United States Patent

[11] **3,608,481**

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[73] Assignee **International Patents & Development Corp.**

[54] **ELECTROMECHANICAL MARKING DEVICE**
5 Claims, 11 Drawing Figs.

[52] **U.S. Cl.** **101/108,** 101/42, 101/111, 101/287
[51] **Int. Cl.** **B41j 1/20,** B41k 1/10, B41k 1/40
[50] **Field of Search** ..... 101/111, 103, 108, DIG. 15, 335, 334, 287, 297, 35, 42; 197/12

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ABSTRACT: An electrically operated marking device for stamping articles repeatedly with preset characters. Marking of an article is accomplished be placing the marking device in contact with the article with slight pressure to close a switching contact. The closing of switch causes the marking device to apply an impression of the preset characters to the article.

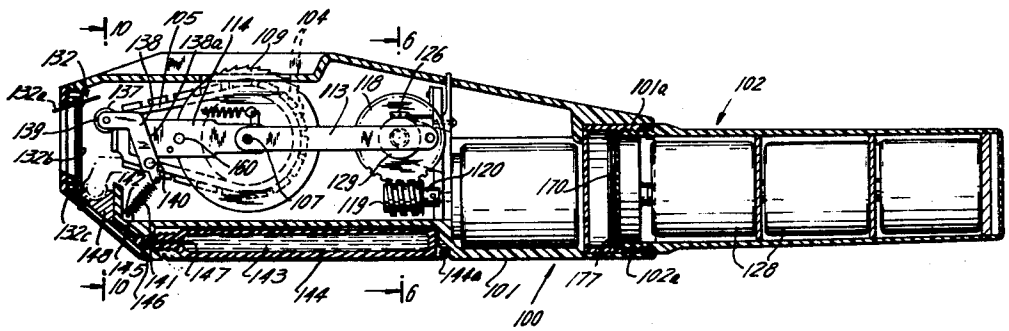

FIG. 7

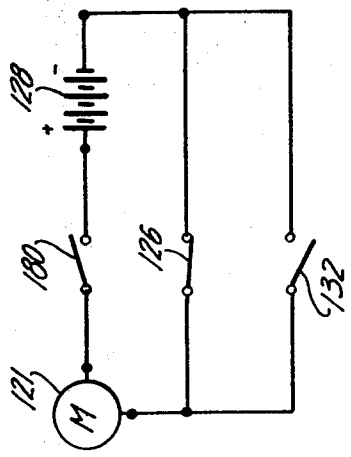

FIG. 1

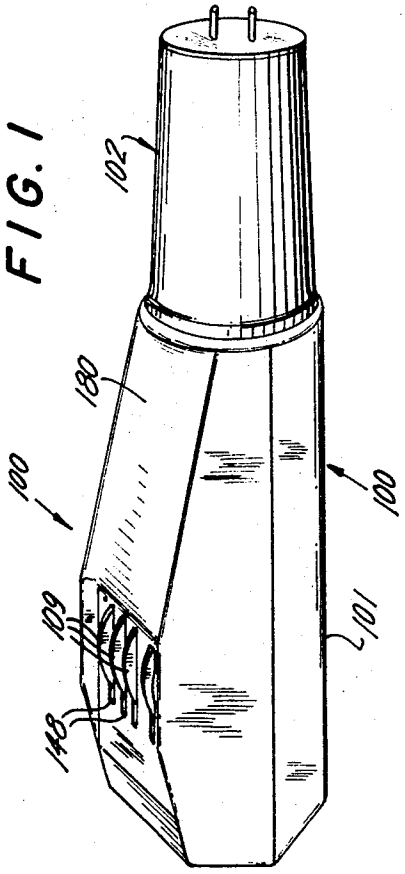

FIG. 2

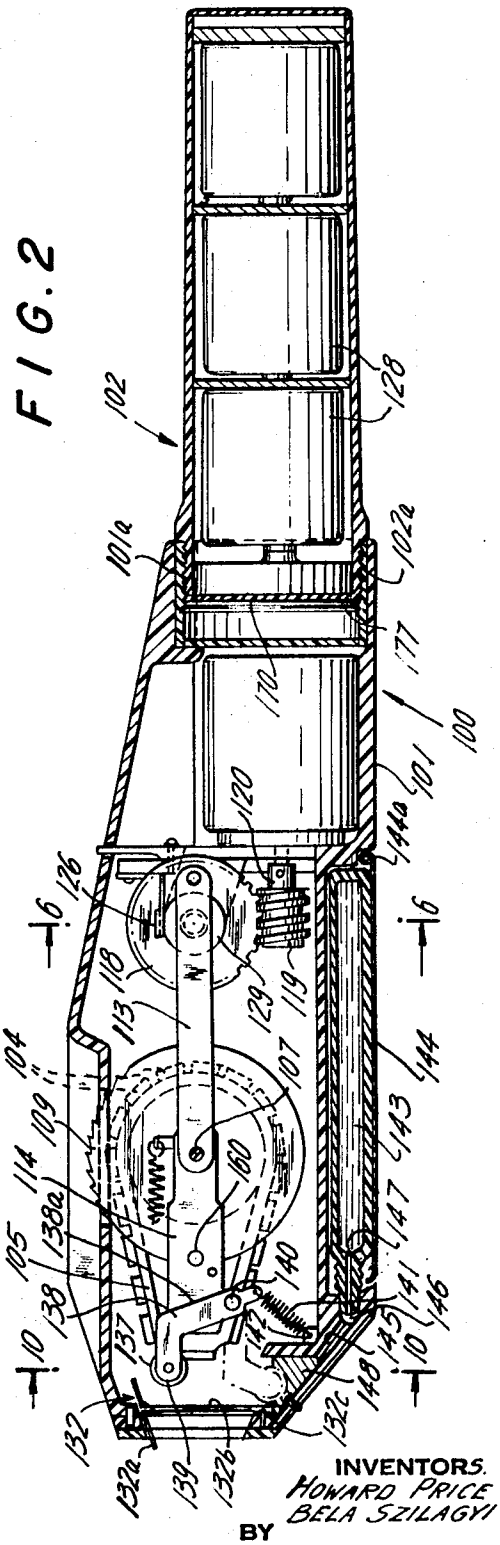

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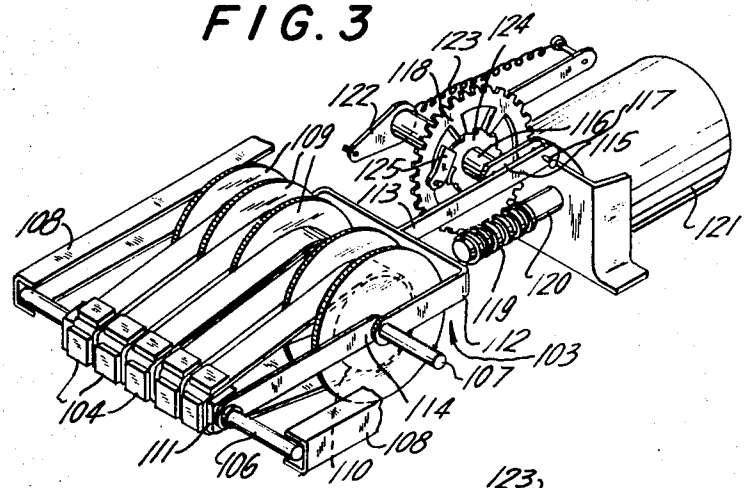
FIG. 3



