Dec. 25, 1951 G. F. DUVALL 2,580,287

TIMING DEVICE

Filed Jan. 13, 1949 3 Sheets-Sheet 1

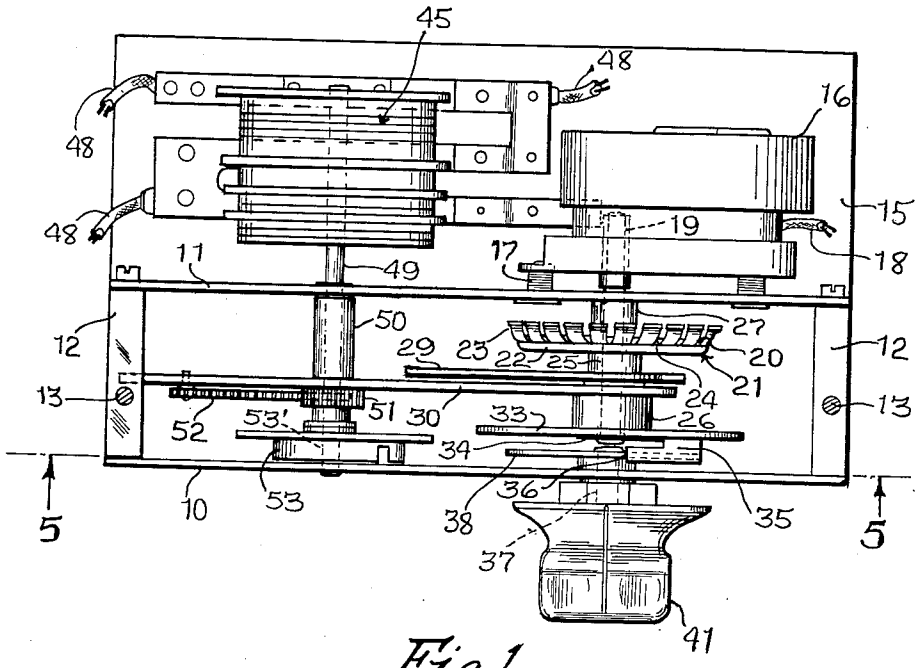


Fig. 1

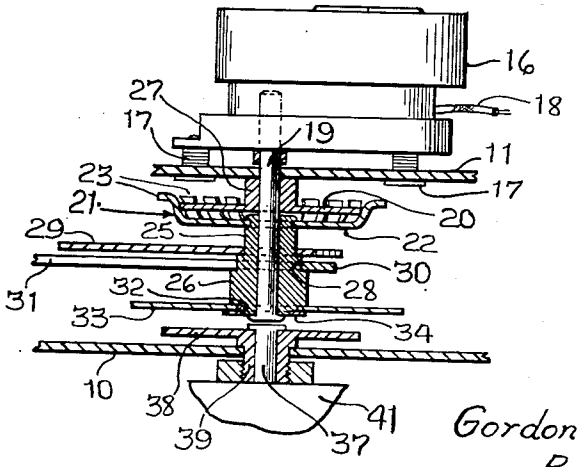


Fig. 2.

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TIMING DEVICE

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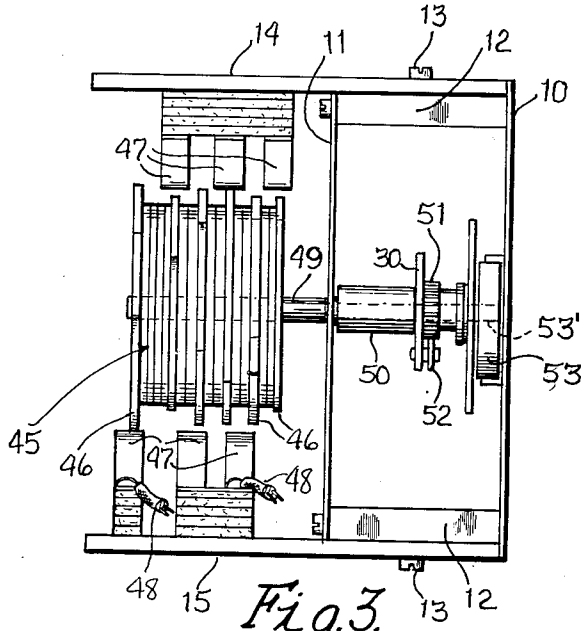


Fig. 3.

