Nov. 17, 1953 C. E. ATTWOOD 2,659,646

SELECTIVELY OPERATED ROTARY DRUM FILE

Filed Sept. 29, 1950 6 Sheets-Sheet 1

FIG. 1.

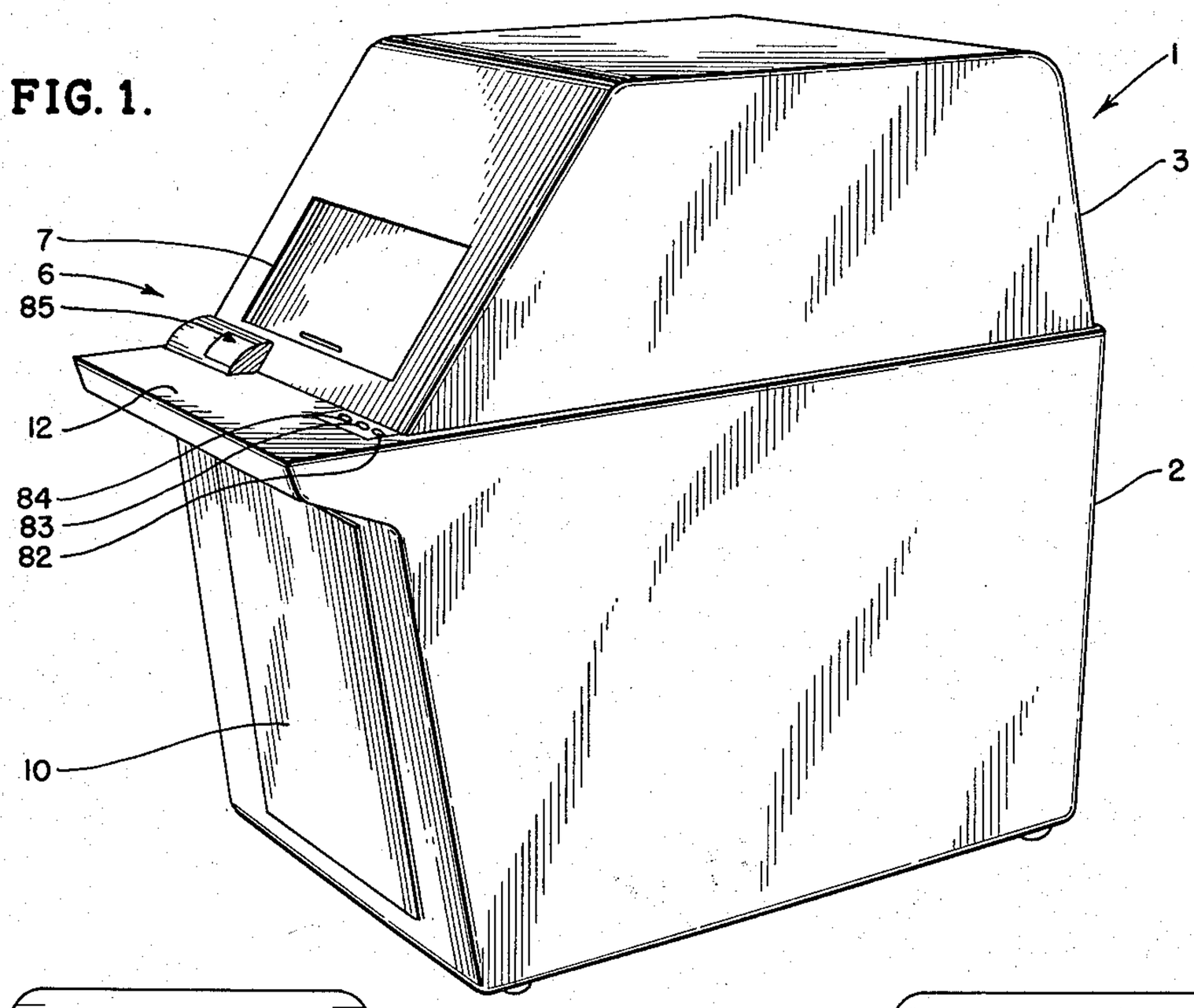
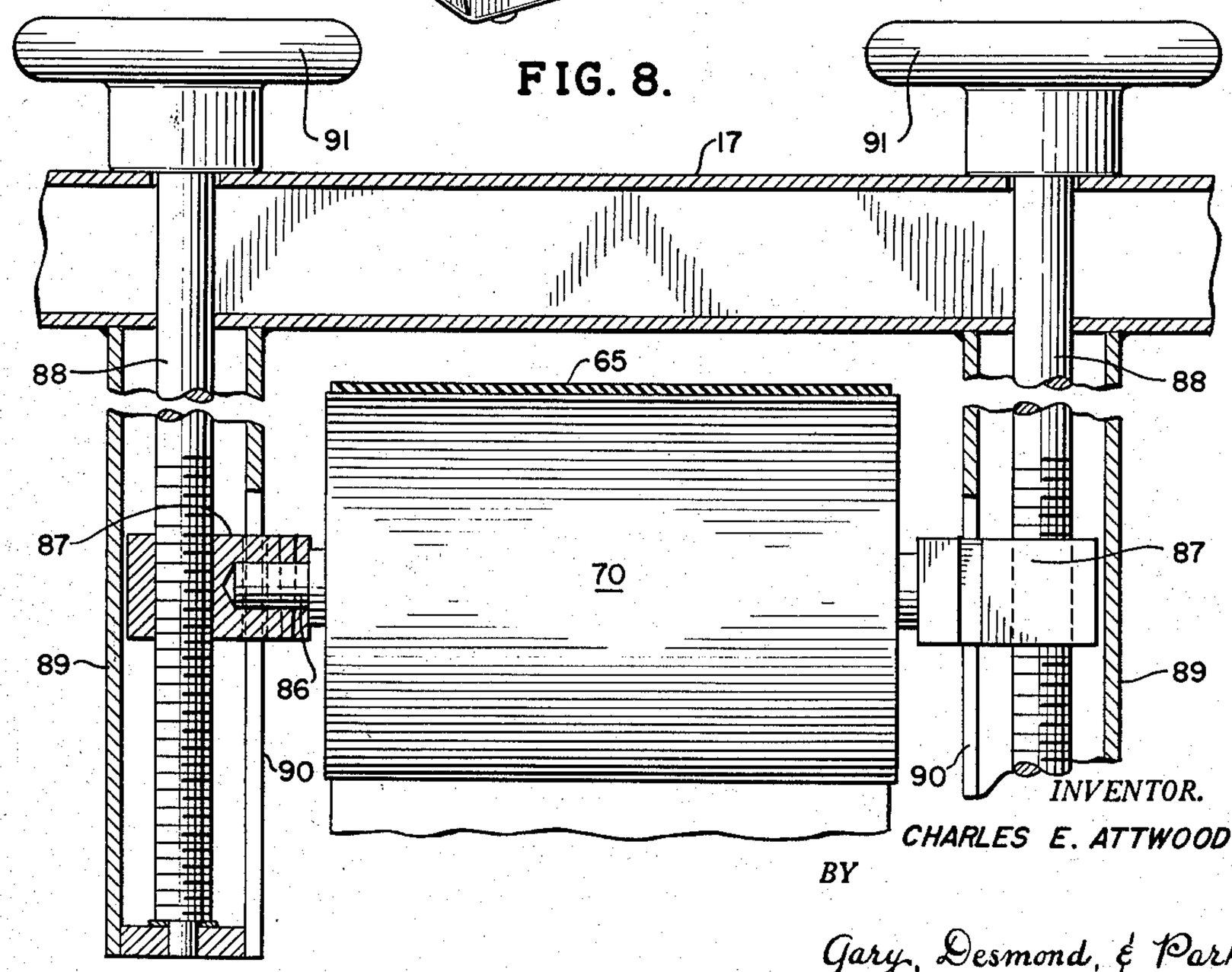


FIG. 8.



