Dec. 26, 1950 T. RAPP 2,535,371

TIMING MECHANISM

Filed Dec. 9, 1946 2 Sheets-Sheet 1

Fig. 1

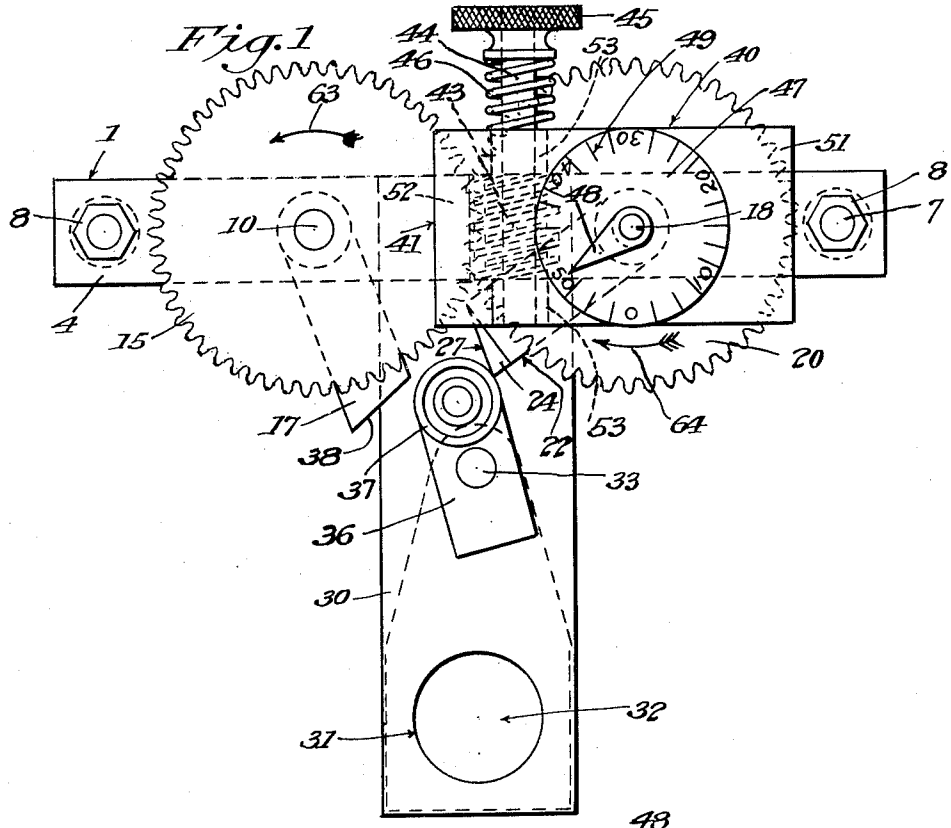
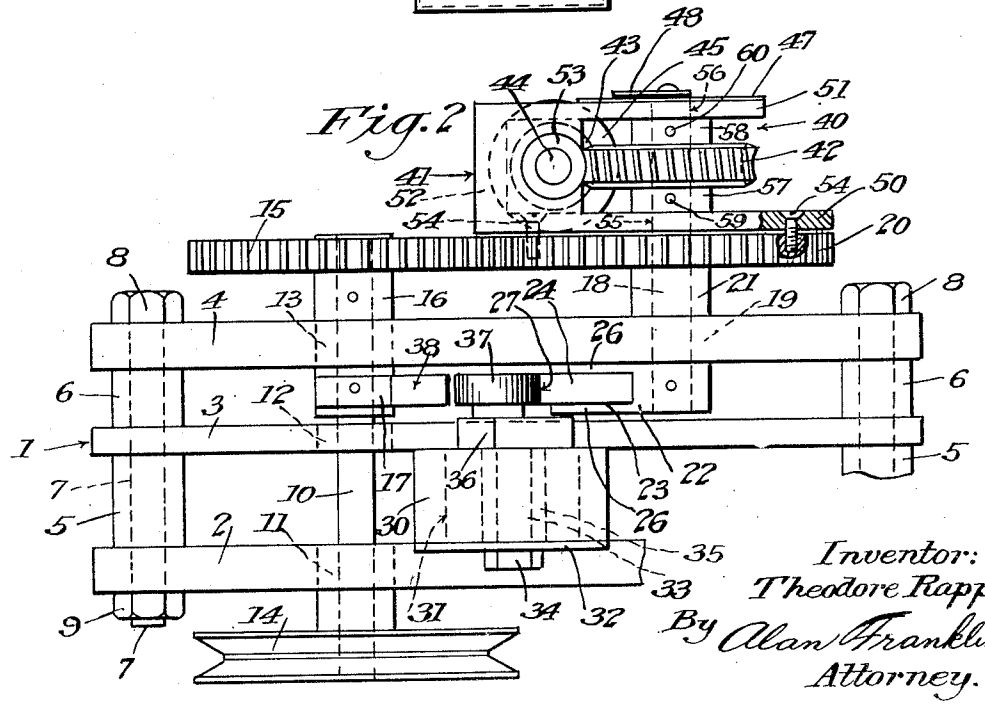


