United States Patent

[11] 3,537,563

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[21] Appl. No. **708,268**
[22] Filed **Feb. 26, 1968**
[45] Patented **Nov. 3, 1970**

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[32] Priority **Feb. 27, 1967**
[33] **Bulgaria**
[31] **I-262**

[54] **CYLINDRICAL PRINTING MEMBER**
4 Claims, 2 Drawing Figs.

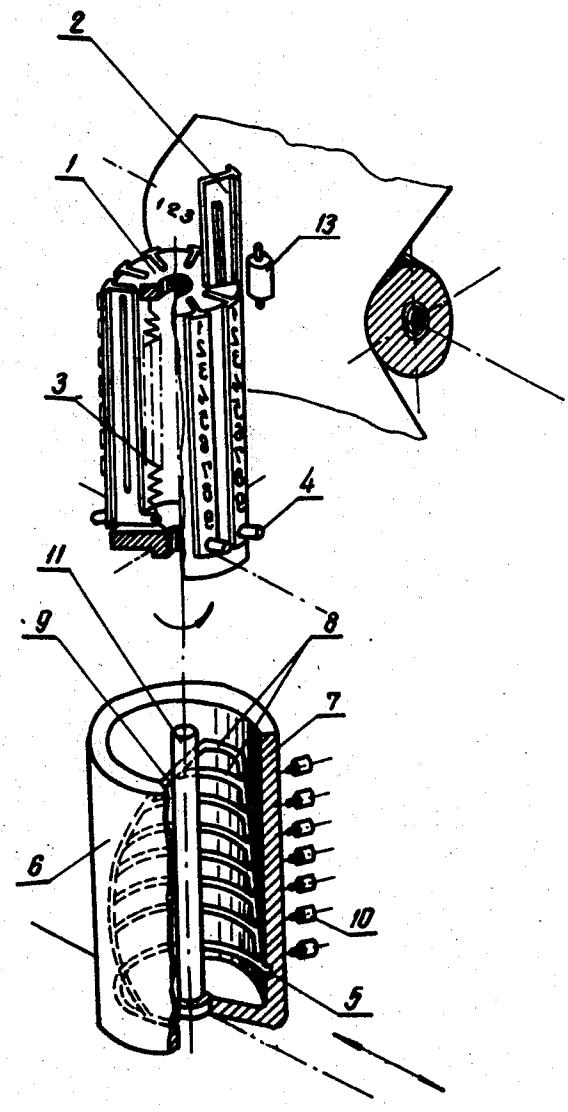
[52] **U.S. Cl.** **197/48,** 197/53, 197/18, 101/103
[51] **Int. Cl.** **B41j 1/08**
[50] **Field of Search** 197/18, 48, 49, 55, 53; 101/91, 103

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ABSTRACT: A printing device for printing numbers or the like, comprising a first, hollow, vertical cylindrical body. A second hollow cylindrical body is mounted on a rotatable shaft inside the first hollow cylindrical body. The second hollow cylindrical body is provided on its outer surface with a plurality of longitudinally vertically extending grooves in which a corresponding plurality of printing rods are slidably disposed. These printing rods are operatively connected to a plurality of biasing means and are provided with a plurality of radially projecting pins. The interior surface of said first cylindrical body is provided with a plurality of guide grooves into which the aforementioned pins extend. A plurality of electro-mechanically actuated fixing pins adapted to be selectively moved into control positions in said plurality of guide grooves thereby adjusting and controlling the movements of the pins of the printing rods in the guide grooves.



