F. WALLER, JR.

AUTOMATIC TIMER.

APPLICATION FILED JULY 2, 1910.

1,025,726.

Patented May 7, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

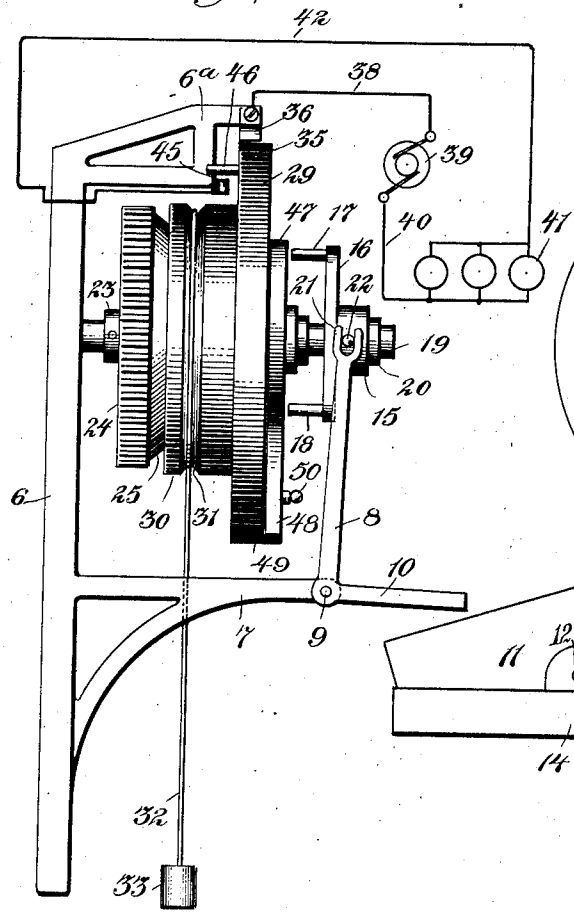

Fig. 2.

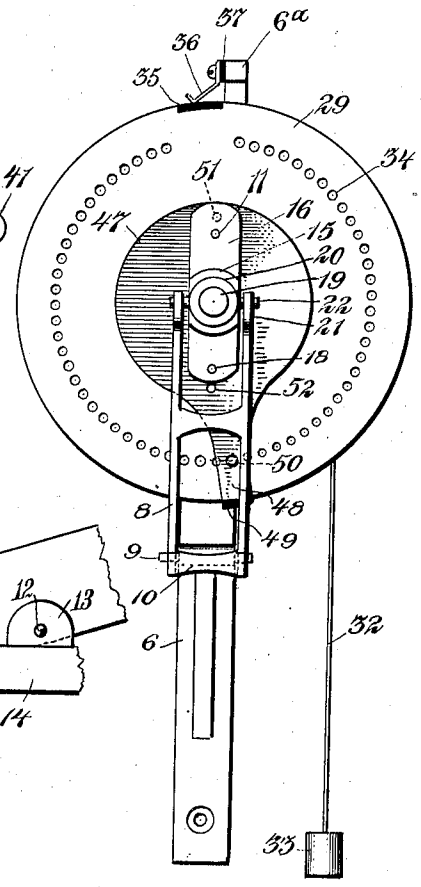

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Fig. 3.

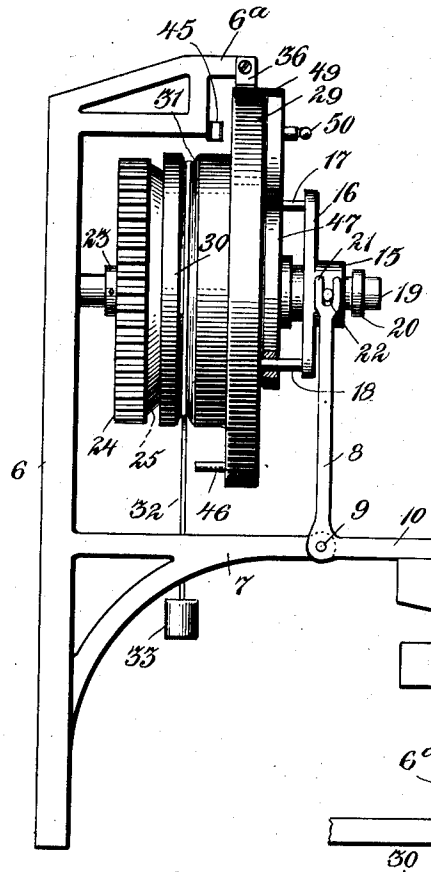


Fig. 7.

