

**June 23, 1953**

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**2,642,685**

MONOGRAMMIC INDICATOR

Filed July 31, 1948

6 Sheets-Sheet 1

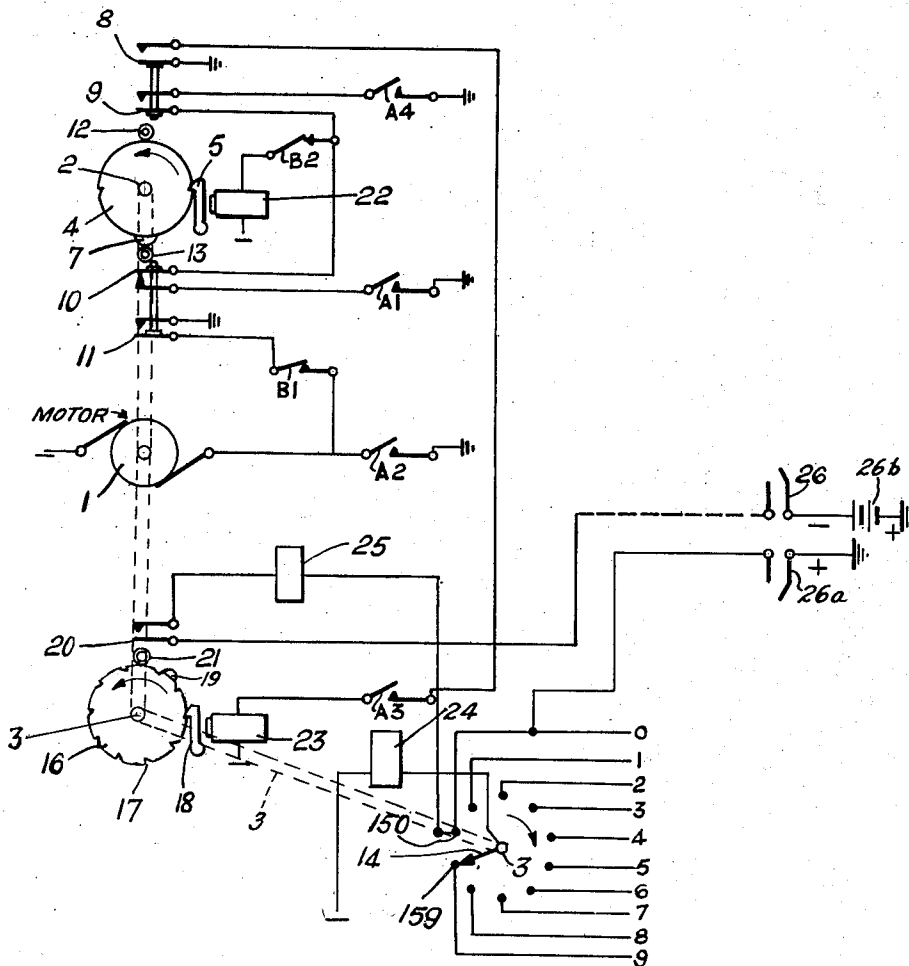


Fig. 1

