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TIMING DEVICE.

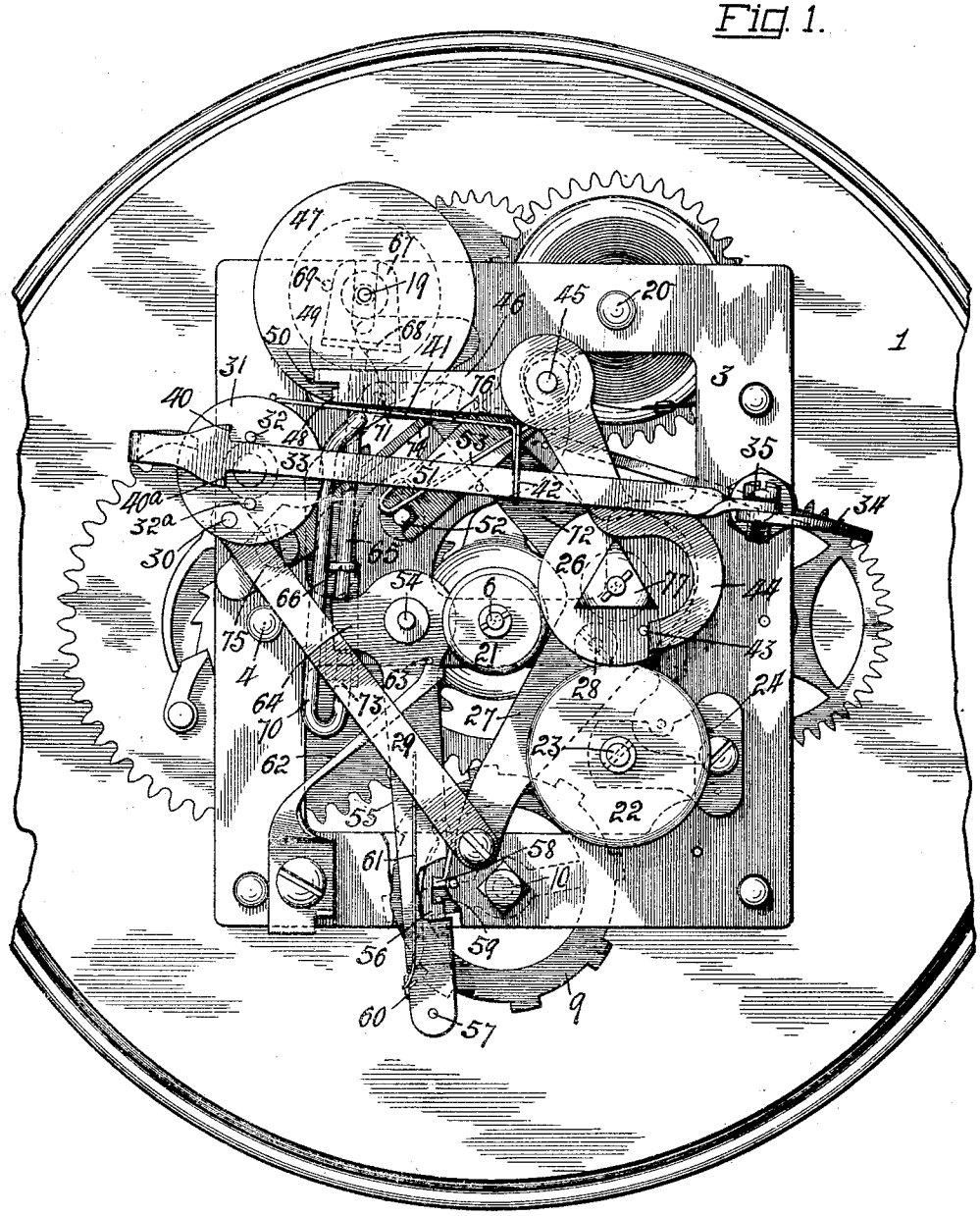
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1,111,123.

Patented Sept. 22, 1914.

4 SHEETS—SHEET 1.

Fig. 1.



