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[54] **TYPE BAND MARKING DEVICE HAVING
 ELECTRICALLY OPERABLE ACTUATING MEANS**
5 Claims, 14 Drawing Figs.

[52] U.S. CL. **101/108,**
 101/35, 101/316, 101/111, 101/287
 [51] Int. CL. **B41j 1/20,**
 B41f 17/00
 [50] Field of Search..... 101/111,
 103, 108, 333, 334, 287, 297, 35, 42, 44, 316;
 197/1, 12

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ABSTRACT: A marking device in which reciprocating motion is applied to a carrier bearing selectable marking indicia. A rotary member grasps one end of the connecting rod to the reciprocating carrier, when retracting the carrier into its housing. The connecting rod is freely released by the rotary member, when the carrier is brought forward into marking position. Upon release of the connecting rod from the rotary member, a spring, tensioned during retraction of the carrier, forces the carrier forward and against the surfact to be marked.

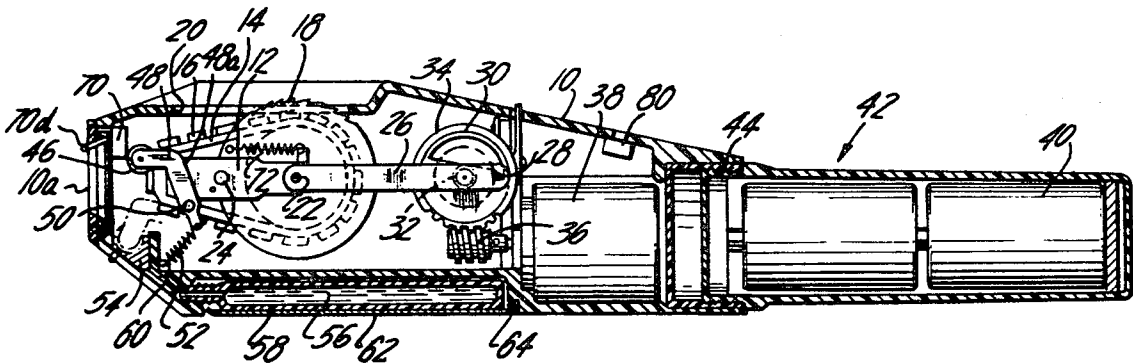


FIG. 2

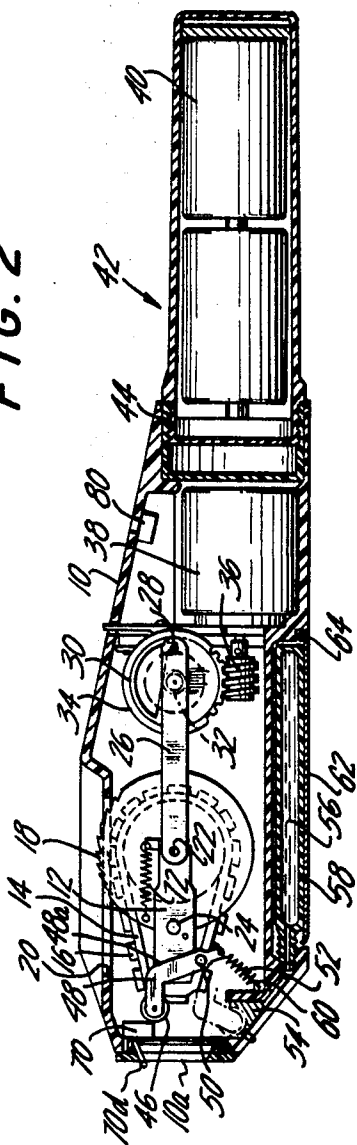


FIG. 3

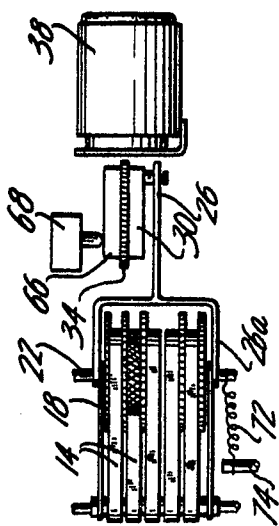


FIG. 4

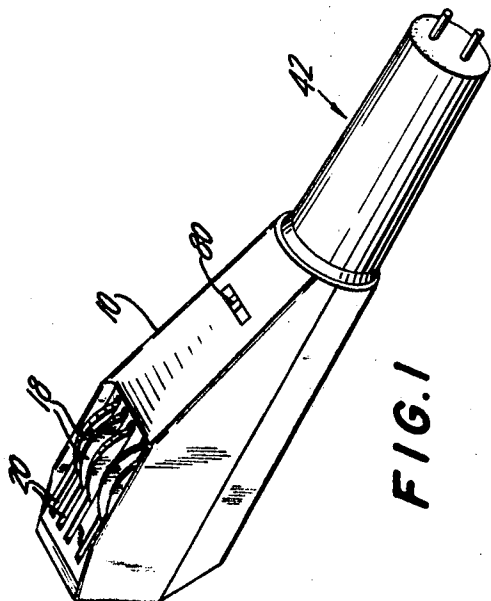
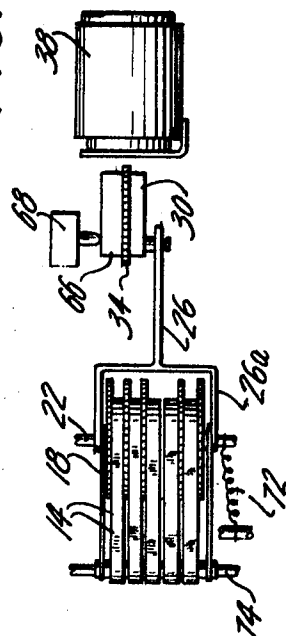