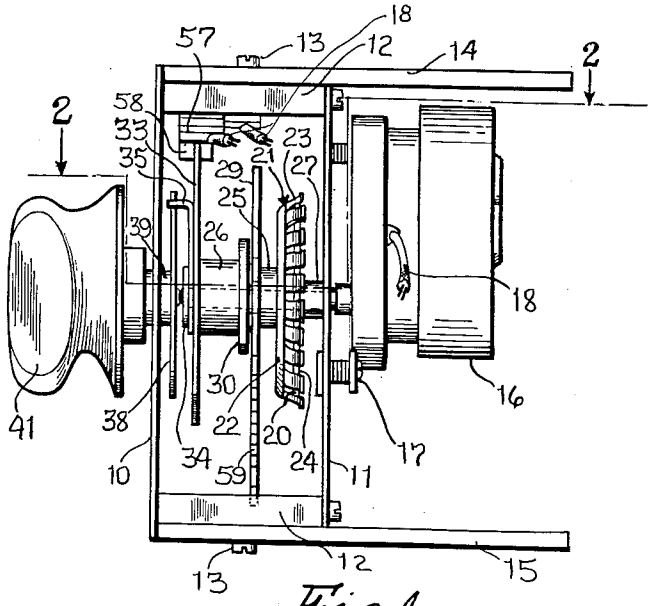


Fig. 4.

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TIMING DEVICE

Filed Jan. 13, 1949 3 Sheets-Sheet 3

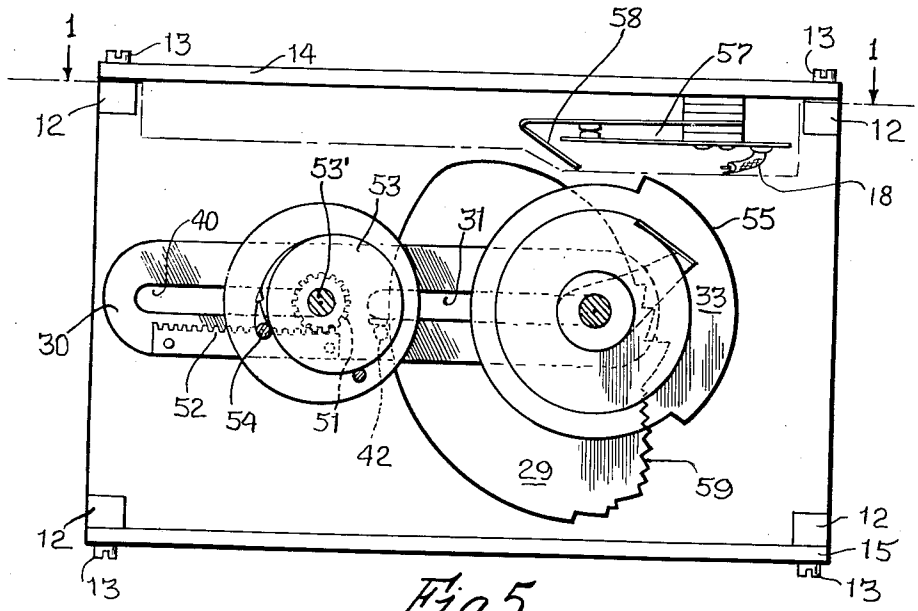


Fig. 5.

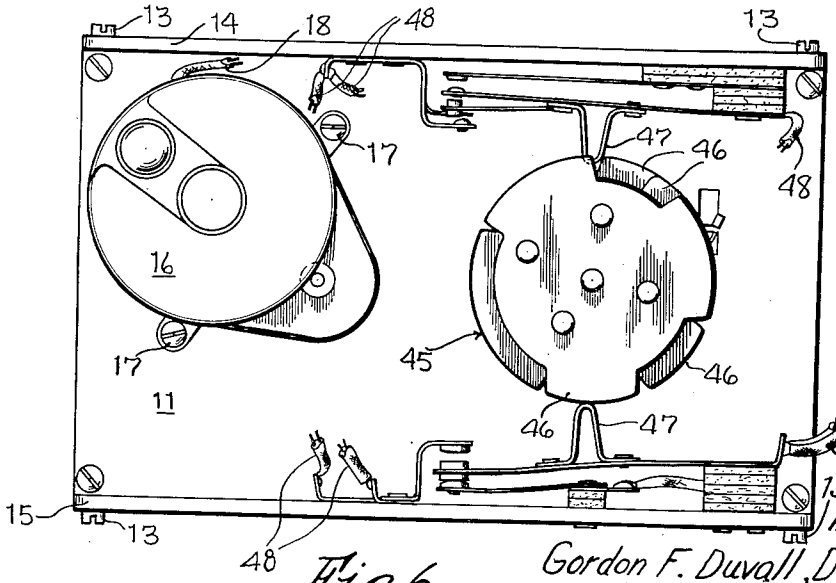


Fig. 6.

