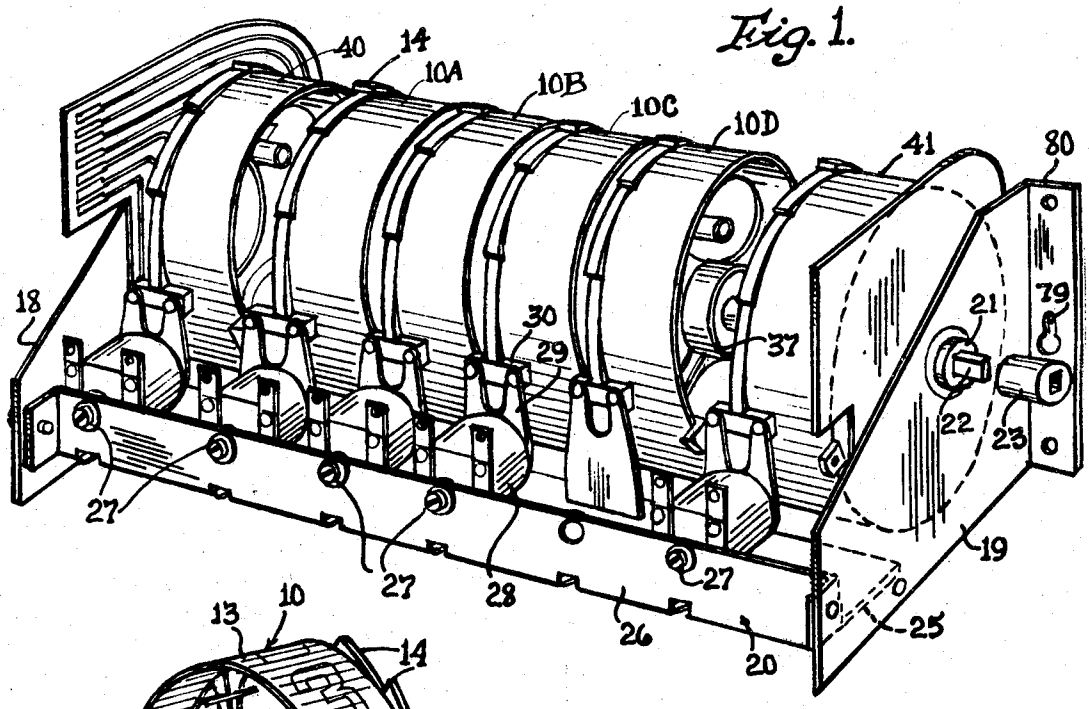
June 25, 1968 H. S. ROSS ET AL 3,389,857

MOTOR-DRIVEN SCORE DRUMS

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Fig. 1.



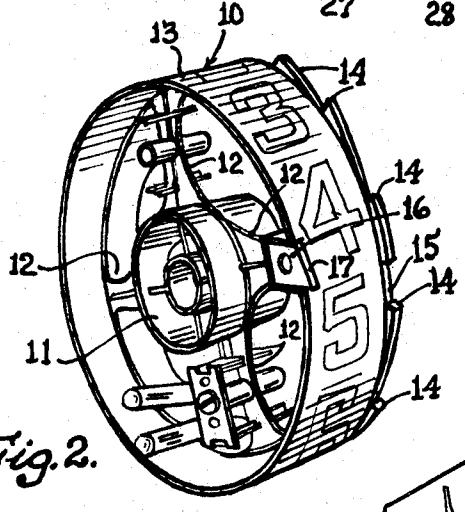


Fig. 2.

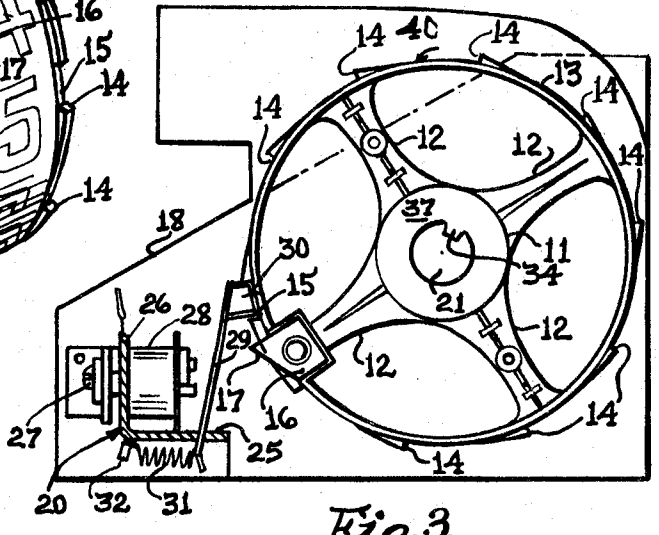


Fig. 3.