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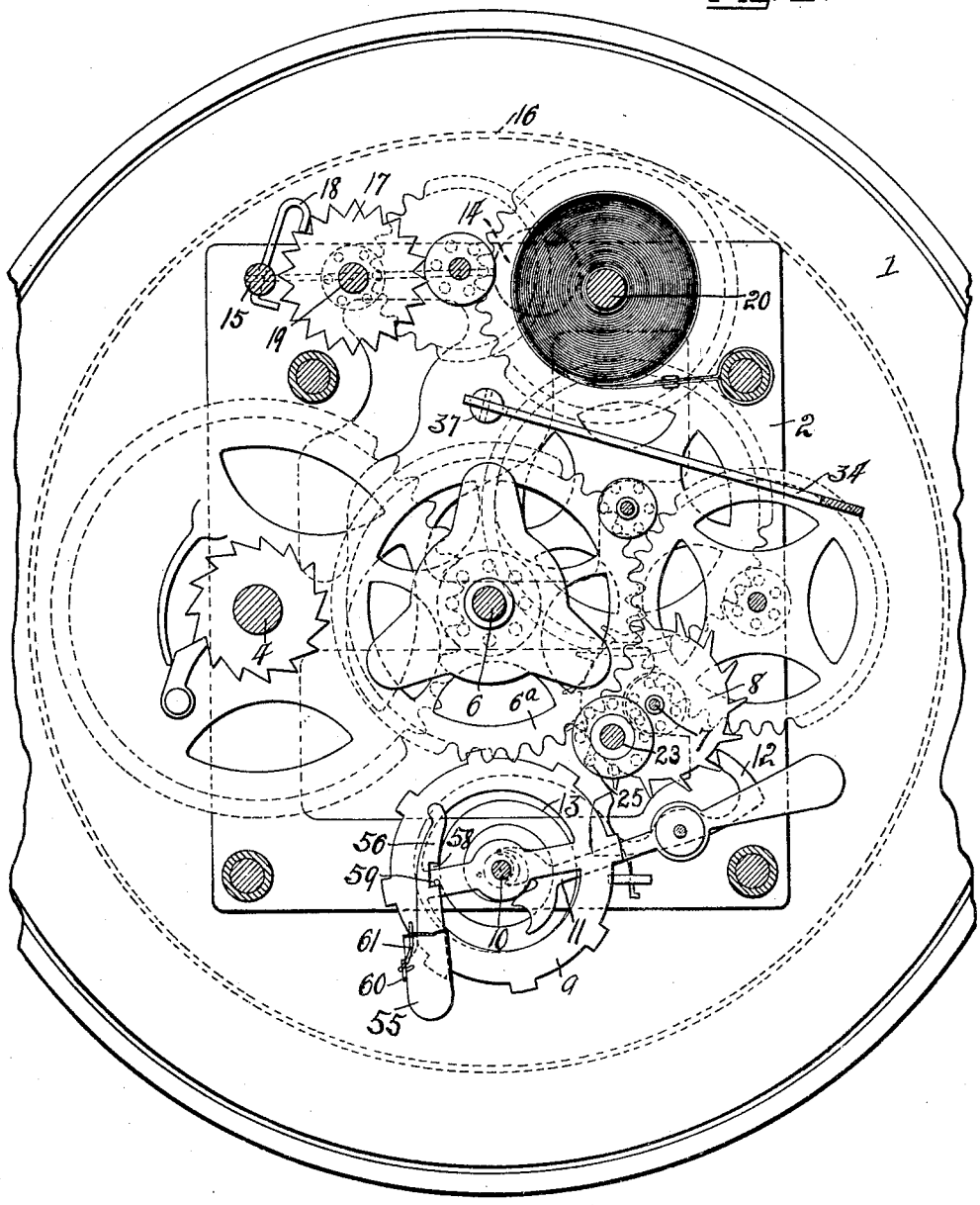
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 3.

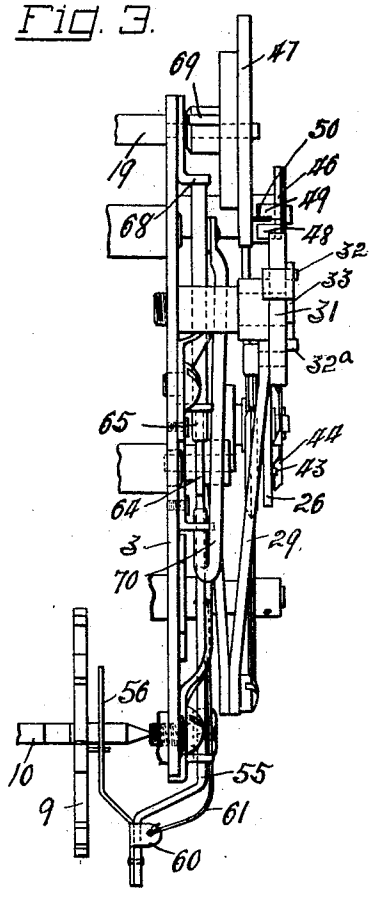
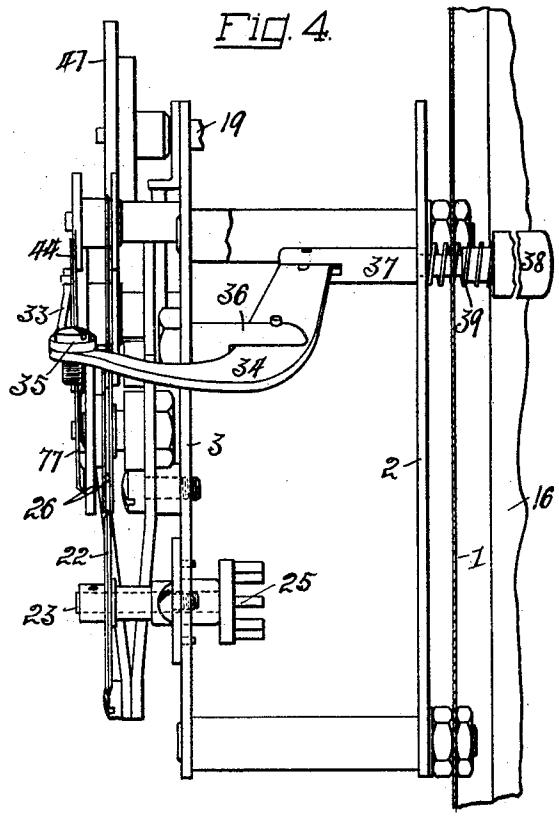


Fig. 4.



