United States Patent

[11] 3,574,326

[72] Inventor **Ralph Koehn**
San Francisco, Calif.

[21] Appl. No. **716,088**
[22] Filed **Mar. 26, 1968**
[45] Patented **Apr. 13, 1971**

[73] Assignee **Donald F. Flynn**
San Francisco, Calif.

[54] **ACTUATING MECHANISM FOR ROTATING PRINTING DISC**
6 Claims, 3 Drawing Figs.

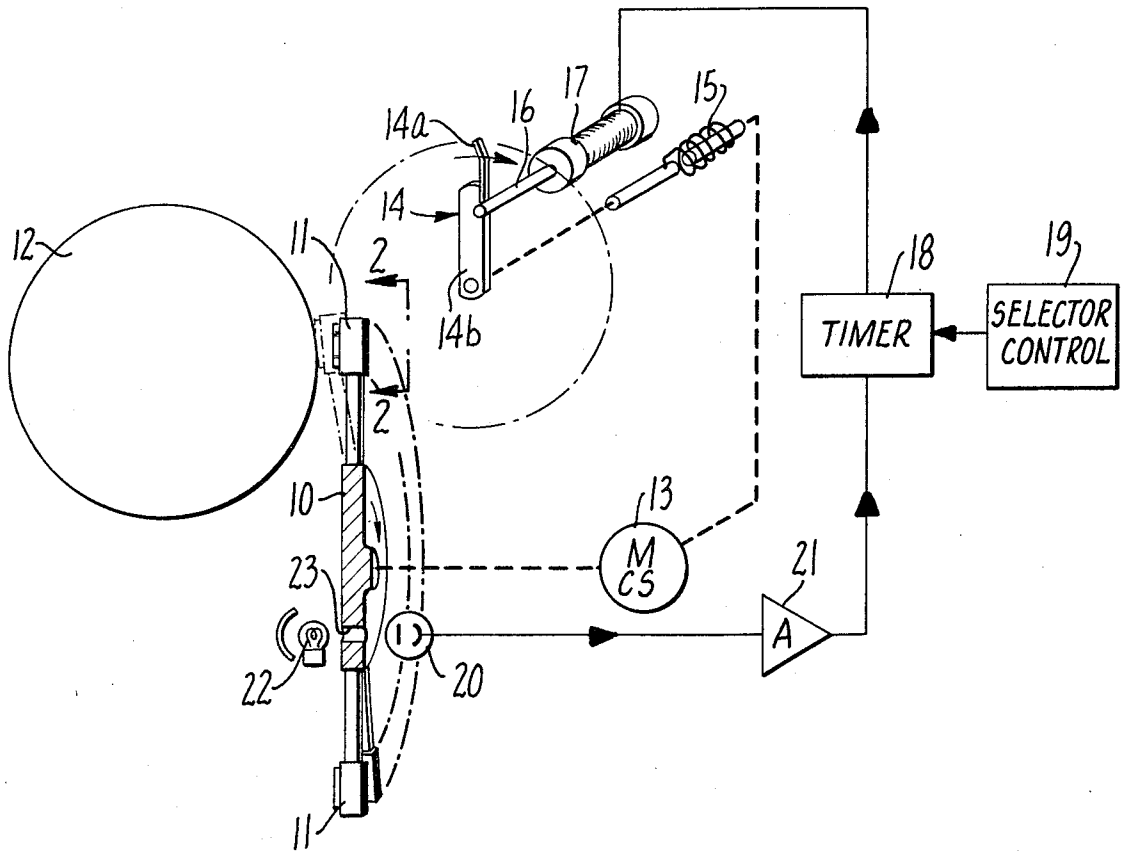
[52] **U.S. Cl.** **197/49,** 197/18, 197/53
[51] **Int. Cl.** **B41j 1/24**
[50] **Field of Search** 197/18, 53, 49

[56] **References Cited**
UNITED STATES PATENTS

3,239,049	3/1966	Voit	197/16
3,330,398	7/1967	Hylan	197/16
304,463	9/1884	Sheehy	197/18
1,652,463	12/1927	Tyberg	197/55X
2,127,507	8/1938	Fuchs	197/53
2,236,663	4/1941	Adams	197/53
2,369,433	2/1945	Casey	197/18X
2,796,966	6/1957	Toeppen	197/17
3,289,805	12/1966	Kleinschmidt et al.	197/53X
3,355,001	11/1967	Reed et al.	197/53X
3,371,766	3/1968	Staller	197/53
3,381,790	5/1968	Chaveneaud et al.	197/49X
3,442,365	5/1969	Ragland et al.	197/53

Primary Examiner—Edgar S. Burr
Attorney—Eckhoff and Hoppe

ABSTRACT: Apparatus for selectively actuating one of a plurality of character pads on a continuously rotating disc, comprising a rotary hammer mounted with respect to the disc for momentarily engaging, centering and actuating a selected character pad at a printing position adjacent to a platen.