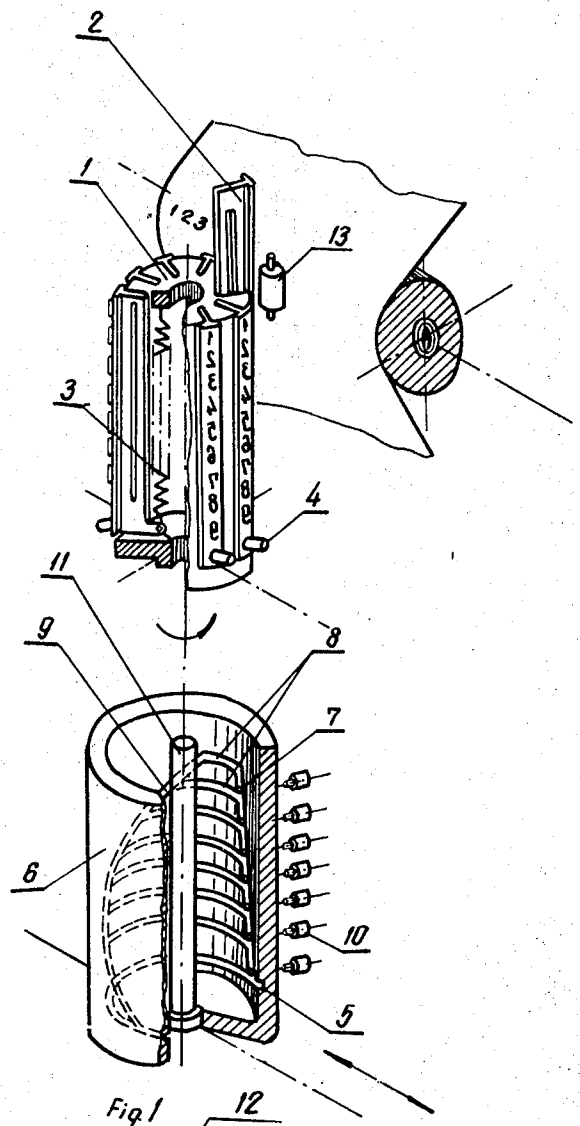


Fig. 1

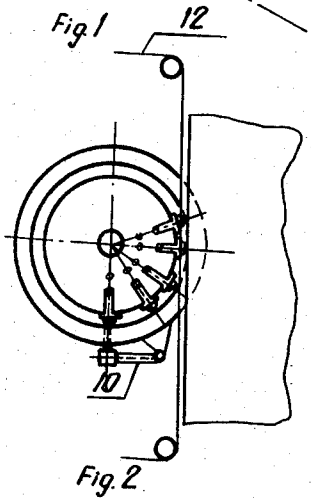


Fig. 2

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CYLINDRICAL PRINTING MEMBER

BACKGROUND OF THE INVENTION

The present invention relates to printing devices.

In particular, the present invention relates to that type of printing device which is controlled by electromechanical means and in which the printing means impinge on the printing surface without rolling or slipping.

Known printing devices of the above described general type require a considerable time interval before the printing position selection has been completed; an additional considerable time interval for the actual printing operation; and, finally, a considerable time interval for returning the printing means to their original position. Consequently, the operation of these known printing devices is relatively slow.

SUMMARY OF THE INVENTION

It is accordingly a primary object of the present invention to provide a printing device which operates more rapidly than the known devices.

In particular, it is an object of the present invention to provide a printing device in which the selection of the printing position, the actual printing operation and the return to the original position of the printing means are all performed practically simultaneously.

In accordance with the invention, the above objects are achieved by having the first vertical cylindrical body perform a reciprocating motion along the printing surface. The second cylindrical body is rotatably mounted inside the first cylindrical body. The second cylindrical body has a plurality of longitudinally extending grooves on its outside surface in which a corresponding plurality of printing rods are slidably mounted. Biasing means are operatively connected to the plurality of printing rods so as to urge them upwardly inside the grooves into an upper extreme position. The printing rods are maintained in their lower extreme by virtue of the fact that pins, radially extending therefrom, extend and slidably engage into an annular groove located in the interior surface of the first hollow cylindrical body. The interior surface of the first hollow cylindrical body is further provided with additional annular grooves, each of which corresponds to a predetermined printing position, which are connected to each other by means of a helical groove, on the one hand, and by means of a vertically extending groove, on the other hand.

A plurality of control pins are operatively mounted in the vertical groove and are connected to electromechanical means for moving the pins into and out of their respective control positions.

BRIEF DESCRIPTION OF THE DRAWING

The present invention is illustrated by way of example in the accompanying drawing which forms part of this application, and in which:

FIG. 1 is a schematic representation of the printing device of this invention shown in an exploded view in perspective wherein certain parts are broken away for clarity's sake; and

FIG. 2 is a top plan view of the printing device of this invention.

DESCRIPTION OF PREFERRED EMBODIMENTS

The printing device of the present invention comprises a first vertical cylindrical hollow body **6**, which is reciprocably movably mounted in the direction indicated by the double arrow in FIG. 1. Inside the hollow body **6** there axially upwardly extends, from the bottom thereof, a shaft **11** on which there is freely rotatably mounted a second cylindrical hollow body **1**. The outer surface of the body **1** has a plurality of longitudinal radial slots in which a corresponding plurality of printing rods **2** are respectively slidably mounted. Each one of the printing rods **2** has an inwardly extending arm. Each one of a plurality of coil springs **3** is connected, at one of its ends, to

the inwardly extending arm of a printing rod **2** and, at the other one of its ends, to the top of the body **1**, thereby urging the corresponding printing rod **2** upwardly inside its radial slot.