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4 SHEETS—SHEET 4.

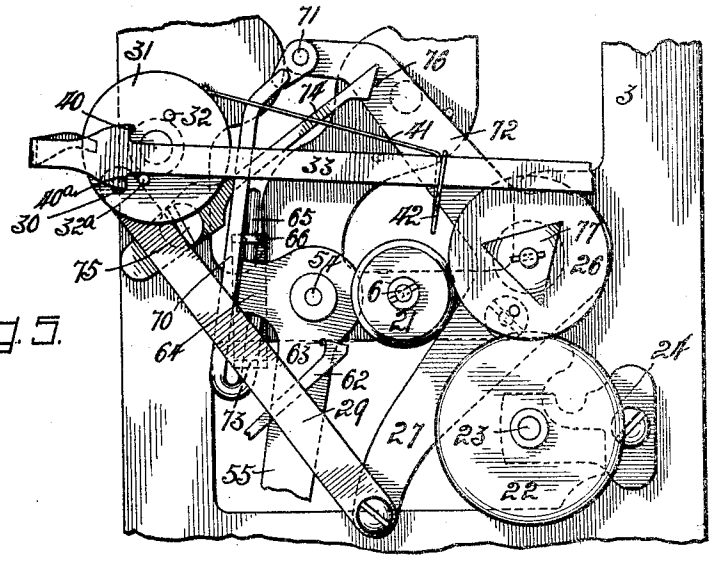


Fig. 5.

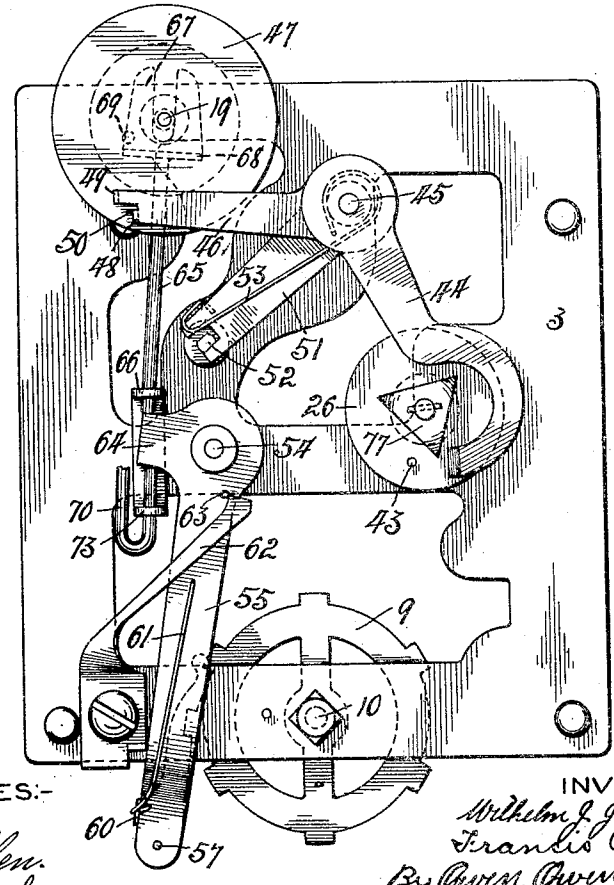


Fig. 6.

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TIMING DEVICE.

1,111,123. Specification of Letters Patent. Patented Sept. 22, 1914.

Application filed March 13, 1914. Serial No. 824,535.

To all whom it may concern:

Be it known that we, WILHELM J. J. ZELLIN and FRANCIS P. HUYCK, citizens of the United States, and residents of Toledo, in the county of Lucas and State of Ohio, have invented a certain new and useful Timing Device; and we 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, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to timing devices, and while it is particularly designed with reference to the needs of photographers in connection with the developing of negatives, it is not restricted to such use, as it may be used in any connection where it is desired to secure a predetermined timing between successive acts and for which the device may be adapted or appropriate either in its present or in a modified form.

In photography it has been determined that in the developing of negatives the time required after the placing of negatives in a developing solution until the high lights appear is one-twelfth of the time required to complete the developing after the high lights appear, so that the ratio of one period of time to the other is the same as 1 to 12.

The primary object of this invention is the provision of a device of simple and efficient construction, which is operable to secure an accurate predetermined timing between successive acts, whereby, if the device is used in connection with the developing of negatives, the length of time required for the completion of the developing after the appearance of the high lights will be accurately determined in proper ratio to the time required for the appearance of the high lights after the placing of the negatives in the developing solution, and notification given when the negatives should be removed from the bath. This is automatically accomplished irrespective of the strength of the developing solution, for if the solution is weak and it takes longer to develop the high lights it will take a longer time to complete the negatives after the high lights appear. Further objects, advantages and uses of the invention will be apparent from the following detailed description thereof.

The invention is fully described in the following specification, and while in its broader aspect, it is capable of numerous modifications and of uses in different connections, a single embodiment only thereof, adapted for use in connection with photography, is illustrated in the accompanying drawings, in which,—

Figure 1 is an enlarged face view of the mechanism embodying the invention, with parts broken away. Fig. 2 is a vertical section taken at the rear of the front plate and illustrating the main parts of a clock or actuating mechanism. Figs. 3 and 4 are opposite side views thereof with the clock or other actuating mechanism removed, and Figs. 5 and 6 are different details of the mechanism.