Fig. 2



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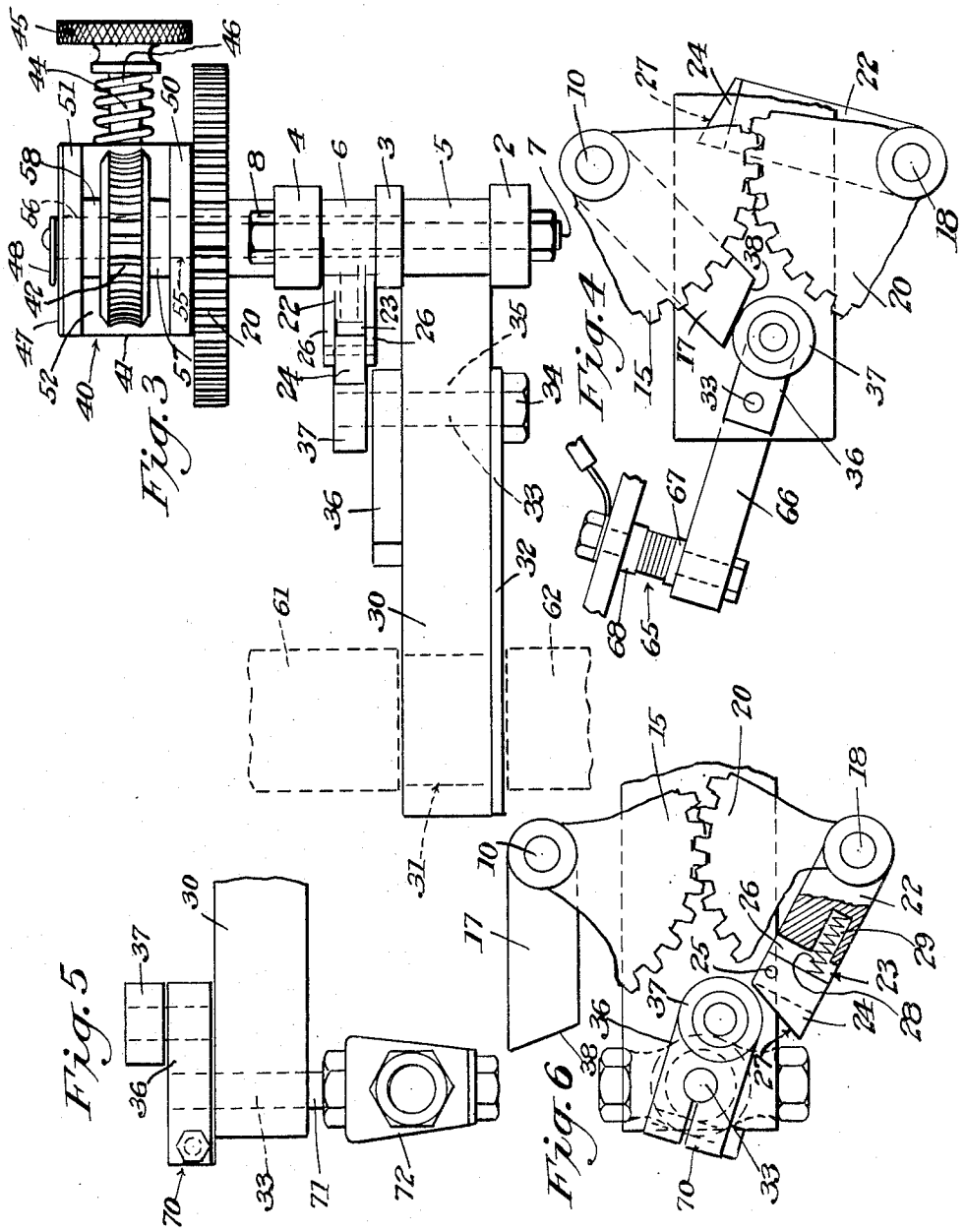


Fig. 3

Fig. 4

Fig. 5

Fig. 6

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TIMING MECHANISM

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9 Claims. (Cl. 74—25)

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This invention relates to timing mechanisms and the general object of the invention is to provide an improved adjustable timing mechanism for adjusting intervals of time between operations of various mechanisms, such as the operations of valves for measuring quantities of liquids; the operations of electric switches controlling various electric circuits; the operations of a shutter of a photoelectric eye; the operations of air valves controlling pneumatic apparatus; and the operations of any device requiring timing operations.