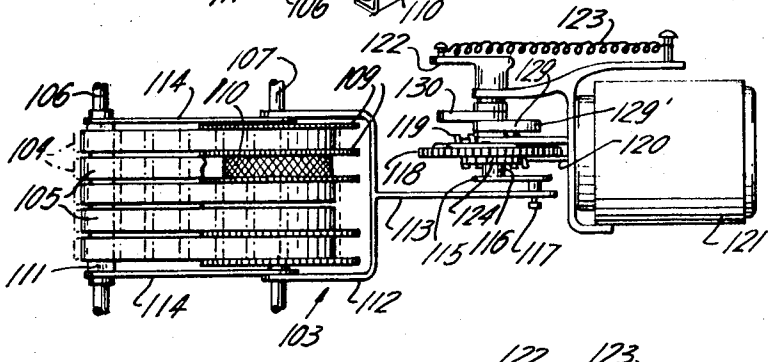


FIG. 4

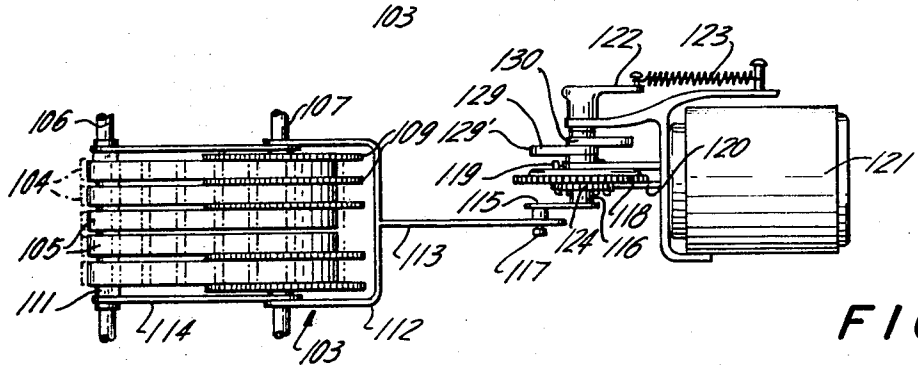


FIG. 5

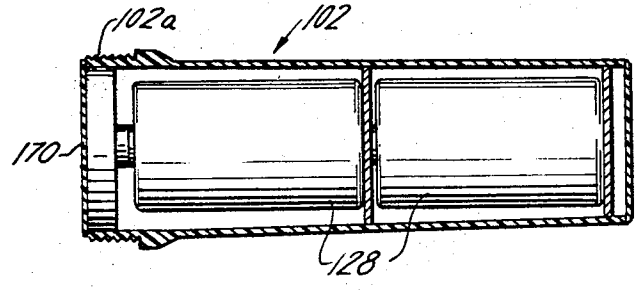


FIG. 2a

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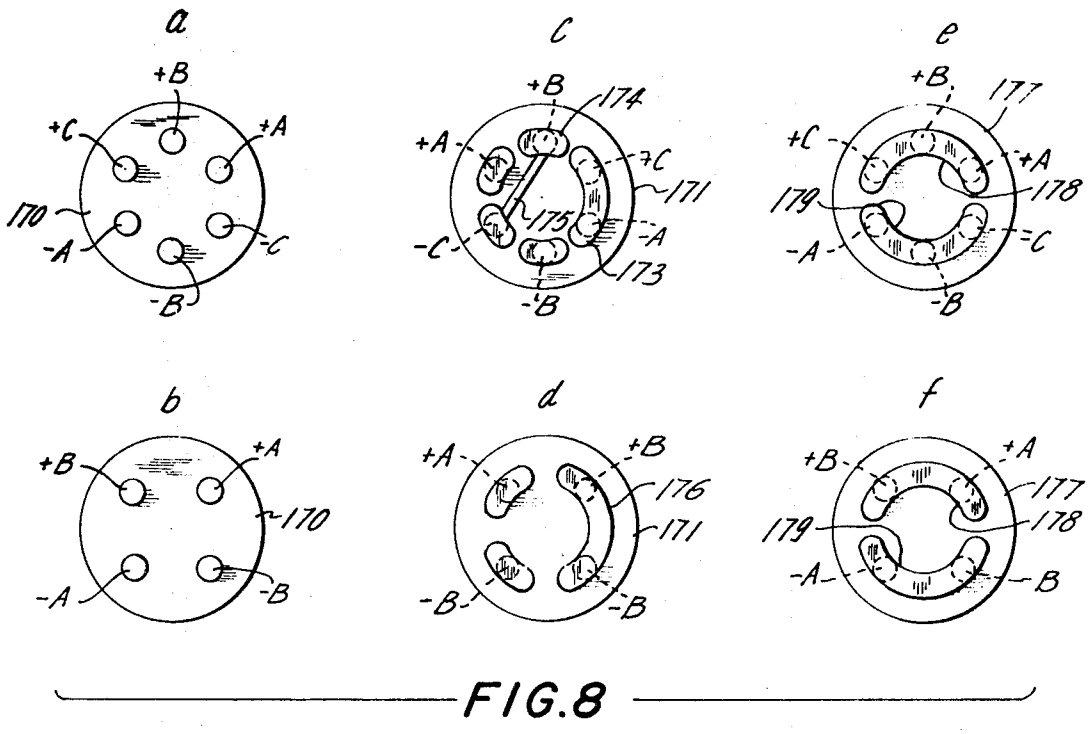