FIG. 1

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FIG. 5

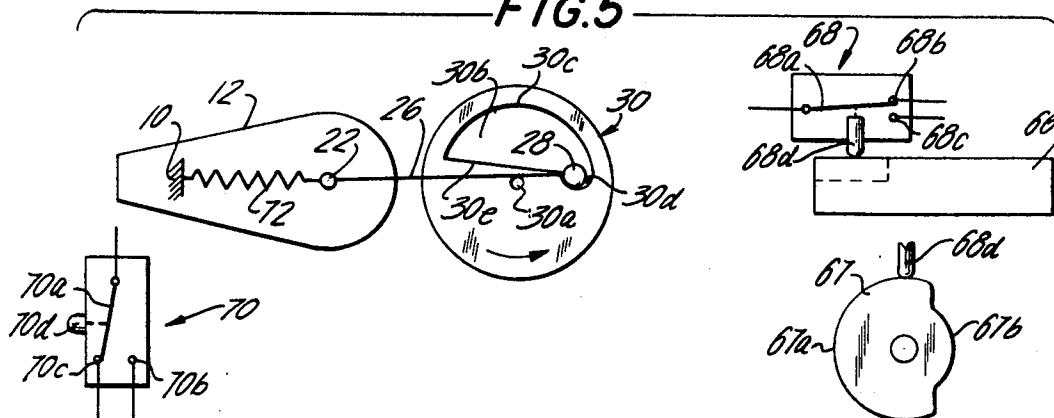


FIG. 6

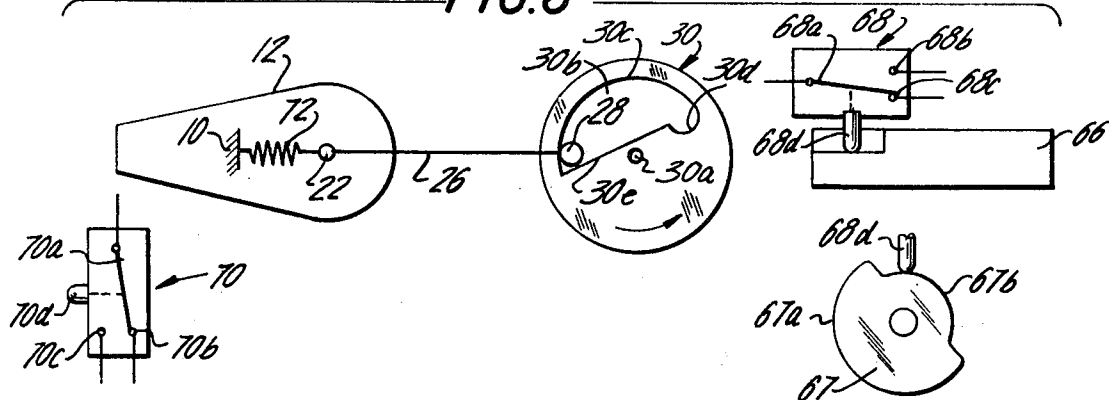
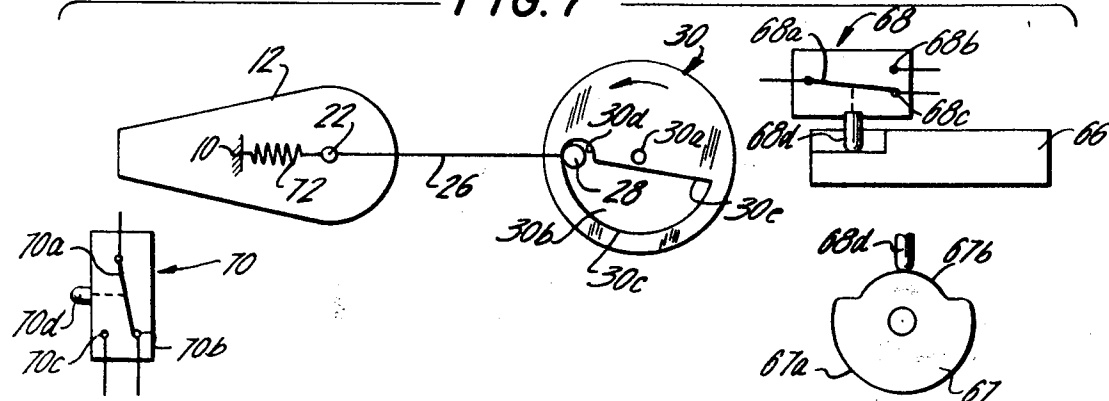