INVENTOR.
CHARLES E. ATTWOOD
BY
Gary, Desmond, & Parker
ATTORNEYS

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SELECTIVELY OPERATED ROTARY DRUM FILE

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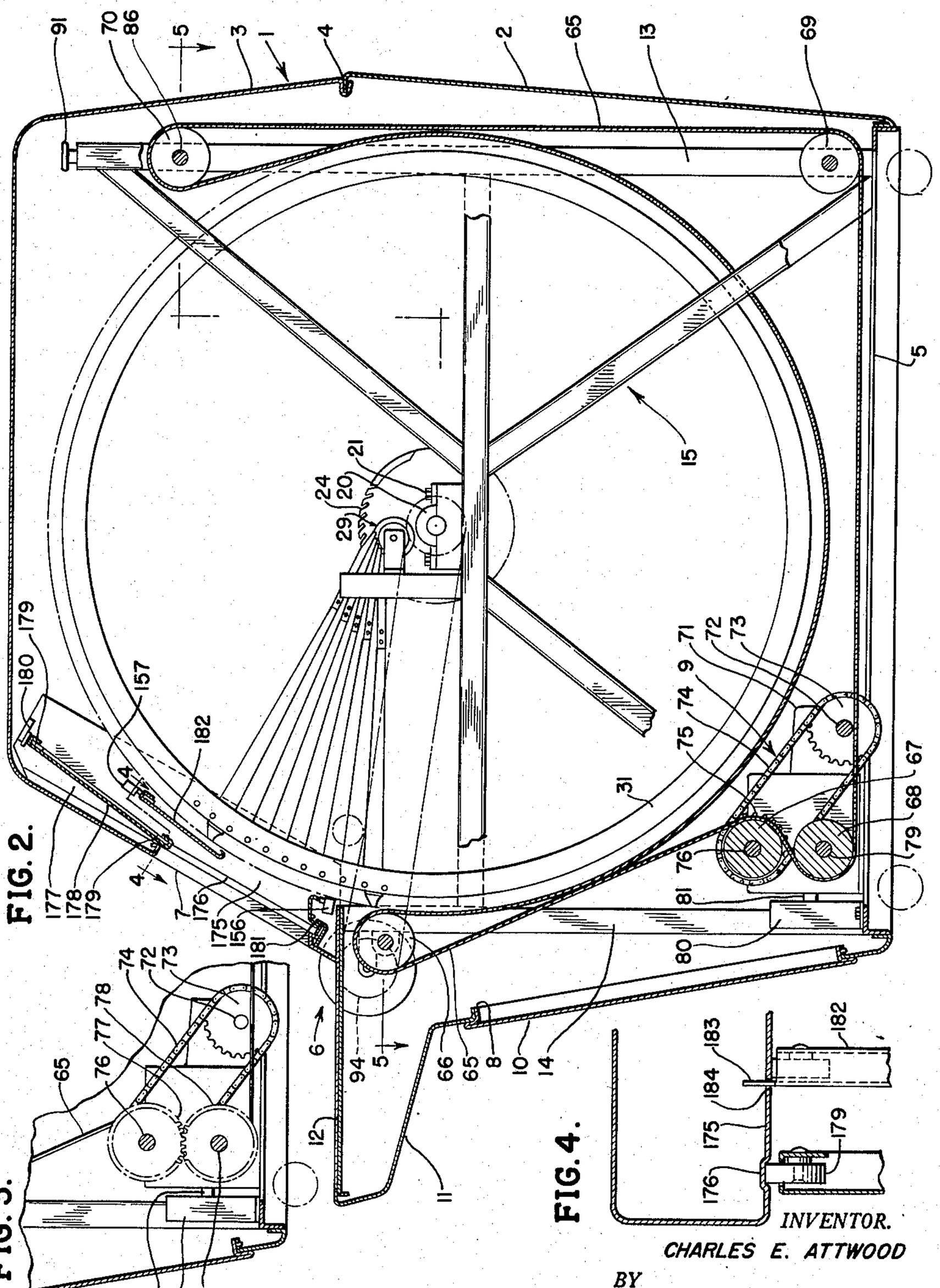

FIG. 2.

FIG. 3.

FIG. 4.

INVENTOR.
CHARLES E. ATTWOOD
BY
Gary, Desmond, & Parker
ATTORNEYS

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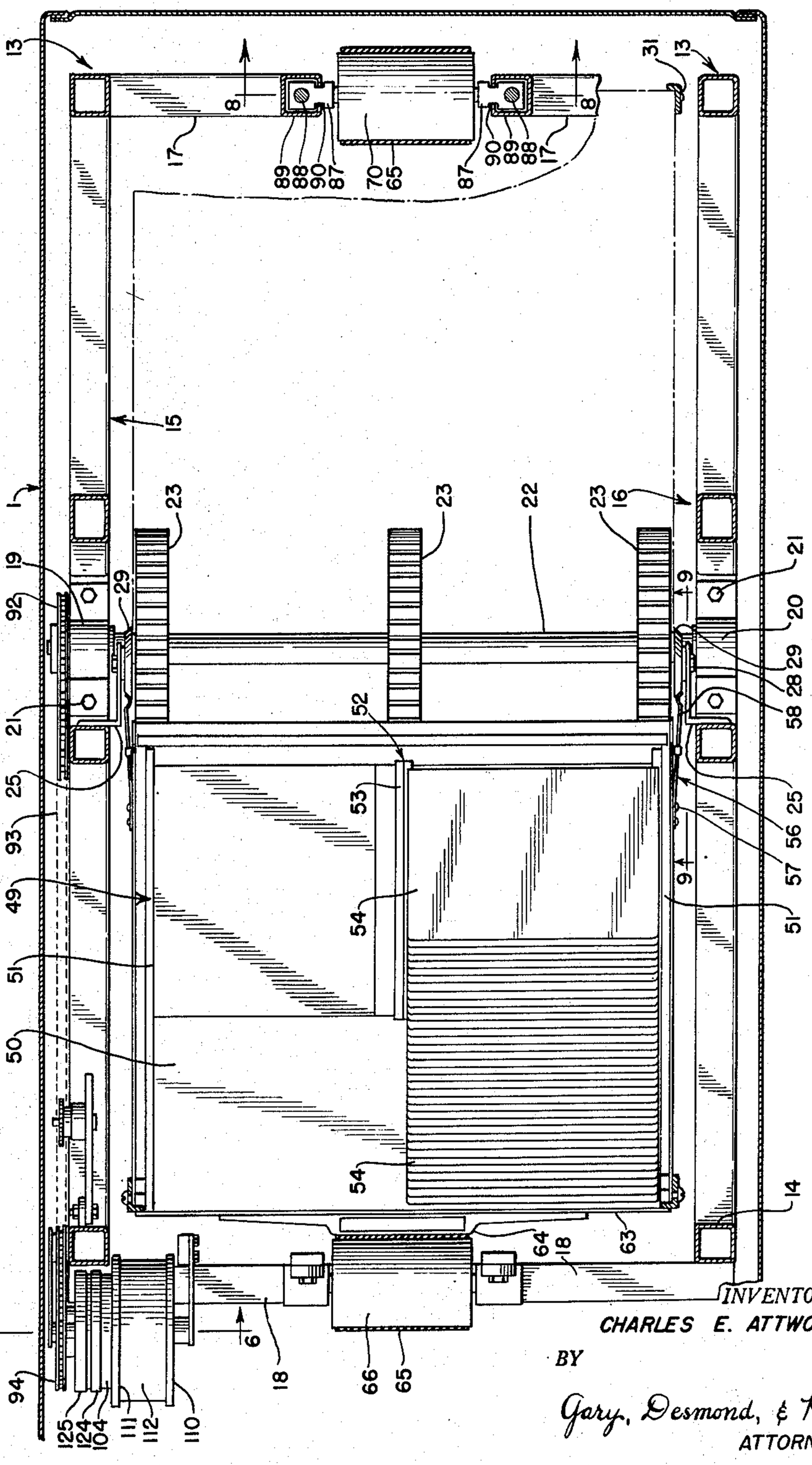
FIG. 5.



INVENTOR.
CHARLES E. ATTWOOD

BY

Gary, Desmond, & Parker
ATTORNEYS

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FIG. 6.