FIG. 8

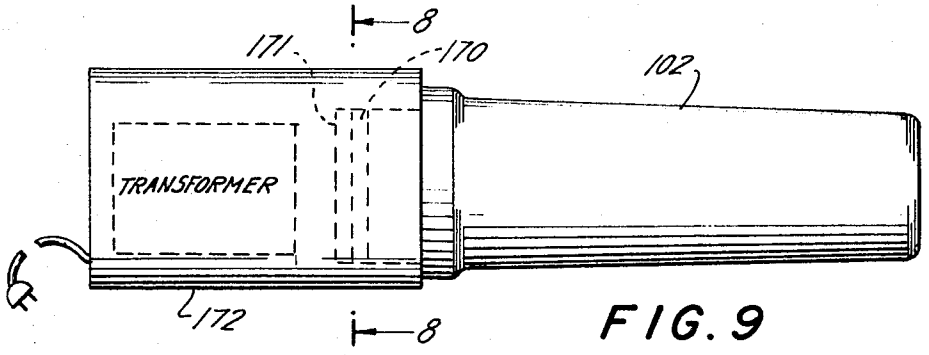
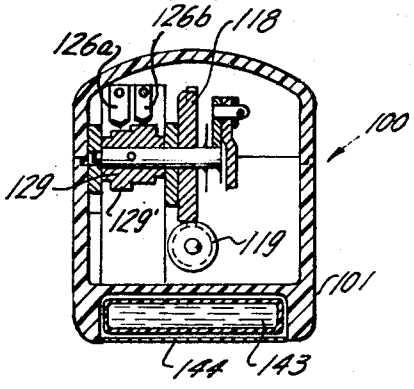


FIG. 9

FIG. 6



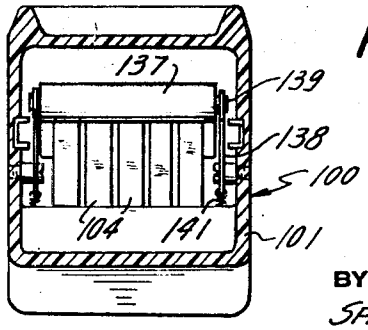


FIG. 10

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ELECTROMECHANICAL MARKING DEVICE

CROSS-REFERENCES

This application is related to the copending application Ser. No. 828,573.

BACKGROUND OF THE INVENTION

The present invention relates to marking devices in which the characters to be stamped my be varied at will. Heretofore, preset rubber stamps had to be manually operated when applying repeated stamping operations to a large number of identical articles desired to be stamped. This has particularly been the case in food markets or super markets where a large number of articles must be price-marked daily. The present invention overcomes the laborious manual operation of the conventional rubber-stamping devices known in the art, by providing a novel improvement in the form of an electrically operated device.

SUMMARY OF THE INVENTION

An electromechanically operated marking device in which a motor is energized by the closing of a switch actuated when the marking device is placed upon the article to be marked. The operation of the motor imparts translatory motion to a carriage which moves preset characters in contact with the article to be marked. An inking roller operated through the action of the carriage applies ink to the characters prior to every impression to be made by them. A novel inking arrangement assures that the proper amount of ink is applied to the printing characters. An interchangeable handle is provided with the marking device for containing battery cells used in the operation of the motor. During operation of the marking device, the battery cells are connected in parallel, whereas they are connected in series when being recharged. The interchangeable handle is designed so that different numbers of battery cells may be readily used in operation. Interchangeability of the handle allows continuous operation of the marking device. The duration of the motor operation is controlled through a novel arrangement of cam-operated switches. The cams are mounted on a shaft which determines the motion of the carriage in applying the printing character to the article being marked.

Various further and more specific purposes, features and advantages will clearly appear from the detailed description given below taken in connection with the accompanying drawings which form part of this specification and illustrated merely by way of examples, embodiments of the device of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the following description and in the claims; parts will be identified by specific names for convenience, but such names are intended to be as generic in their application to similar parts as the art will permit. Like reference characters denote like parts in the several figures of the drawing, in which

FIG. 1 is an isometric view of the marking device as it appears on the surface, in accordance with the present invention;

FIG. 2 is a longitudinal sectional view of FIG. 1 and shows the internal assembly of the marking device;

FIG. 2*a* is a longitudinal sectional view of another embodiment of the handle from that of FIG. 2;

FIG. 3 is a perspective view of the carrier and associated mechanism for the operation thereof;

FIG. 4 is a top view of FIG. 3;

FIG. 5 is a top view similar FIG. 4 of the carrier and associated mechanism when in the marking position;

FIG. 6 is a transverse sectional view taken along line 6—6 in FIG. 2.