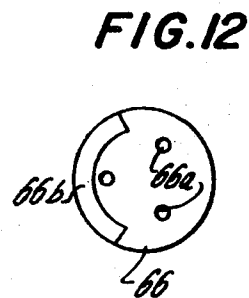
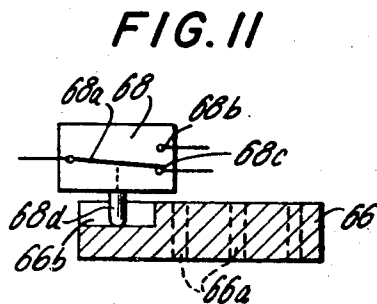
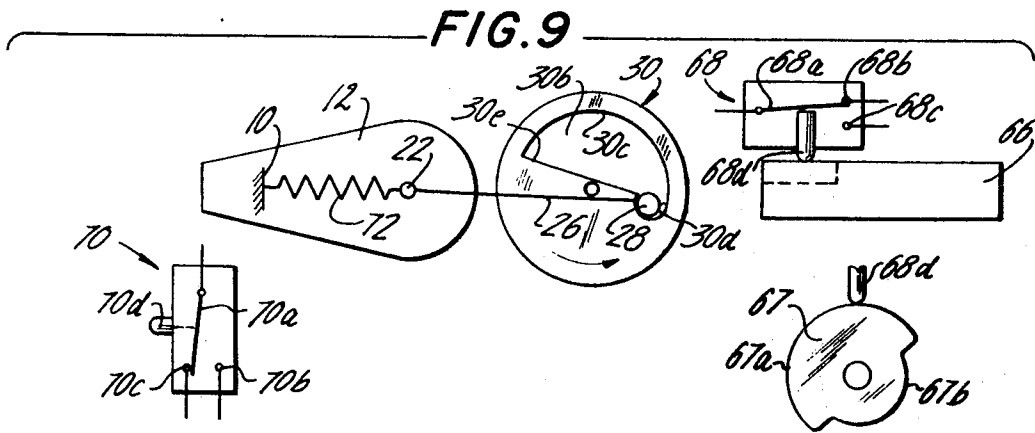
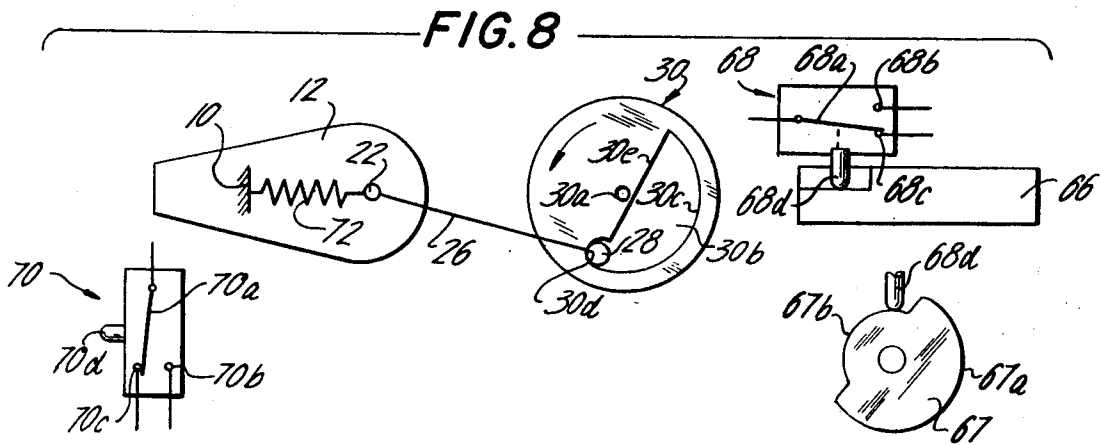