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6 Sheets-Sheet 2

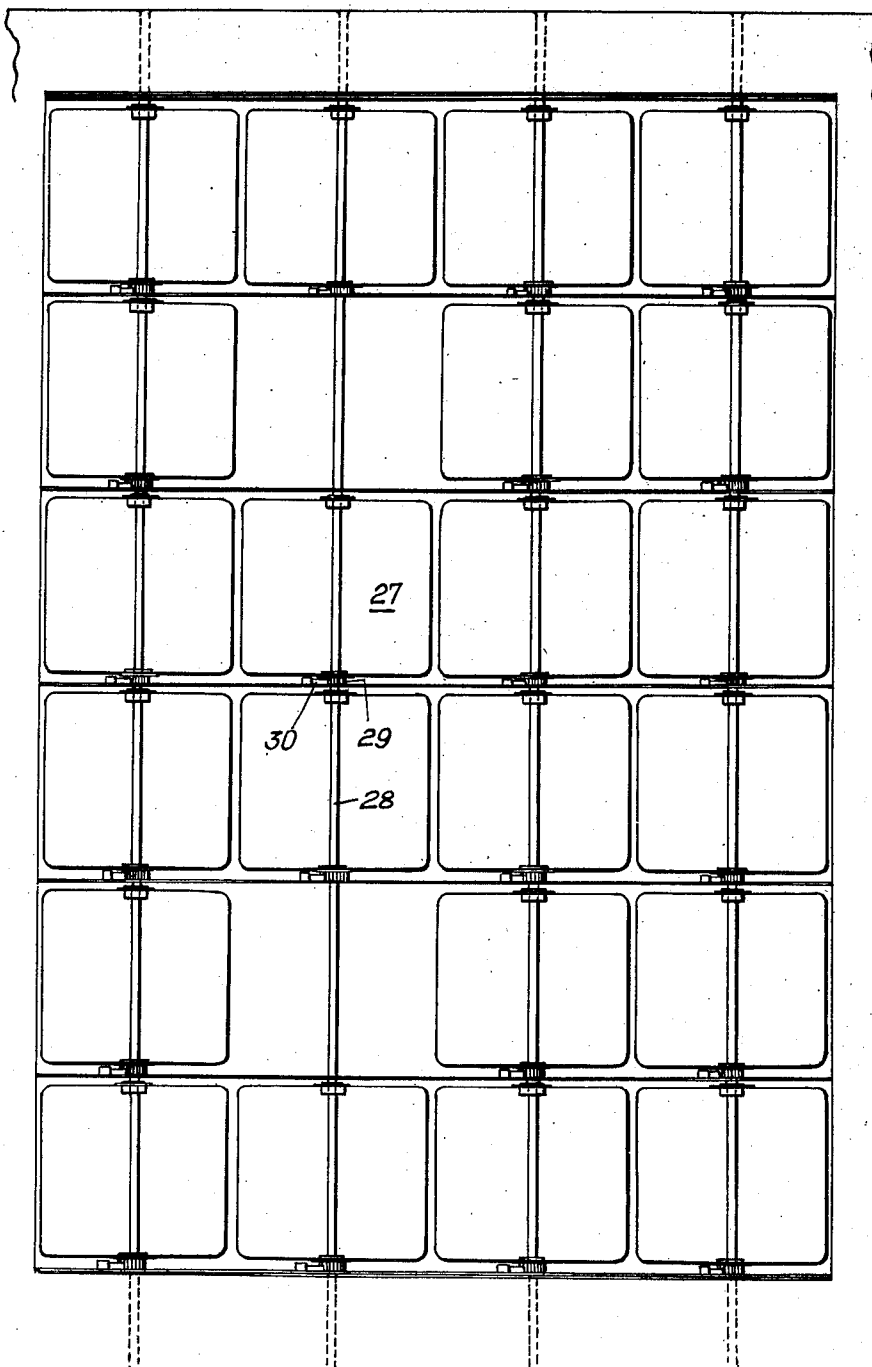


FIG. 2

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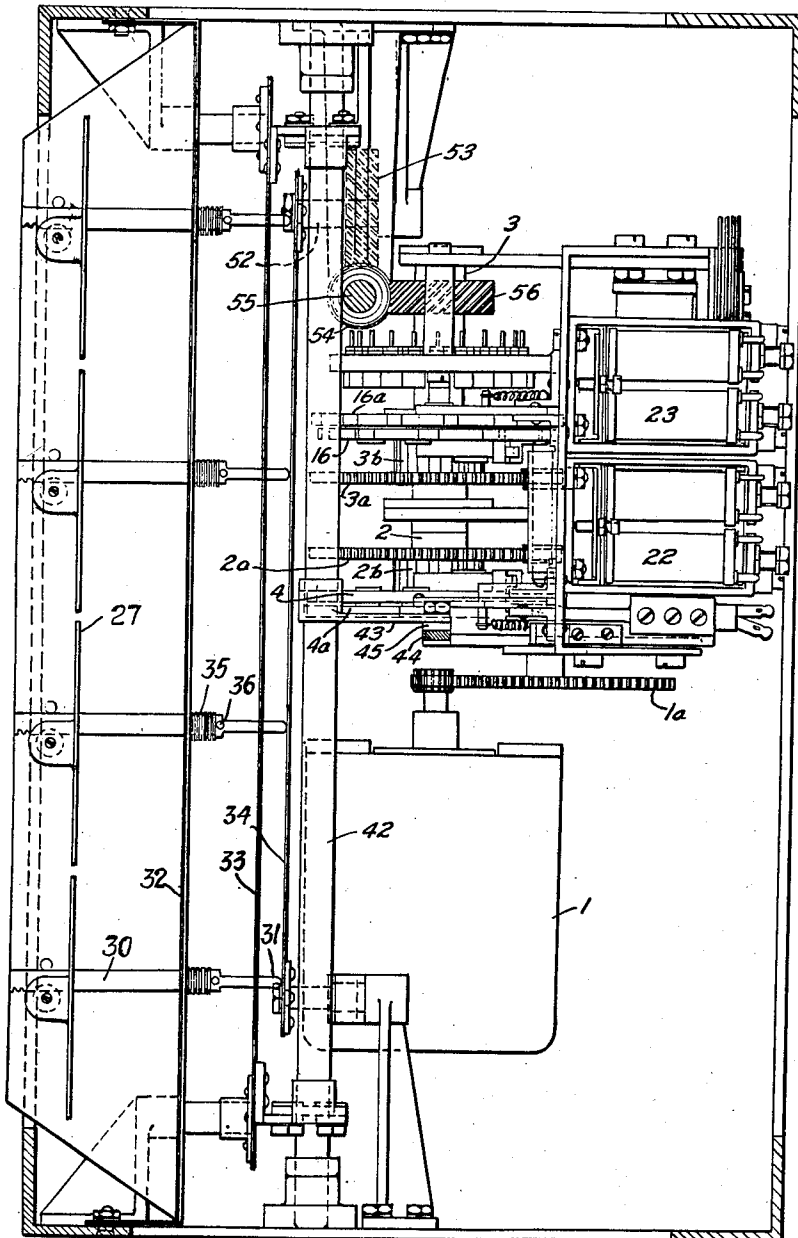