Referring to the drawings, 1 designates a plate, which may comprise a part of a case or housing for the mechanism, and which, in the present instance, carries the operative parts. Fixedly carried, in the present instance, in spaced relation by the plate 1 at one side thereof, are the inner and outer plates 2 and 3, respectively, between which is mounted an ordinary alarm clock mechanism, the particular construction of which forms no part of this invention.

The driving mechanism, illustrated in Fig. 2, comprises a clock train of which 4 is the key stem carrying the customary spring (not shown), 6 the hour-hand shaft, and 7 the shaft on which the escapement-wheel 8 is mounted, rotation being communicated from the stem 4 to the shaft 6 and from the shaft 6 to the shaft 7 through suitable intermediate gearing, as indicated. The balance wheel 9, of the mechanism, is mounted on the shaft 10 and has operative connection with the escapement-wheel 8 through a lever 11 and connected pallet 12 in a manner well understood in the art. A balance spring 13 is mounted on a shaft 10 with the balance wheel.

The alarm of the clock mechanism, in the present instance, comprises a striking arm 14, which is mounted for vibratory movements on a shaft 15 and is intended, when vibrated, to have striking contact with a bell or sounding member 16 that is carried

by the plate 1 at the outer side thereof. A serrated-wheel 17 is intended, when rotated, to coact with a finger 18, projecting from the shaft 15, whereby to impart rapid rocking movements to such shaft. The wheel 17 is mounted on a shaft 19 and has connection with a spring driven shaft 20 through the medium of a suitable gear train, as shown.

In carrying out the idea of our invention, we mount a wheel 21 on the forwardly projected end of the shaft 6 in advance of the plate 3, and also mount a wheel 22 on a shaft 23, which, in the present instance, is suitably journaled in a bearing carried by a bracket 24 secured to the plate 3, the inner end of the shaft 23 carrying, in the present instance, a gear 25 in mesh with the gear 6^a, which is carried by the shaft 6 and is one of the train of gears which communicate rotation from the winding-stem 4 to the escapement-wheel 8. It is thus evident that when the shaft 6 is being rotated, the wheels 21 and 22 will have reverse rotation communicated thereto at different speeds. The wheels 21 and 22, in the present instance, are of disk form with V-shaped edges to enable each to have frictional engagement within a peripheral groove of a wheel 26, which is carried by a stub-shaft projecting from a lever 27. This lever is fulcrumed to the plate 3, as at 28, and carries the wheel 26 in position to be moved into peripheral driving engagement with one or the other of the wheels 21, 22 upon a very slight rocking movement of the lever.

The end of the lever 27 which is opposed to the end thereof carrying the wheel 26, is connected by a link 29 to a crank pin 30 on a wheel 31, which wheel is suitably carried for rocking movements in advance of the left-hand portion of the plate 3. This wheel has pins 32 and 32^a projecting laterally therefrom at opposite sides of its axes, and extending between these pins, transversely of the wheel, is a draft-bar 33, which pivotally connects at the right-hand end thereof to the adjacent end of a bell-crank lever 34, as at 35. The lever 34 is fulcrumed at the rear of the plate 3 to a post 36, projecting inwardly from said plate, and has the end thereof opposed to that to which the bar 33 is attached, pivotally connected to a push-rod 37. This push-rod extends through registering openings in the plates 1 and 2, substantially at right angles to the arm of the lever 34 to which it is attached, and is provided at the rear of the plate 1 with a push-button 38. A compression-spring 39 is disposed between the plate 2 and push button 38 and acts thereon to normally retain the push-rod 37 at the limit of its rearward movement. The draft-bar 33 is adapted to have limited rocking movements between the pins 32, 32^a in the plane thereof and is provided, in the present instance, at the left of such pins with the shoulders 40 and 40^a, which are positioned to respectively engage and rock the pins 32, 32^a, when the bar 33 is moved to the right and is in either its raised or lowered positions. A spring-finger 41 projects to the right from the upper peripheral portion of the wheel 31 and is provided at its free end with a loop 42 through which the draft-bar 33 loosely projects, the spring-finger and loop being so disposed that they yieldingly retain the free or left end portion of the bar 33 in raised contact with the pin 32 when the wheel 31 is in the position shown in Fig. 5. Upon the next rocking movement of the wheel 31, which is to the right or in clockwise direction, the spring-finger 41 is moved sufficiently to permit the bar 33 to lower into position for the shoulder 40^a thereof to have engagement with the pin 32^a when said bar is again moved to the right. It is thus evident that the bar 33, upon successive retracting movements thereof, alternately engages the pins 32 and 32^a, whereby the wheel 31 is rocked first in one direction and then in the other, and that such rocking movements are communicated to the lever 27 through the link 29.