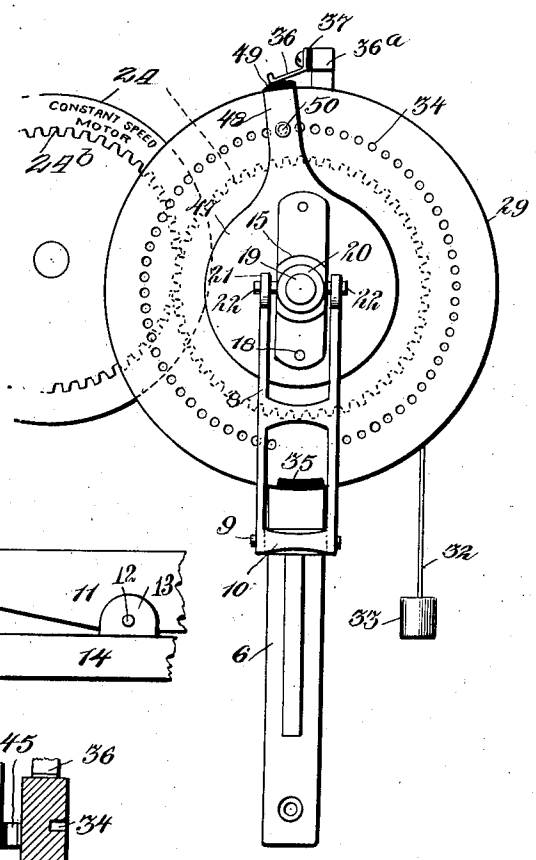
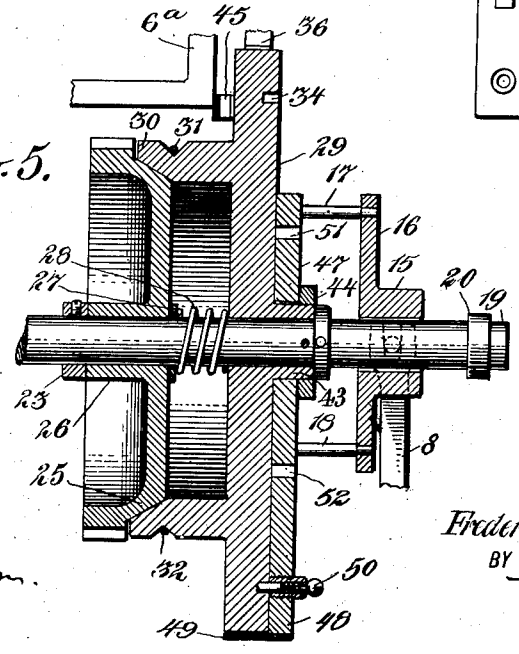


Fig. 5.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC TIMER.

1,025,726. Specification of Letters Patent. Patented May 7, 1912.

Application filed July 2, 1910. Serial No. 570,118.

To all whom it may concern:

Be it known that I, FREDERICK WALLER, Jr., a citizen of the United States, and a resident of Lynbrook, in the county of Nassau and State of New York, have invented a new and Improved Automatic Timer, of which the following is a full, clear, and exact description.

My invention relates to automatic timers, such as are used more particularly for timing exposures for developing paper, photographs and the like, my more particular purpose being to produce a timer of this type in which the various parts, when set for a particular exposure, may be restored to normal condition after the exposure, and that, too, independently of the immediate attention of the operator.

My invention more particularly comprehends a continuously driven gear member, and clutch mechanism connected therewith and adapted to grip and release in varying intervals of time, determined by the relative position in which various adjustable parts are set beforehand at will.