FIG. 3.

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6 Sheets-Sheet 4

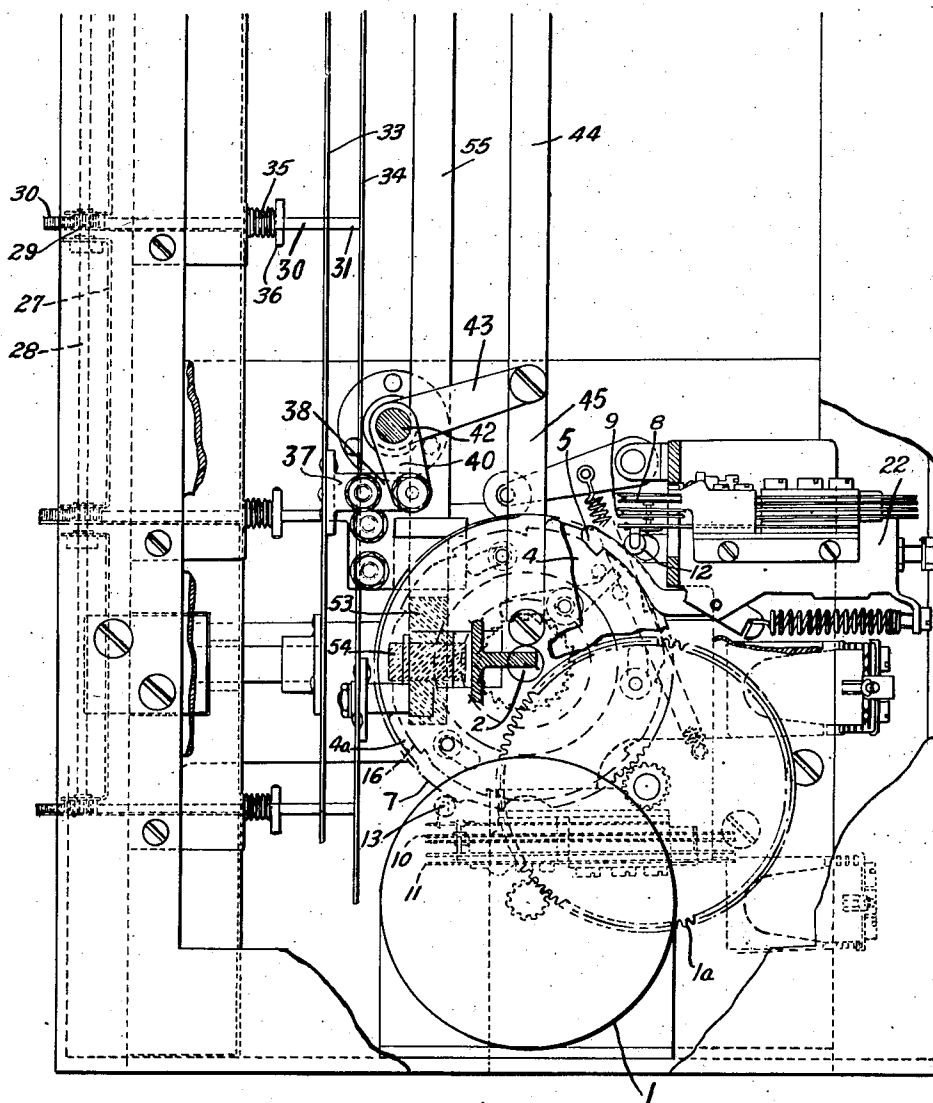


FIG. 4.

