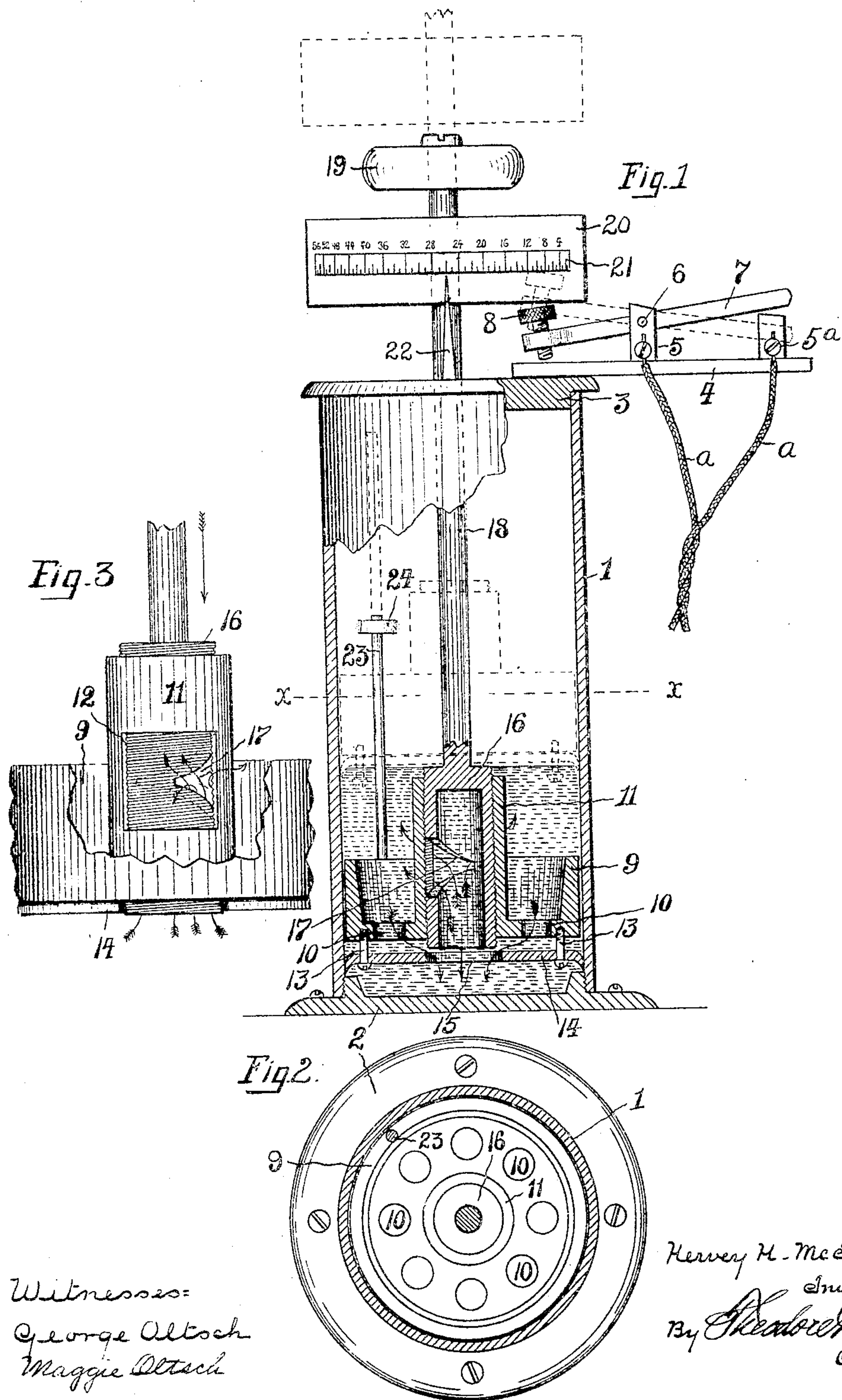


No. 807,574.

PATENTED DEC. 19, 1905.

H. H. McINTIRE.  
TIMING DEVICE.

APPLICATION FILED AUG. 3, 1903.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

HERVEY H. McINTIRE, OF SOUTH BEND, INDIANA.

## TIMING DEVICE.

No. 807,574.

Specification of Letters Patent.

Patented Dec. 19, 1905.

Application filed August 3, 1903. Serial No. 168,054.

*To all whom it may concern:*

Be it known that I, HERVEY H. McINTIRE, a citizen of the United States, residing at South Bend, in the county of St. Joseph and State of Indiana, have invented certain new and useful Improvements in Timing Devices; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to a timing device, and while more particularly designed for use in connection with a photographic-printing apparatus it may be applicable to any machine or device in which a period of time of a certain operation or action is to be regulated.

The object of the present invention is to provide an improved device of the kind named and for the purpose stated which is simple in construction, durable in use, and efficient and accurate in operation and wherein each duration of the printing operation of a photograph may be predetermined and accurately measured.

