Dec. 24, 1968 M. FLEISCHER ET AL 3,417,847

PRINTING MECHANISM HAVING A RIM OF ROTATING TYPE LEVERS

Filed March 20, 1967 3 Sheets-Sheet 1

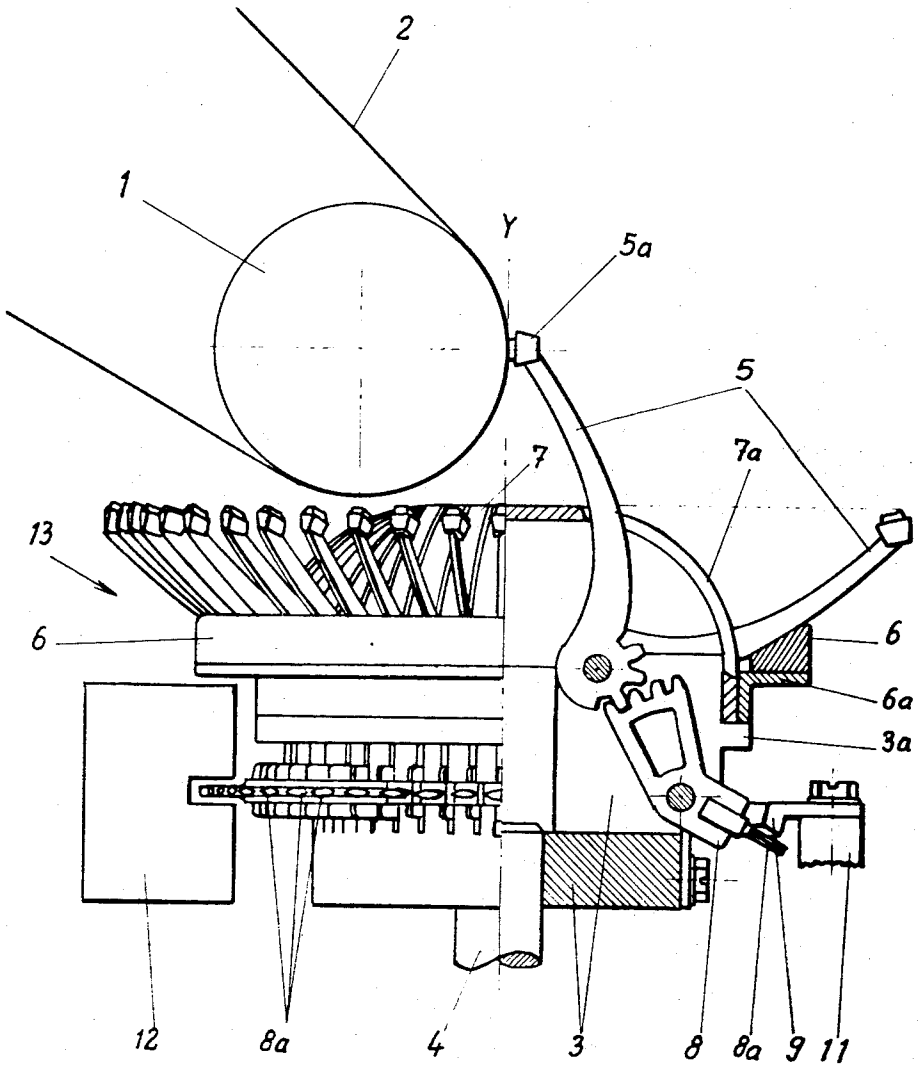

Fig. 1

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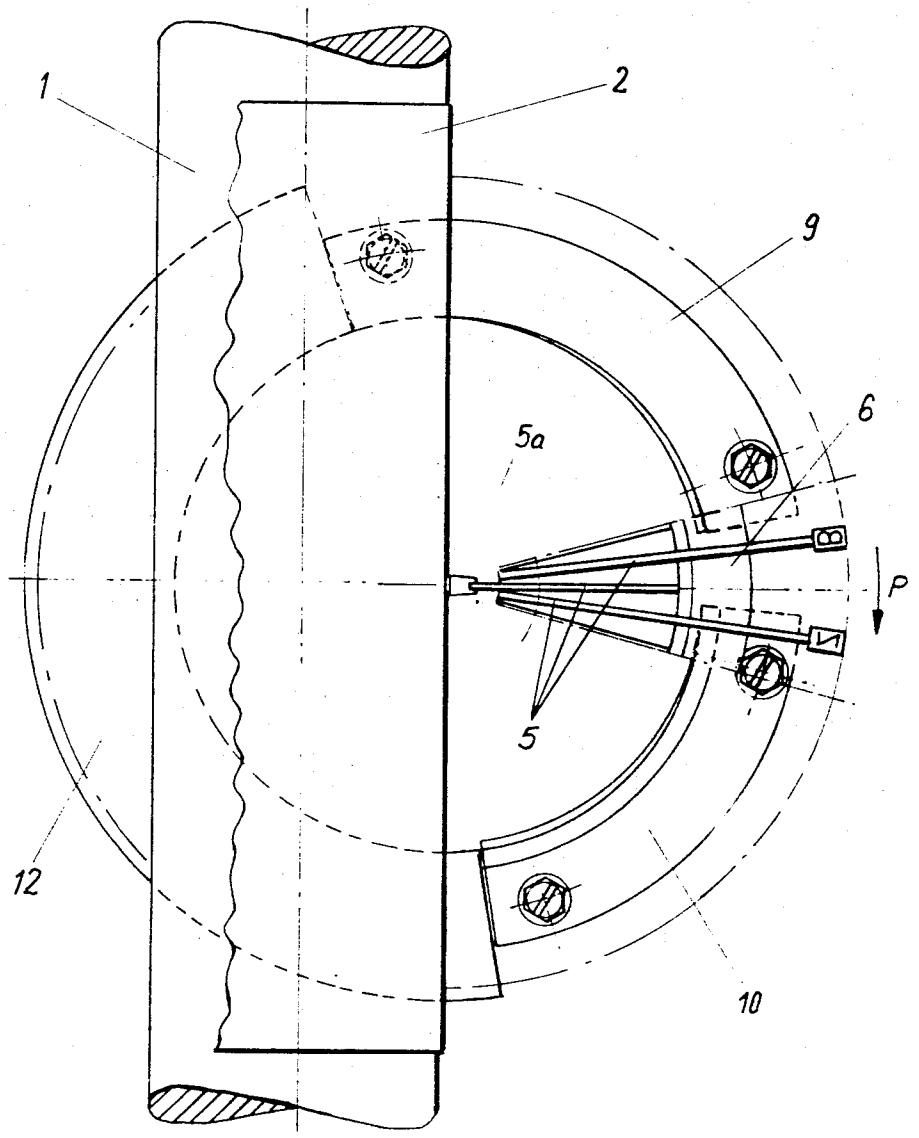

Fig. 2

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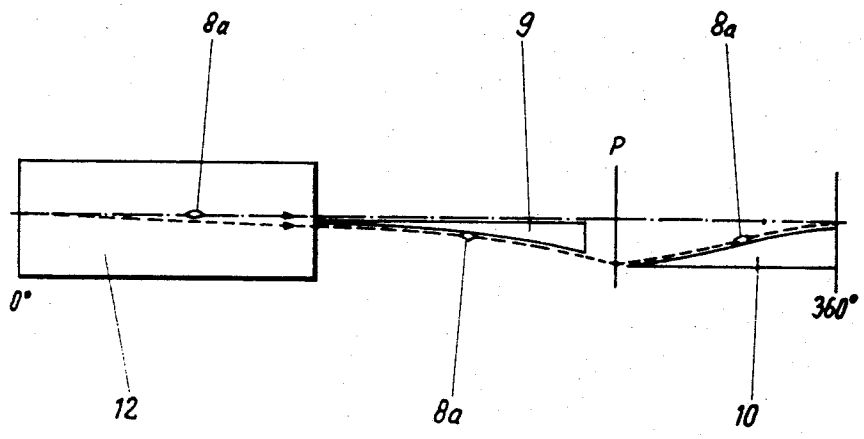

Fig. 3

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3,417,847

PRINTING MECHANISM HAVING A RIM OF ROTATING TYPE LEVERS

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7 Claims. (Cl. 197—18)

ABSTRACT OF THE DISCLOSURE

A printing mechanism in which the printing elements consist of a rim of type levers arranged radially in relation to their axis of rotation. The arrangement with respect to the printing plane being such that the extended center line of this axis intersects at the printing point in the printing plane.

