July 5, 1949. H. E. HOBBY 2,475,501

PROGRAM CONTROL UNIT

Filed April 9, 1946 2 Sheets-Sheet 1

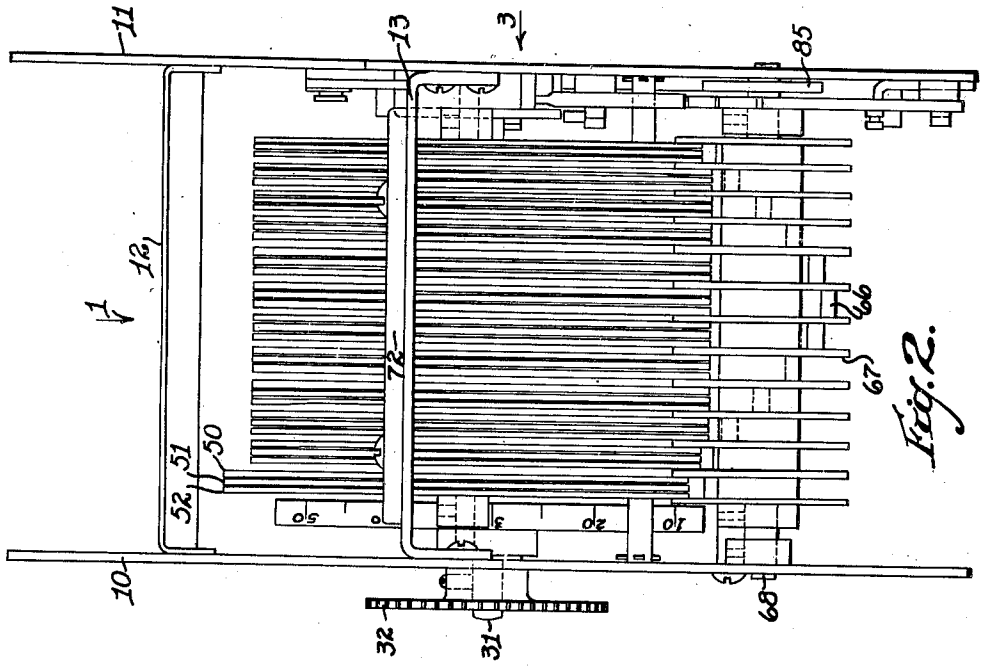


Fig. 2.

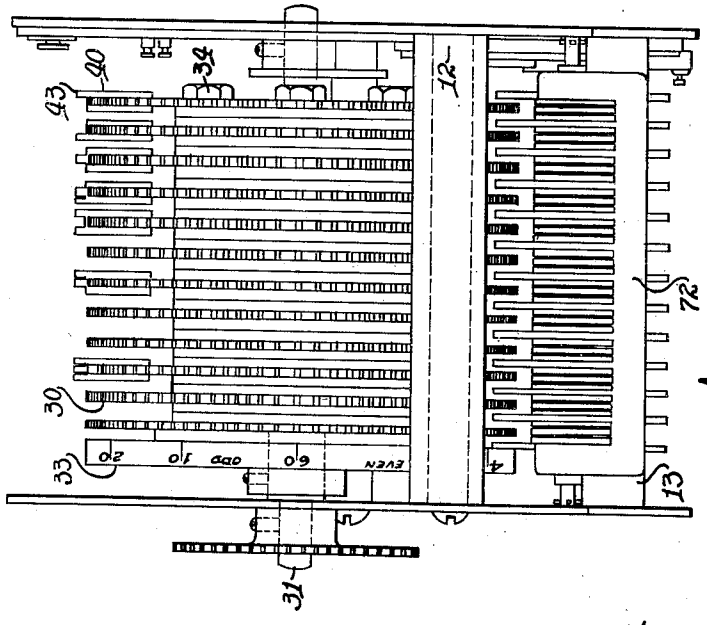


Fig. 1.