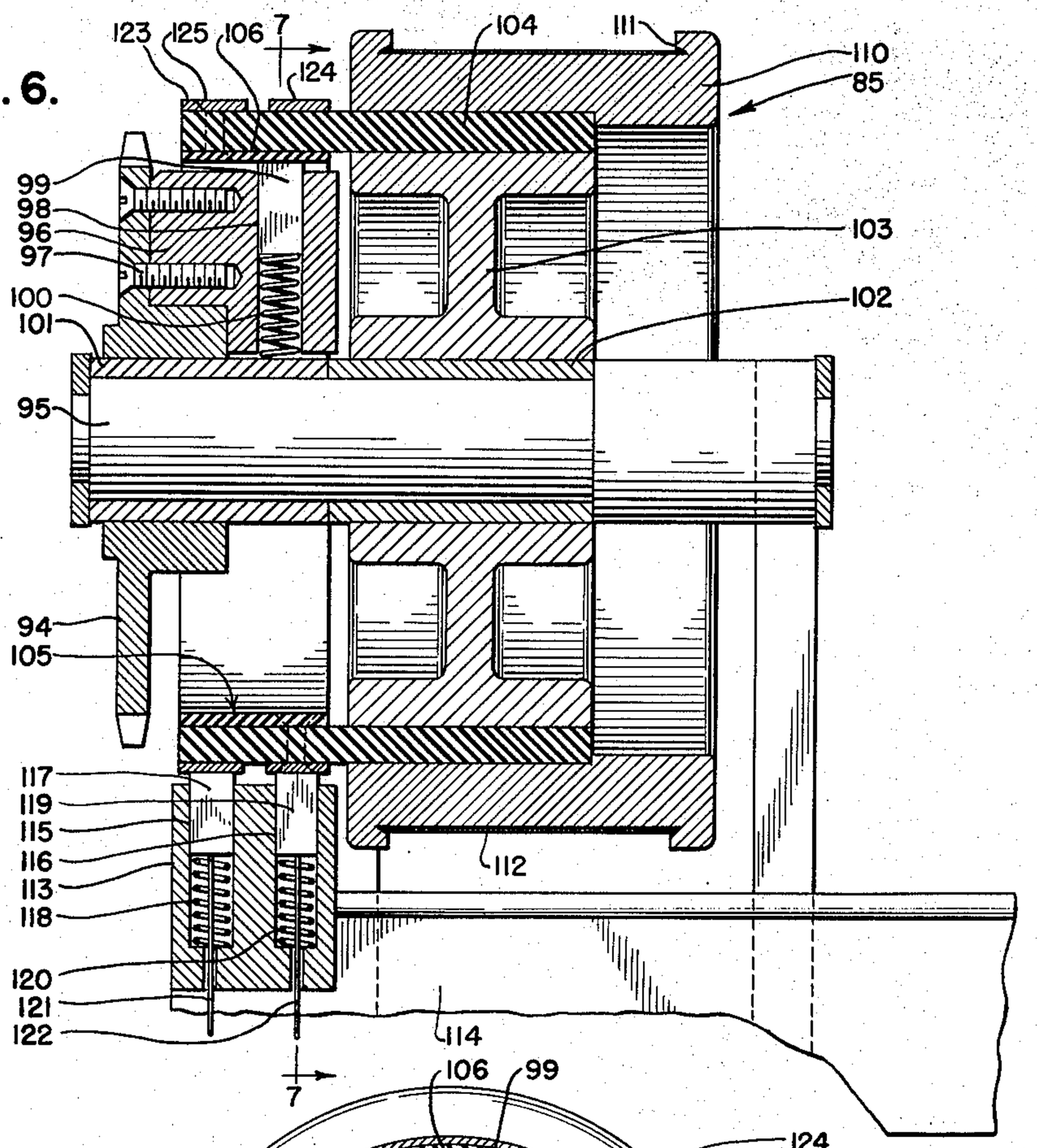
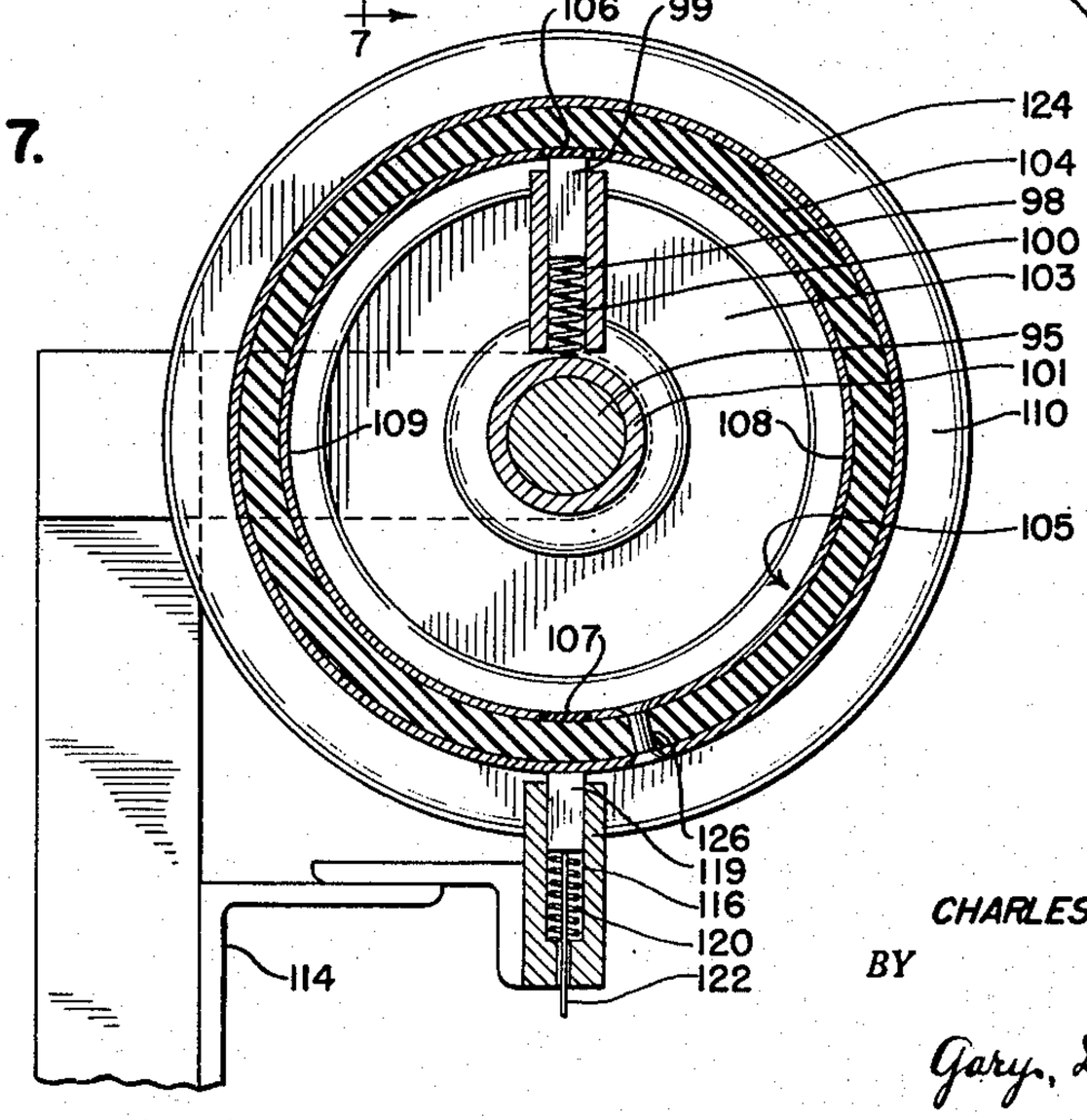


FIG. 7.



INVENTOR.
CHARLES E. ATTWOOD
BY

Gary, Desmond, & Parker
ATTORNEYS

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FIG. 9.

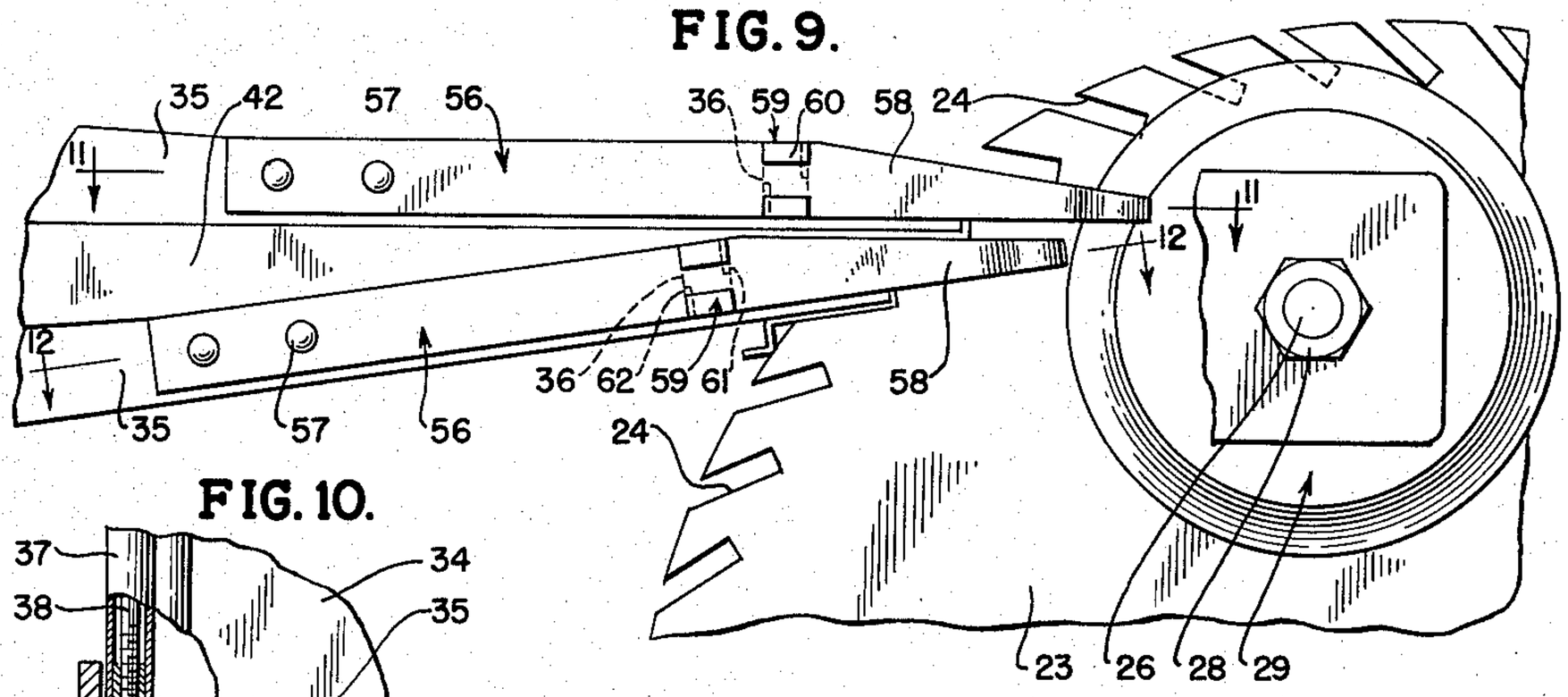


FIG. 10.