FIG. 7 is a circuit diagram and shows the electrical control of the marking device;

FIG. 8 is a layout diagram of electrical contact arrangements for adapting different numbers of battery cells to charging and use in the marking device;

FIG. 9 is a side view and shows the assembly of the handle of the marking device and a battery charger;

FIG. 10 is a transverse sectional view taken along line 10—10 in FIG. 2.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, the marking device **100**, in accordance with the present invention, has a housing **101** which is recessed at one end to accommodate a handle **102**. The internal wall of the recess **101***a* is internally threaded to receive a corresponding threaded portion **102***a* on the handle **102**. A slidable carriage or carrier **103** is arranged within the housing **101**, and has mounted upon it a plurality of endless elastic bands **105** in juxtapose position. The bands **105** are provided with characters **104** made of suitable material as, for example, rubber. The characters carried upon the bands **105** are reversed so that they print positive characters on the articles to be marked with the device. Post **106** and shaft **107** extend laterally into tracks **108**, within the housing **101**, for the purpose of guiding the carriage or carrier **103** in straight-lined motion.

Shaft **107** carried knurled wheels **109** arranged parallel to each other in spaced relation. Each wheel has a hub **110** over which a band **105** is trained in the conventional manner. The bands are further trained over a bar **111**. A saddle **112** is mounted on the shaft **107**. A centrally disposed bar **113** extends from the saddle **112**. Bar **111** is transversely arranged and supported by lateral arms **114** which are mounted on the shaft **107**. An arm **115** fixed to a shaft **116**, is rotatably connected to the bar extension **113**, through means of the pin **117**. A worm gear **118** secured to the shaft **116**, is driven by a worm **119** mounted upon the shaft **120** of a motor **121**. The motor **121** is operated through a battery **128**, preferably of the rechargeable type. A lever arm **122** is also fixed or secured to the shaft **116**, and has attached to it one end of a helical spring **123**. The other end of the spring **123** is anchored to a fixed support. A ratchet wheel **124** is also secured or fixed to the shaft **116**. A pawl **125** is mounted swivably on the worm gear **118**, and meshes with the ratchet wheel **124**. Thus, when the motor **121** rotates, shaft **120** and worm **119** rotate the worm gear **118**. As a result shaft **116** is also rotated. With the rotation of shaft **116**, the lever **122** is also displaced angularly and thereby cause the expansion of the spring **123**. With the rotation of the arm **115**, at the same time, reciprocal motion is imparted to the bar extension **113**, and therefore to the carriage **103**, pulling the latter to its retracted position shown in FIGS. **3** and **4**. When this position of the attained, the switch **126** is actuated and the motor **121** is stopped.

The switch **126** has two spring contacts **126***a* and **126***b*. The spring contacts cooperate with a cam **129** having high and low sections through its angular motion. Thus, when the spring contact **126***a* is not in contact with the surface of the cam **129**, as shown in the drawing. the circuit associated with this particular spring contact is open. When, on the other hand, the cam rises **129'** passes underneath the spring contact **126***a*, a circuit closure is established for the spring contact. These same structural conditions apply to the spring contact **126***b*. The cam **129** is made of conductive material so that when both spring contacts are actuated by high sections under cam, at the same time, an electric circuit may be completed through the spring contacts **126***a* and **126***b*. Thus, is a potential were applied to the spring contact **126***a*, and both spring contacts were actuated through cam risers **129'**, this same voltage potential would appear at the spring contact **126***b*, and the switch **126** would be designated as being closed, If, on the other hand, one of the springs as, for example, **126**a is not in contact with the cam **129**, as shown in the drawing, the switch **126** is in the open state because current cannot flow from the spring contact **126***a*, through the cam **129**, and out of the

spring contact **126***b*. It may be see, therefore, that the cam **129** serves as a shorting element which shorts the spring contact and establishes circuit closure for a particular angular disposition of the cam. The high sections of the cam **129'** are arranged so that the switch **126** is normally closed. During this state of the switch, the motor is being operated. When the cam **129** has rotated to a predetermined position in which one of the spring contacts are not in electrical contact with the cam, the motor is disconnected from the battery **128**. The cam **129** is mounted upon the shaft **116**, and actuates the the switch **126** directly. When the angular rotation of the shaft **116** and hence cam **129** has been attained, so that the motor is stopped by interrupting its circuit leading to the battery **128**, the spring **123** is under tension. Counterclockwise rotation of the shaft **116** resulting from the tension in spring **123**, is prevented through the action of the ratchet **124** and the pawl **125**. The device is now set or in the state for operation.