The invention embodies a casing having a suitable substance therein which tends to repel the fall of a plunger, and the plunger is provided with means for changing its resistive action on said substance, whereby the period for the fall of the plunger may be varied for different exposures.

For a full understanding of the merits and advantages of this invention reference is to be had to the following description and the accompanying drawings, wherein—

Figure 1 is a view partly in side elevation and partly in vertical section. Fig. 2 is a transverse section on the line  $x-x$  of Fig. 1. Fig. 3 is an enlarged detail in elevation of the plunger-valve with a portion of the plunger broken away.

Referring to the drawings, wherein similar reference notations indicate like parts appearing in the several illustrations, and reference being had thereto, 1 designates a cylindrical casing mounted in an upright position upon a base-plate 2, which closes its lower end, and the upper end is covered by a suitable plate or disk 3, from which extends an arm or bracket 4, carrying the terminals 5 and 5<sup>a</sup> of electric conductors  $a-a$ . On this arm 4 is pivoted, as at 6, a switch-blade 7, the outer end of which coöperates with the terminal 5<sup>a</sup> to make and break an electric

current, while the inner end carries a set-screw 8, by which a very accurate adjustment for the trip of the blade may be effected, as will be hereinafter set forth.

A certain amount of fluid—such as air, water, or oil, preferably the last—is contained in the casing, and the quantity is such as will permit a complete operation under normal condition in the maximum time to which the device may be set, as will appear hereinafter.

Mounted to reciprocate within the casing is a plunger 9, provided with a plurality of apertures 10, and a central hollow upstanding boss 11, in which is formed an opening 12, through which the liquid escapes to the upper side of the plunger while the latter is moving downward. From the bottom of the plunger extend a plurality of pins 13, on which is loosely mounted a washer 14, which is provided with a central aperture 15. This washer is free to move up and down on the pins independently of the plunger to close the apertures 10 therein and prevent the escape of liquid therethrough upon the downward movement of the plunger; but upon the upward movement of the plunger the liquid on the upper side of the same will be permitted to pass through the apertures 10 and the large central aperture 15 in the washer 14, which has by virtue of the pressure of the liquid become unseated from the bottom of the plunger, as shown and indicated by the arrows pointed downwardly in Fig. 1.

Mounted in the hollow boss 11 of the plunger is a rotary valve 16. This valve is hollow and closes the upper end of the hollow boss 11, while the lower end thereof is open to provide a cylindrical chamber into which the fluid passes upon the downward movement of the plunger. The contiguous faces of the valve and hollow boss are preferably screw-threaded, and through the wall of the valve is formed a valve-opening 17, which is adapted to be brought by a rotary movement of the valve into alinement with the opening 12 in the plunger, and this opening 17 is preferably formed with divergent borderlines, so that a graduated opening may be formed to graduate the flow of fluid through the valve upon the downward movement of the plunger. The valve-stem 18 extends upwardly through the cover 3 and is provided at its upper end with a suitable hand-wheel 19, by which the plunger may be lifted and the valve rotated. On the valve-stem 18, above



the casing, is secured a weight 20, which is in the form of a disk and has upon its periphery a scale 21, marked off to indicate the units of time and by means of which the time required for the fall of the plunger may be predetermined. Since the rotation of the valve increases or decreases the size of the opening 17, through which the fluid has to pass as the plunger descends, it will be obvious that the time for the fall of the plunger may be varied as may be required for different exposures, and this variation is ascertained and predetermined by means of the scale 21, which coöperates with a pointer 22 to indicate the exact time for the descent of the plunger.

In order to prevent the plunger from rotating with the valve, the former is provided with a rod or key 23, which plays loosely through a guide 24, formed in the wall of the casing.

Assuming that the electric conductors *a a* supply the light for a photographic-printing apparatus and that during the operation of printing it is desired to change the period of exposure for the different qualities of sensitized paper and insure that the proper exposure is made, the present device is utilized, and it being premised that an exposure of twenty-six seconds is to be made the operator by rotating the valve 16 in the plunger 9 may bring the scale 21 to a position to register twenty-six seconds, as is shown in Fig. 1 of the drawings, and this rotary movement of the valve will bring so much of the graduated opening 17 into alinement with the opening 12 in the hollow boss as to require twenty-six seconds for the fluid in the casing to pass through the said openings, and now if the plunger be raised to the position shown in dotted lines in Fig. 1 and the switch-blade 7 engaged with the terminal 5<sup>a</sup>, as indicated in dotted lines, the plunger in descending will displace the fluid from the lower side thereof to the upper side, and the substance in passing through the alining openings 17 and 12 will permit the plunger to gradually descend in the time to which the device has been set, and when the plunger has reached the limit of its downward movement the weight 20 will engage the set-screw 8 and trip the switch-blade 7 to break the electric current, which will immediately extinguish the light. A minute and very accurate adjustment for the tripping action of the blade is effected by means of the set-screw 8. In this way a positive and accurate timing of the exposure is accomplished, and it is evident that the quantity of liquid used and the size of the valve-opening may be proportioned so that when the valve is entirely opened the piston will make the full downward movement in the minimum time and by adjusting the size of the valve-opening any period for the descent of the plunger may be predetermined. The

dotted lines shown in Fig. 3 indicate two of the positions to which the graduated valve-opening may be set.