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6 Sheets-Sheet 5

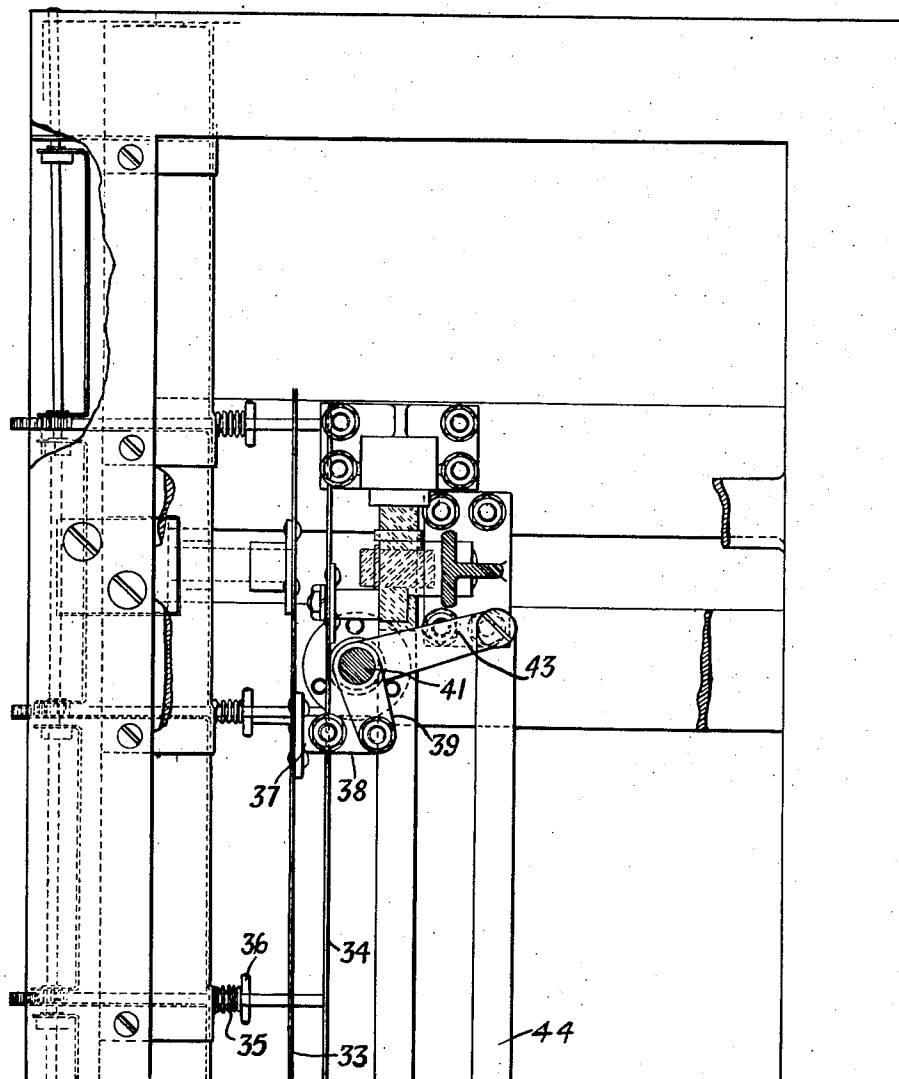


FIG. 4a

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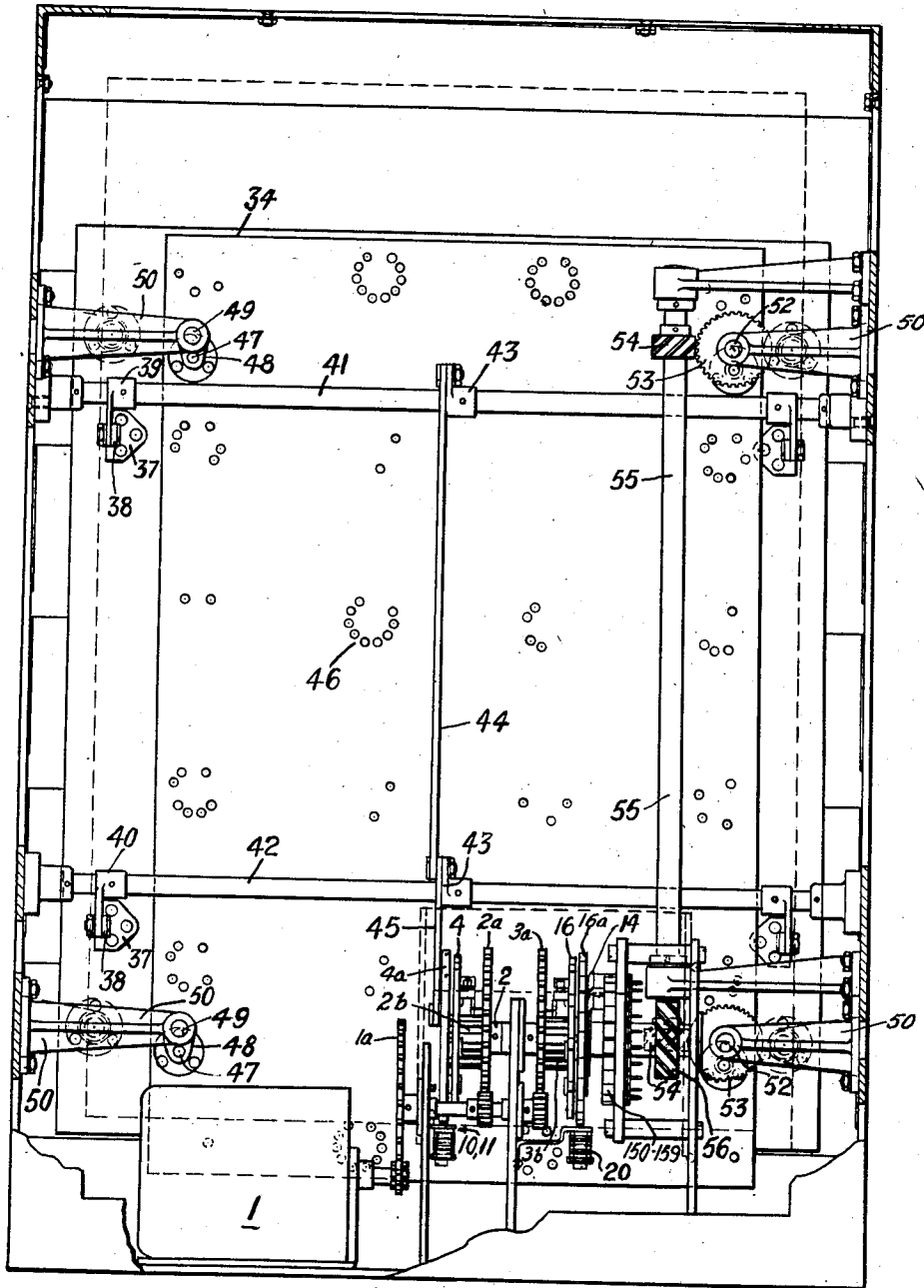


FIG. 5

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## UNITED STATES PATENT OFFICE

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## MONOGRAMMIC INDICATOR

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6 Claims. (Cl. 40—52)

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This invention relates to monogrammic indicators comprising a number of plates adapted to be individually moved between display and non-display positions, which may be for example, flat and on-edge positions, or white front and black back exposures, respectively.

An object of the invention is to provide a compact control equipment for such an indicator.

The invention consists broadly in a monogrammic indicator comprising indicator display sections, perforated control plate or card means for selecting a desired combination of display sections for display and means for moving the selected display sections between non-display and display positions.

The invention will be described with reference to a preferred embodiment illustrated in the accompanying drawings in which:

Fig. 1 shows electrical control circuits for selecting any desired combination of plates for display;

Fig. 2 is a broken view in front elevation of the indicator;

Fig. 3 is a plan, partly in horizontal section, of the indicator;

Figs. 4 and 4a together form a side elevation partly in section and partly broken away; and

Fig. 5 is a view looking towards the rear face of the perforated control plate.

Referring first to Fig. 1 of the drawings, the indicator is provided with a control circuit and mechanism, shown diagrammatically and including a motor 1 geared through clutches to aligned operating and selecting shafts 2 and 3, respectively. The motor is arranged to drive either or both of the shafts 2 and 3 and the respective clutches, represented in Fig. 1 as a ratchet and pawl, are controlled by electromagnets. The manner in which the shafts 2 and 3 control the selection of the indicator plates to be displayed, and effect movement of selected plates to selected position will be described later in relation to Figs. 2 and 3 of the drawings.