FIG. 11

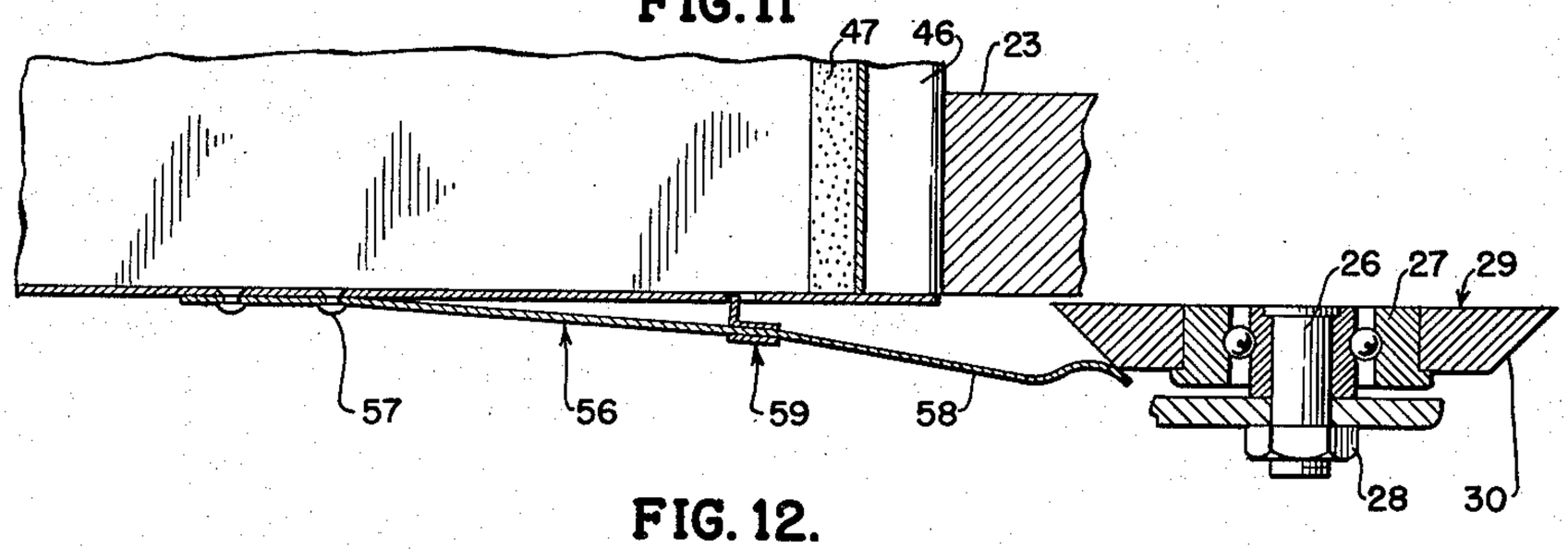


FIG. 12.

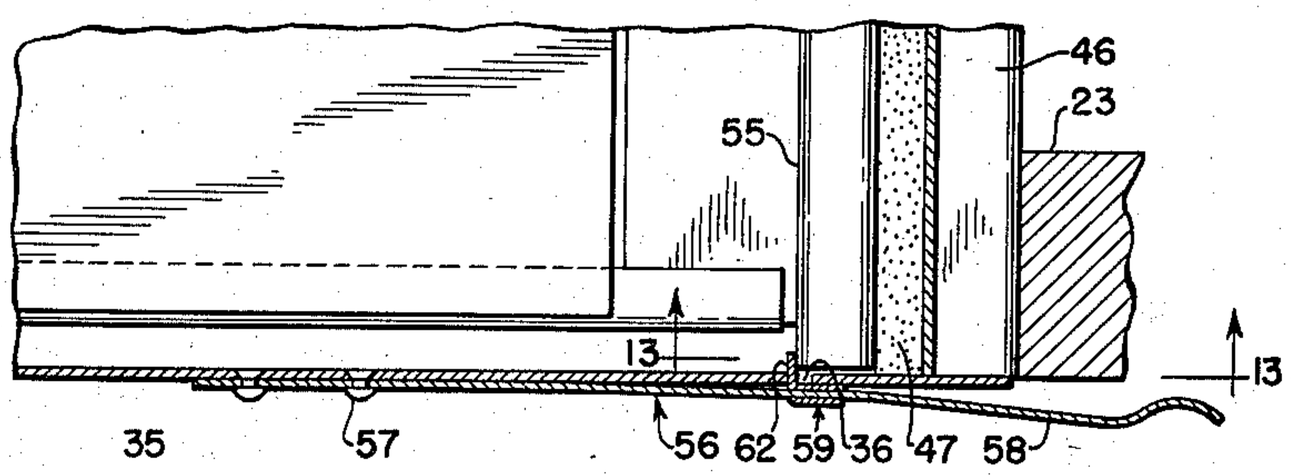


FIG. 13.

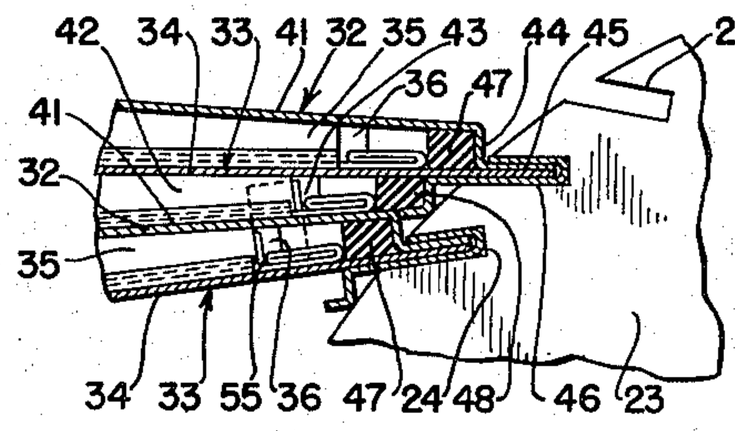
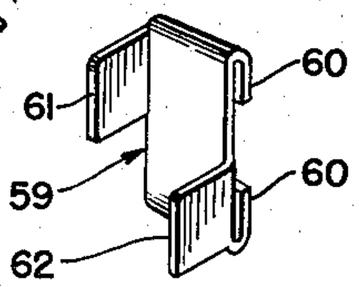


FIG. 14.



INVENTOR.
CHARLES E. ATTWOOD
BY

Gary, Desmond & Parker
ATTORNEYS

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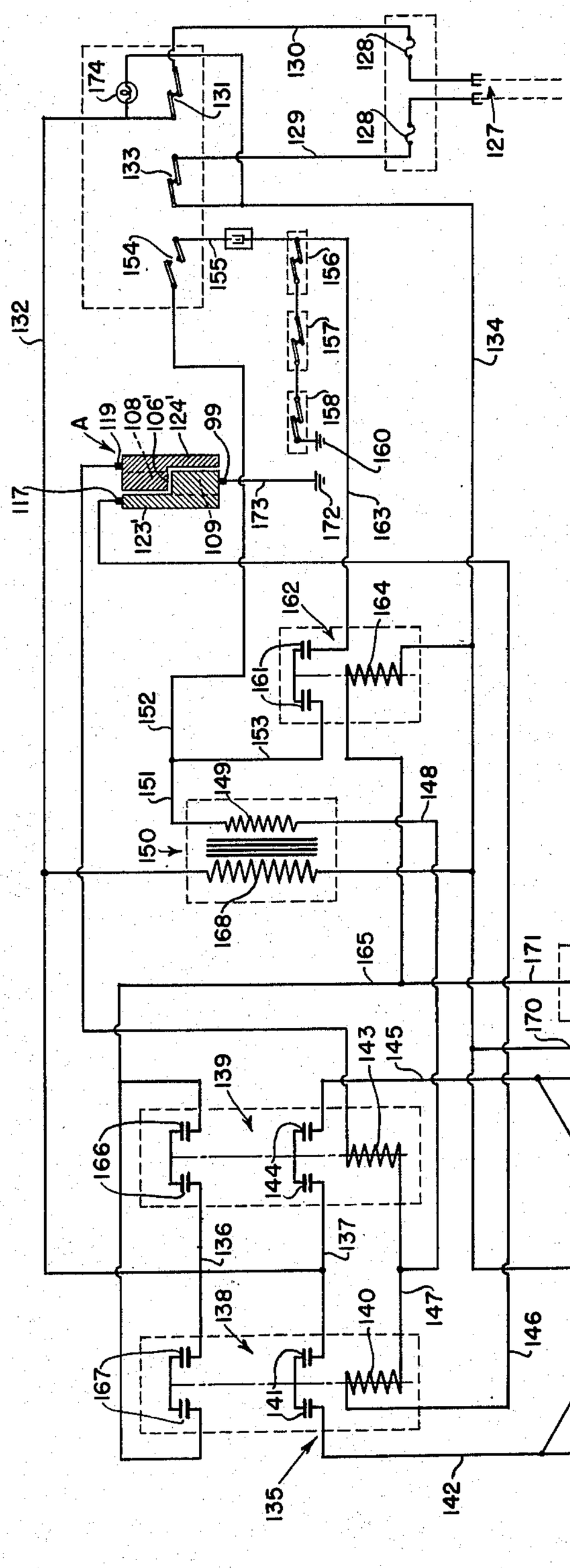

FIG. 15.