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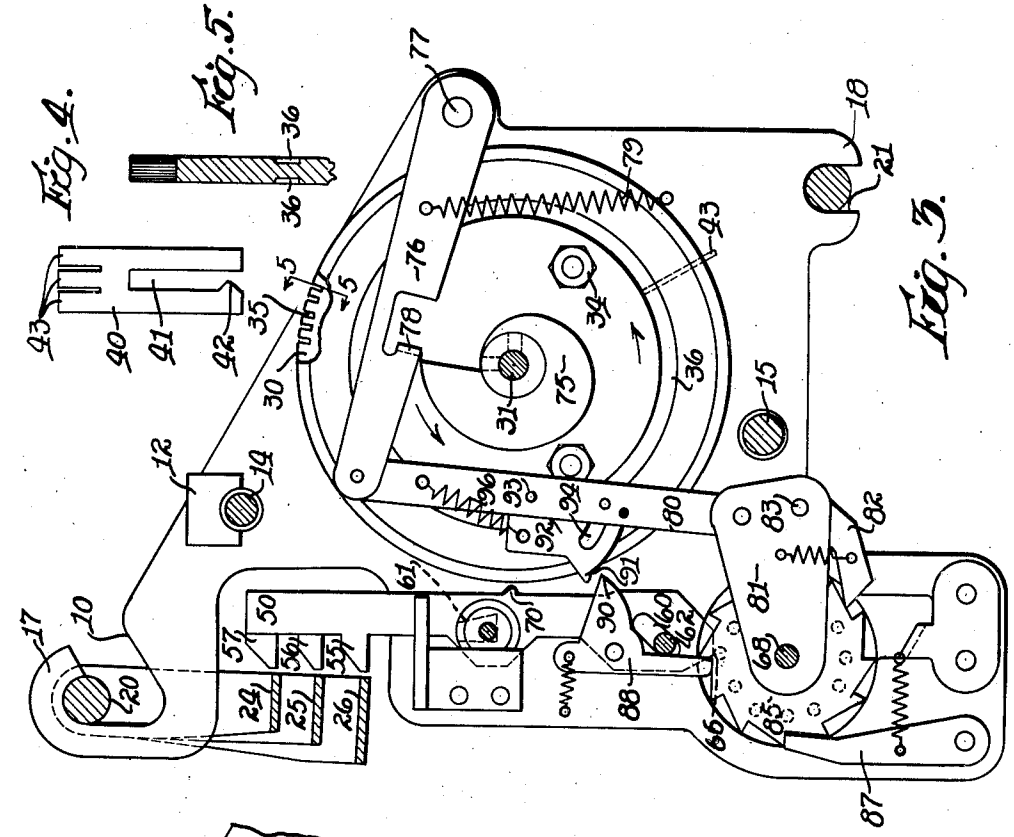


Fig. 4.

Fig. 5.

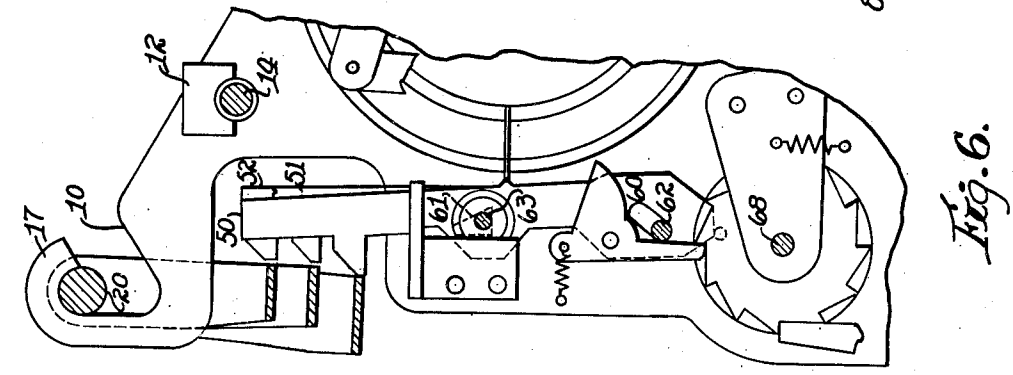


Fig. 6.