The operating shaft 2 carries a clutch represented diagrammatically by a ratchet wheel 4 and a pawl 5, the latter being controlled by an electromagnet 22. The ratchet teeth of the clutch wheel 4 are diametrically opposed, so that when the wheel is released, it and shaft 2, turn through half a revolution. Wheel 4 has a cam lobe 7 adapted to operate the contact springs of diametrically opposed pairs of switches 8, 9 and 10, 11 respectively, through cam rollers 12 and 13. As can be seen, the diameter on which these pairs of switches lie is at right angles to the diameter on which the ratchet teeth lie when the wheel is at rest.

The shaft 3 can be driven from the motor 1 by a clutch represented in Fig. 1 by a ratchet wheel 16 and a pawl 18, the pawl being controlled

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by an electromagnet 23. This ratchet wheel 16 has ten teeth 17, so that when the pawl releases it, it and its associated shaft 3 turn through one tenth revolution. Wheel 16 has a cam lobe 19 adapted to operate the contact spring of a switch 20 through a roller 21.

The shaft 3 also carries a wiper 14 of a single motion switch having ten contacts 150, 151 . . . 159, connected to ten leads 0, 1 . . . 9. The position of the wiper 14 is determined, in a manner to be described, by the connection of earth potential from any desired control equipment, such as a totalisator counter, through one of the leads 0, 1 . . . 9 to any one of contacts 150 . . . 159.

Control relays 24 and 25 operate the movable contacts of switches A1, A2, A3, A4 and B1, B2, respectively. Leads marked with a minus sign are connected to the minus side of a current supply such as battery 26b, the plus side of which is grounded to the metal frame of the indicator. Other leads marked to ground are connected through the frame to the plus side of the battery.

It will be assumed that the wiper 14 is in the position shown, with relay 24 energized by current flow to earth via wiper 14, contact 159 and lead 9. Switches A1, A2, A3 and A4 are all open, so that motor 1 and electromagnets 22 and 23 are de-energized. If the earth potential is removed from contact 159, indicating that the position of shaft 3 should be altered, relay 24 releases and its switches all close. At A1 the magnet 22 is energized over switches A1, 10, and B2, and this withdraws pawl 5 and releases the clutch wheel 4. At A2 a circuit is completed for motor 1 which commences to rotate, and since the clutch 4—5 is released shaft 2 is driven.

When shaft 2 commences to rotate, the cam lobe 7 causes switch 10 to open to de-energise magnet 22. Switch 11 closes and completes an alternative circuit for the motor 1 over switch B1. When the clutch wheel 4 has turned through a half of a revolution it closes switches 8 and 9. When switch 8 is closed electromagnet 23 is energized over switch A3 to withdraw pawl 18 which releases the ratchet wheel 16. Shaft 3 is then driven, and carries with it the wiper 14. In the position shown, one tenth of a revolution of shaft 3 brings the wiper 14 to contact 150. If there is an earth potential thereon, indicating that the correct setting is zero (that corresponding to the contact 150), relay 24 re-operates and opens all its switches to stop the motor. When the cam lobe 7 closed switch 9, the magnet 22 was re-energized over switches A4, 9 and B2 to again withdraw pawl 13 so that the wheel 4 and shaft 2 are allowed to perform a second half revolution to bring them back to their original position as shown.

If, however, the wiper 14 does not find an

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earth potential on contact 150 relay 24 does not. In this case when the clutch wheel 4 returns to re-operate so that its switches remain closed. its normal position, having performed one complete revolution, its cam lobe closes switch 10 and opens switch 11. Electromagnet 22 is then re-energised and the clutch again released. As before the cam lobe 7 closes switches 8 and 9 to re-energise electromagnets 22 and 23. This causes the release of both shafts 2 and 3 as before, shaft 2 being released for one half and shaft 3 for one-tenth of a revolution. This action continues until wiper 14 finds an earth potential on one of contacts 150—159, when relay 24 operates to stop the motor, as described. During this follow-up action, shaft 3 makes one tenth of a revolution for each revolution of shaft 2.

If the blank key 26 is operated when the earth-holding relay 24, actuated via a working position of the wiper 14, is transferred to contact 150, the relay 24 will release and the clutch member 4 will make a half revolution, first opening the switch 10 and closing the switch 11, and then closing the switches 8 and 9. When the wiper 14 reaches the contact 150, battery potential is connected from a battery 26b via the key 26, switch 20 (closed by the cam lobe 19 in the home positions of the wiper 14 and the clutch member 16), relay 25, wiper 14 to earth via contact 150. Relays 24 and 25 operate, stopping the wiper 14. The clutch electromagnet 22 will not operate, however, as the switch B2 is open, and the clutch member 16 remains in the non-display position until the key 26 is restored, releasing the relay 25 to display O. The relay 24 remains operated.