FIG. 7



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FIG. 10

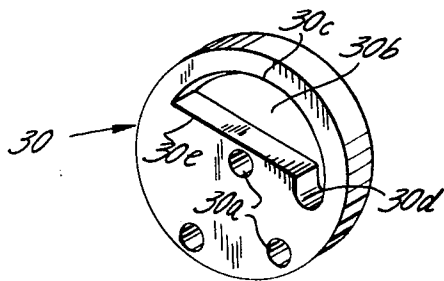


FIG. 14

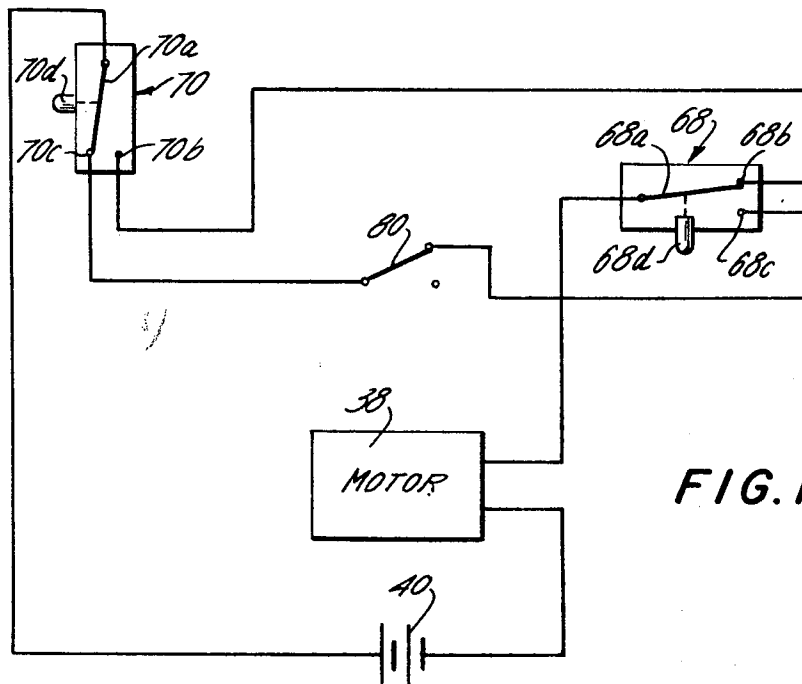
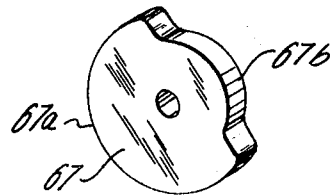


FIG. 13

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TYPE BAND MARKING DEVICE HAVING ELECTRICALLY OPERABLE ACTUATING MEANS

Background of the Invention

The invention relates to electrically operated marking devices of the class disclosed in copending applications Ser. Nos. 744,544; 753,290; 823,573.

In the art of marking devices, selectable indicia are mounted upon a reciprocable carrier enclosed within a housing. After the desired indicia have been selected, the marking device may be actuated for operation, by producing a circuit closure which results in energizing of, for example, a motor used to apply motion to the carrier and bring it in contact with the surface to be marked. After the marking operation has been completed, the carrier is retracted within the housing where it is brought into a stationary position preparatory for a new marking cycle which may be initiated by the user of the device.

The reciprocating motion to the carrier has been applied, heretofore, through substantially complex mechanisms which tend to wear with usage of the device. When applying the marking device for a highly repetitive use as, for example, in the marking of supermarket articles, the resulting wear of the linkage by which the reciprocating motion is applied to the carrier, may cause a significant decrease in the operating life of the device. Furthermore, the complex design of this linkage makes servicing and maintenance of the device difficult. It is a desideratum of the present invention to overcome the foregoing disadvantages and provide a more efficient and desirable marking or stamping device.

SUMMARY OF THE INVENTION

A marking device adapted for substantially high repetitive use, in which selectable indicia are supported on a reciprocable carrier. To carry out a marking cycle, the carrier is transferred from a retracted position within the housing of the marking device, and brought forward into a marking position and against the surface to be marked. The reciprocating motion applied to the carrier is derived from a linkage mechanism in which a rotary member is driven, in one direction, through an electrical motor energized during the marking cycle. One side face or surface of the rotary member has a cutout which is shaped to grasp one end of a connecting rod which is, in turn, pinned to the carrier at its other end. The contour or cutout of the rotary member grasps the respective end of the connecting rod during retraction of the carrier into the housing, prior to initiating a marking cycle.