My invention further comprehends contact mechanism controllable by my improved timing mechanism for the purpose of opening and closing an electric lighting circuit, though I do not limit myself in all instances to the use of the contact mechanism. Neither do I limit myself to the precise arrangement of the several parts shown, nor to the exact construction of any particular part—the scope of my invention being commensurate with my claims.

While my improved automatic timer may be made in a great variety of ways, all of which it is impracticable to describe, I will, for convenience, content myself with describing a typical form of the device for use more particularly in connection with exposures of developed prints.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side view, partly in elevation and partly diagrammatic, showing my improved automatic timer and an electric lighting circuit controllable by the same, the device being in its normal position. Fig. 2 is a front elevation of the mechanism shown in Fig. 1; Fig. 3 is a side elevation showing the mechanism of Fig. 1, but at a more advanced step—to wit, just after the exposure has been made and the clutch is disengaged. Fig. 4 is a front elevation of the mechanism shown in Fig. 3, but with the addition of a constant speed motor. Fig. 5 is a fragmentary vertical section showing the clutch mechanism in action and various other parts as they appear while the exposure is being made.

A frame 6 is provided with forwardly-extending portions 6ª, 7, and mounted upon the portion 7 by aid of a pivot 9 is a clutch fork 8 provided with a forwardly-extending plate 10. A printing frame is shown at 11, and may be placed under the plate 10, said printing frame 11 being mounted on a plate 14 by the aid of a pivot 12 and a bearing 13, the printing frame 11 having an extension, as shown, placed beneath the plate 10 and used to lift the plate 10 upward or let it downward, as may be seen by contrasting Figs. 1 and 3.

The clutch fork 8 extends upwardly toward a hub 15 which is integral with a yoke 16, the latter being provided with stop pins 17, 18. The hub 15 is slidably mounted upon a stationary shaft 19, the latter being provided with a set collar 20 which serves as a limiting stop and prevents undue travel of the hub 15 and yoke 16 in one direction, as will be understood from Figs. 1 and 3. The upper end of the clutch fork 8 is provided with slotted bearings 21 and extending through these bearings are pins 22 mounted rigidly upon the hub 15. When the plate 10 is raised, the tendency of the stop pins 17, 18 is to move endwise toward the left according to Figs. 1 and 3.

Mounted upon the shaft 19 is a set collar 23 and adjacent to the latter is a gear wheel 24 provided with a smooth beveled portion 25 serving as a clutch member, and further provided with a hub 26 which turns freely upon the shaft 19. The gear wheel 24 is driven by aid of a constant speed motor 24ª (see Fig. 4) and is therefore time controllable. Any well known make of constant speed motor is suitable for use in this con-

nection. A collar 27 encircles the shaft 19 and engaging this collar is a compression spring 28. A disk 29 is revolubly mounted upon the shaft 19 and is provided with an annular clutch member 30, the latter having a groove 31. A cord 32 rests in this groove and supports a weight 33, the tension of the weight maintaining the cord taut and tending to turn the disk 29 in a clockwise direction according to Figs. 2 and 4. The constant speed motor 24^a is provided with a gear wheel 24^b which meshes with the gear wheel 24. The wheel 24 and the movable parts connected with it are driven at a constant rate of speed.

The disk 29 is provided with holes 34, preferably sixty in number and indicating subdivisions of a minute of time. In the particular instance here illustrated the disk 29, when moved by rotation of the gear 24, as hereinafter described, turns at the rate of one revolution per minute, so that the various holes 34, passing a given fixed point, do so at the rate of one per second. This arrangement is convenient for setting the timing device for a particular number of seconds or for a definite fraction of a minute. The disk 29 is made of metal and carries a sector 35 of insulating material sunken flush with its outer peripheral surface. A contact spring 36, supported by the portion 6^a of the frame and insulated therefrom by a plate 37 of insulating material, normally engages the sector 35.

Connected with the contact spring 36 is a wire 38 which leads to a dynamo 39 or other source of electricity. A wire 40 is connected with this source of electricity and leads to a number of lamps 41 used in this instance for the purpose of furnishing the light for the exposure. A wire 42 is connected with the lamps 41 and with a contact spring 45 which engages the disk 29 when the latter is in its extreme position to the left, as indicated in Fig. 5.