The indicator may be reset to zero, by operating a blank key 26a to connect earth potential to the contact 150, and the blank key 26 to connect battery potential to switch 20. The earth potential from the controlling device, e. g. a totalisator counter, is simultaneously removed, so that relay 24 releases. This causes the usual action and shaft 3 is driven in steps, in the manner already described, until wiper 14 reaches contact 150. Relay 24 then operates in the usual manner, and relay 25 also operates from negative battery over key contacts 26, switch 20, now closed by virtue of the position in which cam 19 and shaft 3 stands, the winding of relay 25, key 26a and earth. Relay 25 opens switches B1 and B2, breaks the alternative circuit for the motor 1 and breaks the operating circuit of the electromagnet 22 so that it cannot re-operate until the keys 26 and 26a are re-opened.

The motor 1, the clutches indicated at 4, 5 and 16, 18 in Fig. 1, the wiper switch, and the electrical contacts and relays shown diagrammatically in Fig. 1 are all of well-known design, and are shown but not in detail in the constructional drawings comprising Figs. 2 to 5 in order to render the construction and operation of the mechanism clear and unobstructed by the unnecessary representation of the details of standard parts. It will be understood that the shafts 2, 3 carry the clutches geared to the motor 1 and contact operating cams, while the shaft 3 also carries the selecting wiper. This arrangement is shown in Figs. 3, 4 and 5 from which it will be seen that the motor 1 drives a gear wheel 1a, which in turn drives gear wheels 2a and 3a, respectively, on shafts 2 and 3 and connected thereto through clutches indicated at 2b and 3b, respectively. The cams 7 and 19, respectively associated with the shafts 2 and 3 and shown diagrammatically in Fig. 1, are actually carried on cam discs 4a

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and 16a, respectively, which are arranged to rotate with the ratchet wheels 4 and 16, respectively.

The indicator plates 27 shown in Fig. 2, of which there are six rows of four plates each, are black on one side and white on the other and are horizontally pivoted on their centre lines. The pivot spindles 28 of the plates 27 to which they are fixed carry small gear-wheels 29 meshing with rack bars 30 terminating in pins 31 (Fig. 3). The racks 30 when in their forward positions hold the plates with their black sides to the front and when moved to their rearmost positions reverse the plates so that their white sides are displayed. The position and movement of the racks 30 and plates 27 are controlled by three vertical and parallel plates 32, 33, 34 disposed behind and parallel to the indicator plates 27.

The plates 32 nearest to the indicator plates 27 is fixed in position and apertured for the passage of the rack bars 30 which are urged towards their rearward positions by helical springs 35, one surrounding each bar 30 between the rear surface of the plate 32 and a pin 36 passing through the bar.

The plate 33 is arranged for horizontal motion towards and away from the indicator plates, always remaining in a vertical plane. The plate 33 is apertured for the passage of all the pins 31.

The plate 33 carries on its rear surface, near each vertical edge, upper and lower brackets 37 (Figs. 4, 4a and 5) which are connected by links 38 to two-armed levers 39, 40 fixed to upper and lower horizontal shafts 41, 42. Levers 43 fixed centrally on the shafts 41, 42 are interconnected by a vertical link 44 which is in turn pivoted at its lower end to an operating link 45, the lower end of which is eccentrically connected to the cam disc 4a carrying the cam 7, the disc 4a being connected for rotation with the ratchet wheel 4 on the operating shaft 2 which corresponds to the shaft 2 in Fig. 1.

The rear vertical plate 34 is the perforated control plate and is provided with rings of holes 46 (Fig. 5). The rings of holes are so disposed on the perforated plate 34 that in the normal or rest position of the plate 34 the centre of each ring of holes corresponds in position with one of the display section control pins 31. By moving the plate 34 it can be placed in any one of a number of positions in each of which a selected plurality of holes are in register with a corresponding selection of the control pins. It is thereby possible to change from non-display to display positions particular sections of the indicator section. Each position in which the plate can be placed corresponds to one particular indication of the indicator. Mechanism is provided for imparting to the plate 34 orbital movement in its own plane, the orbit having the same radius as the rings of holes so that any desired sets of holes can be brought into register with the pins 31. Consider any one hole position in the rings: at each ring position only a section of holes out of the possible total of holes is provided, the selection made varying from hole position to hole position, so that, in any given position of the plate, some of the pins will be in register with the solid surface of the plate, the selection of pins which are opposite holes varying from position to position of the plate. It is in this way that the selection is made of the indicator plates to be displayed in the manner now to be described.