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Patented Dec. 25, 1951

2,580,287

UNITED STATES PATENT OFFICE

2,580,287

TIMING DEVICE

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Application January 13, 1949, Serial No. 70,737

2 Claims. (Cl. 161—1)

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This invention relates to certain new and useful improvements in timing devices especially designed and adapted for controlling the operation of a bank of switch actuating cams.

The invention has for its principal object the provision in a timing device of a spring actuated drive bar, the movement of which is controlled by a master cam, having a plurality of steps which permit the periodical movement of the drive bar in a direction for rotating simultaneously the bank of cams.

Another and equally important object of the invention is the provision of a timing device of the character herein described which is especially designed for use in timing the operation of a machine such for example, a washing apparatus which requires timed operation of its mechanism to complete a cycle of operation.

Another object of the invention is the provision in a timing device of a spring actuated mechanism for controlling the periodical movement of a bank of cams without lost motion or delay, whereby to effect quick and positive movement of the cams of the bank to a position where they are expected to perform the respective functions.

Other objects will appear hereinafter.

The invention consists in the novel combination and arrangement of parts to be hereinafter described and claimed.

The invention will be best understood by reference to the accompanying drawings showing the preferred form of construction, and in which:

Fig. 1 is a top plan view of the timing device embodied in the invention taken substantially on line 1—1 of Fig. 5;

Fig. 2 is a fragmentary sectional detail view taken substantially on line 2—2 of Fig. 4;

Fig. 3 is an end view as viewed from the left of Fig. 1;

Fig. 4 is an end view as viewed from the right of Fig. 1;

Fig. 5 is a sectional detail view taken substantially on line 5—5 of Fig. 1; and

Fig. 6 is a detail view as viewed from the left in Fig. 3.

Prior to this invention, it was a common practice to control the periodical closing of a bank of switches by means of a cam shaft rotatable at a constant uniform speed of rotation to bring the cams thereon into engagement with the switches. While this method of controlling the bank of switches is not entirely objectionable, yet due to the fact that the cams move into switch closing position no faster than the rotation of the cam, there resulted considerable delay in the actual

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closing and opening of the switches. Unless properly timed, the phase of operation of the mechanism becomes disrupted. This invention has for its object the provision of spring-actuated mechanism for effecting a snap-like action of the cam into switch-actuating position, thereby eliminating any delay which would otherwise result from a slow closing operation. The arrangement also reduces, to a minimum, arcing at the switch points.

These and other objects of this invention are accomplished by providing in a timing mechanism a front wall 10 and a rear wall 11. The front wall 10 and the rear wall 11 are connected together at corresponding corners by spacer bars 12. To these spacer bars 12 are connected as at 13 a top wall 14 and a bottom wall 15.

A timing motor of a well known conventional construction is indicated at 16. This motor is supported from the wall 11 as at 17.

This motor is connected in circuit with a suitable source of electric energy by conductors 18. It includes a shaft 19. On this shaft is fixedly secured in any suitable manner, a hub 27 formed as an integral part of a clutch disc 20 of a clutch structure 21. This clutch structure 21 includes a complementary clutch disc 22 having a plurality of spring fingers 23 adapted to slide over the tapered teeth 24 of the clutch disc 20 when rotated in one direction and adapted to have latch engagement with the teeth when rotated in an opposite direction to provide a coupling between the discs 21 and 22. The clutch disc 22 is fixedly secured in any suitable manner to a portion 25 of a sleeve 26. This sleeve 26 is rotatable upon the shaft 19. On the hub portion 25 of the sleeve 26 is fixedly secured a cam 29, hereafter referred to as a program cam, as it is this cam which governs the movement of the bank of switch-actuating cams hereinafter referred to.