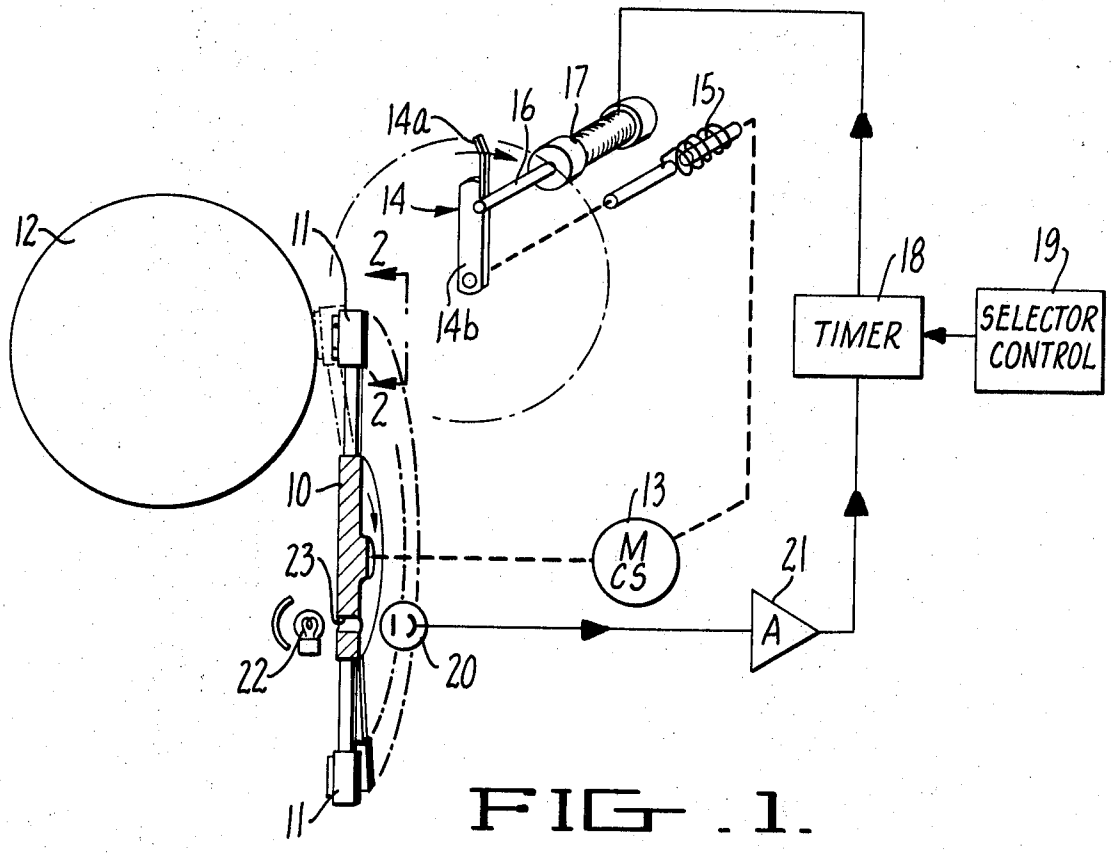


FIG. 1.

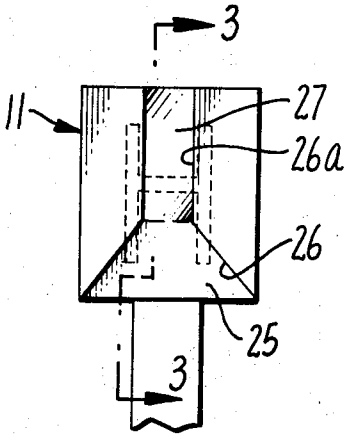


FIG. 2.

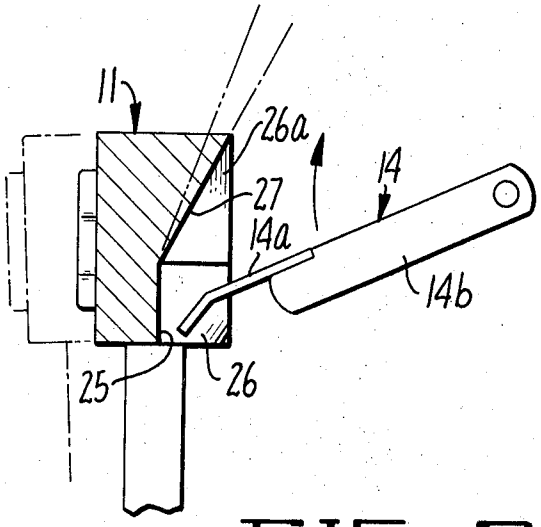


FIG. 3.