The present invention relates to a printing mechanism for effecting the serial data recording in which the printing element consists of a rim of type levers arranged radially in relation to the axis of rotation. The type levers are selected individually, to strike a printing base, which is a cylindrical body having a horizontally or vertically arranged shaft.

Conventional printing mechanisms of this kind, for example, German Patent No. 423,548, have certain disadvantages and one is that the achievable printing speed is relatively low, because the rim of type levers must first be brought to a standstill prior to each printing operation.

According to the present invention, this disadvantage is overcome by providing printing out of the movement which eliminates the problem of the high relative movement between the type and the recording medium as is done in the so-called on-the-fly printing. According to the invention this is accomplished by the rim of type levers rotating at a constant speed, and the axis of rotation of the rim of type levers is arranged, in relation to the printing base or support, so that the extended centre line of the axis (shaft) intersects with the vertical line on the printing point. This point of intersection lies in or approximately in the printing plane. This allows printing to occur each time on the centre line of the axis such that the angular variation of the struck type, with respect to the recording medium, has little effect for the time duration of the printing operation, and print is produced.

An exemplified embodiment of the invention will now be explained in detail with reference to FIGS. 1 to 3 of the accompanying drawings, in which:

FIG. 1 shows in a simplified representation, the printing mechanism in a side view taken in a partial sectional elevation;

FIG. 2 shows a top view of selected portions of FIG. 1 to illustrate the cam plates (curved tracks); and

FIG. 3 shows in a developmental view, the optionally controllable rotational tracks of the cam plate sensing elements associated with the type levers.

Referring to FIG. 1, the individual type levers **5** are supported in a rim-shaped fashion in the radially arranged indentations of an annular type-lever bearing **3**. In common to all type levers **5** is the type-lever support **6** resting on a ring console **6***a*, and a dome-shaped type lever guide **7** with the guide slots **7***a*. With the aid of this guide the Coriolis force, which acts transversely in relation to the striking movement of the type-levers, is extensively rendered ineffective. The console **6***a* and the guide **7** are centrically led through the upper portion of the type lever

bearing **3** and are supported on a ring shoulder **3***a*. A (not shown) clamping device prevents the parts **6** and **7** from sliding off or shifting on their own. With each type lever **5**, there is associated a transfer lever **8** which, by means of a gear mesh, are in a form-locking connection or engagement with one another. Each of the transfer levers **8** is provided at its other end with a slide member **8***a* having a shuttle-type cross-section. These slide members radially project out of the circumference of the type-lever bearing **3**, and serve to bring the type levers, which are selected by stationary control means **12**, into connection with the stationarily arranged cam plates (curved tracks) **9** and **10**, into the impact (striking) position, and into position for returning the type levers to normal.

The type-lever bearing **3** is rigidly connected to a vertical axis of rotation **4**. According to the present invention, this axis is subjected to a continuous drive, and is arranged so that the extension of the centre line Y of the axis coincides with the tangent line extending through the centre point of printing P at the circumference of the platen **1** or the paper track **2** which is led round it. With this arrangement it is possible to achieve a clean printing, because of combination of the centre of rotation being at the printing point, and the angular variation resulting from the continuously rotating rim of type levers **13**, of the type bar **5***a* in the printing position, has very little effect upon the font of type during the time required for the printing operation.

As shown in FIG. 3, the selection of the type bar **5***a* into the printing position is effected with the aid of control means **12**. The respectively associated sliding member **8***a* is deflected by a mechanical or electrical deflector (separator) from the normal track of rotation, as indicated by the dot-and-dash line, onto the track indicated by the dash line. Due to this deflection, the respective sliding member **8***a* is brought onto the inclined portion of the striking cam plate **9** which causes the associated type lever **5** as shown in FIG. 1 to be brought into striking (printing) position. After the printing, which is effected at point P, the sliding member **8***a*, due to the continuous rotation of the rim of type levers, enters the range of the reset cam plate **10** and returns to the normal non-printing position.