The front end **130** of the housing **101** is open and is surrounded by a frame **131**. A second switch **132** is located within the housing and in the vicinity of the opening of or front end **130**. The switch **132** has two spring contacts **132***a* and **132***b*. The spring contact **132***a* has an angled arm which protrudes beyond the front face of the marking device. The spring contact **132***a* is fixed at one end **132***c*, to the housing **101**. The spring contact **132***b* is similarily fixed at one end to the housing **101**. The spring contacts **132***a* and **132***b* are arranged to cooperate with each other, so that when slight pressure is applied to the protruding angled arm of the spring contact **132***a*, the latter is moved into electrical contact with the spring **132***b*, and thereby establishes circuit closure for the switch **132**. When any pressure applied to the spring contact **132***a*, in this manner, is released, the latter moves away from the spring contact **132***b*, and thereby interrupts the electrical circuit through the spring contacts. As a result, the switch **132** is in the open state.

An inking roller **137** is pivotably mounted upon an arm **138**, through means of the pin **139**. The arm-shaped lever **138** is itself rotatably mounted upon a pin **140**. A spring **141** has one end attached to the arm-shaped lever **138**, and one end to a fixed portion **142** of the housing **101**. The spring **141** is tensioned so that the lever **138** and hence the inking roller **137** are in the position shown in the drawing, when the carriage **103** is in the retracted state or position. An inking wick or pad **148** is retained within a reservoir shaped in the form of a compartment from the housing **101**. The inking wick or pad **148** applies ink to the inking roller **137** when the latter is dipped into the wick when in the position shown by the phantom lines in the drawing. The ink is supplied by a cartridge **143** located in an accessible manner within the housing **101**. The cartridge **143** is of the disposable type, in that it may be discarded when the ink within the cartridge has been exhausted. When replacing the cartridge **143**, the door **144** hinged to the housing by means of the pivot **144***a* is swung open. When using the device in normal operation, the door or flap **144** is closed and flush with the exterior surface of the housing **101**. The cartridge **143** has an opening **147** leading into a reservoir or cavity **146**. A duct or passage **145** within the housing wall **101** communicates with the reservoir **146** and the wick **148**. When the marking device **100** is operated, ink flows by gravity from the cartridge **143** to the wick **148**, through the action of gravity. As a result, the wick **148** is continuously maintained moist with ink. At the same time, excess ink within the wick is avoided, for once the wick is sufficiently moist, ink will cease to flow from the cartridge **143**, in view of the relatively narrow dimension of the passage **145**. When the carriage **143** is moved forward for the purpose of carrying out a marking operation, the pin **160** upon the arm **114** bears against the lever **138** and forces the latter to pivot about the pin **140**. Thus, when the carriage **103** moves forward, the pin **160** rides along the surface **138***a*, and this action results in angular rotation of the lever **138**, which in turn causes the inking roller **137** to dip into the wick **148**. When the inking roller is thus dipped into the wick **148**, the roller is also out of the way of the marking characters **104** which may now move forward to carry out the desired marking operation. When the carriage **103** is again retracted at the end of the marking operation, the spring **141** returns the lever **138** to its initial position shown by the solid lines in the drawing. While returning to this initial position, the inking roller **137** contacts the characters **104** and applies into them in preparation for the next marking operation.

Each of the bands **105** is operated by a knurled wheel **109** which protrudes through suitable slots **148** in housing **101**. Wheels **109** are preferably arranged so that they do not protrude above the top plane of the housing **101**. This design prevents accidental movement of the wheels.

The handle **102** serves as the enclosure for the batteries **128** used to operate the motor **121**. Depending upon the design of the motor, two or three battery cells may be used. At the same time, these batteries may be interconnected in different manner to apply different voltages suitable to a particular motor design. The batteries are preferably of the rechargeable type to allow for their continuous reuse. The handle **102** is threadably secured to the housing **101**, to permit interchanging of different handles with different batteries. As a result of this feature, one set of batteries in one handle may be recharged, while another set of batteries which have been recharged may be placed into service by securing the handle **102** to the housing **101**. In this manner, the marking device **100** may be continuously operated, without the incurrence of interruption during which the batteries are charged. This feature is particularly attractive, since the charging time of batteries may be of considerable duration.