INVENTOR.
CHARLES E. ATTWOOD
BY
Gary, Desmond, & Parker
ATTORNEYS

Patented Nov. 17, 1953 2,659,646

UNITED STATES PATENT OFFICE

2,659,646

SELECTIVELY OPERATED ROTARY DRUM FILE

Charles E. Attwood, Chicago, Ill., assignor to Acme Visible Records, Inc., Chicago, Ill., a corporation of Delaware

Application September 29, 1950, Serial No. 187,523

6 Claims. (Cl. 312—223)

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This invention relates to improvements in visible index equipment and refers particularly to a rotary drum-type visible index device wherein a plurality of index card-carrying trays are carried by a rotary drum, the drum being controllably movable to render a predetermined tray available for use at an operating station.

One of the important features of the present invention resides in an index card-carrying device which is so constructed as to include a maximum number of index cards in a minimum of space and yet render all of said cards readily available for reference or otherwise at an operating station.

Another important feature of the invention resides in the speed at which a predetermined card of a relatively large number of cards in an index system may be made available to an operator with the expenditure of minimum effort by the operator.

A further important feature of the invention resides in a device of the class described which is compact, positively operating, economically constructed and rugged, and can be conveniently operated and economically maintained.

Briefly described, the invention comprises a housing carrying a rotary drum provided with a plurality of tray-holding cavities in which card-carrying trays may be positioned, with selective pushbutton means for rotating the drum to bring a selected tray to an operating station, automatic means being contemplated for rotating the drum in one direction or the other so as to cause the drum to rotate through the smaller angle of rotation in bringing the selected tray to the operating station.

Other objects, advantages and important features of the present invention will be apparent from the accompanying drawings and following detailed description.

In the drawings, Fig. 1 is a perspective view of the index device comprising the concepts of the present invention.

Fig. 2 is a longitudinal sectional view of the device illustrated in Fig. 1.

Fig. 3 is a detailed sectional view illustrating particularly the drive for the rotary drum.

Fig. 4 is a detailed sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a slightly enlarged horizontal sectional view taken on line 5—5 of Fig. 2.

Fig. 6 is an enlarged detailed sectional view taken on line 6—6 of Fig. 5.

Fig. 7 is a detailed sectional view taken on line 7—7 of Fig. 6.

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Fig. 8 is an enlarged detailed sectional view taken on line 8—8 of Fig. 5.

Fig. 9 is an enlarged fragmentary detailed elevational view illustrating tray-carrying partitions mounted upon the rotary drum.

Fig. 10 is a fragmentary detailed sectional view of mounting means for a tray upon a drum peripheral ring.

Fig. 11 is a sectional view taken on line 11—11 of Fig. 9.

Fig. 12 is a sectional view taken on line 12—12 of Fig. 9.

Fig. 13 is a detailed sectional view taken on line 13—13 of Fig. 12.

Fig. 14 is a detailed perspective view of a tray retainer clip employed in the device.

Fig. 15 is a schematic wiring diagram of the electrical circuit employed in the device.

Referring in detail to the drawings, 1 indicates generally the housing for the rotary drum index comprising the embodiments of the present invention. The housing 1 comprises a lower cover member 2 and an upper or hood member 3. The cover member 2 and hood member 3 are preferably constructed of relative thin metal such as sheet steel or the like and the members may be secured together at their line of juncture by crimping the adjacent edges, as indicated at 4 in Fig. 2. The cover member 2 is supported upon base 5 which comprises a substantially rectangular frame constructed of angle irons or other suitable structural members.

The housing 1 is closed at its top, back and opposite sides, but its front portion, at which an operator's station 6 is located is provided with openings 7 and 8, the former being provided for access to the card-carrying trays and the latter being provided for access to the mechanism, principally the drive mechanism 9 confined in the housing. The opening 8 is provided with a removable closure 10 and is normally closed. The front portion of the housing carries an extension 11 which carries a work platform 12 upon which the operator may conveniently perform necessary functions incident to use of the device.

A frame is carried by the base 5 within the housing and comprises vertical frame members 13 and 14, being the rear and front vertical frame members, respectively, and side frame members 15 and 16 disposed adjacent and inwardly from the side walls of the housing. The frame members 13, 14, 15 and 16 are preferably of box section, but may take any other conventional structural form. Transverse frame mem-

bers 17 and 18 may join the opposite side frame members together to form a rigid frame structure.

A bearing 19 is mounted upon side frame 15 and a similar bearing 20 is mounted upon the opposite frame 16, the bearings being secured to the respective frame members by means of screws 21 or the like. The bearings 19 and 20 are in alignment with each other and are positioned substantially centrally within the housing. A shaft 22 is journaled in the opposite bearings, said shaft carrying in spaced relation three notched wheels 23, one being disposed adjacent and inwardly from each bearing and the third being disposed centrally upon shaft 22 between the outer wheels.

The three wheels are identical and each is provided with a plurality of adjacent notches 24 which are spaced from each other throughout the periphery of the wheel, the notches having their axes disposed at an angle to radii of the wheel. The projected axes of all adjacent notches make equal angles with each other, that is, they are all inclined at the same angle to the circumference, or more strictly speaking, they make equal angles with a tangent to the circumference at the point of intersection of a respective notch axis with the circumference. In addition, the notches on all of the wheels are disposed at the same inclination relative to a predetermined direction of rotation of shaft 22, that is, the only notches whose axis project outwardly from the wheels toward the operating station are contained in the second quadrants of said wheels, as viewed in Fig. 2. The purpose of this arrangement will be hereinafter more fully described.

A bracket 25 (Fig. 5) is mounted adjacent each end of the shaft 22 upon side frames 15 and 16, respectively, and each bracket carries a stub shaft 26 (Fig. 11). A ball bearing assembly 27 is rotatably carried by each stub shaft 26, the inner race of each bearing and shaft 26 being secured to bracket 25 by means of nut 28. The outer face of each bearing 27 carries a circular cam plate 29 having a tapered outer surface 30. It will be noted that the stub shafts 26 and cam plates 29 are mounted above shaft 22 and are offset from said shaft toward the operating station 6. The cam plates are also disposed respectively adjacent the outer surfaces of the endmost wheels 23.

A ring 31 (Figs. 2, 5 and 10) is concentrically disposed with respect to shaft 22 in radial alignment with the outer surfaces of each of the endmost wheels 23 and a plurality of partition plates 32 and 33 emanate from the notches 24 in wheels 23 and extend to the rings 31. Each partition plate 33 comprises a flat panel portion 34 having upturned lateral edges 35, each adjacent its inner end being provided with a slot 36. At its outer end each partition plate 33 carries a bead 37 which receives a rod 38 carrying threads at each end. A threaded sleeve 39 extends through an aperture 40 provided in ring 31 whereby the outer portions of the partitions are secured to the rings 31.

Adjacent partition plate 33 and disposed alternately with respect to partition plates 33 are partition plates 32. Each partition plate 32 has a flat panel portion 41 having upturned opposite lateral flanges 42 which are provided adjacent their inner ends with slots 43. At their outer ends (not shown) the partition plates 32 are secured to the rings 31 in the same fashion as has been described in conjunction with partition plates 33.

Partition plates 32 at their inner ends are offset downwardly, as at 44 in Fig. 13 and then inwardly parallel to the panel 41, as shown best at 45. Both the inner end of the panel 34 of a partition plate 33 and the inner end 45 of a partition plate 32 are disposed in a single notch 24 of each of the wheels 23. A fastener or clip 46 embraces the end edges of each pair of members 34 and 45 in a notch 24 and the assembly thus formed is secured rigidly in said notch by pressing, brazing, welding or the like. A resilient bumper 47 is disposed adjacent the offset portion 44 and a similar bumper 48 is positioned adjacent an offset portion of each clip 46.

Each of the lateral flanges 35 and 42 taper outwardly toward rings 31 whereby a drum is formed having inwardly extending partitions and completely closed side walls. It will be noted that the partitions extend non-radially with respect to wheels 23 and rings 31, said partitions being disposed along progressive secant lines traversing the peripheries of wheels 23. In other words, the partitions follow the direction of the axes of the notches 24.

