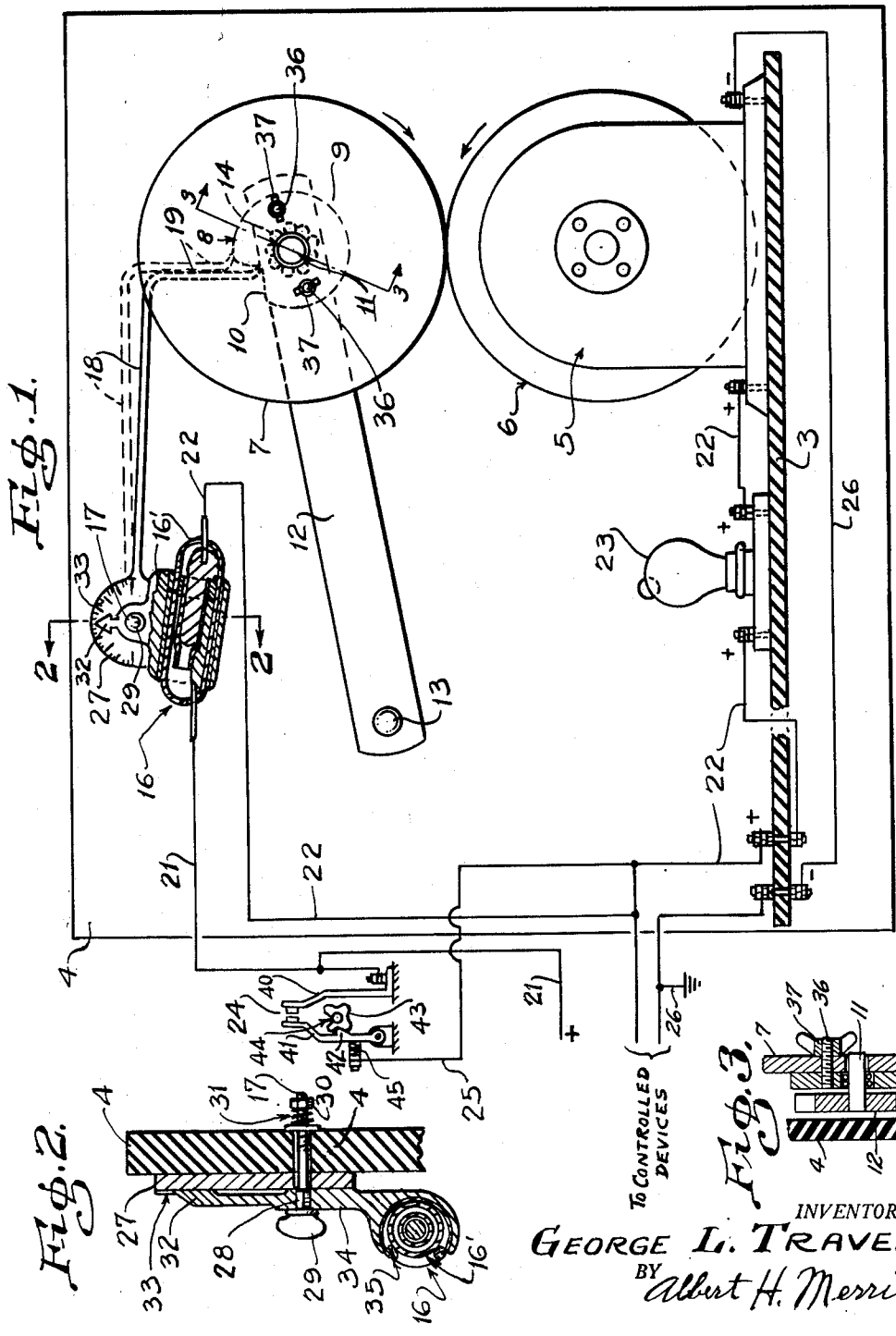
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MECHANICALLY AND ELECTRICALLY CONTROLLED TIMING APPARATUS

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INVENTOR.
GEORGE L. TRAVER
BY Albert H. Merrill
ATTORNEY.