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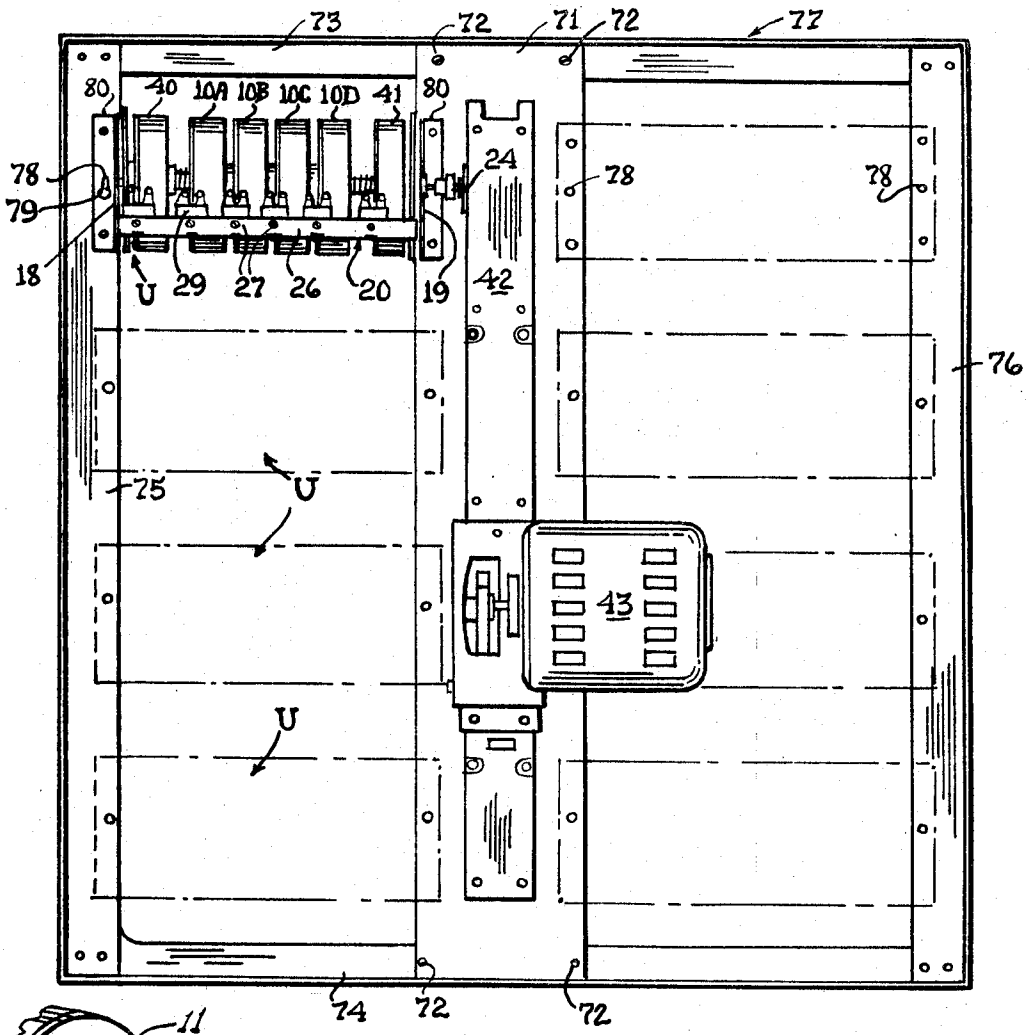


Fig. 4.