The wheel 26 is provided at one side of its axis with a pin 43 which is driven with the wheel in clockwise direction when the wheel 22 is acting as the driver and in counter-clockwise direction when the wheel 21 is acting as the driver. When the pin 43 is being moved in counter-clockwise direction, it is adapted at a predetermined point in such movement to engage the registering end of a lever arm 44 and impart a slight rocking movement to such arm. This lever arm is fulcrumed to a stud 45 projecting from the upper portion of the plate 3 and has an arm 46 projecting to the left from its inner or fulcrumed end at the side of the lower edge portion of a stop-wheel 47 and terminates at its free end in a pair of inwardly projecting fingers 48, 49, which are spaced both transversely and longitudinally of the lever-arm 46, as shown in Figs. 1 and 3. A stop-pin 50 projects from the outer side of the wheel 47 in position to strike against and have its revolution stopped by the finger 48 when the lever arm 46 is in its normal raised position. The wheel 47 is fixed to the shaft 19 with the serrated signal mechanism wheel 17, and serves as the control wheel for the alarm or signal mechanism. When the pin 43 coacts with and imparts a rocking movement to the lever 44, 46, the finger 48 thereof is lowered from stop engagement with the pin 50, thus permitting such wheel to have a single rotation imparted thereto by the signal mechanism, the rotation thereof being stopped at the end of a single revolution by reason of the pin 50 striking the finger 49, which stands in the

path of movement of the pin when the arm 46 of the lever is lowered.

The rocking movements of the lever 44, 46 are limited by an arm 51 projecting from the fulcrumed portion thereof and being forked at its free end to receive a stop-post 52, projecting from the plate 3. The post 52 is narrower than the space in the forked end of the arm 51 to permit such arm to have limited rocking movements relative thereto. A spring-finger 53 bears at one end against the post 52 and extends therefrom to and around the stud 45 and has its other end fixed to the inner end portion of the lever arm 51 in manner to tend to urge the lever in a direction for the finger 48 of the arm 46 to stand in the path of movement of the stop-pin 50.

Depending from a stud 54 which projects from the plate 3, in the present instance, at the left of the shaft 6, is a lever arm 55 which extends at its lower end below the plate 3 and pivotally carries a notched finger 56, which finger is pivoted to the lever arm, as at 57, and rises therefrom at the rear of the plate 3 in position for its notch 58 to receive a pin 59 projecting from one side of the balance-wheel 9 when the lever arm 44 is in the position of its movement shown in Fig. 1. The catch-finger 56 is provided with an ear 60, which coacts with a side of the lever-arm 55 to limit the movements of the catch finger to the right relative to the lever-arm, and a spring finger 61 connects the lever-arm and ear to yieldingly retain the finger in the position which it assumes when the ear is in stop contact with the lever-arm. A spring-finger 62 fixedly projects from the plate 3 and has its end in contact with a pin 63 on the lever-arm 55 and tends to hold the lever-arm at one limit or the other of its rocking movements. In Fig. 1, the spring-finger 62 is shown as acting against the pin 63 to tend to retain the lever-arm 55 in balance-wheel stopping position, and when the lever is thrown to the left to balance-wheel releasing position the side of the finger end 62 acts against the pin 63 to tend to retain the lever-arm in such position.

Projecting from one side of the inner end portion of the lever-arm 55 is a short arm 64, which receives the lower end-thrust of a rod 65, which is guided for reciprocatory movements by a guide part 66 at one end and by a forked portion 67 at the opposite end thereof straddling the shaft 19. When the lever 55—64 is at the left of its movement, or in balance-wheel released position, the rod 65 is held thereby in position for a table or flange 68 on the forked end portion thereof to be engaged and forced away from the shaft 19 by a pin 69 on the inner side of the wheel 47 when such wheel is revolved. The engaging of the table 68 by the pin 69 upon a rotation of the wheel 47, forces the rod 65 downward or away from the shaft 19 and effects a throwing of the lever 55—64 to the right into position for the catch-finger 56 thereof to engage the balance-wheel pin 59 and stop the movement of the balance-wheel.

The lever 55—64 is moved from balance-wheel locking position by the upward movement of a draft-rod 70, which is pivotally suspended, as at 71, from the free end portion of an arm 72, which projects laterally from the end of the lever 27, carrying the wheel 26. The lower end of the draft-rod 70 extends below the lever-arm 64 and is then bent upwardly to place the end thereof in position to have upward thrust contact with the lower edge of the arm 64 when the rod is raised from its lowered position. The bent end portion of the rod 70 is guided for reciprocatory movements by a guide part 73. It is thus evident that when the lever 27 is moved to throw the wheel 26 out of engagement with the wheel 21 and into engagement with the wheel 22 the draft-rod 70 is raised to effect a throwing of the lever 55—64 from balance-wheel locking position. The lever 27 is yieldingly held in one or the other of its limits of rocking movements by a spring-finger 74, which is fixed at one end to the plate 3, as at 75, and has its opposite end provided with a V-shaped nose, which engages a pin 76 on the lever-arm 72, such pin moving from one side to the other of the tapered nose as the lever-arm 72 is rocked.