When such a marking cycle is initiated by the user of the marking device, the motor which drives the rotary member becomes energized, and the connecting rod becomes released from the rotary member, after the latter has rotated through a substantially small angle. A tension spring then forces the carrier into forward position and against the surface to be marked, upon release of the connecting rod from the rotary member. The rotary member continues to rotate and after the elapse of a predetermined time interval during which the marking operation has been completed, the connecting rod is again grasped by the rotary member and the carrier becomes retracted. During this retracting motion of the carrier, the spring becomes again retensioned in preparation for a new marking cycle.

It is an object of the present invention to provide a marking device in which reciprocating motion to the carrier is applied through a linkage mechanism having substantially no wear characteristics in normal operation of the device.

It is also an object of the present invention to provide such a linkage mechanism for applying reciprocating motion to the carrier, which is simple in design, has substantially few parts, and may be readily serviced.

It is further an object of the present invention to provide a simple control circuit through which the marking device is controlled in its operation of marking and selecting indicia as desired.

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 illustrate merely by way of example an embodiment of the device of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

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, and shows the housing and the means for selecting indicia as desired for marking, in accordance with the present invention;

FIG. 2 is a sectional view through the longitudinal axis of the marking device of FIG. 1, and shows the internal construction of the device;

FIG. 3 is a plan view of the interior of the marking device of FIG. 2, and shows the mechanical linkage arrangement between the carrier of the marking indicia and the electrical motor which serves as a source of motion and energy for the carrier, when the latter is in the retracted position within the housing;

FIG. 4 is a plan view of the linkage arrangement of FIG. 3 with the carrier in the forward marking position;

FIG. 5 is a functional schematic diagram of the reciprocating linkage for the carrier, when in the retracted position, together with the positions of controlling elements which control the timing of the motion of the carrier;

FIG. 6 is a functional schematic diagram of the linkage and controlling elements of FIG. 5, with the carrier in the forward marking position;

FIG. 7 is a functional schematic diagram of the linkage arrangement and controlling elements of FIG. 5 with the carrier at the instant of being transferred from its forward position to its retracted position;

FIG. 8 is a functional schematic diagram of the linkage arrangement and controlling elements of FIG. 5 with the carrier in the state of being moved into retracted position;

FIG. 9 is a functional schematic diagram of the linkage and controlling elements of FIG. 5 with the carrier having been brought back to its fully retracted position after having executed a marking operation;

FIG. 10 is an isometric view of the rotary member shown schematically in FIGS. 5 to 9 for the purpose of applying reciprocating motion to the carrier;

FIG. 11 is a sectional view of a cam cooperating with a switch for controlling the energizing of the electrical motor used to drive the rotary member of FIG. 10;

FIG. 12 is a plan view of the cam of FIG. 11; and

FIG. 13 is an electrical circuit diagram of the controlling elements by which the operation of the motor used to drive the carrier is controlled; and

FIG. 14 is an isometric view of cam 66 shown in drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing and in particular to FIGS. 1 and 2, the marking device, in accordance with the present invention, has a housing 10 in which a carrier 12 is moved between a forward marking position and a retracted inoperative or non-marking position. The carrier 12 serves as a support for bands 14 containing indicia 16 of the form desired. The desired indicia may be selected by rotating wheels 18 protruding through slots 20 of the housing 10. To facilitate rotation of the wheels by the user of the marking device, the rims of these wheels 18 have a knurled or ratchet surface.

The reciprocating motion of the carrier is guided through, for example, slotted guide rails (not seen) in the sides of the housing, in which ends of the shafts 22 and 24 ride. The shaft 22 also serves as the axle for the indicia selecting wheels 18.

The bifurcated end 16a of a connecting rod 26 is rotatably mounted on the shaft 22, whereas the other end of this connecting rod 26 has a roller-shaped or ball-shaped follower 28 riding within a cutout of a rotary contoured member 30. This rotary member 30 serves to apply reciprocating motion to the connecting rod 26, and is mounted upon a shaft 32. Also mounted upon this shaft 32, is a worm gear 34. The mounting arrangement of the rotary member 30 and worm gear 34 is such that they are secured together and will thereby rotate together about the shaft 32.

The worm gear 34 is in mesh with a worm 36 mounted upon the shaft of an electrical motor 38. Electrical power for the motor is supplied by preferably rechargeable batteries 40 held within handle 42 which is threadably secured to housing 10. Thus, through the provision of thread 44, handle 42 may be readily removed from the housing for the purpose of replacing the batteries 40, or inserting another handle with a fresh supply of batteries. Accordingly through the use of interchangeable handles 42, the marking device may be maintained in continuous operation, and the batteries in one handle may be charged while the batteries in another handle are in use in the marking device, with the handle threadably secured to the housing 10.