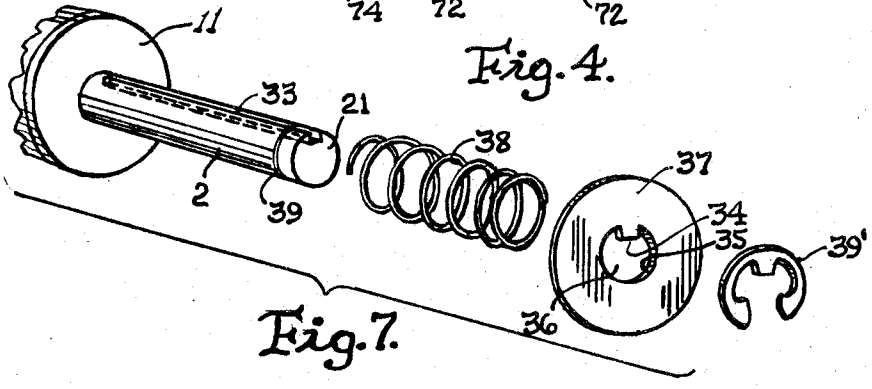


Fig. 7.

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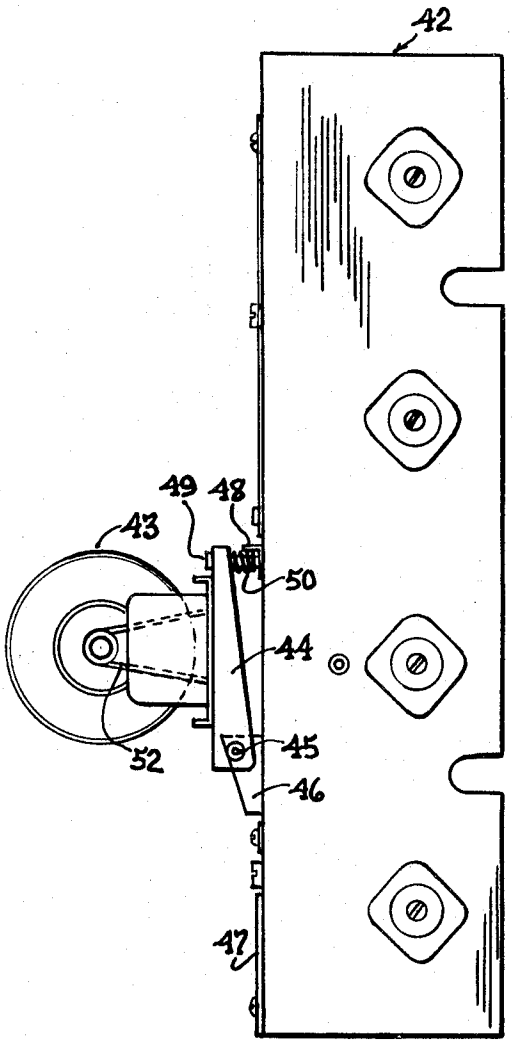


Fig. 5.

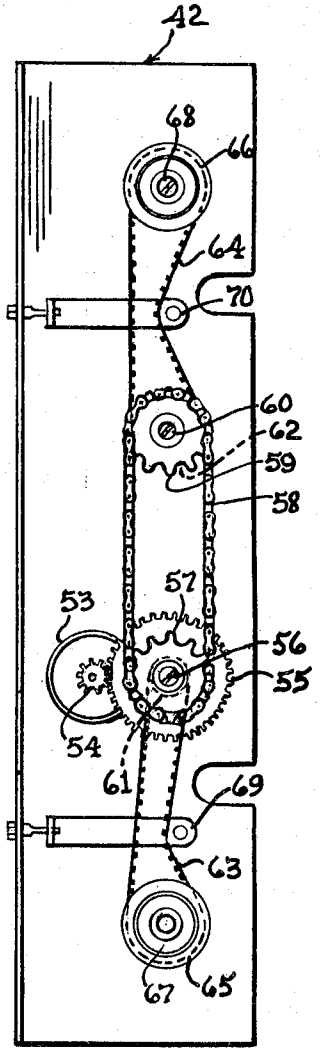


Fig. 6.

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3,389,857

MOTOR-DRIVEN SCORE DRUMS

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Filed July 5, 1966, Ser. No. 562,689
10 Claims. (Cl. 235—144)

This invention relates to motor-driven score drums and more particularly to indicia-bearing score drums utilized in apparatuses wherein a progressive number counting or registration is to be visually indicated.

A principal object of the invention is to provide in a device of this character a motor-driven means for advancing a single numbered drum or a plurality of numbered drums through various positions and, by reversible action of the motor-driven means, return or reset the drum or drums to either the original or zero position.