Other objects and advantages will appear hereinafter as this specification progresses.

The invention is illustrated in the annexed drawings which form a part of this specification and in which:

Fig. 1 is a plan view of my invention.

Fig. 2 is a front elevation of my invention as shown in Fig. 1.

Fig. 3 is a side elevation of my invention as shown in Figs. 1 and 2.

Fig. 4 is a plan view of a modification of my invention.

Fig. 5 is a fragmentary side elevation of another modification of my invention.

Fig. 6 is a plan view of the modification shown in Fig. 5.

Referring more particularly to the annexed drawings in which corresponding parts are designated by the same reference numerals in all of the figures, 1 designates a frame comprising three superimposed horizontal frame plates 2, 3 and 4 arranged in vertically spaced relation by tubular spacers 5 and 6, the spacers 5 spacing the plate 3 above the plate 2, and the spacers 6 spacing the plate 4 above the plate 3. Bolt 7 extends downwardly through the ends, respectively, of the plates 4, 3 and 2, and through the tubular spacers 6 and 5 between the ends of the bars 4 and 3 and between ends of the bars 3 and 2, respectively, with the heads 8 of said bolts resting upon the upper side of the plate 4, and nuts 9 are threaded on the lower ends of said bolts 7 against the lower side of the frame plate 2, whereby the plates 2, 3 and 4 are detachably held in spaced relation by the spacers 5 and 6.

A vertical drive shaft 10 extends through the frame plates 2, 3 and 4 and is journaled in bearings 11, 12 and 13, respectively, in said plates, there being a pulley 14 secured on the lower end of said shaft 10 and a gear 15 secured on the upper end of said shaft, with the hub 16 of said gear turnably resting upon the upper plates 3 and 4. An actuating arm 17 is secured on the shaft

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10 between the frame side of the upper frame plate 4. A vertical driven shaft 18 extends through the upper frame plate 4 and is journaled in a bearing 19 in said plate, there being a gear 20 secured on said shaft 18 above said plate in mesh with the gear 15 and with the hub 21 of the gear 20 turnably resting upon the upper side of said plate, and there being an actuating arm 22 secured on the lower end of the shaft 18 between the frame plates 4 and 3 and opposite the actuating arm 17. The outer end of the actuating arm 22 is bifurcated at 23, and a spring-pressed shoe 24 is pivoted in said bifurcation near the forward side of said arm 23, on a pivot pin 25, which is secured in the side walls 26 of said bifurcation, the outer edge 27 of said shoe 24 being inclined outwardly in the rearward direction, there being a coil spring 28 located in a socket 29 in the arm 22 extending from the inner end of the bifurcation 23, with one end of said spring bearing against the inner end of said socket and the other end of said spring bearing against the inner edge of the shoe 24 for normally projecting the rear outer edge 27 of said shoe outwardly beyond the outer end of the actuating arm 22.

Between the frame bars 2 and 3 is secured the inner end of a valve base member 30, in the outer end of which is provided a vertical valve opening 31, which is controlled by a swingable plate valve 32, which is secured at one end on the lower end of a pivot shaft 33 against the lower side of said base member 30 by a nut 34 threaded on said lower end of said shaft, which shaft extends upward through and is journaled in a bearing 35 in said base member, and a valve-actuating arm 36 is secured on the upper end of said shaft 33 and rests upon the upper side of the valve base member 30. On the upper side of the arm 36 at one end thereof is journaled a roller 37 in position to be engaged by the inclined outer cam end edge 38 of the actuating arm 17 and the inclined outer edge 27 of the shoe 24 in the outer end of the actuating arm 22 in the manner and for the purpose hereinafter more fully described.

On the upper end portion of the shaft 18 above the gear 20 is mounted a timing device 40, which includes a carriage 41, a worm gear 42 mounted in said carriage, a worm 43 in mesh with said worm gear, a worm shaft 44 journaled in said carriage on which shaft said worm 43 is secured, a thumb wheel 45 secured on the outer end of said worm shaft, a worm-friction-holding coil spring 46 surrounding said worm shaft between one side of the carriage 41 and said thumb wheel 45, a dial 47 secured on the carriage 41, and an indicator

48 secured on the upper end of the vertical shaft 18 above said dial for pointing to graduations 49 on said dial for indicating the position of the actuating arm 22 with relation to the actuating arm 17 in the manner and for the purpose hereinafter more fully described.