Inking of the indicia is accomplished through a roller 46 mounted on an arm 48 which is pivoted about the pin 50. In the retracted position of the carrier 12, the roller 46 is held in the position shown in FIG. 2, through the action of the spring 52 which acts upon the arm 48. When the carrier 12 is moved into its forward marking position, the pin 24 bears against the arm 48 and forces, thereby, the roller 46 into the downward position shown in dash-dot lines. Thus, during the forward motion of the carrier 12, the pin 24 rides along the surface 48a, and thereby removes the roller 46 from the path of the carrier and away from the front of the marking indicia. When the roller 46 is in this downward position shown in phantom in FIG. 2, it dips into an inking sponge or pad 54.

Ink is supplied to this sponge 54, through an ink reservoir 56 confined within a bottle or container 58. Ink is doled out to the sponge 54 from the reservoir 56, through a duct 60 communicating with the sponge 54 and an opening through the bottle or container 58. Ink flow from within this bottle to the sponge or pad 54 takes place, for example, through capillary action. When the ink within the bottle or container 58 has been consumed, the bottle may be replaced by opening the flap or door 62 hinged to the housing 10 at the hinged joint 64. When the carrier 12 is returned to its retracted position, the spring 52 acts on the arm 48 so as to return the roller 46 into the position shown in solid lines in FIG. 3 for the purpose of inking the selected indicia preparatory to a new marking operation.

The rotary member 30 is secured to the worm gear 34 by means of screws passing through opening 30a in the member 30. Through such mounting of the rotary member 30, the latter is rotatable with the worm gear 34. The member 30 is a disc-shaped member having a cutout or recess 30b. This cutout or recess has a closed contour which includes a section 30c substantially concentric with the rim of the disc-shaped member 30. At one terminal point of this section 30c of the contour, is a cavity-shaped portion 30d designed to fit freely about the roller or ball-shaped member 28 at one end of the connecting rod 26. The straight-lined portion 30e joins the cavity-shaped portion 30d with the other end of the ring-shaped portion 30c. The depth of the recess or cutout 30b is designed so that the roller-shaped member 28 may slide readily and freely along the interior surface defined by the contour of the recess.

On the other side or face of the worm gear 34, is mounted a cam 66. This cam is secured to the worm gear through screws or bolts passing through holes 66a in the cam 66. Thus, the mounting of the cam 66 is similar to the mounting of the rotary member 30 onto the gear 34. The cam 66 is used to control the state of a switch 68 which, in turn, determines the operational state of the motor 38. The switch 68 is a single

pole double throw switch which is spring actuated so that it will assume the state shown in FIG. 11, when the switch is not actuated or depressed. The switch 68 has an actuator 68d for the purpose of transferring the contact 68a to the contact 68b, when actuated or depressed. When the switch 68 is in the normal or unactuated state, the contact 68a of the switch lies against the contact 68c.

The cam 66 which cooperates with the switch 68 and actuates this switch, has a cutout 66b along a predetermined portion of its rim. When this cutout 66b lies opposite the actuator 68d, as shown in FIG. 11, the switch 68 is in an unactuated state. When, on the other hand, the rotary position of the cam 66 is such that the actuator 68d lies outside of the area of the recess or cutout 66b, then this actuator 68d is depressed and the switch 68 is in the actuated or operated state in which the contact 68a lies against the contact 68b.

A switch 70 is mounted at the frontal portion of the marker, and serves to initiate the circuitry for bring the carrier into its forward marking position, when the front portion of the marker is placed into contact with the surface to be marked. For this purpose, the housing 10 is provided with an opening 10a at the front of the marker, and the actuator 70d of the switch 70 projects through this opening 10a. The switch 70 is similar in construction to the switch 68, and is a single-pole, single-throw switch.

When the actuator 70d becomes depressed by bringing the opening 10a of the housing in contact with the surface to be marked, the movable switching contact 70a is brought against the contact 70b of the switch. Thus, the switch 70 is used for the purpose of initiating a marking cycle, and this cycle may be initiated by simply placing the front end of the marker in contact with the surface upon which the indicia, selected beforehand, are to be applied.

When the marker is in the inoperative state, the carrier 12 is in its retracted position inside of the housing 10, as shown in FIG. 5. The carrier 12 is held in this retracted position through the rotary member 30 which assumes the position shown in FIG. 5. In this position of the carrier, furthermore, a spring 72 is tensioned. This spring has one end secured to the shaft 22, by means of a securing link, whereas the other end of the spring is fastened to a pin 74 which, in turn, is secured to the housing 10 of the marker. Thus, whereas one end of the spring is fixed to the housing of the marker, the other end of the spring moves with the carrier 12.