Another object of this invention is the provision in an apparatus of this character of rotatably mounting a a plurality of individual score-indicating drums on a single continuously rotating shaft and electromagnetic means for releasably holding each drum against rotation with the shaft and a friction clutch for each drum for independently effecting rotation of the individual drums with the shaft in either direction when the same are released for rotation by the electromagnetic means.

Presently the accepted method of advancing a plurality of indicating drums includes an electromagnetic solenoid for each drum operable in a manner such that with each energization of the solenoid the drum is mechanically stepped a predetermined distance. To accomplish a multitude of steps or a predetermined distance of rotation of each of the drums, the electromagnetic solenoid must be periodically energized. This arrangement requires a large quantity of parts and electrical connections and results in a slow and blatant operation. The present invention overcomes these objections by the structural arrangement herein described.

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 perspective view of one unit of indicating drums and the mounting structure therefor;

FIG. 2 is a perspective view of one of the indicating drums;

FIG. 3 is a side elevational view of one drum and its associated mounting and operative structure;

FIG. 4 is an elevational view showing the compact mounting frame for a plurality of units as well as the motor-driven means therefor;

FIG. 5 is a side elevational view of the motor-driven mounting means;

FIG. 6 is a side elevational view of the motor-driven mounting means with a side cover removed;

FIG. 7 is a fragmentary exploded view of the friction clutch arrangement as employed in this invention.

The structural arrangement of this invention includes a drum **10** which is constructed of a light-weight one-piece molded unit formed of a translucent thermo-plastic material. The drum **10** consists of a hollow hub **11** and radially extending spokes **12** which in turn support a peripheral flange **13**. On one edge of the peripheral flange **13** is formed a plurality of raised stop shoulders **14** as well as a recessed lock port **15**. In the opposite edge of the peripheral flange **13** is carried a cam member **16** which has a cam surface **17** extending tangentially beyond the surface of the peripheral flange **13**.

Indicia-bearing drums of the type just described may

be utilized singly or as a unit U comprising a plurality of identically designed drums. Such a unit of drums is indicated in FIG. 1, wherein there is shown a mounting comprising end plates **18** and **19** connected together by an L-shaped support **20**.

Journalled through the end plates **18** and **19** as well as the hub **11** of each of the drums **10** is a shaft **21**. The shaft **21** extends beyond the end wall **19** and provides a flat portion **22** which by a suitable sleeve **23** (see FIG. 4) may be mounted to a driving shaft **24** hereinafter described.

The support **20** which extends between the end walls **18** and **19** provides a base **25** and a vertical wall **26** to which is connected by means of a screw **27** or the like a plurality of electromagnetic means **28**. The electromagnetic means **28** includes a magnetically attracted latch plate **29** having at its free end a latch finger **30** which is adapted to engage either the stop shoulders **14** or the recessed lock port **15** formed on the one edge of the peripheral flange **13** of the drum **10**. The latch plate **29** is maintained in latching position by means of a spring **31** which extends between one end of the latch plate **29** and a lug **32** provided by the base **25** of the support **20**. As shown in FIG. 1, there is an electromagnetic means **28** for each of the individual drums **10** mounted as a unit.

Referring to FIG. 7, there is shown the shaft **21** which supports the plurality of drums **10** as a unit. This shaft is provided with a longitudinally extending slot **33**, forming a keyway which receives an internal key **34** formed on the inner wall **35** of an aperture **36** formed in an anti-friction washer **37**. The anti-friction washer **37** is disposed on the shaft **21**, with the key **34** in the slot **33** and with the washer **37** in facial abutment with one edge of the hub **11** of the drum **10**. Embracing the shaft **21** between washers **37** of the endmost drums **40** and **41** and the inner adjacent drums, is a coil spring **38** having sufficient expansion force to create a rotating movement between the drums and the shaft when the former are released as hereinafter described. To maintain all of the hereinbefore described parts in assembled relation, the end of the shaft **21** has formed therein an annular groove **39** which receives a split O-ring fastener **39'**.

The frictional clutch connection between the shaft **21**, washers **37** and drums **10** is sufficient to cause rotation of each or all of the drums when they are released from their latched position. Thus, when viewing the unit as shown in FIG. 1, when the electromagnetic means **28** which is associated with the endmost drum **40** is caused to be energized, its latch plate **29** will be pivoted so that its latch finger **30** is withdrawn from holding contact with either the stop shoulder **14** or withdrawn out of the lock port **15**, permitting such drum to rotate with the shaft **21** until the electromagnetic coil **28** is de-energized and its latch plate **29** again engages a stop shoulder **14** or is displaced into the lock port **15**. By this arrangement, the rotation of the drum is controlled through a period of time, which is that period that its associated electromagnetic means is energized. If all of the electromagnetic means shown in FIG. 1 were simultaneously energized, all of the score drums would be free to rotate. Thus, there is provided a simple yet effective method of rotating a drum or a plurality of drums for a predetermined time.