FIG. 2 shows the arrangement of the two cam plates **9** and **10**, as well as the control means **12** with respect to the printing platen **1** and the printing point P. The cam plates **9** and **10**, with respect to the rotating rim of type levers **13** rotating in the direction indicated by the arrow, are mounted on stationary cam plate bearings **11** (FIG. 1) and are adjustible within certain limits for exactly defining the printing time position. The striking cam plate **9** has a pitch which is almost constant throughout its entire length, so that very favourable acceleration values are obtained. Because of the effective centrifugal forces, it is possible to eliminate spring mounting of type lever. The position of the centre of gravity of both the type levers **5** and of the transfer levers **8** is selected so that the type levers, during rotation, are retained by centrifugal force in their position against the type-lever support **6**. Moreover, the sliding members **8***a*, because of the moment of inertia occurring during the printing and the resetting movement, reliable adherence to the cam plates is assured.

For printing, any conventional ink ribbon may be used or, due to the rotation of the rim of type levers **13**, a conventional type of ink roller may be utilized so that the types are inked while passing.

Due to the rim-shaped arrangement of the type levers, it is possible to accommodate a substantially greater number of type levers than in the conventional types of type-lever machines. In the case of a requirement for a greater number of letters and figures, it is not necessary to provide a double occupancy of figures or letters on the type-

levers, and the conventional shifting from one case group to the other is thereby eliminated.

Besides platen **1** as shown, it is also possible to use a printing wheel with a vertically standing axis of rotation, or a printing bar having a plane surface, as is customary in strip chart recorders, as the printing base. These are then arranged in a similar way as described hereinbefore, with respect to the centre line of the axis of rotation **4**.

In view of reducing the lengths of the type levers, of diminishing the swivel angle of the type levers, and consequently, of a possible increase of the operating frequency, it is possible to provide the rim of type levers **13** with a position which is inclined towards the printing point with respect to vertically standing axis **4**.

In this case, the type-lever bearing **3** is connected in a form-locking manner to the axis of rotation **4** via a Cardan-joint-like intermediate member.

While we have described above the principles of the invention in connection with specific apparatus, it is to be clearly understood that this description is only by way of example and not as a limitation to the scope of our invention as set forth in the accompanying claims.

What is claimed is:

1. A print mechanism comprising:

means for supporting a print receiving member at a printing point;

a printing element including a rim of type levers carrying type heads and rotating about an axis at a constant speed;

each of said type levers being arranged radially in relation to the axis of rotation of said rim and being pivotally mounted to the rim at the end of the type lever which is normally closest said axis of rotation, said axis of rotation passing through said printing point;

the type head on a selected type lever being arranged to move toward said axis of rotation during its movement from a normal rest position to said printing point; and

means for individually bringing said type levers into the printing position.

2. A mechanism according to claim **1**, wherein said means for supporting a print receiving member is a platen, said axis of rotation is vertical, and said rim of type levers rotates below said platen and horizontally around the vertical axis of rotation.

3. A mechanism according to claim **2** including stationary guide means, said guide means causing said rim of type levers to assume a position inclined towards the printing point, and a shaft at the axis of rotation, said shaft being connected in a form-locking manner to each type of lever of said rim of type levers by means of a pivotly mounted transfer lever.

4. A mechanism according to claim **1** in which each type lever of said rim of type levers is in a form-locking connection with a transfer lever, said transfer lever including on one end a sliding member adapted to engage a pair of stationary supported cam plates, said cam plates arranged within the range of the rotational track of said sliding members, such that the selected type levers are brought into the printing position by one of said cam plates and returned to the normal position by the other of said cam plates.

5. A mechanism according to claim **4**, in which said sliding members in a normal position define a circular track which is unaffected by said cam plates, and in which said sliding members in a selected position are deflected into a track extending over the cam plates.

6. A mechanism according to claim **5**, wherein said type levers are guided, above their center by rotation, in the slots of a dom-shaped lever guide.

7. A mechanism according to claim **6**, in which the position of the center of gravity of said type and transfer levers when at normal, is chosen so that the centrifugal forces are effective during rotation to retain said type levers with a sufficient pressure, in a counter-force position, on a type lever support.

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