In FIG. **2**, three battery cells A, B and C are shown. In FIG. **2***a* only two battery cells A and B are shown within the handle **102**. Each battery cell is normally of 1.5 bolt-type. The operation of the marking device, in accordance with the present invention, however does not depend upon the battery cells having a particular voltage rating. Batteries of any voltage rating can be directly applied to the use of the marking device as disclosed. If the motor **121** is designed to operate 1.5 volts are applied across its terminals, then it is desirable to operate the batteries in parallel, regardless of the number of battery cells being used, since each cell is normally rated at 1.5 bolts. To permit the interconnection of the battery cells for such parallel operation, even though the batteries are situated end-to-end within the handle **102**, a contact plate **170** is secured at the end of the handle **102** admitted into the housing **101**. The contact plate **170** has a contact distributed about it leading to the terminals of the individual battery cells. The layout of the contact plate **170** is shown in FIGS. **8***a* and **8***b*. FIG. **8***a* shows the layout of the contact plate **170** when three battery cells are used. In the diagram, the positive and negative terminals of the battery cell A, for example, are denoted by +A and −A, respectively. The other two battery cells, corresponding to the configuration of FIG. **2**, are similarily denoted in FIG. **8***a*. FIG. **8***b* shows the contact arrangement on the plate **170** when only two battery cells are used, corresponding to the configuration of FIG. **2***a*.

When it is desired to charge the battery cells, the handle **102** is removed from the housing **101** and inserted into a charger **172** shown in FIG. **9**. The battery charger **172** is of the conventional type, in that it usually includes a transformer which steps down the voltage obtainable from a utility outlet, to a level suitable for charging batteries. To avoid charging resistors, it is desirable to charge the batteries in series, even though they may be operated in parallel. For this reason the contact plate **171** is provided within the charger **172**, and is adapted to engage to contact plate **170**, when the handle **102** is threadably inserted into the charging unit **172**. The insertion of the handle **102** into the charging **172** is similar to the insertion of the handle into the housing of the marking device. FIGS. **8***c* and **8***d* show the contact layout of the contact plate **171**, when using three battery cells and two battery cells respectively. When using three battery cells, the contact plate of FIG. **8***c* in the charger **172**, is an electrical contact with the

plate shown in FIG. 8*a*. Under this condition, the negative terminal of battery A and the positive terminal of battery C are connected to each other through the conducting shorting strip **173** on the plate **171**. The strip or segment **173** is in the form of a conductive layer, serving as a bridging contact for the two terminals of the cells A and C. Conductive layers **174** are similarly provided on the plate **171** for the remaining terminals of the three battery cells being used. It is seen furthermore, that the positive terminal of the Battery and the negative terminal of the battery cell are connected to each other through the conductor **175** which may be a deposited layer of conducting material upon the plate **171**, If +0.450 and −0.455 volts from the charger **172** are applied to the positive and negative terminals of the batteries A and B, respectively, the three battery cells will be charged in series. FIG. 8*b* shows the arrangement of the contact plate **171** when only two battery cells A and B are used. In this event, the contact segment **176** shorts the positive and negative terminals of the cells B and A, respectively, and hence, the two battery cells are similarly charged in series when +3 and −3 volts are applied to the positive and negative terminals of cells A and B, respectively. FIGS. 8*e* and 8*f* show the arrangement of the contact plate **177** within the housing **101** for connecting all battery cells in parallel to operate the motor. The contact plate **177** which is in electrical contact with the plate **170** when the handle is threadably inserted into the housing **101**, is provided with **2** conductive segments **178** and **179**. In FIG. 8*e* it may be seen that when three battery cells are used, corresponding to the arrangement of FIG. **2** all three positive terminals of the three cells are connected together through the shorting segment **178**. At the same time, all negative terminals of the three cells are also connected together by the conductive segment **179**. The segments **178** and **179** serve as electrical contacts and are constructed similar to that described in relation to the contacts **173** and **174**. By connecting the three positive terminals together and the three negative terminals together as shown in FIG. 8*e*, and +1.50 and −1.50 volts are available at the segments **178** and **179**. These segments or contacts are connected directly to the terminals of the motor, and therefore the motor is supplied with the proper voltage. FIG. 8*f* shows the layout of the contact **177** corresponding to FIG. 2*a*, when only two battery cells are used. Under this condition the two positive terminals and the two negative terminals are similarly connected together, so that the batteries are connected in parallel. It may be seen, that the contact plate **177** is of the same design for operation with two battery cells or three battery cells. Accordingly, it is not necessary to change to contact plate **177** when changing from three-cell operation to two-cell operation.