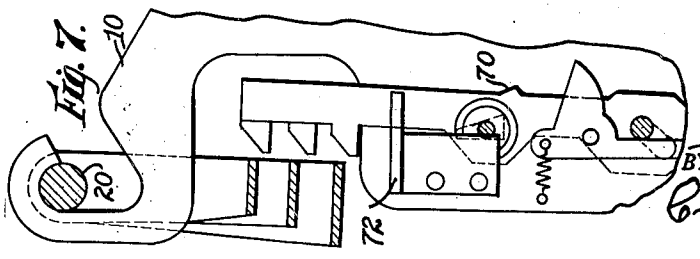


Fig. 7.

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2,475,501

PROGRAM CONTROL UNIT

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Application April 9, 1946, Serial No. 660,586

7 Claims. (Cl. 161—2)

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This invention relates to program devices which may be prearranged to effect selected results at predetermined times.

It is the general object of my invention to provide an improved construction in a program device by which a plurality of mechanisms may be selectively controlled by a single program unit.

A further object is to provide an improved program control unit by which any one or more of a plurality of mechanisms may be selectively activated at any prearranged minute of a twenty-four hour period.

To the accomplishment of this general purpose, I provide twelve continuously rotated two-hour discs each adapted to receive one or more indicating clips for any selected minutes, and I further provide means to shift the control of the mechanisms to be activated to a different disc at two-hour intervals throughout a twenty-four hour period.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention is shown in the drawings, in which

Fig. 1 is a plan view of my improved program unit, looking in the direction of the arrow 1 in Fig. 2;

Fig. 2 is a front elevation thereof, looking in the direction of the arrow 2 in Fig. 1;

Fig. 3 is a side elevation with the side frame removed and partly in section, looking in the direction of the arrow 3 in Fig. 2;

Fig. 4 is a side elevation of a detachable indicating clip;

Fig. 5 is a partial sectional view of a rotating disc, taken along the line 5—5 in Fig. 3; and

Figs. 6 and 7 are side elevations similar to Fig. 3 but showing certain parts in different positions.

My improved control device is of unitary construction and comprises side plates 10 and 11 secured together by U-shaped cross frame members 12 and 13 and by cross rods 14 and 15. The side plates 10 and 11 are provided with hook-shaped upper end portions 17 and with notched lower rear portions 18, said portions 17 and 18 being adapted to engage cross rods 20 and 21 in a time recorder or other mechanism with which the control unit is to be associated.

U-shaped pivoted control members 24, 25 and 26 are mounted on the fixed cross rod 20, as shown in Figs. 3, 6 and 7, but these U-shaped control members do not form any part of the removable control unit. The control members 24, 25 and 26 may be connected to separately activate the mechanisms which are to be selectively controlled according to a predetermined program.

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By way of illustration, the control member 24 may operate a micro-switch in a bell signal circuit. The member 25 may control mechanism for shifting a two-color ribbon in a time recorder at predetermined intervals, and the member 26 may control the periodical shifting of a card guide and card support in a time recorder.

The particular mechanisms controlled by the members 24, 25 and 26 form no part of the present invention but reference is made to the prior patent to Dell and Hobby, No. 2,389,345, issued November 20, 1945, as disclosing one form of mechanism controlled by a U-shaped swinging member similar to the members 24, 25 and 26.

Having indicated the purpose of my improved control unit, the specific construction thereof will now be described.

A series of twelve timing discs 30 are mounted on a cross shaft 31 rotatable in bearings in the side frame members 10 and 11 and continuously rotated through a gear 32 which is driven from any suitable source of power. The power drive is so designed that the gear 32 and the shaft 31 make one revolution every two hours.

A head or circular flange 33 is fixed on the shaft 31, and the discs 30 are secured in fixed angular relation to the head 33 by cross bolts 34. The head 33 may be graduated and numbered as indicated in Figs. 1 and 2 to facilitate setting up a program.

Each disc 30 is provided with 120 notches 35, as indicated in Fig. 3, and is also provided with an annular groove 36 on each side face as shown in Fig. 5. Clips 40 (Fig. 4), preferably of saw steel, are mounted in selected notches 35 and are slotted at 41 to receive the edge of an associated disc 30. A lug 42 snaps into one of the grooves 36 when the clip is in position and holds the clip from displacement. The outer end of each clip is slotted to form three projecting lugs 43, each adapted to engage a control lever to be described and to thereby actuate one of the swinging control members 24, 25 and 26.