The carriage 41 is formed with a lower horizontal base wall 50, an upper horizontal supporting wall 51 suitably spaced above said base wall, an end wall 52 joining said base wall 50 and said upper supporting wall 51 at one end thereof, and a pair of bearings 53 at opposite sides of the carriage 41 near said end wall 52, in which bearings are journaled the worm shaft 44, which extends at one end beyond one side of the carriage 41 and on said end of said shaft is secured the thumb wheel 45, while the worm friction-holding spring 46 surrounds said worm shaft 44, bearing at one end against the hub of said thumb wheel 45 and at its other end against the bearing 53 on the adjacent side of the carriage 41, which spring frictionally holds said worm shaft 44 and the worm 43 against turning, for holding the actuating arm 22 in adjusted position with relation to the actuating arm 17, said worm 43 being secured on said worm shaft 44 in the carriage 41 between the bearings 53. The carriage 41 is supported upon the gear 20, with its base wall 50 resting upon said gear and secured thereto by screws 54, the base wall 50 and the upper supporting wall 51 of the carriage 41 being provided with openings 55 and 56, respectively, through which the gear shaft 18 loosely and turnably extends. The worm gear 42 is located on the gear shaft 18 between the base wall 50 and the upper supporting wall 51 of the carriage 41, and said gear is formed with hubs 57 and 58 on its lower and upper sides, respectively, with the lower hub 57 resting upon the upper side of the base wall 50 and the upper hub 58 resting against the under side of the upper supporting wall 51, said worm gear 42 being secured on the shaft 18 by pins 59 and 60 driven through said hubs 57 and 58, respectively, and through said shaft. The dial 47 is secured on the upper side of the supporting wall 51 with the gear shaft 18 extending centrally therethrough.

The operation of my invention is as follows:

My invention is positioned with the valve opening 31 in valve base member 30 under the lower end of a liquid delivery pipe 61, and with said base member and the plate valve 32 over a receptacle 62 with said valve opening directly over said receptacle, as illustrated in Fig. 3 of the drawing.

Assuming the parts of my invention to be in the position shown in Fig. 1, in which position the plate valve 32 is shown as having just been closed and with said plate valve covering the valve opening 31, power being applied to the pulley 14 through a belt (not shown), said pulley, shaft 10, actuating arm 17 and gear 15 are rotated counter-clockwise, or in the direction of the arrow 64 as shown in Fig. 1, while the gear 20 in mesh with the gear 15 is rotated clockwise, as indicated by the arrow 64, whereby the vertical shaft 18, carriage 41, worm gear 42, and the actuating arm 22 are likewise rotated clockwise, while the worm 43 and worm shaft 44, thumb wheel 45 and worm holding spring 46 are rotated with the carriage 41 but are held by the spring 46 against rotation about their own axes. As the actuating arm 17 is rotated counter-clockwise as aforesaid, the inclined outer end 38 of said arm engages the roller 37 and swings the valve-actuating arm 36 and the plate valve 32 clockwise, until said plate valve is swung open, uncovering the valve opening 31, whereupon liquid flows through said opening from the pipe 61 into the receptacle 61 until said receptacle is filled with the liquid, at which time the actuating arm 24 is rotated clockwise by the gears 15 and 20 and the shaft 18, through the carriage 41 and worm gear 42, into position so that the edge 27 of the shoe 24 engages the roller 37 and swings the valve-actuating arm 36 and the plate valve 32 counter-clockwise until said plate valve covers the valve opening and shuts off passage of liquid through the passage 31 from the pipe 61 into the receptacle 62, as shown in Fig. 1.

As shown in Fig. 1 the actuating arm 22 is adjusted by my timing device 40 to such position that the shoe 24 of said arm will engage the roller 37 and close the valve 32, when the valve has remained open for nearly the longest period of time within the range of the device, and said valve will thereupon be immediately opened by the engagement of the outer end of the actuating arm 17 with said roller 37. The length of time that the valve 32 remains open depends upon the relative position of the actuating arms 17 and 22, and, as shown in Fig. 1, said arms are adjusted to their closest relationship to cause the same to actuate the valve 32, so that it will remain open for its longest period of time during a cycle of operations of my timing device. My timing device may be adjusted to cause the valve 32 to remain open for shorter periods of time down to zero by turning the actuating arm 22 clockwise upon turning the thumb wheel 45, whereby said actuating arm is turned in said direction through the medium of the worm shaft 44, worm 43, worm gear 42, and vertical shaft 18; and said shorter periods of time, during which the valve will remain open, will be indicated by the indicator 48 pointing to the graduations 49 on the dial 47 representing said shorter periods of time.