For the selection of characters **104**, in operation, switch **180** is closed permitting current flow to the motor **121**, since the switch is normally closed, Worm gear **118** is thus rotated, which in turn rotates shaft **116**, As a result lever arm **122** moves clockwise over dead center with relation to spring **123**, permitting the latter to contract. This hastens rotation of the shaft **116** and results in a positive moment or "kick" to be imparted to the carriage **103**, through are **115** and extension **113**. The portion of the cam **129** cooperating with the switch **126***a* has its high point 180° displaced from the high point of the cam portion cooperating with the spring contact **126***a*. Thus, after movement of the carriage **103** to its furthest "protracted" position, the switch **126** is in its open state and, accordingly, the motor **121** is deenergized. Carriage **103** is now in the position wherein the characters **104** are at the front of the housing **101**. The characters to be marked on an article are set by moving the wheels **109** into the proper and corresponding angular position.

Upon positioning the marking device **100** onto the article to be marked, a slight downward pressure causes the spring contact **132***a* to engage the spring contact **132***b* and hence close the switch **132**. As a result, the motor **121** is energized. Worm gear **118** is thereby rotated, and, in turn, rotates shaft **116**. Lever arm **122** moves clockwise over dead center in relation to spring **123** and permits the latter to contract. This action hastens rotation of shaft **116** which, in turn, imparts a positive moment or "kick" to carriage **103**, through arm **115** and extension **113**. Through rotation of the cam **129**, the switch **126** becomes closed. The motor is thereby maintained energized even though the device is removed from the article and the switch **132** is open. This results from the condition that the switches **126** and **132** are connected in parallel, and the motor circuit is closed as long as one of the two switches are closed. With the motor operating after the stamping operation, continued rotation is applied to the shaft **116**, resulting in the retraction of the carriage **103** through the arm **115** and extension **113**. Lever arm **122** is also rotated and this places the spring **123** under tension. The device is now reset for repeat marking of the same characters.

While the invention has been described and illustrated with respect to certain preferred examples which give satisfactory results, it will be understood by those skilled in the art after understanding the principle of the invention, that various changes and modifications may be made without departing form the spirit and scope of the invention and it is intended therefore in the appended claims to cover all such changes and modifications.

What is claimed is:

1. An electromechanical marking device comprising, in combination, a housing open at one end; a handle secured to the other end of said housing; battery means within said handle; guide means longitudinally movable in said housing and guided by said guide means; a plurality of bands adjustably disposed on said carrier in side-by-side relationship, said bands carrying characters for printing, said carrier means being longitudinally movable between an operative printing position and an inoperative retracted position, said carrier means being in said operative printing position when in proximity of said open end of said housing; motor means within said housing and electrically connected to said battery means; ratchet means connecting said carrier means to the shaft of said motor means, said shaft executing rotational motion during operation of said motor means and driving said ratchet means; spring means connected to said ratchet means and tensioned by said ratchet means when said ratchet means is driven by said motor means to drive said carrier means from said operative printing position to said inoperative retracted position, said characters for printing projecting through said open end of said housing when in said operative printing position; first switch means at said open end of said housing connected between said motor means and said battery means, said first switch means closing the circuit from said battery means to said motor means upon actuation through contact with a surface to be marked with said marking device; second switch means connected in parallel with said first switch means, cam means linked to said ratchet means and actuating said second switch means when said carrier means is in said retracted inoperative position, said cam means being driven by said ratchet means, said ratchet means releasing said spring means for moving said carrier means form said retracted position to said operative printing position upon actuation of said first switch means, said carrier means remaining at said retracted position after turn thereto upon actuation of said second switch means, said second switch means having two spring contacts mounted adjacent to each other and cooperating with said cam means, said second switch means being closed when said cam means is in contact with both said spring contacts simultaneously, and said second switch means being open when only one spring contact is in contact with said cam means.

2. The electromechanical marking device as defined in claim 1 said battery means comprising a plurality of cells, electrical contact means connected to said motor means and said cells for operating said cells in parallel circuit connection.

3. The electromechanical marking device as defined in claim 3 including battery charging means and charging contact means for charging said cells in series circuit connection.

4. The marking device as defined in claim 1 wherein said first switch means comprises further a movable spring contact having an angled arm extending from said open end of said housing for contacting said surface to be marked; and a fixed spring contact against which said movable contact bears when pressure is applied to said angled arm by said surface.

5. The electromechanical marking device as defined in claim 1, inking means for applying printing ink to said characters prior to printing on said surface, said inking means comprising ink reservoir means for retaining a predetermined quantity of printing ink, ink roller means actuated by said carrier means and dipped into said reservoir means to become coated with ink, said roller applying ink to said characters after dipping into said reservoir; and ink storage means communicating with said reservoir means and maintaining said reservoir means filled with ink.