A set of three control levers 50, 51 and 52 is provided adjacent each control disc 30. The lever 50 of each group has a lug 55 adapted to engage and shift the control member 26. Each lever 51 has a corresponding lug 56 adapted to engage the member 25, and each lever 52 has a lug 57 adapted to engage the control lever 24. Each lever 50, 51 or 52 is provided with an inclined lower slot 60 (Fig. 3) and a wedge-shaped

upper slot 61. The several groups of levers are assembled on fixed cross rods 62 and 63.

Each set of three associated control levers 50, 51 and 52 is engageable at its lower end by one of a series of cross pins 66 (Figs. 2 and 3) mounted in angularly spaced relation between a series of discs 67 secured on a cross shaft 68. The twelve pins 66 form a complete and regular circular series, with each pin spaced 30° behind its preceding pin and with all of the pins at the same radial distance from the axis of the shaft 68.

As each pin 66 is shifted to its uppermost position, it engages the lower ends of the associated set of control levers and shifts these levers from the inoperative position shown in Fig. 7 to the raised position shown in Fig. 3. In this latter position, the levers will be swung forward if a lug 70 (Fig. 3) on the back of any lever is engaged by a lug 43 on any clip 40.

On such engagement, the lever swings forward about the lower cross rod 62 to the position shown in Fig. 6, such movement being permitted by the increased width of the lower portion of the wedge-shaped opening 61. When the levers are dropped to the inoperative position shown in Fig. 7, the inclined slots 60 in the lower ends of the levers swing the lugs 70 forward and the wedge-shaped slots 61 coact to clear the lugs 43 of the clips 40.

A fixed guideplate or comb 72 is mounted on the U-shaped cross frame member 13 (Figs. 1 and 2), and the fingers of the comb separate adjacent groups of control levers as clearly shown in Fig. 1.

I will now describe the mechanism by which the shaft 68 is advanced one space every two hours, on completion of a full revolution of a two-hour program disc 30, thus moving a new pin 66 to raised position and rendering a new set of control levers operative, while the previously operative set becomes inoperative.

A scroll cam 75 (Fig. 3) is mounted on the disc shaft 31 and rotates continuously with the control discs 30, thus completing one revolution every two hours. A lever 76 is mounted on a fixed pivot 77 and has a rearwardly projecting lug 78 resting on the cam 75. A spring 79 furnishes power to move the lever 76 when released by the cam 75.

The lever 76 is connected by a link 80 to an arm 81 loosely mounted on the shaft 68 and having a feed pawl 82 pivoted thereto at 83. The pawl 82 engages a ratchet wheel 85 fixed on the shaft 68. Each time the lever 76 is raised by the cam 75, the feed pawl 82 is withdrawn one space, and each time the lever 76 is dropped from the high point of the cam, the ratchet wheel is advanced one space to move a new pin 66 to topmost position.

A holding pawl 87 prevents rearward movement of the ratchet wheel 85, and a locking pawl 88 prevents overfeed thereof and also locks the ratchet wheel from forward movement except during the feeding movement of the lever 76. This is accomplished by providing the locking pawl 88 with a wing 90 engageable by a lug 91 on a latch 92 pivoted at 93 on the link 80. A slot 94 in the latch 92 coacts with a stop pin 95 to hold the latch normally in the position shown in Fig. 3 under the influence of a spring 96.

When the link 80 starts to move downward on a feeding movement, the lug 91 engages the wing 90 and swings the locking pawl from holding position before the pawl 82 advances the ratchet wheel 85 in its feeding movement. As the downward movement continues, the lug 91 clears the wing 90, which immediately returns to holding position behind the next tooth and thus prevents overfeed.

The provision of the three indicating lugs 43 on each clip 40 permits the clips to be used selectively as indicated in the upper part of Fig. 1. Either one, two or three of the lugs 43 may be retained, and if only one or two lugs are retained, they may be positioned to engage different selected combinations of control levers.