When the unit as shown in FIG. 1 is caused to be actuated so as to register a numeric value greater than 9, 99, or 199 it is necessary to effect a rotation of two or more, or all of the drums **10A**, **10B**, **10C** and **10D**. This may be accomplished notwithstanding that only one of the electromagnetic means, i.e. that associated with drum **10A**, is caused to be energized. The means by which this is accomplished is the cam **16** which is positioned on the edge of the peripheral flange **13** of the respective

drums. For example, if drum 10A as shown in FIGS. 1 and 3, is permitted to be rotated in an anticlockwise direction beyond one full cycle, the cam 16 thereof will be caused to engage the latch finger 30 of the juxtapositioned electromagnetic means 26 associated with the adjacent drum 10B. The cam surface 17 of such cam 16 will cause the latch finger 30 holding such adjacent drum 10B to be mechanically disengaged from a stop shoulder 14 or the lock port 15 thereon, to permit that drum through its friction clutch connection to be rotated a limited distance until the latch finger 30 again engages the next succeeding stop shoulder 14. Thus, by energization of one of the electromagnetic means 26, the advancement of two or more drums has been accomplished and a number registration greater than a unit count is visually indicated.

The means for rotating the shaft 21 is contained in a housing 42 and includes an electrical reversible motor 43 carried by a mounting plate 44. The mounting plate 44 is pivotally connected as at 45 to a protruding flange 46 carried by the top wall 47 of the housing 40. The opposite end of the mounting plate is adjustably connected to a bracket 48 carried by the top wall 47 by means of a threaded bolt 49 which passes through the mounting plate 44 and is threaded into the bracket 48. Coiled about the bolt 49 and disposed between the bracket 48 and plate 44 is a coil spring 50 which normally urges the mounting plate 44 away from the top wall 47 of the housing 42.

The motor 43 includes a rotatable shaft 51. A pulley 52 embraces the shaft 51 as well as a pulley wheel 53 positioned within the housing 42. The pulley wheel 53 includes a sprocket gear 54 which is adapted to mesh with a sprocket wheel 55 rotatably connected to a driven shaft 56. Also fixedly mounted on the shaft 56 is a second sprocket wheel 57 which through a chain 58 drives a sprocket wheel 59 fixedly mounted on a second driven shaft 60. Mounted on the driven shafts 56 and 60 are a pair of pulley wheels 61 and 62, respectively, about which are strung flexible pulleys 63 and 64, which in turn embrace and drive pulley wheels 65 and 66 fixedly connected to driven shafts 67 and 68. By this arrangement, the single motor 43 rotates a plurality of driven shafts 56, 60, 67 and 68. To maintain proper tension and driving connection of the flexible pulleys 63 and 64, there are provided adjustable idler wheels 69 and 70 as shown in FIG. 6.

The housing 42 is carried by a center plate 71 connected by screws 72 and the like to the top wall 73 and bottom wall 74 and between and equally spaced from the side walls 75 and 76 of a mounting frame 77 as seen in FIG. 4. The side walls 75 and 76 as well as the center plate 71 provide adjacent their confronting elongated edges, mounting studs 78 which are adapted to be projected into locating slots 79 formed in laterally projecting flanges 80 provided by the end walls 18 and 19 of the score drum mounting unit (see FIG. 1). The electromagnetic means 28 are all equipped with quick-connector terminals for easy and convenient disconnection from an electrical conductor. By this arrangement the score drum mounting units as well as the housing 42 may be readily removed for repair or replacement.

In the operation of the device, when one of the electromagnetic means 28 is energized through a suitable circuit for a predetermined period of time, the latch plate 29 associated therewith will be magnetically attracted so as to remove the latch finger 30 momentarily from contact with the stop shoulder 14 or the lock port 15, to permit the drum associated therewith to be instantaneously rotated with the shaft 21, which in turn is continuously rotated by the energization of the motor 43.