INVENTOR.
RALPH KOEHN
BY Eckhoff and Hoppe
ATTORNEYS

ACTUATING MECHANISM FOR ROTATING PRINTING DISC

This invention relates to printing apparatus and more particularly to actuating mechanisms for striking one of a plurality of character pads against a platen. The invention more particularly involves an actuating mechanism for selectively moving one of a plurality of character pads on a continuously rotating disc.

Prior art printing mechanisms are known which are comprised of a continuously rotating disc of character pads and an actuating mechanism for operating a selected one of said character pads against a platen. The actuating mechanism, in general, comprises a hammer that is reciprocally moved against a selected character pad in timed relationship to the rotation of the printing disc. Inertia forces of the hammer create serious problems in reciprocating the hammer with sufficient rapidity to strike and release a selected character pad without smudging its imprint or creating an interference between the hammer and other character pads. This difficulty has necessitated much lower speeds of rotating the printing wheel than is desired.

In brief, the present invention involves an actuating mechanism comprising a rotary hammer which, because it obviates the problems of inertia characteristic of reciprocating hammers, may be moved at much greater speeds. This, in turn, allows the printing disc to be rotated with higher angular velocity.

One object of this invention is to provide an improved actuating means for striking a selected one of a plurality of character pads against a platen.

Another object is to provide an improved actuating means of the kind described and further including character pads having a guide passageway that may be engaged by the rotary hammer and momentarily held on center while being struck.

It is another object of the invention to provide an actuating mechanism of the kind described and further including character pads having a camming surface sloped or positioned relative to the striking position of a rotary hammer to adjust the pressure applied by the hammer in forming an imprint.

Other objects of this invention will become apparent in view of the following detailed description and the accompanying drawings.

In the drawings forming a part of this application and in which like parts are identified by like reference numerals throughout the same.

FIG. **1** is a schematic diagram illustrating a preferred embodiment of the invention in an improved actuating mechanism for character pads on a continuously rotated printing wheel;

FIG. **2** is an enlarged elevation as viewed on lines **2–2** of FIG. **1** showing the back surface of one character pad on the rotating disc; and

FIG. **3** is a section of the character pad taken on lines **3–3** of FIG. **2** and including an illustration of the rotary hammer in the guide passageway of the pad.

Referring to FIG. **1**, there is shown a printing wheel **10** comprised of a plurality of character pads **11**, each resiliently attached to the wheel and adapted for being struck against a platen **12**. Wheel **10** is continuously driven by a synchronous motor **13**.

This invention more particularly relates to the actuating mechanism for selectively moving each character pad independently of the others against platen **12**. This mechanism comprises a rotary hammer **14** having a resilient head **14***a* mounted at the end of an arm **14***b*. Hammer **14** is adapted to be driven through an overrunning clutch **15** by motor **13**, although held by a pin **16** disposed in the path of the hammer's rotary movement. Pin **16** restrains movement of the hammer, disengaging clutch **15**, until retracted by a solenoid **17**. This solenoid is operated in a control circuit comprised of a timer **18**, a selector control **19** and a position sensing circuit including a photocell **20** and an amplifier **21**. Control circuits of this type are well known to the art and form no part of the invention except in combination with the rotary printing hammer.

In addition, various systems may be used for driving hammer **14** without involving the use of an overrunning clutch and motor **13**. It is contemplated, for example, that the hammer driving means may be altogether independent of motor **13**, as by using a separate motor device, and that various other types of clutches may be used to initiate the movement of the hammer.

In brief, the control circuit operates in a manner whereby operation of selector control **19** places a signal upon timer **18**, setting up a particular count for operating one of the character pads **11**. The count of timer **18** begins when a second signal is received from the photocell **20** indicating the position of wheel **10**. This signal is created by the sensing of a light source **22** through an opening **23** formed in the wheel.

Solenoid **17** is momentarily energized by a pulse of current transmitted under the control of timer **18**. The pulse of current occurs at the end of the particular count set up on the timer through operation of selector control **19**. The momentary energizing of solenoid **17** retracts pin **16** from the path of hammer **14**, said pin then returning to its position in the path of the hammer and blocking further rotation thereof. Nevertheless, the momentary retraction of pin **16** allows engagement of clutch **15** and the hammer is driven one full turn by motor **13** with synchronous movement relative to printing wheel **10**.