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MECHANICALLY AND ELECTRICALLY CONTROLLED TIMING APPARATUS

George L. Traver, Compton, Calif.

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3 Claims. (Cl. 200—30)

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This invention relates to a mechanically and electrically controlled timing apparatus.

More specifically speaking, the invention pertains to an apparatus whereby a single, continuously operating motor may be used to time the operations of a plurality of remote devices, such, for example, as liquid dispensers used to control the intermittent addition of chemicals or other ingredients to a stream of industrial waste water for the purpose of precipitating impurities suspended therein.

Although it is not altogether new, in the art to which this invention pertains, to provide an apparatus of the above stated kind, yet there remains ample room for improving such an apparatus both in regard to reducing the number of working parts required, and in lowering cost of manufacture, and such improvements are effected by this invention.

One specific object of the present invention is to provide a simplified, motor driven cam member, and, in combination therewith, an improved cam operated member to open and close an electric switch which controls the supply of electric current to the already mentioned remotely situated devices the operation of which is controlled by this invention.

Other objects, advantages and features of invention will hereinafter appear.

Referring to the accompanying drawing, which illustrates a preferred, reduced to practice embodiment of the invention,

Fig. 1 is a wiring diagram wherein some mechanical elements are outlined in side elevation and others in section, and including a mercury controlled electric switch. A cam operated member is shown at one limit of its movement in full lines and at the opposite limit of its movement in broken lines.

Fig. 2 is an enlarged sectional detail on the plane indicated by line 2—2 on Fig. 1.

Fig. 3 is a fragmentary cross section on line 3—3 of Fig. 1.

Referring in detail to the drawing, therein is shown a combination base 3 and panel structure 4 whereon is mounted an electric motor 5 which, while the apparatus is in operation, will be kept continuously running. Said motor is furnished with a driving wheel 6 which frictionally drives a wheel 7 having concentrically secured to it a cam 8, having, in turn, a circular dwell portion 9 interrupted by a generally right-angular recess 10 having rounded corner portions, as shown. Said wheel 7 and cam 8 are carried by a stub shaft 11 which is swingably

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supported by one end portion of an arm 12, the opposite end portion of said arm 12 being carried by a pivot shaft 13. Preferably said shaft 11 is in a fixed relation to the arm 12, and the wheel 7 and cam 9 rotate about said shaft. Also, desirably, a ball bearing 14 is interposed between said shaft and the cam 9. The cam 9 is located between the arm 12 and driven wheel 7. This arrangement facilitates detaching one driven wheel from the cam and then attaching thereto another driven wheel of a different diameter.

A mercury switch 16 is rockably mounted upon a supporting pivot 17, said switch carrying an arm 18 shown as angularly shaped with a right-angularly directed end portion 19 which is operatively related to the aforesaid cam 9 and its notch 10.

Starting with the positive supply wire 21, the electric connections will now be described. Said wire 21 leads through the aforesaid mercury switch 16 and beyond said switch is provided with a lead 22 which supplies current to the "controlled devices" indicated in the lower, left hand portion of the wiring diagram. At the same time said lead 22 supplies current which drives the motor 5, on its way to said motor supplying current to the low wattage lamp 23.

The aforesaid wire 21 also supplies current through a starting switch 24, the latter switch, separately considered, forming no part of the present invention. Beyond said starting switch the current is conducted by a lead 25 which completes the circuit through the aforesaid control devices. At the same time said lead 25, owing to its communication with the aforesaid lead 22, supplies current to the motor 5, the current on its way to said motor passing through the lamp 23. Also, through a lead 26, the motor and said control devices are grounded.

Describing in detail the preferred construction of the mercury switch 16, said switch comprises a semicircular graduated dial plate 27 which affords an attaching means for the aforesaid arm 18. A turnable shaft 28, carrying an operating knob 29 passes loosely through panel structure 4, said shaft being attached by means of a nut 30 and being frictionally held in place by a coiled wire spring 31 underlying said nut. Said shaft passes loosely through said dial, but is in a non-turnable relation to a knife-edged pointer 32 which co-operates with a series of graduated grooves 33 on said dial, yieldably to maintain said pointer after rotational adjustment in a set relation to said dial.