In the nonoperating state of the marker, furthermore, the switch 70 remains unactuated, so that the contact 70d connects with the contact 70c. Switch 68, however, has its actuator depressed into the switch so that the contact 68a connects with the contact 68b. The position of switch 68, in this manner, is determined by the design of the associated cam 66. The relative operation of the switch 68 and cam 66 is schematically shown directly beneath the switch 68 and cam 66 in FIG. 5, for illustrative purposes. In the nonoperating state of the marker, consequently, the actuator 68d is depressed through the cam 66, and this arrangement is also shown in schematic form in FIG. 5. By referring to the electrical circuit of FIG. 13, it may be seen that in this nonoperating state of the marker, corresponding to FIG. 5, the motor 38 is deenergized.

The control circuit for the motor, shown in FIG. 13, interconnects the switches 68, 70, battery 40, and motor 38 so that the different operating functions and modes of operation of the marker may be realized. If, now, the switch 70 becomes actuated for the purpose of initiating a marking cycle, a circuit closure is produced through contacts 70a and 70b, and as a result the voltage of the battery 40 is applied across the motor 38, as shown by FIG. 13. With the rotation of the motor 38, the rotary member 30 also rotates, and after the latter has moved through a substantially small angle, as seen from FIG. 6, the roller or ball-shaped member 28 slips out of the cavity-shaped portion or pocket 30d, and the connecting rod 26 becomes thereby released from the member 30. With such release of the connecting rod 26, the tensioned spring 72 drives the carrier 12 to its forward marking position, as shown

by FIG. 6. Rotation of the member 30 is, at all times, in the direction designated by the arrows in the drawing.

When the rotary member 30 has attained the position shown in FIG. 6, the actuator 68d projects into the portion 66b of the cam 66, and consequently this switch 68 is now in the released or unactuated position in which contact 68a connects with contact 68c. In the schematic representation of cam 66 and switch 68, it may be noted that the state corresponding to FIG. 6 may be represented by the actuator 68d being on the low portion 66b of cam 66.

When, furthermore, the carrier 12 is in the forward position of FIG. 6, the spring 72 is in the contracted state. If the actuator 70d of the switch 70 remains depressed after the carrier 12 has been driven to the forward position, the motor 38 will be deenergized, and the carrier 12 will be held or will remain in this forward position. From the instant that the connecting rod 26 is released from the rotary member 30, to the instant that the actuator 68d lies within the portion 66b of the cam 66, the rotary member rotates by an amount so that the cavity-shaped portion 30d is moved into proximity of the roller 28, as shown in FIG. 7. This position of the rotary member in FIG. 7 also takes into account the motion of this member 30, which takes place due to the inertia of the member 30, after the switch 68 has been released and is in the state shown in FIG. 6 and 7.

If, now, the marker is lifted or moved away from the surface that was marked, the switch 70 becomes released since the actuator 70d is no longer held depressed by the marked surface. Under these conditions, the circuit to the motor 38 is closed and as a result of the motor rotation, the rotary member, driven in the direction of the indicating arrow on the drawing, grasps the roller 28 within the cavity-shaped portion 30d. With continued rotation of the member 30, in this manner, the carrier 12 becomes retracted, and the spring 72 becomes expanded as shown in FIG. 8. In this position of the rotary member 30, the actuator 68d still projects into the portion 66b of the cam 66.

With further rotation of this member 30, however, the actuator 68d becomes depressed by coming into contact with the surface 66a of the cam 66, as shown in FIG. 9. The schematic equivalent of the actuator 68d and the cam 66 are also represented in FIGS. 8 and 9, corresponding to the position of the rotary member 30 and carrier 12 in these figures. Thus, whereas the actuator 68d is still on the lower portion 66b of the cam 66, in the configuration of FIG. 8, the actuator 68d becomes raised onto the higher portion 66a in the configuration of FIG. 9. In this position of the rotary member 30 in FIG. 9, the carrier 12 is fully retracted and the spring 72 is expanded or tensioned to its maximum value. When the actuator 68d does become depressed through the member 30 achieving the configuration of FIG. 9, the motor 38 becomes deenergized, as evident from FIG. 13, since the actuator 70d remains in the released or unactuated position as also illustrated in FIG. 9.

Accordingly, once the rotary member 30 is in the position of FIG. 9, and the switch 70 remains unactuated, a complete marking cycle has been carried out, and the marker is in retracted position preparatory to carrying out a subsequent cycle when initiated by bringing the front end of the housing in contact with the surface to be marked.