At 46 is a stop pin carried by the disk 29 and adapted to lodge against the portion 6^a of the frame, so as to prevent excessive travel of the disk 29. When the stop pin 46 lodges against the framework 6^a, the sector 35 (see Fig. 2) is in engagement with the contact spring 36 and the disk 29 occupies its normal position of inactivity. At 47 is a revoluble disk which is mounted upon an annular boss 43 integral with the disk 29. The disk 47 is retained by a collar 44. The disk 47 is provided with a sector 49 of insulating material, the disk 47 and its neck 48 being of metal.

At 50 is a spring pin carried by the neck 48 and adapted for holding the disk 47 in any one of a number of different positions relatively to the disk 29.

The operator, by manipulating the spring pin 50 and turning the disk 47, may give this disk any desired position relatively to the disk 29, and in doing this the operator merely shifts the spring pin 50 from one to another of the holes 34. Because of the action of the stop pin 46 in lodging against the portion 6^a of the frame, the disk 29 can never make more than one complete revolution in any direction.

The disk 47 is provided with two holes 51, 52, the hole 51 being a little nearer than the hole 52 to the shaft 19. The distance from the hole 51 to the shaft 19 is the same as the distance from the stop pin 18 to this shaft. Similarly the distance from the hole 52 to the shaft is the same as that from the stop pin 17 to the shaft. When, therefore, the disk 47 occupies relatively to the disk 29 the position indicated in Fig. 2, the hole 51 when quite near the stop pin 17 is unable to register with the same, and this is also true of the hole 52 and stop pin 18. By this arrangement of the holes 51, 52 and stop pins 17, 18, the disk 29 may be arranged for practically one complete revolution or any subdivision of the same.

The operation of my device is as follows: I will suppose, first, that the parts are in their respective normal positions, as indicated in Figs. 1 and 2. The weight 33 is now at its lowermost limit; the disk 29 (see Fig. 2) is in such position that the spring 36 rests upon the insulating sector 35; the stop pin 46 is against the portion 6^a of the frame; the plate 10 is down, the clutch fork 8 is swung outwardly at its upper end, and the stop pins 17, 18 are out of engagement with the disk 47. The operator now wishing to time an exposure—say of a developing paper—determines first the number of seconds he wishes the exposure to continue. This, I will assume for the moment, happens to be thirty. The operator grasps the spring pin 50 and by its aid releases the neck 48 and disk 47 from engagement with the disk 29. The neck 48 is now turned into such position that the number of holes 34 between the spring pin 50 and the sector 35 corresponds to the number of seconds desired for the exposure—in this instance 30. That is to say, the neck 48 is shifted around until thirty holes can be counted in a clockwise direction, according to Fig. 2, from the sector 35 around to the neck. If the exposure were to be any other number of seconds—say 15, 16 or 20—the neck 48 would be shifted accordingly so that the number of holes between the sector 35 and the neck 48, reckoned in a clockwise direction, according to Fig. 2, corresponds to the number of seconds desired for the exposure. The location of the neck 48 being thus adjusted and the spring pin being released, the neck 48 is held rigidly in rela-