The pointer structure **32** has a shank portion **34** the lower part of which is shaped to form a snap-in cradle **35**, into which is snapped the tube **16'** of the mercury switch **16**. By this arrangement said mercury switch is caused to operate through the desired angle in relation to the horizontal, it being necessary to adjust the angle of the switch when the driven wheel **7** is replaced by a larger or a smaller wheel, as is necessary when the timing feature of the device has to be changed. At all times, however, a cam **8** of the same size may be retained, the substituted wheel being quickly and easily attached directly to said cam in a substantially abutting relation thereto by means of threaded pins **36** provided with winged nuts **37**, said pins being radially spaced away from the central aperture through said wheel **7**. It is to be understood that said cam and its ball bearing structure **14** will be permanently attached to the shaft **11**.

The use of the swingable arm **12** to mount driven wheel **7** differing in diameter is an important feature of this invention.

As already stated, the aforesaid starting switch **24**, separately considered, forms no part of the present invention. However, because of the manner in which it co-operates with the other parts of the apparatus its structure will be further described. Said switch **24** comprises a stationary arm **40** and a spring pressed arm **41**, the latter arm carrying a lug **42** with which co-operates a rotatably mounted star wheel **43**. Said star wheel is shown having a series of four peripheral positioning notches, one of which, designated **44**, is considerably deeper than the others, so that, when said lug **42** springs into said deep notch under the urge of a diagrammatically indicated compression spring **45**, said switch **24** is closed. It is to be understood that said star wheel will be rotated at intervals by conventional mechanical means, for example, a flow watch.

The mercury switch **16** is for the purpose of maintaining the circuit closed through the controlled devices for predetermined given lengths of time during the periods that the starting switch **24** is open.

I claim:

1. In an apparatus of the kind described, mounting means comprising an upstanding panel with a substantially horizontal basal portion, an electric motor mounted upon said basal portion and including a driving wheel which rotates in a vertical plane, an arm having one end portion pivotally attached to said panel, a centrally apertured driven wheel rotatably and detachably carried by the opposite end portion of said arm and held by gravity in a frictional contact with the upper side portion of said driving wheel, a cam, means spaced radially from the aperture of said driven wheel whereby said cam and wheel are detachably secured together in a

substantially abutting relation, a mercury switch rockably mounted upon said panel, an operating arm for said switch carried thereby, said operating arm being in engagement with said cam so as to be intermittently operated thereby to close the circuit through said switch, there being an electric circuit controlled by said switch, said circuit including within it remote devices intermittently put into operation by the apparatus.

2. In an apparatus of the kind described, a support, a driving wheel mounted thereon to be rotated in a vertical plane by a motor, a vertically swingable arm having one end portion pivoted to said support, a horizontal stub shaft carried by the free end portion of said arm, a portion of said shaft projecting laterally from one side of said arm, a cam rotatably mounted upon said projecting shaft portion, a driven wheel substantially abutting against said cam and detachably secured to said cam to rotate therewith, said arm co-operating with gravity to maintain the lower side of the periphery of said driven wheel in contact with the upper part of the periphery of said driving wheel in a position to be rotated by the latter wheel, and electric switch operating means mounted on said support in an operative relation to said cam, said cam being located between said arm and driven wheel.

3. In an apparatus of the kind described, a support, a driving wheel mounted thereon to be rotated in a vertical plane by a motor, a vertically swingable arm having one end portion pivoted to said support, a horizontal shaft carried by the free end portion of said arm, a portion of said shaft projecting laterally from one side of said arm, a cam rotatably mounted upon said projecting shaft portion, a driven wheel detachably secured to said cam to rotate therewith, said arm co-operating with gravity to maintain the lower side of the periphery of said driven wheel in contact with the upper part of the periphery of said driving wheel in a position to be rotated by the latter wheel, an electric switch operating means mounted on said support in an operative relation to said cam, said cam being located between said arm and driven wheel, and threaded nut carrying pins carried by said cam and projecting through apertures provided for them in said driven wheel.

GEORGE L. TRAVER.

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