The brief time lag for engaging clutch **15** and moving hammer **14** to the point of impact at a printing position adjacent platen **12** is a factor taken into consideration by the count placed upon timer **18**. The time relationship for moving hammer **14** to strike a particular character pad may, accordingly, be expressed by the formula $T_{W_H} = T_{D_H} + T_L$, where T_{W_H} equals the time required to rotate printing wheel **10** from the input of a signal emanating from photocell **20** to position the character pad "H" in printing position; T_L is the lag time required to actuate solenoid **17**, pull pin **16** and move arm **14** to the printing position and T_{D_H} is the time of timer delay required to simultaneously position hammer **14** with the character pad H at the printing position.

It will be readily apparent that in certain systems of operation, T_{W_H} (or the time required for rotating wheel **10** to any other position) may be of a shorter period than T_L. But this is readily compensated by actuating the selected character pad on the next rotation of the wheel. Any adjustments or compensations of this type are well within the ordinary skill of persons familiar with timer controls for printing circuits.

FIGS. **2** and **3** of the drawings illustrate improvements in forming character pads to complement the use of a rotary hammer. More particularly, each character pad **11** is formed with a guide passageway **25** defined by convergent sidewalls **26** and parallel sidewalls **26***a*. It will be seen that the lower end of passageway **25** between sidewalls **26** presents a relatively large mouth for receiving the end of hammer head **14***a*, said hammer being of a width essentially the same although slightly less than the normal distance between sidewalls **26***a*. Therefore, head **14***a* may be received within the confines of sidewalls **26** even though the rotational movement of hammer **14** is either slightly advanced or retarded in relationship to the ideal position for engaging a particular character pad. Nevertheless, once head **14***a* is received within the confines of walls **26**, it will center the character pad in a positive striking position and hold the pad on center for the brief movement required to strike an imprint. It is to be understood, of course, that the resilient connection of pads **11** to wheel **10** allow the pads to be shifted to the right or left as may be needed for centering a pad as it is struck.

Passageway **25** is further defined by a camming surface **27**, this surface being sloped in the direction away from the platen. Accordingly, when camming surface **27** is struck by the head **14***a*, the character pad itself is moved in the direction of the platen.

It is contemplated that the slope of camming surface **27** may be varied for different character pads to adjust and control the amount of pressure applied by the hammer in its actuation. A variation of this type is indicated by the broken lines in FIG. **3**,

one line showing an extension of the surface **27** and the other an alternate slope that may be used with a character pad that is to be more lightly struck. Alternately, of course, all camming surfaces may be of the same slope but certain ones recessed more than others to accomplish the same function. In operation, the resilient hammer strikes the various character pads with a force that depends upon the distance relationship between the camming surface of a specific pad and the face of the character mounted thereto.

Although a single preferred embodiment of the invention has been illustrated and described, various modifications and changes may be resorted to without departing from the spirit of the invention or the scope of the appended claims, and each of such changes is contemplated.

I claim:

1. In combination, printing apparatus having a printing disc including a plurality of character pads resiliently attached thereto for movement independently of each other, means for continuously rotating said disc, a platen and means for striking and moving a selected one of said pads into a printing relation with said platen, comprising a rotary hammer for momentarily engaging a selected one of said pads at a printing position adjacent said platen and moving said one pad into printing relation with said platen by a camming action in which said hammer engages said pad adjacent one side, travels across said pad and leaves said pad at a side opposite said one side; means for rotating said hammer from a triggering position one complete revolution about a fixed axis for each character to be printed, one revolution of rotation causing said hammer to be moved from said triggering position through said printing position and returned to said triggering position; and control means responsive to the rotational position of said disc and the selection of a particular one of said pads for holding said hammer at said triggering position and selectively releasing said hammer to synchronize the simultaneous positioning of said hammer with a selected pad at the printing position.

2. The apparatus of claim **1**, said hammer having a resilient head that provides sufficient give to shorten the distance between the axis of rotation and the pad engaging end of said hammer and allow the pad engaging end of said hammer to be moved past a pad after it has been struck against the platen.

3. The apparatus of claim **1**, each of said character pads being formed with a guide passageway for engaging said pad with said hammer and centering said pad relative to said hammer while it is being struck, said passageway having a relatively wide mouth at one end and tapering in a direction substantially normal to the direction in which the pad is struck when the pad occupies a position to be struck by said hammer.

4. The apparatus of claim **3**, a portion of said guide passageway having an approximate width equal to the width of said hammer and defined in part by a camming surface for moving said character pad toward said platen.

5. The apparatus of claim **1**, said hammer being rotationally mounted on an axis perpendicular and offset relative to the axis of said disc, said hammer moving in a radial direction with respect to said disc while in contact with a pad.

6. The apparatus of claim **1**, said character pads being formed with camming surfaces which move the pads toward said platen when contacted by said hammer, the camming surfaces of said character pads being positioned in varying distance relationships to the face of the characters based on the desired pressure to be applied by said hammer.