In the event that the valve 32 should jam, the shoe 24 of the adjusting arm 22 will be pressed inwardly against the tension of the spring 28 upon engagement of said shoe with the roller 37 and the shoe will be allowed to pass said roller without breaking any parts of the mechanism.

In the modification of my invention shown in Fig. 4, my timing device is shown applied to an electric switch 65, with the swinging arm 66 of said switch secured on the lower end of the shaft 33 and the switch contact 67 positioned on said arm for engaging the fixed contact 68 of the switch 65 and closing said switch, when the switch arm is swung clockwise by the engagement of the roller 37 by the end of the actuating arm 17. The switch 65 is opened by the engagement of the roller 37 by the actuating arm 22 which swings the switch arm 66 counter-clockwise and the switch contact 67 away from the switch contact 68.

In the modification of my invention shown in Figs. 5 and 6, the arm 36 is adjustably clamped on the upper end of the shaft 33 by a clamp 70, so that said shaft may be clamped in different positions in the arm 36 to which the shaft may be turned with relation to said arm. The shaft 33 forms the stem 71 of a valve 72, on the lower end of which stem is secured the controlling member of said valve in the valve casing. The valve 72 is opened by the engagement of the end of the actuating arm 17 with the roller 37, and said valve is closed by the engagement of the shoe 24 on the end of the actuating arm 22 with said

roller 37, the engagement of said arms with said roller causing the arm 36 to swing and turn the shaft 33 and valve stem 71 to operate the valve.

I do not limit my invention to the exact construction and arrangement herein shown and described, because various changes may be made therein without departing from the spirit of the invention.

I claim:

1. A timing mechanism as disclosed including a drive shaft, a driven shaft, a drive gear secured on said drive shaft, a driven gear turnable on said driven shaft in mesh with said drive gear, an actuating arm secured on said drive shaft, an actuating arm secured on said driven shaft, a timing device connected to said driven gear and to said driven shaft for adjusting the position of the actuating arm on said driven shaft with relation to said driven gear and to the actuating arm on said drive shaft, an actuated shaft, an actuated arm secured on said actuated shaft, and a roller on said actuated arm to be engaged successively by said actuating arm on said driven shaft and by said actuating arm on said drive shaft.

2. A timing mechanism as characterized by claim 1 including an indicator for indicating the position to which the actuating arm on the driven shaft is adjusted with relation to the position of the actuating arm on the drive shaft.

3. A timing mechanism as characterized by claim 1 including a dial on said timing device, and an indicator arm on said driven shaft pointing to said dial for indicating the adjusted position of the actuating arm on the driven shaft with relation to the actuating arm on the drive shaft.

4. A timing mechanism as disclosed including a drive shaft, a drive gear secured on said drive shaft, a driven shaft, a driven gear turnable on said driven shaft in mesh with said drive gear, an actuating arm secured on said drive shaft, an actuating arm secured on said driven shaft, a timing device for adjusting the position of the actuating arm on said driven shaft with relation to said driven gear and to the arm on said drive shaft, said timing device comprising a carriage secured on said driven gear, a worm gear secured on said driven shaft, a worm shaft journaled in said carriage, a worm secured on said worm shaft in mesh with said worm gear, and means whereby said worm shaft may be turned for operating said timing device, an actuated shaft, an actuated arm secured on said actuated shaft, and a roller on said actuated arm to be engaged successively by said actuating arm on said driven shaft and by said actuating arm on said drive shaft.

5. A timing device as characterized by claim 1 including means for holding the actuating arm on said driven shaft in adjusted position.

6. A timing device as characterized by claim 4 including a thumb wheel secured on the outer end of the worm shaft, and a coil spring surrounding the worm shaft with one end thereof bearing against said thumb wheel and its other end bearing against the carriage of the timing device for frictionally holding the actuating arm on the driven shaft in adjusted position.

7. A timing device as characterized by claim 4 including a dial secured on the carriage of the timing device, and an indicator arm secured on the driven shaft pointing to said dial for indicating the adjusted position of the actuating arm on the driven shaft.

8. A timing device as characterized by claim 1 including a resilient shoe on the outer end of the actuating arm on the driven shaft which engages the roller.

9. A timing device as characterized by claim 1 including a resilient shoe on the outer end of one of the actuating arms for engaging the roller.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
761,699	Ney et al.	June 7, 1904
1,691,408	Palmer	Nov. 13, 1928