A spring washer 77 is mounted on the stud with the wheel 26 and serves to resist a free turning of the wheel on the stud, the resistance being sufficient to counteract the tension of the spring 53 on the lever 44—46 when the pin 43 is acting against and holding said lever out of normal position. This prevents a slight shifting of the wheel due to the lever pressure against the pin 43 when the wheel is being shifted from and to the other of the wheels 21, 22. In the use of this form of our invention in connection with the developing of negatives, the operator, at the time of placing one or more negatives in the developing bath, presses the push-button 38 (the timing mechanism being in the position shown in Fig. 1), thus rocking the lever 34 and moving the draft-rod 33, which is attached thereto, to cause the shoulder 40 thereof to engage the pin 32 on the wheel 31 and move such wheel a predetermined distance in clockwise direction. Such movement of the wheel 31 causes the wheel 26 to be thrown into driving contact with the wheel 22, due to the connecting of the wheel 31 and lever by the link 29. The movement, which is thus imparted to the lever 27, causes an upward movement of the draft-rod 70 and a consequent movement of the lever 55—64 to release the catch-finger 56 from locking engagement with the pin 59 of the balance-wheel 9 to permit movements of

such wheel under the influence of the spring 13, thereby starting the clock or other mechanism, which drives the wheels 21 and 22. Upon a running of the clock mechanism with the wheel 22 in driving engagement with the wheel 26, said latter wheel is caused to rotate in a direction to move the pin 43 away from the actuating end of the lever-arm 44. The operator having thus started the timing mechanism watches the negatives until the high lights begin to appear, and immediately upon the appearance of such lights again presses the push-button 38 to effect a shifting of the wheel 26 from engagement with the wheel 22 and into engagement with the wheel 21, so that the direction of driving of the wheel 26 will be reversed. The pushing of the push-button 38 causes the wheel 31 to be moved in counter-clockwise direction, due to the draft-bar 33 at this period in the operation standing in position for the shoulder 40^a thereof to engage and move the pin 32^a of said wheel. The wheel 26 is now driven in counter-clockwise direction by the wheel 21, or in the reverse direction to the direction in which it was driven by the wheel 22, thereby moving the pin 43 toward the coacting end of the lever-arm 44. When the wheel 26 has turned sufficiently in this direction to nearly return the pin 43 to its starting position such pin will engage the registering end of the lever 44 and effect a movement of such lever and a consequent lowering of the free end portion of the attached arm 46 to move the finger 48 thereof, which now stands in stop engagement with the pin 50 on the wheel 47, out of stop engagement with such pin, thus permitting the wheel 47 to rotate under the influence of the spring or other actuating means of the signaling mechanism. The wheel 47 is stopped at the end of substantially a complete rotation thereof by the pin 50 coacting with the stop finger 49, which stands in register with such pin when the lever-arm 44 is at the limit of its outward movement. The rotation of the serrated wheel 17, which takes place upon a rotation of the wheel 47, causes the striker-arm to have vibratory contact with the bell 16, in the present instance, to signal the operator that the negatives are ready to be taken from the developing bath. Upon a rotation of the wheel 47 the pin 69 thereon coacts with the flange or table portion 68 of the thrust rod 65 and forces such rod downward against the upper edge of the lever-arm 64, thereby throwing the lever 55—64 into position for the catch-finger 56 thereof to have catch engagement with the pin 59 on the balance-wheel 9 and stop the operation of the clock or other actuating mechanism.

In the use of our timing mechanism for negative developing purposes, the ratio of driving of the wheel 26 by the wheels 22 and 21 should be approximately as 1 to 12, as it is found from experiments that it takes approximately twelve times as long for the completion of the developing of a negative after the high lights appear as it takes for the high lights to appear after the placing of the negative in the bath. This ratio of driving is accomplished, in the present instance, partly by the difference in sizes of the wheels 21 and 22, and partly by the gearing connection of the respective wheels with the driving mechanism. It will of course be understood that the ratio of driving of the wheel 26 by the wheels 21 and 22 may be changed to suit the connection in which the timing device is to be used, and that while the device has been particularly described for use in connection with the developing of negatives it is not restricted to such use, but is intended for use in any connection for which it may be adapted or appropriate.

We also wish it understood that our invention is not limited to any specific construction, arrangement or form of the parts thereof, or to the use of the same in connection with any particular form of driving and signaling mechanism, as numerous changes may be made in the invention and the same adapted to numerous forms of driving and signaling mechanisms without departing from the spirit of the invention.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is,—

1. In combination, a rotatable element, manually controlled gear mechanism operable to impart successive movements to said element, the period of one movement determining the period of a later movement, and signal means automatically operable at a predetermined point in the later period of movement.

2. In combination, a rotatable element, a gear mechanism operable to impart differentially timed movements in first one and then another direction to said element, and means operable to stop said mechanism at a predetermined point in the movement of said element in one direction.

3. In combination, a rotatable element, mechanism operable to impart successive differentially timed movements to said element, the period of one movement determining the period of another, and means automatically operable to stop the element driving action of said mechanism at a predetermined point in one movement of the element.

4. In combination, a movable element, mechanism operable to impart successive timed movements to said element, the period of one movement being more or less uncertain and determining the period of a later movement, and means automatically operable to stop the element driving action of

said mechanism at a predetermined point in the later period of movement of said element.

5. In combination, a movable element, manually controlled mechanism mechanically operable to impart successive timed movements to said element, the period of one movement being more or less uncertain and determining the period of a later movement of said element, and means automatically operable to stop the element driving action of said mechanism at a predetermined point in the later period of movement of said element.