The plate 34 as shown in Fig. 5, carries at each corner a pivot pin 47 normal thereto. The left hand pins 47, Fig. 5, are pivotally connected by links 48 to pins 49 mounted in fixed brackets 50. The corresponding right hand pins are pivotally connected to operating cranks fixed to spindles 52 in the right-hand brackets 50 carrying worm wheels 53 geared to worms 54 on a vertical shaft 55. The lower worm 54 is also geared to a worm 56 on the selecting shaft 3 which is the same as the shaft 3 in Figs. 1 and 3.

It will be remembered that the control circuit in Fig. 1 causes the following sequence of movements of the shafts 2, 3 to change the indication.

(a) Half rotation of the operating shaft 2.

(b) Rotation of the selecting shaft 3 from one selecting position to another.

(c) Half rotation of the operating shaft 2.

The normal position of the indicator is with the pins 31 spring-urged against or through the plate 34 according as they are not or are opposite holes in the plate.

The first half rotation of the shaft 2 acts through the linkages 45-38 to move the middle plate 33 towards the fixed plate 32. The plate 33 engages the pins 36 through the rack bars 30 and forces the bars 30 forward, turning all the indicator plates 27 so that their black faces are to the front. By this movement the pins are withdrawn from the plate 34. The rotation of the selecting shaft 3 then moves the plate to a new selecting position. The second half rotation of the shaft 2 now restores the plate 33 to its normal position, allowing the pins 31 to be spring-pressed on to or through the plate 34. The racks of those pins which pass through the plate rotate their respective indicator plates to display their white faces and a new symbol is displayed.

Instead of rings of holes in the perforated control plate, any other predetermined arrangement of a maximum number of holes could be provided, the plate being given a movement such that each hole position in the arrangement can be individually aligned with the corresponding control pin.

It will be seen that the provision of the perforated control plate and the operating plate parallel to and quite close to the display plane gives a very compact form of indicator. In addition, a smooth and controlled operation of the indicator is obtained.

What is claimed is:

1. A perforated-plate-controlled monogrammic indicator which comprises indicator display sections, a perforated control plate provided with sets of holes, one set per display section, said sets comprising different selections of holes from a maximum number of possible hole positions, the holes of the sets being arranged respectively on the arcs of similar rings, control pins each associated with a display section and each adapted to cooperate with a corresponding set of holes and to sense the various possible hole positions of said set to control the display of its associated display section, means including a rotatable crank for imparting to said perforated control plate an orbital movement in its own plane the radius of which is equal to the radius of said rings of holes to register different possible hole positions in said sets with said control pins, and means for moving selections of said display sec-

tions between non-display and display positions under control of said perforated plate.

2. A monogrammic indicator as claimed in claim 1 in which there is provided a second plate through which all of said control pins pass, and means for moving said second plate in such a manner as to control the sensing of the perforated plate by the pins, and in which said perforated plate and said second plate are parallel to the display plane of the indicator display sections whereby a compact indicator is provided.

3. A monogrammic indicator as claimed in claim 2 in which the control pins are normal to the display plane and to the plates and form the terminations of rack bars meshing with gear wheels on the pivot spindles of pivoted plates forming the indicator display sections.

4. A monogrammic indicator as claimed in claim 3 comprising control means for causing a sequence of operations consisting in moving the control pins away from the perforated plate, moving the perforated plate to a new selecting position and finally moving the control pins to sense the hole positions of the perforated plate in its new position, and to control the operation of a corresponding selection of display sections to the display position.

5. A perforated-plate-controlled monogrammic indicator which comprises indicator display sections, a perforated control plate provided with sets of holes, one set per display section, said sets comprising different selections of holes from a maximum number of possible hole positions arranged in a predetermined relation, control pins each associated with a display section and each adapted to co-operate with a corresponding set of holes and to sense the various possible hole positions of said set to control the display of its associated display section, means for moving the perforated control plate to register different possible hole positions in said sets with said control pins, means for moving selections of said display sections between non-display and display positions under control of said perforated plate, a second plate through which all of said control pin pass, and means for moving said second plate in such a manner as to control the sensing of the hole positions of the perforated plate by the pins, said perforated plate and said second plate being parallel to the display plane of the indicator display sections, whereby a compact indicator is provided.

6. A monogrammic indicator as claimed in claim 5 in which the control pins are normal to the display plane and to the plates and form the terminations of rack bars meshing with gear wheels on the pivot spindles of pivoted plates forming the indicator display sections.

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