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

1. In a device of the class described, the combination with a casing having a fluid therein, a plunger reciprocal within the casing, and means for varying the retarding action of the fluid on the plunger, of an indicator, and a scale operated through said last-named means for predetermining the period of the descent of the plunger.

2. In a device of the class described, the combination with a casing having a fluid therein, a plunger reciprocal within the casing, and means for varying the retarding action of the fluid on the plunger, of an indicator, and a weight having a scale operated with said last-named means for predetermining the period of the descent of the plunger.

3. In a device of the class described, the combination with a casing having a fluid therein, a plunger reciprocal within the casing, and means for varying the retarding action of the fluid on the plunger, of an indicator for predetermining the period of the descent of the plunger, means accessible from the exterior of the casing for setting the means for varying the retarding action of the fluid on the plunger, and an electric switch having an extension disposed within the path of said setting mechanism and operated thereby.

4. In a device of the class described, a casing having a fluid therein, a plunger reciprocal within the casing, a valve engaged with the plunger and having a rotary movement relative thereto, means formed in the valve to graduate the flow of the fluid from one side to the other of the plunger, and means within the casing to lock the plunger against rotation.

5. In a device of the class described, a casing having a fluid therein, a plunger adapted to reciprocate within the casing and having a central hollow boss provided with an opening, a rotary valve engaged within the hollow boss and having an opening provided with divergent border-lines, whereby the flow of fluid through the openings may be graduated, and means to lock the plunger against rotation.

6. In a device of the class described, a casing having a fluid therein, a plunger adapted to reciprocate in the casing and provided with openings, a rotary valve engaged with the plunger having an opening therein which registers with the opening in the plunger and formed with divergent border-lines to graduate the flow of the fluid to the upper side of the plunger, a guide-rod carried by the plunger, a guide on the casing engaged by the rod,



and a weight on the valve to operate the plunger.

7. In a device of the class described, a casing having a fluid therein, a plunger adapted to reciprocate within the casing and having a plurality of apertures therein, a washer carried by the plunger and movable independently thereof to close the apertures upon the downward movement of the plunger, a rotary valve engaged by the plunger and constructed to graduate the flow of fluid therethrough, and means carried by the plunger to hold it against rotation.

8. In a device of the class described, the combination with a casing having a fluid therein, a plunger adapted to reciprocate within the casing, of a graduated rotary valve engaged with the plunger, a valve-stem extending through the casing and having a scale thereon which coöperates with the rotary valve to regulate the time required for the flow of fluid therethrough, and an electric switch having an arm arranged in the path of the scale and operated thereby.

9. In a timing device, the combination of a casing having a fluid therein, a plunger in the casing, said plunger having a hollow boss provided with an opening, a rotary valve engaged within the boss and formed with an opening which coöperates with the opening in the boss to graduate the flow of fluid therethrough, a valve-stem extending through the top of the casing, a weight on the valve-stem, a scale on the weight arranged to indicate the units of time required for the descent of the plunger, a switch-blade having an arm disposed in the path of the weight and operated thereby and means to adjust the trip of the switch-blade.

10. In a device of the class described, the combination with a casing having a fluid

therein, and a plunger reciprocal within the casing, of an adjustable valve engaging the plunger, and a valve-stem projecting outside the casing to operate the valve and elevate the plunger.

11. In a device of the class described, the combination with a casing having a fluid therein, and a plunger reciprocal within the casing, of a rotary adjustable valve engaging the plunger, and provided with a valve-stem projecting outside the casing to operate the valve.

12. In a device of the class described, the combination with a casing having a fluid therein, and a plunger reciprocal within the casing, of an adjustable valve engaging the plunger, a valve-stem extending outside the casing, a scale carried by the valve-stem, and a pointer on the casing.

13. In a device of the class described, the combination with a casing having a fluid therein, a plunger reciprocal within the casing, and an adjustable valve engaging the plunger, of means carried by the valve and accessible from the exterior of the casing to adjust the valve and predetermine the adjustment thereof.

14. In a device of the class described, a casing having a fluid therein, a plunger reciprocal within the casing and having a boss provided with an opening, a rotary valve engaging the boss and having an opening provided with divergent border-lines to graduate the flow of the liquid through the opening in the boss, and a guide for said plunger.

In testimony whereof I affix my signature in presence of two witnesses.

HERVEY H. McINTIRE.

Witnesses:

GEORGE OLTSCH,  
DANIEL RICH.