The space between adjacent partitions 32 and 33 is open at its outer end between rings 31 and a tray 49 is adapted to be slidably disposed in each of said spaces. Each tray comprises a flat panel portion 50 with inturned edges 51. A central rib 52 is carried by each tray and also is provided with inwardly turned edges 53, the arrangement being such that the inturned edges 51 and 53 define channels for the reception of conventional index card hangers (not shown) for carrying a plurality of index cards 54 in overlapping relationship upon each tray, two sets of such cards being carried by each tray.

The inner ends of each tray is bent upon itself to provide a shoulder 55, which when the tray is inserted to the inner end of each partition space is in alignment with a slot 36 or 43 provided in the lateral flanges 35 and 42, respectively, of partitions 33 and 32. A resilient arm 56 is secured by rivets 57 or the like to each opposite partition flange 35, each of said arms terminating in a resilient cam follower finger 58 which, at a predetermined period of rotation of the drum bears upon cam plate 29. A latch member 59 is carried by each arm 56 adjacent a notch 36, said latch member having two arms 60 which embrace arm 56 and rigidly hold the latch upon the supporting arm. A lug 61 is carried by each latch member 59 and is adapted to normally extend into a slot 43 in flange 42 of partition plate 32, and offset from said lug 61 and on the opposite side of the latch member 59, a lug 62 is carried which normally extends into a slot 36 in flange 35 of a partition plate 33.

By the normal position of arm 56 is meant the position occupied by said arm when its follower 58 does not ride on cam plate 29. Accordingly, when the arms 56 are in normal position each of the lugs 61 and 62 of the latch members 59 carried on said arms extend inwardly through notches 43 and 36 respectively and in this position the lugs engage the shoulders 55 upon the trays carried by the partitions and prevent outward movement of said trays.

Each of the trays 49 carries a front wall 63 which provides an outer closure for the space between adjacent partitions and a handle 64 is mounted upon each of the front walls 63. As will be hereinafter described, the handles 64, col-

lectively around the surface of the drum form a bearing surface for a driving belt for rotating the drum.

For driving the drum, a flexible endless belt **65** is wrapped around a portion of the drum, the belt bearing upon the handles **64**. The belt **65** is trained around guide roll **66** journaled adjacent the front portion of the housing **1**; around drive rolls **67** and **68** in the lower front portion of the housing; around guide roll **69** at the lower rear portion of the housing; and around adjustable guide roll **70** at the upper rear portion of the housing. Between guide roll **66** and adjustable guide roll **70**, the belt wraps around the drum.

An electric motor in association with a suitable conventional speed reducer are both shown diagrammatically at **71** in Fig. 2. Output shaft **72** carries a sprocket wheel **73** over which a sprocket chain **74** is trained, said chain also being trained around sprocket wheel **75** mounted upon shaft **76**. A spur gear **77** is also mounted upon shaft **76** and meshes with a spur gear **78** mounted upon shaft **79**. Drive roll **67** is mounted upon shaft **76** and drive roll **68** is mounted upon shaft **79** whereby both of these rolls are driven to move belt **65**. An electromagnetic brake **80**, associated with the driving mechanism by shaft **81** is positioned adjacent motor **71**. The operation of the driving mechanism including the brake will be hereinafter more fully described.

At the front of the housing **1** upon the work platform **12** at the operator's station **3** pushbuttons **82**, **83** and **84** are positioned. In addition, a selector mechanism **85** is disposed at the operator's station whereby the operator may conveniently select a desired tray upon the drum. The pushbutton **82** is a conventional on and off switch which connects the entire mechanism or disconnects the entire mechanism from a suitable source of electric current. The pushbutton **83** manipulates a normally closed momentary contact switch and is employed as a stop switch for stopping the operation of the mechanism manually. The pushbutton **84** operates a normally open momentary contact switch which is employed to initiate movement of the drum by momentarily closing the switch associated therewith. The complete electrical circuit will be described in detail more fully hereinafter.

The operation of the mechanism described hereinbefore is as follows:

To commence operations the pushbutton switch **82** is manipulated to connect the mechanism to a suitable source of electric current. After the mechanism has been so connected the selector, to be hereinafter more fully described, is manipulated to select a desired tray among those carried by the drum. The pushbutton **84**, after the selection has been made upon the selector **85**, is manipulated and the drum commences rotation by means of the driving mechanism **9**. The arrangement is such that when the selected tray upon the drum moves to a position opposite opening **7** in the housing the drum automatically stops, the brake **80** assisting in instantaneously stopping the movement of the drum at a desired point in its rotation as determined by the selector mechanism.

As has been hereinbefore described, the normal position of the arms **56** is such as to have the lugs **61** and **62** carried by each arm so positioned as to engage the shoulders **55** upon the respective trays carried by the drum. As the drum rotates, however, the cam follower arms **58** carried by

the partition plates **33** periodically move into contact with the cam plates **29**. This operation causes the cam follower arms to move upon the inclined surfaces of the cam plates **29** thereby flexing the arms **56** and causing the lugs **61** and **62** to become disengaged from the shoulders **55** of the trays associated with the partition plates in question. The cam plates **29** are so positioned with respect to the rotation of the drum that as trays approach the operator's station **6** the follower arms **58** ride upon the cam plate **29** and consequently only those trays which are adjacent the operator's station are free to be withdrawn from the spaces between the partition plates. The remaining trays are locked in place by the normal position of the arms **56**.

Accordingly, it can readily be seen that the trays are selectively locked and unlocked between the partition plates. Hence, only those trays adjacent the operator's station can be removed from the partition plates and the remaining trays carried by the drum cannot be displaced from their confined position. In view of the fact that the belt **65** wraps around a portion of the lower periphery of the drum, said belt also assists in holding the trays in positions between the partitions particularly at the lower portion of travel of the drum. However, by virtue of the latches including the engagement of the lugs **61** and **62** with the shoulders **55** of the trays, double assurance is had that trays will not be displaced during rotation of the drum and only those trays which are available to the operator are removable.

Referring particularly to Figs. 2, 5 and 8 the adjustable guide roll **70** is carried upon a shaft **86** which in turn is journaled at each of its ends in bearings **87**. A threaded shaft **88** is rotatably positioned transversely through a rear frame member **17** and each shaft projects downwardly through a vertical frame member **89**. The inner sides, that is the sides facing each other, of the frame members **89** are provided with elongated openings **90** and the threaded rods **89'** engage with the bearings **87** which project through the openings **90**. Hand wheels **91** are carried at the upper ends of the shafts **88** and consequently by the manipulation of the hand wheels **91** bearings **87** and hence roll **70** may be raised or lowered along the length of the threaded shafts **88**. In this fashion a desired degree of tension may be applied to the belt **65**.

A sprocket wheel **92** is rigidly mounted upon shaft **22** exteriorly of bearing **19**. A sprocket chain **93** is trained around the sprocket wheel **92** and is driven thereby, said chain being trained also around sprocket wheel **94** carried upon shaft **95** of the selector mechanism **85** (Fig. 6). A brush holding block **96** is mounted upon sprocket wheel **94** by means of screws **97** or the like, said block being provided with an aperture **98** in which an electrically conductive brush **99** is positioned. A coil spring **100** is also positioned in the aperture **98** and functions to resiliently urge the brush radially outwardly. The sprocket wheel **94** together with the block **96** are carried by sleeve **101** which is freely rotatable upon shaft **95**.

The arrangement is such that when shaft **22** rotates sprocket wheel **94** also rotates in timed relationship therewith, being driven from sprocket wheel **92** by chain **93**. In addition, block **96** rotates with sprocket wheel **94** in order that the brush **99** shall make desired contact to be hereinafter more fully described.

A second sleeve **102** is loosely mounted upon

shaft 95, said sleeve carrying a hub 103 which in turn carries at its outer periphery an insulating cylinder 104. The insulating cylinder 104 projects outwardly from the hub 103 and exteriorly of said hub said cylinder carries a coaxial ring 105 upon its inner surface, the ring 105 being constructed of electrically conductive material. The ring 105 is provided with a slot disposed parallel to shaft 95 and in said slot an insulating segment 106 is positioned. The ring 105 is adapted to make contact with the end of brush 99 and during rotation of the sprocket wheel 94 and block 96 the extending end of brush 99 makes contact with the metallic ring 105 and periodically comes into contact with the insulating segment 106. The width of the segment 106 is such with respect to the width of the brush 99 that the brush when contacting the segment cannot bridge the segment and make contact between the abutting ends of the ring 105.

The ring 105 is also provided with a transverse insulating segment 107, thereby dividing the ring 105 into two sections 108 and 109 which are electrically insulated from each other by the segments 106 and 107.

A selector drum 110 is mounted upon the insulating cylinder 104 and carries an annular recessed peripheral portion 111 in which a calibrated strip 112 may be positioned. The strip 112 may be provided with transverse calibrations corresponding in number to the number of trays carried by the main drum, the calibrations upon the strip being related to each other circumferentially upon the selector drum in precisely the same manner as the trays are circumferentially related to each other upon the tray-carrying drum.

