow shaft at the radius of said cam, whereby the clutch is maintained coupled for more than one revolution of the fast shaft.

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