6. In combination, a movable element, manually controlled mechanism mechanically operable to impart successive timed movements in different directions to said element, and means automatically operable to stop the element driving action of said mechanism at a predetermined point in one movement of the element.

7. In combination, a movable element, mechanism mechanically operable to impart different timed movements to said element, and means automatically operable at a predetermined point in one movement of said element to stop the element driving action of said mechanism and to signal the operator.

8. In combination, a rotatable element, mechanism operable to impart successive differentially timed movements to said element, one movement bearing a predetermined ratio to the other, and means automatically operable at a predetermined point in one movement of said element to stop the member driving action of said mechanism and to render a signal.

9. In combination, a rotatable element, mechanism operable to impart successive differentially timed movements to said element, the period of one movement determining the period of another, and means automatically operable at a predetermined point in one movement of said element to stop the member driving action of said mechanism and to render a signal.

10. In combination, a rotatable element, mechanism operable to impart successive movements to said element, the period of one movement determining the period of a later movement, means manually operable to change the element driving action of said mechanism from one movement to another, and signal means automatically operable at a predetermined point in the later movement of said element.

11. In combination, a movable element, mechanism operable to impart successive movements to said element, the period of one movement determining the period of another movement, means manually operable to change the element driving action of said mechanism from one movement to another, and means automatically operable to stop the element driving action of said mechanism at a predetermined point in the later period of movement of said element.

12. In combination, a movable element, mechanism operable to impart successive movements to said element, the period of one movement determining the period of a later movement, means manually operable to change the element driving action of said mechanism from one movement to another, and means automatically operable at a predetermined point in the later period of movement of said element to stop the element driving action of said mechanism and to render a signal.

13. In combination, a movable element, mechanism operable to drive said element in first one and then in the reverse direction at predetermined speeds, means manually operable to change the element driving action of said mechanism, and means automatically operable to stop the element driving action of said mechanism at a predetermined point in the reverse driving of said element.

14. In combination, a movable element, mechanism operable to impart successive forward and reverse rotation at predetermined speeds to said element, means manually operable to change the element driving action of said mechanism, and means automatically operable at a predetermined point in the reverse driving of said element to stop the element driving action of said mechanism and to render a signal.

15. In combination, a rotatable element, mechanism having separate driving parts for said element together with means for rendering one or the other of said parts active with respect to said element, the period of movement of one of said parts determining the period of movement of the other, and signal means automatically operable at a predetermined point in the movement of said element by one of said parts.

16. In combination, a rotatable element, mechanism having separate driving parts for said element together with means for rendering one or the other of said parts active with respect to said element, the period of movement of one of said parts determining the period of movement of the other, and means automatically operable at a predetermined point in the movement of said element by one of said parts to stop the element driving action of said mechanism and to render a signal.

17. In combination, a signal device, a rotatable element, mechanism operable to impart successive differently timed movements to said element, the period of one movement determining the period of a later movement, and signal release means intermediate said element and signal device and

operable at a predetermined point in the said later movement of said element to render the signal device active.

18. In combination, a normally operating signal device, a movable element, mechanism operable to impart successive movements to said element, one period of movement of said element determining the period of a later movement thereof, and stop means for said signal device automatically operable to release said device at a predetermined point in the said later movement of the element.

19. In combination, a signal device, a movable element, mechanism operable to impart successive movements to said element, the period of one movement being determined by the period of a former movement, and means normally serving as a stop for said signal device and operable by said element at a predetermined point in its later period of movement to release the signal device and then to reëngage the same.

20. In combination, a normally operating signal device, stop means in connection with said device comprising a revoluble stop-pin carried by a part of said device, and a lever having two stops for said pin which cooperate to releasably stop a revoluble movement of said pin, mechanism having a successively movable driven part which at a predetermined point in one of its movements coacts with said lever to temporarily release its stop engagement with said pin, the successive movements of said element being of predetermined ratio, and manually controlled means operable to effect successive movements of said element by said mechanism.

21. In combination, a movable element, mechanism operable to impart successive differentially timed movements to said element, means manually operable to place said element in engagement with said mechanism for successive movements, and means operable to effect a stopping of the element driving action of said mechanism when the element is at a predetermined point in one movement thereof.

22. In combination, a movable element, mechanism operable to impart successive movements to said element, means operable to lock said mechanism against movement or to release the same, and means manually operable to move said locking means to release said mechanism and to place said element in driving connection with the mechanism and also operable to change the driving connection of the said element and mechanism, and means operable by said element at a predetermined point in a movement thereof to operate said locking means to stop the driving action of said mechanism.

23. In combination, a movable element, a drive mechanism operable to impart forward and reverse movements to said element at predetermined speeds, a stop member movable into position to stop the driving action of said mechanism or to release the same, means manually operable to move said stop member to released position and to connect said element with said mechanism for forward driving movement and also operable to change the connection of the element with said mechanism to secure a reverse driving of the element, and means operable at a predetermined point in the reverse driving movement of said element to move said stop member to mechanism locking position.

24. In combination, a drive mechanism having reversely driven members, an element movable into driving engagement with one or the other of said members, means controlling the shifting movements of said element, and means automatically operable to stop the driving action of said element by one of said members when said element is at a predetermined point in its movement.