With this arrangement ,at a selected minute any one of a set of control levers 50, 51 or 52 may be advanced to swing its associated U-shaped member 24, 25 or 26. Alternately, any two of the levers may be activated, as 50 and 52 by removing the middle lug 43, or 50 and 51 by removing one side lug 43. By reversing the clip with one side lug removed, the levers 51 and 52 may be be activated, and with all three lugs left on the clip, all three levers may be operated together.

It will thus appear that my improved control unit may be used to activate any one of three different mechanisms at any minute in a twenty-four hour period. Each disc 30 contains 120 slots 35 and rotates once in two hours, thus providing a separate slot for every minute in a two hour period. At the end of the two hour period, the rearwardly projecting lug 78 of the lever 76 drops off of the cam 75, the ratchet wheel 85 and associated parts is advanced one space, the levers associated with the disc which has just completed its two-hour circuit become inoperative, and the levers associated with the next adjacent disc immediately become operative.

By thus shifting at two-hour intervals from one to another of the twelve discs 30, selective control of the members 24, 25 and 26 is provided for every minute of the twenty-four hour period, after which similar control for the next twenty-four hour period is immediately instituted.

The cam 75 may obviously be set to cause the shift from one disc to the next to occur at any selected time during a two-hour period. The shift commonly takes place at a relatively inactive time, such as 43 minutes after the odd hour. It is considered advisable not to place an indicating clip 40 on the particular minute when the shift is taking place.

The unitary construction above described makes it possible to quickly and easily remove the unit for inspection or for changing the program, and also makes it possible to provide two or more interchangeable units set up for different programs, so that a shift may be easily made from one program to another where two or more different programs are used alternately.

Having thus described my invention and the advantages thereof, I do not wish to be limited to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:

1. In a program control unit, a continuously rotated shaft, a plurality of notched discs on said shaft, indicating clips insertable in selected notches in said discs, a separate set of control levers associated with each disc and selectively engageable by said clips, and means to move successive sets of levers to engageable position relative to the clips on the associated discs at the completion of each rotation of said shaft and discs.

2. A program control unit comprising a frame, a shaft rotatably mounted in said frame, means to continuously rotate said shaft, a plurality of indicating discs mounted on said shaft and each having notches about its periphery, detachable

indicating clips insertable in selected notches, a separate set of control devices selectively engageable by the clips on an associated disc at predetermined selected times, means to render one set only of said control devices engageable during a given period, and a plurality of control members each operable by one device only in every one of said sets of control devices.

3. A program control unit comprising a frame, a shaft rotatably mounted in said frame, means to continuously rotate said shaft, a plurality of indicating discs mounted on said shaft and each having notches about its periphery, detachable indicating clips insertable in selected notches, a separate set of control devices selectively engageable by the clips on an associated disc at predetermined selected times, and means to shift each set of control devices out of engageable relation with its associated disc and clips on completion of a full revolution of said disc.

4. In a program control unit, a set of control levers each having an inclined slot near one end and a wedge-shaped slot near the center, fixed supporting rods extending through said slots, a lever-actuating device, and means to intermittently shift said set of levers longitudinally and transversely to engageable and non-engageable positions relative to said actuating device.

5. In a program control unit, a set of control levers each having an inclined slot near one end and a wedge-shaped slot near the center, fixed supporting rods extending through said slots, a lever-actuating device, and intermittently operated means to raise said set of levers to engageable position relative to said actuating device and to thereafter lower said levers to an inoperative position.

6. In a program control unit, a disc having peripheral notches at close intervals, means to rotate said discs, a set of three control levers associated with each disc, and clips detachably mounted in said notches and having lugs aligned with selected levers and effective to engage and activate said selected levers.

7. A program control unit comprising a plurality of rotatable discs, indicating clips on said discs, a separate set of levers engageable by the clips on each disc, a rotatable member having pins mounted in alignment with the lower ends of said sets of levers and in angularly spaced relation to each other, and means to advance said rotatable member at predetermined time intervals to bring said pins successively to operative position and to thereby raise the associated set of levers to engageable relation with the clips on the associated rotatable disc.

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