A brush holder 113 is carried by a portion 114 of the machine frame, said brush holder being constructed of insulating material and being provided with two recesses 115 and 116. A brush 117 is positioned in recess 115 and is urged outwardly by means of a coil spring 118 also positioned in the recess. Similarly a brush 119 is carried in recess 116 and is urged outwardly by means of coil spring 120 also carried in recess 116. Electrical conductors 121 and 122 respectively connect with brushes 117 and 119. On the outer surface of the projecting portion of the insulating cylinder 104 a pair of spaced slip rings 123 and 124 are carried, said slip rings being constructed of electrically conductive material and being so disposed as to be contacted respectively by brushes 117 and 119. The operation of the selector mechanism 35 will be hereinafter more fully described.

Strip 123 is electrically connected to section 109 by means of metallic rivet 125 and slip ring 124 is electrically connected to section 108 by metallic rivet 126. In Fig. 15 the arrangement comprising the ring 105 and the slip rings 123 is shown diagrammatically, the diagrammatic member A comprising a segment 123′ and a segment 124′ electrically insulated from each other, the portion 106′ corresponding to the transverse insulating segment 106.

Referring particularly to Fig. 15, a schematic wiring diagram of the electrical circuit employed is shown. 127 indicates a source of alternating electric current the two sides of the line being connected through suitable fuses 128 to conductors 129 and 130. Conductor 130 connects through a conventional "off and on" switch 131 to conductor 132, switch 131 being manipulated by pushbutton 82 at the operator's station. Conductor 129 connects through normally closed switch 133

controlled by pushbutton 93, to conductor 134. Switch 133 is of the momentary contact type, that is, manipulation of pushbutton 83 functions to open switch 133 as long as the operator continues to push the button 83. Conductors 132 and 134 supply current to motor 71 through a reversing circuit indicated generally at 135.

Conductor 134 leads directly to motor 71 whereas conductor 132 connects with common wires 136 and 137 of relays 138 and 139. Relay 138 comprises relay coil 140 which controls a pair of series contacts 141 which are normally open, said contacts, when closed connecting lead 127, and hence line 132 to conductor 142, which in turn supplies current to motor 71. Relay 139 comprises a coil 143 which controls a pair of series contacts 144 which are also normally open and which, if closed, connects line 132 to conductor 145, also connected to motor 71. Motor 71 is of the reversing type which energization through conductors 134 and 142 rotates it in one direction and energization through conductors 134 and 145 rotates it in the opposite direction.

One end of relay coil 140 is connected by conductor 146 to brush 117 and one end of coil 143 is connected to brush 119. The opposite ends of said coils are connected to the common conductor 147, which, in turn, is connected by lead 148 to the secondary coil 149 of a step-down transformer 150. The opposite side of secondary coil 149 is connected by conductor 151 to leads 152 and 153. Conductor 152 connects through switch 154 to lead 155, which, in turn, connects through series switches 156, 157 and 158 to ground 160. Switch 154 is a normally open switch and may be closed momentarily by depressing pushbutton 84. Switches 156, 157 and 158 are normally closed microswitches and are employed as safety switches in a manner to be hereinafter more fully described. Lead 153 connects through series contacts 161 of relay 162 to conductor 163 which, in turn, connects with conductor 155, and, hence, through switches 156, 157 and 158 to ground 160.

Coil 164 of relay 162 connects at one end to line 134 and at the opposite end to conductor 165 which may connect through either series contact 166 of relay 139 to the line 132 or through series contacts 167 to line 132. The primary winding 168 of transformer 150 is connected across lines 132 and 134, and solenoid 169 for releasing brake 80 connects across lines 132 and 134 by conductors 170 and 171 and 165 through either of the series contacts 166 or 167. Brush 99 is connected to ground 172 through conductor 173.

In the operation of the device the switch 131 is turned on which fact is indicated by pilot light 174 connected across line 132 and 134, switch 133, as described, being normally closed. The device is then ready for operation. The indicator drum 110 is then rotated to bring a desired calibration on the strip 112 opposite a predetermined index mark (not shown) at the operator's station. Rotation of the drum 110 brings the insulating segment 106 of ring 105 at a predetermined angular position with respect to brush 99 and in contact with an electrically conductive portion of ring 105, unless the tray selected by the operator is already at the operator's station in which case brush 99 will already be in contact with segment 106.

After a selection has been made by appropriately positioning selector drum 110, pushbutton 84 is depressed, momentarily closing switch 154 and closing the following circuit: from secondary coil 149 to lines 151 and 152; through normally

closed switches 156, 157 and 158 to ground 160; to ground 172 and conductor 173 to brush 99 to section 109 of ring 105, that is, the section in contact with the slip ring 123 (123' diagrammatically shown in Fig. 15); through slip ring 123 to brush 117 thence through conductor 146 to coil 140 of relay 135 and thence returning to the opposite side of secondary coil 149. Coil 140 of relay 138 is therefore energized and the normally open contacts 167 are closed thereby energizing brake solenoid 169 and releasing the brake 80. The normally open contacts 141 are closed by coil 140 and hence motor 71 is energized through wires 134 and 142. The motor will then turn in a predetermined direction.

Of course, when switch 154 is momentarily closed, relay coil 164 of relay 162 is actuated by current passing through line 134, coil 164, line 165, closed contacts 167, wire 136 and 132. Contact points 161 of relay 162 are closed thereby completing the circuit from secondary coil 149, line 153, contacts 161, line 160 and closed switches 156, 157 and 158 to ground 160. In other words this circuit comprises a holding circuit for completing the motor circuit after switch 154 returns to its normal open position.

The tray-carrying drum rotates thereby rotating brush 99. When brush 99 encounters the insulating segment 106 (106' diagrammatically in Fig. 15) the circuit to coil 140 is broken. The contacts 141 and 167 of relay 138 open thereby deenergizing motor 71 and permitting the application of the brake 80. Brake 80 is normally applied and is released by solenoid 169 and only so long as said solenoid is energized.

The operation has hereinbefore been described in circumstances where the selected tray and, hence, brush 99 contacted section 109 of ring 105. If the tray selected, however, required the selector drum 110 to be so moved as to position brush 99 in contact with section 108 of ring 105 the motor would rotate in the opposite direction. For example, with a selection made which results in brush 99 contacting section 108 the following operation would take place.

With the drum selector 110 properly positioned pushbutton 84 may be momentarily depressed thereby momentarily closing switch 154. The circuit is then completed from the secondary coil 149 of transformer 150 through conductors 151 and 152; through closed switch 154, conductor 155 and through the normally closed switches 156, 157 and 158 to ground 160; from ground 172 to brush 99, which, by virtue of the selection made, is now in contact with section 108 of the ring 105. The circuit will be completed through section 108 to its connecting slip ring 124 (shown diagrammatically in Fig. 15 as 124'); to brush 119 and thence to solenoid coil 143 of relay 139 and thence back to the secondary coil 149 by means of conductor 148.

By energizing coil 143 the normally open contacts 144 are closed and hence the circuit to the motor 71 is completed through line 134, the motor lead 145, closed contact points 144, the common wire 137 and the opposite line 132. It will be noted that the motor is now energized through wires 134 and 145 and hence will revolve in the opposite direction from the previous case wherein the motor was energized from wires 134 and 142. Of course, when solenoid 143 is energized contact points 166 are also closed and hence the brake release solenoid 169 is energized thereby releasing brake 80 and permitting free rotation of the motor and drum to take place. It is to

be understood, of course, that the holding relay 162 also goes into operation, as has been hereinbefore described, to maintain the circuit in closed condition after the momentary switch 154 opens.

It can readily be seen that the greatest degree of rotation of the tray carrying drum is 180° in on direction or the other depending upon which section 108 or 109 of ring 105 is in contact with brush 99 by the appropriate selection upon the selector 85. Hence, the tray selected will be brought to the operator's station and stopped there when brush 99 contacts the segment 106 in a minimum of time.

As an additional feature of the invention after the selection has been made and pushbutton 84 has been depressed and the motor is in operation tending to move the selected tray to the operator's station, the operator may find that an error was made in the selection. If such is the case pushbutton 83 may be depressed which breaks the circuit of line 134. Hence the motor may be stopped, the contacts 161 of the holding relay 162 will be opened and the solenoid 169 will be deenergized and the entire operation will be halted and all of the circuits will be cleared for a new selection. By this arrangement it is unnecessary for a selection once made to proceed to the end of its cycle before a new selection can be made since a predetermined selection can be interrupted in any phase of its cycle by depressing pushbutton 83 and momentarily opening switch 133. Another manner in which a selection previously made may be interrupted and a new selection made is by merely rotating the selector drum 110 during the selection cycle. This operation, of course, repositions the brush 99 relative to the ring 105 and thereby imposes a new selection upon the circuits.