The body **6** has on its inner cylindrical surface a lower annular groove **5** and a plurality of essentially semicircular grooves **8** disposed parallel and equidistant with respect to each other. The grooves **5** and **8** are connected to each other, at one end, by the agency of a groove or channel **7** slightly inclined from an imaginary vertical line (see FIG. **1**) and, at the other end, by the agency of a helical groove or channel **9**. The number of grooves **8** correspond to the number of printing positions.

The extent of inclination of the groove **7** from an imaginary vertical line will determine the relative angular movement of the bodies **1** and **6** with respect to each other and thus the printing steps are performed. The slight inclination ensures the free ascension of the printing rods **2** due to the action of the associated coil springs **3**. Each one of the printing rods **2** has, near its bottom end, a radially projecting pin **4** integral therewith which engages into the annular groove **5**. A plurality of control pins **10**, corresponding in number to the number of grooves **8**, are reciprocally mounted along the channel **7** as illustrated in the drawing. These control pins are actuated by well known electromechanical means, such as for example, solenoids which have not been illustrated in detail.

The printing ink may be supplied by means of an inking roller **13** mounted on the body **6** at the level of the printing line, or by means of a printing ink ribbon **12**, mounted as illustrated in FIG. **2**.

OPERATION

The cylindrical body **6** is connected to known means which are adapted to reciprocally move it at a predetermined speed in the direction of the double arrow of FIG. **1** along the printing area. Simultaneously with this movement, the hollow cylindrical body **1** is rotated about the shaft **11** by known electromechanical means (not illustrated), thereby producing a resultant rolling motion without slippage of the cylindrical body **1** over the printing area. During the aforedescribed motion the pins **4** are slidingly guided in the annular groove **5**.

A printing position can be selected with the printing device of the present invention by actuating preselected control pins **10** by known electromechanical means (not illustrated) in such a way that when a printing rod **2** has reached the bottom portion of the vertical groove **7** it will ascend in said groove due to the action of its spring **3** as soon as the lowermost control pin **10** has been withdrawn by its electromechanical means. This printing rod will ascend until its pin **4** reaches a preselected horizontal groove **8**, where its ascendant movement is stopped by another control pin **10**, which causes the pin **4** to enter into the aforesaid horizontal groove **8**. Thus the control pins **10** are reciprocally mounted slightly above each one of the intersections of the channel **7** with the groove **5** and the grooves **8** as is clearly illustrated in FIG. **1** of the drawing. Consequently, when a control pin **10** is operatively projected, the pin **4** of a printing rod **2** will be deflected so that it enters into the corresponding horizontal groove of the preselected printing position.

The printing rod **2** which has been guided upwardly, as described above, to the level of the printing line, is then rolled over the color inking roller **13** or the color inking ribbon **12** just before the actual printing step.

The hollow cylindrical body **1** continues to rotate in the same direction during the joint reciprocating motion with the body **6**, so that the ascended printing rod **2** is eventually descended via the helical groove **9** to its initial position.

While a specific embodiment of the invention has been shown and described in detail to illustrate the application of the inventive principles, it will be understood that the invention may be embodied otherwise without departing from such principle.

I claim:

1. In a printing device, the combination of a first vertical hollow cylindrical body mounted for performing a reciprocating motion along a printing area; shaft means axially disposed inside said first body; a second hollow cylindrical body rotatably mounted on said shaft means, the outside surface of said second body having a plurality of longitudinal grooves; a plurality of printing rods respectively slidably mounted in said longitudinal grooves; biasing means operatively connected to said printing rods and urging them upwardly in said longitudinal grooves; each one of said printing rods having a radially projecting pin, the interior surface of said first body being provided with a lowermost annular groove and a plurality of essentially semicircular parallel grooves disposed above said annular groove; a substantially vertical groove joining said semicircular grooves at one of their ends and a helical groove joining said semicircular grooves at their other ends; said substantially vertical and helical grooves extending to said annular groove; said pins extending into said annular groove and slidingly moving therein, when said printing rods are in a first inactive position, and moving upwardly via said substantially vertical groove, when one of said printing rods is projected by said biasing means to a second active printing position, and descending via said helical groove, when one of said printing rods is returning to said first position.

2. In a printing device, the combination as set forth in claim 1, including a plurality of control pins reciprocally mounted in said vertical groove for controlling the movement of said pins of the plurality of printing rods.

3. In a printing device, the combination as set forth in claim 1, including inking roller means operatively mounted above said first body in said printing device, at least a portion of said printing rod rolling over said roller means prior to performing a printing step.

4. In a printing device, the combination as set forth in claim 1, including inking ribbons means operatively mounted above said first body in said printing device, at least a portion of said printing rod rolling over said ribbon means prior to performing a printing step.