tion to the disk 29, as will be understood from Fig. 5. Developing paper is now placed in the printing frame 11, this frame is then closed, and by virtue of the extension thereof above mentioned, raises the plate 10. This causes the clutch fork 8 to rock slightly so that the stop pins 17, 18, are thrust toward the left according to Fig. 1. The stop pins 17, 18 thus engage the disk 47, and by pressing against the same, move the disk 29 to the left, according to Fig. 5, so that the clutch member 30 is forced into engagement with the clutch member 25. Since power is applied continuously to the gear 24, the gripping of the clutch members causes the disk 29 to begin turning, its direction of rotation being contra-clockwise according to Figs. 2 and 4. The disk 29 carries the disk 47 with it. The disk 47 is pressed by tension of the spring 28 (see Fig. 5), against the stop pins 17, 18 which do not prevent this disk from turning, because as yet the stop pins 17, 18 are not in registry with the holes 51, 52. When, however, the rotation of the disk 47 brings the holes 51, 52 into registry with the stop pins 17, 18, these stop pins snap into the holes—or rather, the disk 47 moves outwardly so that the holes are over the pins—and lock the yoke 16 and disk rigidly together. This prevents further rotation of the disk 47. Moreover, since the disks 29 and 47 are locked together, and the disk 47 slides bodily to the right according to Fig. 5, as soon as the holes 51, 52 are in registry with the stop pins 17, 18, it follows that the clutch members 30, by moving to the right, according to Fig. 5, disengages the clutch member 25. This allows the gear wheel 24 to continue its rotation uninterruptedly; whereas, the weight 33, by pulling upon the cord 32, tends to turn the disk 29 in the reverse direction—that is, clockwise according to Fig. 2, but as the disk 47 is still held by the stop pins, the disk 29 is unable to act, under influence of the weight 33, until the frame 11 is raised and the plate 10 is lowered in consequence. The time of exposure of the developing paper is the time required for the disk 29 (see Fig. 2) to turn under the continuous drive of the gear wheel 24, until the stop pins 17, 18 register with the holes 51, 52, as above described, and the clutch member 30 becomes disengaged from the clutch member 25. Manifestly, if the disk 29 turns at such a velocity that 60 of the holes 34 pass any given fixed point in 60 seconds, the time required for the disk 29 to turn any particular number of seconds, less than 60, may be easily arranged by merely adjusting the position of the neck 48 relatively to the disk 29. That is to say, the operator turns the neck 48 so far in a clockwise direction as to leave between the spring pin 50 and the sector 35 a number of holes corresponding to the number of seconds desired for the exposure.

I will now explain how the light is manipulated to correspond with the time desired for the exposure.

When the parts are in their normal position so that the contact spring 36 rests upon the sector 35, no current, of course, can flow through the lamps 41. Neither can any current flow while the operator is adjusting the disk 47—or in other words, is adjusting the timer. The adjustment having been made, however, and the printing frame 11 having been closed and the extension pressed upwardly against the under side of the plate 10, so as to force the stop pins 17, 18 to the left according to Fig. 5, the clutch member 30 is thus brought into engagement with the power-driven clutch member 25. The disk 29 begins to turn and carries the sector 35 of insulating material out from under the contact spring 36. When this occurs, a circuit is completed as follows: Source of electricity 39, wire 40, lamps 41, wire 42 to contact spring 45, disk 29, contact spring 36, and wire 38, back to source of supply. This energizes the lamps 41 and they begin to glow. As soon, however, as the disk 29 reaches its limit of travel (adjusted as above described by setting the disk 47), the sector 49, carried by the neck 48 reaches the contact spring 36 and raising the same out of engagement with the disk 29 leaves the circuit open. The electric energy is thus not used except during the time when an exposure is actually being made. The circuit is open while the timing device is idle.

My invention may be used in a large number of independent relations. In fact, it may be employed under almost any conditions where it is desirable for the operator to bring about a predetermined movement of a mechanical part after the expiration of a predetermined interval of time, this interval to be ascertained in advance by the operator and the device set or adjusted accordingly.

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

1. An automatic timer, comprising a continuously driven time-controlled clutch member, a second clutch member normally free, means controllable at will for throwing said clutch members into engagement, mechanism for restoring said second-mentioned clutch member to a predetermined normal position after each engagement of said second-mentioned clutch member with said first-mentioned clutch member, and means controllable at will for preadjusting the time interval during which said first-mentioned clutch member engages said second-mentioned clutch member.

2. An automatic timer, comprising contact mechanism including a revoluble disk, means for turning said disk at a constant speed, an adjusting disk movable at will for determining the duration of rotation of said first-mentioned disk, a yoke provided with means for engaging said adjusting disk when the latter is brought into a predetermined position, and mechanism for controlling said yoke in order to force the same into engagement with said adjusting disk.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

FREDERICK WALLER, JR.

Witnesses:

F. W. HANAFORD,

PHILIP D. ROLLHAUS.