For the purpose of selecting the indicia to be impressed by the marker, the switch 80 is transferred or moved to its open circuit position. This switch 80 may be in the form of a conventional slide switch which is mounted on the interior wall of the housing so that the slide member of the switch projects through an opening of the housing and is, thereby, accessible to the user of the marker. Thus, the user may move the switch 80 to its open circuit position by simply applying a sliding motion to the portion projecting through the housing as shown in FIG. 1. After the switch 80 is in open circuit position, in this manner, the actuator 70d is depressed by bringing the front end of the marker, for example, into contact with any desired surface. Under these circumstances, the motor will become energized and thereby rotate the member 30 so as to result in

the release of the connecting rod 26, and consequently the transfer of the carrier 12 into its forward position. This situation may be derived from FIG. 13 by noting that the motor 38 becomes energized when both switches 68 and 70 are depressed.

Once the carrier 12 has been driven to its forward position by the spring 72, however, the switch 68 is undepressed, as evident from FIG. 6. When the switch 68 is, however, undepressed, in this manner, due to the position of the rotary member 30 in the forward position of the carrier 12, current flow to the motor 38 becomes interrupted, since the switch 80 is in open circuit position. Consequently, once the switch 80 has been actuated to open position and the switch 70 is thereafter depressed, the carrier 12 is driven into forward position for as long as the switch 80 remains in the open position. In this forward position of the carrier 12, the user of the marker may then freely select the desired indicia by rotating the appropriate wheels 18.

With the carrier in the forward position, the indicia are fully visible to the user, and the user may thus readily determine that the correct or desired indicia have been selected for marking purposes. After the indicia have been selected, the switch 80 is simply returned to its closed circuit position by the user, and this action results in automatic retraction of the carrier 12, since the motor circuit will now be closed, as evident from FIG. 13. Once the carrier reaches its retracted position, the switch 68 is again depressed, as shown in FIG. 9, and as a result the motor circuit is reopened, so that the carrier remains in the retracted position. The marker is thereby in a preparatory state for carrying out a marking cycle upon depressing the actuator 70d of the switch 70.

What is claimed is:

1. In a spring and motor actuated marking device including a housing portion and a handle portion the combination comprising: means defining a marking opening in one end of said housing and said handle disposed at the opposite end, guide means longitudinally disposed within said housing, electrically actuated carrier means movable on said guide means between printing and retracted positions within said housing, said carrier including a plurality of independent marking bands arranged in side by side relation and each selectively adjustable to present a selected print character when said carrier is in said printing position, spring means connected to said carrier and said housing and urging said carrier to said printing position, electric motor means selectively connected to said carrier to move said carrier solely between said printing and retracted positions, said connection between said electric motor and said carrier including first gear means carried by said motor, a rotary member, a second gear means carried by said rotary member within said housing and drivingly connected to said first gear means, said rotary member including a substantially disc shaped body portion on the periphery of which said second gear means is mounted, means defining an opening in said disc, said opening including a straight-walled portions parallel to the diameter of said disc and an arcuate-walled portion concentric to the periphery of said disc, said arcuate-walled portion terminating at one end of said straight-walled portion and extending beyond the other end of said straight-walled portion to define a cavity at said other end of said straight-lined portion; said rotary member further including cam means disposed on the opposite side of said disc from said opening, an actuating link interconnecting said rotary member and said carrier to move said carrier between positions in response to actuation of said motor, said link including a bifurcated end portion one leg of which is disposed on and connected to each side of said carrier, a bight portion disposed between said carrier and said rotary member and a connecting rod portion including a ball-shaped member at the free end of said rod and transverse thereto, said ball-shaped member disposed within the opening in said rotary member and movable in response to rotation of said rotary member to selectively effect extension and retraction of said carrier, first switch means selectively operable to actuate said motor, said first and

second gear means, said rotary member and said connecting link means, second switch means connected to said motor responsive to the position of said cam on said rotary member to deactivate said motor in response to a preselected position of said cam and said rotary member.

2. The marking device as defined in claim 1 including means for interconnecting said first and second switches with said electrical driving means and said electrical source of power, whereby actuating said first switch connects said electrical drive means to said source of power for permitting said carrier to move into said forward marking position and thereafter on continued actuation of said motor means reversing the motion of said carrier to return said carrier into retracted inoperative position, said second switch being actuated for disconnecting said electrical drive means from said source of power when said carrier is in said retracted inoperative position.

3. The marking device as defined in claim 1 including a worm gear secured to said rotatable member for rotatably driving said rotatable member; and worm wheel means engaging said worm gear means and rotatably driven by said electrical drive means.

4. The marking device as defined in claim 1 wherein said spring means at one end abutting said housing and at the other end and abutting said carrier.

5. The marking device as defined in claim 1 wherein said means for actuating said second switch comprises a cam member mechanically coupled to said rotatable member and having a recess portion for a predetermined angular rotation of said cam member; and cam follower means in contact with said cam member for actuating said second switch as a function of said recess portion on said cam member.

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