After the selection has been made and the drum has stopped with the desired tray at the operator's station, the selected tray can be readily removed by the operator by conveniently grasping the handle 64 of the selected tray and sliding the tray outwardly from between the partitions. As has been hereinbefore described a predetermined number of trays at the operator's station are released by virtue of the fact that the cam follower arm 53 carried by a partition 33 has moved onto an elevated portion of the cam plate 29.

At the operator's station 6 adjacent the opening 7 a portion of the hood 3 is bent inwardly to form opposite inwardly extending walls 175 (Figs. 2 and 4). The walls 175 are indented, as at 176 to provide opposite tracks which become wider as they approach the upper portion of the walls, as shown best at 177 in Fig. 2. A closure 178 having rollers 179 adjacent its corners is adapted to move upwardly and downwardly adjacent opening 7, rollers 179 being guided by tracks 176. The closure 178 is constructed of a ferromagnetic material, preferably sheet steel, and a permanent magnet 180 is mounted at the upper portion of the track 177 whereby closure 178 when raised to its extreme upward position is retained in such position by the attractive force of the magnet. The force of the magnet, of course, can be readily overcome manually by the operator in lowering the closure when the device is not in use.

A ledge 181 is carried at the lower edge of the opening 7, said ledge extending inwardly in cantilever fashion. A normally closed micro-switch 156 is positioned beneath the inwardly extend-

ing portion of the ledge in such relationship that if the ledge is depressed the switch will be actuated thereby to momentarily open the holding circuit of relay 162. The opening of this switch will interrupt a cycle of operation and will clear all circuits and permit the application of brake 80.

The purpose of this arrangement is to prevent counterclockwise movement, as viewed in Fig. 2, of the tray-carrying drum when a tray is being operated upon at the operator's station, that is, when the tray is partially removed from the drum, or when a tray at the operator's station has not been completely inserted between the partitions. Were the selector 85 moved and were push button 84 depressed inadvertently or otherwise the extending tray would contact the ledge 181 and open switch 156. All motion of the parts would then cease and the brake would be applied preventing injury to the parts or possibly preventing injury to the operator. In addition, when the closure 178 is lowered, its lower edge will contact ledge 181 and thus prevent operation of the device when the closure is in lowered position.

A panel 182, having opposite extending ears 183 (Fig. 4) is disposed across the upper portion of opening 7, the opposite ears 183 being positioned in slots 184 provided in the opposite walls 175. The panel 182 has limited movement upwardly and downwardly by play provided in slots 184, and said panel is normally in its lowermost position. A micro-switch 157 is positioned above panel 182 and is momentarily opened by contact with the panel when said panel is moved upwardly. Opening of switch 157, as has been hereinbefore described, opens the holding circuit of relay 162 with the result of halting an operation intermediate a cycle.

By this provision a tray which extends outwardly from the tray carrying drum at the operator's station and brought into contact with the lower edge of panel 182 during clockwise movement of the drum (Fig. 2) will open switch 157 thereby stopping the drum and applying the brake before any damage is done.

As an example of the electrical equipment employed in one embodiment of the present invention, not by way of limitation, however, the following apparatus was employed: With a 110 volt alternating current supply, transformer 150 comprised a stepdown transformer having a voltage output at the secondary coil 149 of 12 volts; relay coils 140 and 143 were 12 volt coils and coil 164 was a 110 volt coil; brake release solenoid operated at 110 volts and motor 71 comprises a ⅛ horsepower, single phase 1550/52 revolution per minute gear motor of the reversing type. To prevent undue arcing at the contacts 141 and 144 upon opening, a capacitor 185 is connected across leads 142 and 145, the capacitor 185 for the arrangement described above being a 20 microfarad oil filled capacitor.

It can readily be seen that herein is contemplated an index device of the rotary drum type which by the expenditure of a minimum effort and time on the part of the operator places selectively at the disposal of the operator one of a relatively large number of index card-carrying trays, the time of the operator being conserved by those operating features of the device wherein (1) the tray-carrying drum revolves through a minimum angle, in one direction or the other, in bringing the selected tray to the operator's station, (2) a selection cycle may be interrupted by a stop switch at any phase of the cycle and a new selection cycle imposed upon the device, or in the alternative, during a selection cycle, the selector may be manipulated to change the selection without first rendering the device inoperative. Of course, the principles of the present invention may be employed to accomplish an end other than the rendering of index cards available at an operator's station, that is, other objects or data-bearing documents may be selectively made available to an operator by employing modifications which will be obvious to those skilled in the art.

I claim:

1. A rotary record card-carrying device comprising in combination, a housing having an operator's station, a rotary drum journaled for rotation in said housing with a portion of its periphery disposed adjacent said operator's station, a plurality of record card-carrying trays mounted upon said rotary drum, said trays being disposed at an angle to the periphery of the drum and being movable outwardly from the periphery of said drum, handles upon said trays at the periphery of the drum, and means for rotating said rotary drum to bring a predetermined tray adjacent said operator's station whereby said tray may be moved by said operator to a position rendering the record cards carried by said tray accessible, said means comprising a flexible endless driving belt which wraps about a predetermined angle of the periphery of the drum and contacts the handles of predetermined of said trays.

2. A rotary record card-carrying device comprising in combination, a housing having an operator's station, a shaft carried by said housing, a plurality of notched wheels carried by said shaft, partitions carried by said notched wheels in the notches thereof and extending at an angle to the radial relative to said shaft providing a plurality of compartments having a plurality of open mouths which extend circumferentially about and are spaced from said shaft, means for rotating said shaft to rotate said notched wheels and partitions, the mouths of said compartments moving adjacent said operator's station during rotation of said shaft, a record card-carrying tray slidably disposed in each compartment in a direction parallel to said partitions, a tray in a compartment adjacent said operator's station being removable from said compartment and said housing.

3. A rotary record card-carrying device comprising in combination, a housing having an opening adjacent an operator's station, a drum journaled in said housing the periphery of which is disposed adjacent said opening, electrical means for rotating said drum, a plurality of record-carrying trays carried by said drum and removable therefrom at an angle inclined to the radial, and normally closed switch means disposed adjacent said opening for completing the circuit to said electrical rotating means, said switch means being in the path of travel of a tray partially removed from the drum through said opening whereby rotation of said drum causes said partially withdrawn tray to contact and open said switch means.

4. A rotary record card-carrying device comprising in combination, a housing having an operator's station, a rotary drum journaled for rotation in said housing with a portion of its periphery disposed adjacent said operator's station, partitions carried by said drum disposed in

spaced relationship to each other and at an angle to the radial, record card-carrying trays positioned on said partitions, means carried by said partitions for removably locking said trays on said partitions, a cam positioned upon said housing adjacent the axis of rotation of said rotary drum and eccentric with respect thereto on the side adjacent the operator's station, said cam being disposed in the path of travel of said locking means during rotation of said drum to contact locking means carried by predetermined partitions to unlock the trays carried by said predetermined partitions to permit their removal from said partitions at the operator's station.

5. A rotary record card-carrying device comprising in combination, a housing having an operator's station, a drum journaled for rotation in said housing with a portion of its periphery disposed adjacent said operator's station, a plurality of record card-carrying trays mounted upon said drum, electrical means for rotating said drum, preselector means for controlling the angular degree of rotation of said drum to move a predetermined tray to the operator's station, said preselector means comprising a rotary electrical contact member, an electrical conducting ring in contact with said contact member when said drum rotates, an insulating segment interposed in said ring, a selector cylinder rigidly secured to said ring, a tray index carried by said cylinder whereby to preset said ring to dispose said segment at a predetermined angular relationship with respect to said contact member, means for rotating said contact member in timed relationship with said drum, and means for electrically connecting said electrical rotating means to a source of electrical current through said contact member and said ring whereby rotation of said contact member into contact with said segment stops rotation of said drum and disposes a predetermined tray at the operator's station.

6. A rotary record card-carrying device comprising in combination, a housing having an operator's station, a drum journaled for rotation in said housing with a portion of its periphery disposed adjacent said operator's station, a plurality of record card-carrying trays mounted upon said drum, electrical means for rotating said drum, preselector means for controlling the angular degree and direction of rotation of said drum to move a predetermined tray to the operator's station, said preselector means comprising a rotary electrical contact member, an electrical conducting ring in contact with said contact member when said drum rotates, substantially diametrically opposite insulating segments interposed in said ring to separate the ring electrically into two ring sections, means connecting each ring section to a source of electrical current of opposite polarity, a selector cylinder positioned at said operator's station, said cylinder being rigidly connected to said ring sections, a tray index carried by said cylinder whereby movement of said cylinder to a predetermined tray indication upon said index presets said ring sections to dispose one of said segments at a predetermined angular relationship with respect to said contact member, means for rotating said contact member in timed relationship with said drum, and means for connecting said electrical rotating means to a source of electrical current through said contact member and one of said ring sections whereby rotation of said contact member in a predetermined direction into contact with said last-mentioned segment stops rotation of said drum and disposes said preselected tray at the operator's station.

CHARLES E. ATTWOOD.

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