Slidably mounted transversely of a hub portion 28 of the sleeve 26 is a drive bar 30. This drive bar 30 is of elongated formation and has an elongated slot 31 formed therein through which projects the hub portion 28. The sleeve 26 provides a reduced hub portion 32 on which a switch-actuating cam 33 is fixedly mounted. Adjacent this cam 33 and fixedly secured to the sleeve 26 is a coupler arm 34 having a latch finger 35. This latch finger 35 is adapted to have latched engagement with a keeper notch 36 formed in a coupler disc 38 mounted upon a stud shaft 37. This disc 38 provides a hub portion 39 through which the stud shaft 37 projects.

Threaded upon the hub portion 39 is a finger knob 41.

The drive bar 30 has a second elongated slot 40 formed therein in spaced longitudinal alignment with respect to the slot 31 and through which the shaft 53' of a spring motor 53 projects.

The drive bar 30 is provided with a rider pin 42. A bank of cams is indicated at 45. The cams 46 of this bank of cams control the opening and closing of circuit switches 47 connected by conductors 48 in circuit with the electric operating or driving element (not shown) within that circuit. This bank of cams is fixedly secured to a shaft 49 journalled between the walls 10 and 11.

On this shaft 49 is fixedly secured a hub 50. This hub 50 carries a pinion 51 which operatively meshes with a rack 52 secured to and carried by the drive bar 30. Secured to this shaft in any suitable manner is one end portion of the clock spring 53, the opposite end of this spring being connected as at 54 to a pin carried by the wall 10.

A starting switch is indicated at 57. This switch is carried by the wall 14 and is adapted to control the circuit to the timing motor. The switch 57 includes a contact finger 58, the end portion of which is adapted to be engaged by the hill 55 of the cam 33. When this switch is closed, the circuit to the timing motor will be completed.

The program cam 29 is provided with a plurality of steps 59 which are adapted to be successively engaged by the rider pin 42 as the program cam 29 is rotated. There are as many steps 59 as there are cams on the bank of cams 45.

The operation of the timing device is initiated by rotating the hand knob 41 to effect coupling between the finger 35 and the disc 36. This coupling effects rotation of the cam 33 to move the hill 55 thereof from engagement with the contact finger 58 as shown in Fig. 5 to close switch 57. At the same time, rotation of the cam 29 to move the drive bar in a direction to the left as viewed in Fig. 5 is effected to place the spring motor 53 under tension, at the completion of which operation the hill 55 will move from engagement with respect to the contact finger 58 to close the circuit to the timing motor 16. This timing motor will now take over the rotation of the program cam 29 and, each time a step 59 of that cam is presented to the pin 42, the drive bar 30 will move in snap action to rotate the bank of cams 45, likewise in snap action to close one or more of the switches 47 controlled by this bank of cams. Each time the cam 29 is rotated to place the spring motor 53 under tension, the bank of cams 45 will be rotated to an initial starting position.

By this arrangement, the closing or opening of the switches 47 is effected under quick snaplike action, thereby avoiding delay in such operation.

This becomes an important feature in a machine where there are a plurality of periodical operations.

While I have illustrated and described the preferred form of construction for carrying the invention into effect, this is capable of variation and modification without departing from the spirit of the invention. I, therefore, do not wish to be limited to the precise details of construction set forth, but desire to avail myself of such variations and modifications as come within the scope of the appended claims.

Having thus described the invention, what I claim as new and desire to protect by Letters Patent is:

1. In a timing apparatus, the combination with the shaft of a timing motor, of a sleeve carried by said shaft for rotation relative thereto, means providing a coupling between said sleeve and said shaft to effect rotation of the sleeve in one direction by rotation of the shaft, said means being ineffective for coupling said sleeve and shaft for rotation in an opposite direction, means for rotating said sleeve independent of the rotation of the shaft, a program cam mounted on and rotatable with the sleeve, a drive member, an element on said drive member adapted to engage the cam surface of the program cam to move the drive member in one direction, a driven shaft, means providing driving connection between the driven shaft and the drive member to effect rotation of the driven shaft in one direction by movement of the drive member by said program cam, and a spring having one end portion connected to said driven shaft and an opposite end portion to a fixed member, for rotating said driven shaft to move the driven member in a direction opposite to the movement of said drive member by said program cam, said spring being placed under tension by movement of said drive member by said program cam.

2. The combination set forth in claim 1 wherein the program cam provides a plurality of steps adapted to be successively engaged by said element on said drive member.

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Administratrix of Estate of Gordon F. Duvall, Deceased.

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

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