25. In combination, a driving mechanism having reversely driven members, an element movable into driving engagement with either of said members, manually controlled means operable to place the element in engagement with either of said members, and means automatically operable at a predetermined point in a movement of the element by one of said members to stop the driving action of said mechanism and to render a signal.

26. In combination, a driving mechanism having parts which are reversely driven at different predetermined speeds, an element movable into driving engagement with one or the other of said parts whereby it is driven in one direction or another, means controlling the connection of said element with the respective parts, a stop member for said mechanism, and means automatically operable to shift said stop member to mechanism locking position at a predetermined point in a movement of said element by one of said parts.

27. In combination, a driving mechanism having reversely driven parts, a lock member for said mechanism, a rotatable element adapted to be driven in one direction or another by the respective parts of said mechanism, means operable to change the connection of said element with said parts and to release the locking engagement of said member with said mechanism when the element is in engagement with one of said parts, and means automatically operable to move said member to locking position at a predetermined point in a movement of the element by the other of said parts.

28. In combination, a driving mechanism, a rotatable element, means operable to place said element in connection with said mechanism whereby it has different rotary movements, and means operable by said element at a predetermined point in one movement thereof to render a signal.

29. In combination, a driving mechanism, a rotatable element, means operable to place said element in connection with said mechanism whereby it has different movements, and means automatically operable by said element at a predetermined point in one movement thereof to stop the element driving action of said mechanism.

30. In combination, a driving mechanism having two parts reversely driven at different speeds, a driven element, control means operable to connect said driven element with one or the other of said parts whereby movement in one or the other direction is imparted to said element, locking means for said driving mechanism, connection between said locking means and control means for imparting mechanism releasing movements to said locking means when the control means is moved to connect said element with one of said parts, and means automatically operable by said element at a predetermined point in a movement thereof by the other of said parts to move said locking means to locking position.

31. In combination, a driving mechanism having a pair of reversely driven parts, a driven element, a control member, means operable by like successive movements of said control member to connect said element with first one and then the other of said parts, and signal means automatically operable by said element at a predetermined point in one direction of movement thereof.

32. In combination, a drive mechanism having a plurality of reversely driven parts, a driven element, a control member, means operable by successive movements of said control member to engage said element with one or the other of said parts, and means automatically operable by said element at a predetermined point in its movement in one direction to stop the driving of said element.

33. In combination, a driving mechanism having a plurality of reversely driven drive parts, the speed of rotation of one of said parts being in predetermined ratio to the speed of rotation of another of said parts, a rotatable driven element, means operable to successively place said element in driving connection with first one and then another of said drive parts, a mechanism locking member, means operable to move said member from locking position when said element is placed in connection with one of said drive parts, and means automatically operable by said element at a predetermined point in a movement of the same by the other drive part to move said member to locking position.

34. In combination, a driving mechanism having a pair of reversely driven parts, a rotatable driven element, control means operable to connect said driven element with one or the other of said parts, a mechanism locking member, connection between said member and control means to move said member from locking position when the element is placed in connection with one of said parts, and means automatically operable by said element at a predetermined point in its movement by the other of said parts to move said member to locking position and to render a signal.

35. In combination, a drive mechanism having two reversely driven parts, a balance means for said driving mechanism, locking means for said balance means, a lever having connection with said locking means and movable to release the same from engagement with said balance means, and a driven member carried by said lever and movable by movements of the lever into engagement with one or the other of said drive parts.

36. In combination, a drive mechanism having reversely driven drive parts, means movable to lock said mechanism against movement or to release the same, a driven element movable into engagement with either of the drive parts of said mechanism, means operable to move said locking means to released position upon a movement of said element into engagement with one of said drive parts, and means operable by said element at a predetermined point in the movement thereof which is actuated by the other of said parts to move said locking means into locking position.

37. In combination, a driving mechanism having reversely driven members, an element movable into driving engagement with either of said members, a locking means for said mechanism, a signal means, means operable by a movement of said element into engagement with one of said members to move said locking means to released position, and means operable by said element at a predetermined point in the movement thereof which is actuated by said other member for rendering the signal means active and for moving said locking means to mechanism locking position.

38. In combination, a driving mechanism having reversely driven members, an element movable into driving engagement with either of said members, stop means for said mechanism, signal means, and means operable at a predetermined point in a movement of said element by one of said mem-

bers to render the signal means active and to move the stop means to mechanism stopping position.

39. In combination, a movable element, mechanism operable to impart different timed movements to said element, a normally operating signal mechanism, and means normally preventing an operating of said signal mechanism and operable by said element at a predetermined point in one movement thereof to release and permit an operating of the signal mechanism.

40. In combination, a movable element, mechanism operable to impart different timed movements to said element, one movement bearing a predetermined ratio to the other, normally active signal means having a rotatable part, and means normally coacting with said rotatable part to prevent a rotation thereof and being automatically operable at a predetermined point in one movement of said element to release and permit a predetermined movement of said rotary part and a consequent operating of the signal means.

In testimony whereof, we have hereunto signed our names to this specification in the presence of two subscribing witnesses.

WILHELM J. J. ZELLIN.
FRANCIS P. HUYCK.

Witnesses:
F. E. AUL,
S. T. KLOTZ.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."