Upon deenergization of the electromagnetic means 28, the spring 31 will again pivot the latch plate 29 so that its latch finger 30 will ride on the peripheral edge of the flange 13 and, in the normal case of advanced registration of the indicia on the drum, will engage the next succeeding stop shoulder 14 and arrest the rotation of the drum without disrupting the continuous rotation of the shaft 21. To reset all of the drums back to their original or zero position, the motor 43 is reversed and the drums will be caused to rotate in a clockwise direction as shown in FIG. 3. The electromagnetic means 28 need not be energized as the drums will rotate until such drums reach their original or zero position, at which time the latch finger 30 will be disposed in the lock port 15, which prevents rotation of the drum in either direction when the electromagnetic means 28 is not energized.

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

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

1. A number-display rotatable drum having a center hub portion and a peripheral indicia-bearing flange and including
   (a) a rotatable shaft journalled through said hub for supporting and rotating said drum in either direction,
   (b) means carried by said shaft and engageable with said hub for frictionally rotatably connecting said drum to said shaft,
   (c) said peripheral indicia-bearing flange of said drum having formed on one edge thereof stop shoulders cooperating with a latch means for preventing rotational movement of the drum with said shaft in one direction,
   (d) latch means engaging said stop shoulders and having a first position holding said drum against rotation with said shaft in one direction while permitting rotational movement of said drum in an opposite direction, and a second position permitting rotation of said drum with said shaft in either direction,
   (e) means for moving said latch means between its first and second positions,
   (f) means connected to said shaft for continuously rotating said shaft in either direction,
   (g) and a second means on said one edge of said peripheral indicia-bearing flange of said drum cooperating with said latch means when in its first position for preventing rotation of the drum with said shaft in either direction.

2. A device as defined by claim 1 wherein said means carried by said shaft and engaging the hub of said drum for frictionally rotatably connecting the same together, includes friction washers connected to and rotatable with said shaft on opposite sides of said hub and spring means for yieldably urging said friction washers in contact with said hub with sufficient pressure to impart rotational movement to said drum when said latch means is in its second position.

3. A device as defined by claim 1 wherein said means for moving said latch means between its first and second positions includes electromagnetic means energizable for a predetermined period of time for magnetically moving said latch means out of its first position wherein it holds said drum against rotation with said shaft in one direction, and into said second position permitting the drum to be rotated with said shaft in either direction.

4. A device as defined by claim 1 wherein said means for continuously rotating said shaft in either direction includes an electrical reversible motor.

5. A device as defined by claim 2 wherein said means for continuously rotating said shaft in either direction includes an electrical reversible motor.

6. A device as defined by claim 3 wherein said means

for continuously rotating said shaft in either direction includes an electrical reversible motor.

7. A device as defined by claim 1 wherein said second means on said one edge of said peripheral indicia-bearing flange of said drum which cooperates with said latch means when in its first position for preventing rotation of said drum with said shaft in either direction, includes a lock port having opposite side shoulders extending perpendicularly to the peripheral edge of said drum and of a size to receive a portion of said latch means to prevent rotation of the drum in either direction when said latch means is in its first position.

8. A mounting frame for a plurality of registering units including

(a) top, bottom and side frame members,

(b) said frame members removably receiving a plurality of indicia-bearing registering unit supports having end wall members between which is journalled a rotatable supporting shaft,

(c) means provided by said frame members for removably connecting each of said unit supports independently thereto whereby each of said unit supports may be removed and replaced without disrupting the registering operation of the remaining units,

(d) motor means carried by said mounting frame for continuously rotating each of said supporting shafts in each of said unit supports in either direction,

(e) means for connecting said motor means individually to each of said supporting shafts,

(f) a removable housing for said motor means carried by said frame perpendicularly to each of said unit supports,

(g) a plurality of registering drums freely mounted on each of said shafts of each unit support in side-by-side relation between said end wall members and in parallel relation to said housing for said motor means,

(h) and means provided by each of said unit supports for controlling the duration and direction of rotation of each of said drums mounted on said supporting shafts.

9. A mounting frame for a plurality of registering units as defined by claim 8 wherein said means for controlling the duration and direction of rotation of said supporting shafts includes electromagnetic means energizable for a predetermined period of time and having a latch member for each of said drums mounted on each of said shafts.

10. A mounting frame for a plurality of registering units as defined by claim 8 wherein said means provided by said frame member for removably connecting each of said unit supports includes locating studs projecting laterally therefrom into openings formed in said end wall members of each of said supporting units.

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