

[54] **RECORDER HEAD FOR CODE CHARACTERS IN LINE PRINTING**

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[51] Int. Cl. **B41j 3/50**

[58] Field of Search..... 197/1 R; 101/93 C; 346/78, 346/79

[56] **References Cited**

UNITED STATES PATENTS

3,209,681	10/1965	Sanborn.....	197/1 X
3,217,640	11/1965	Bradshaw.....	197/1 X
3,333,667	8/1967	Nordin.....	197/1 R
3,467,232	9/1969	Paige.....	197/1 R
3,729,079	4/1973	Zenner et al.	197/1
3,770,092	11/1973	Grim.....	197/1 R

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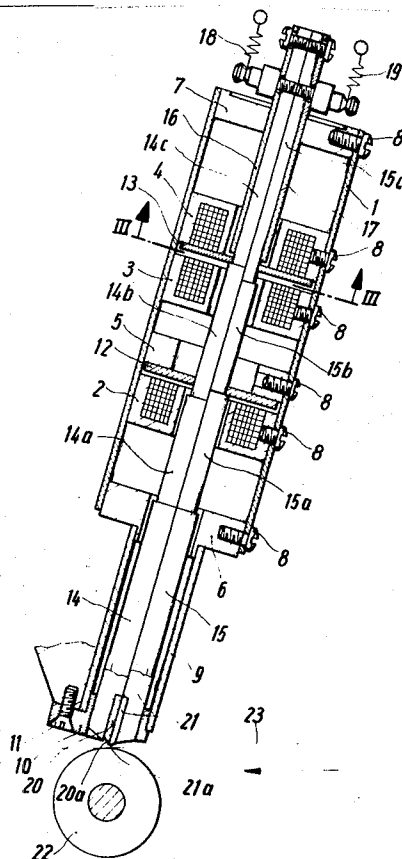
Attorney, Agent, or Firm—Herbert L. Lerner

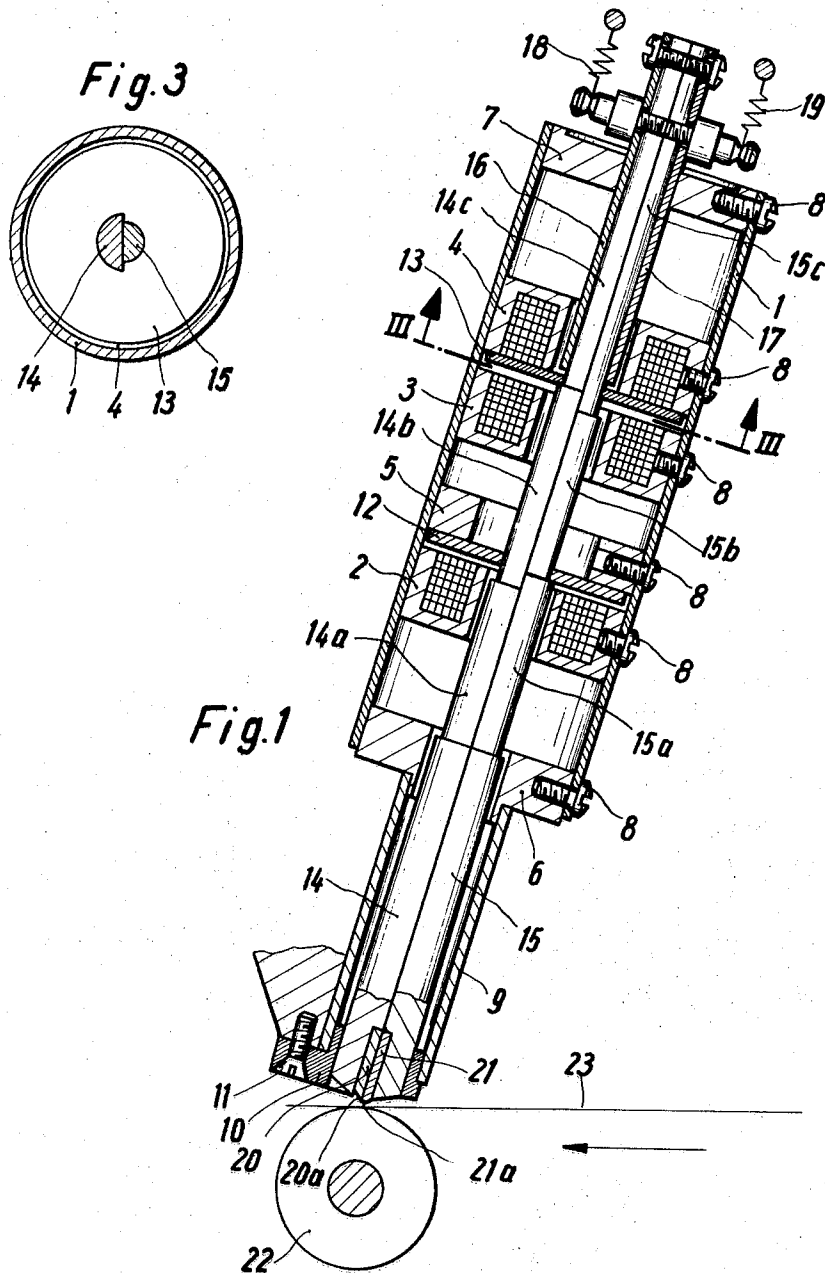
[57] **ABSTRACT**

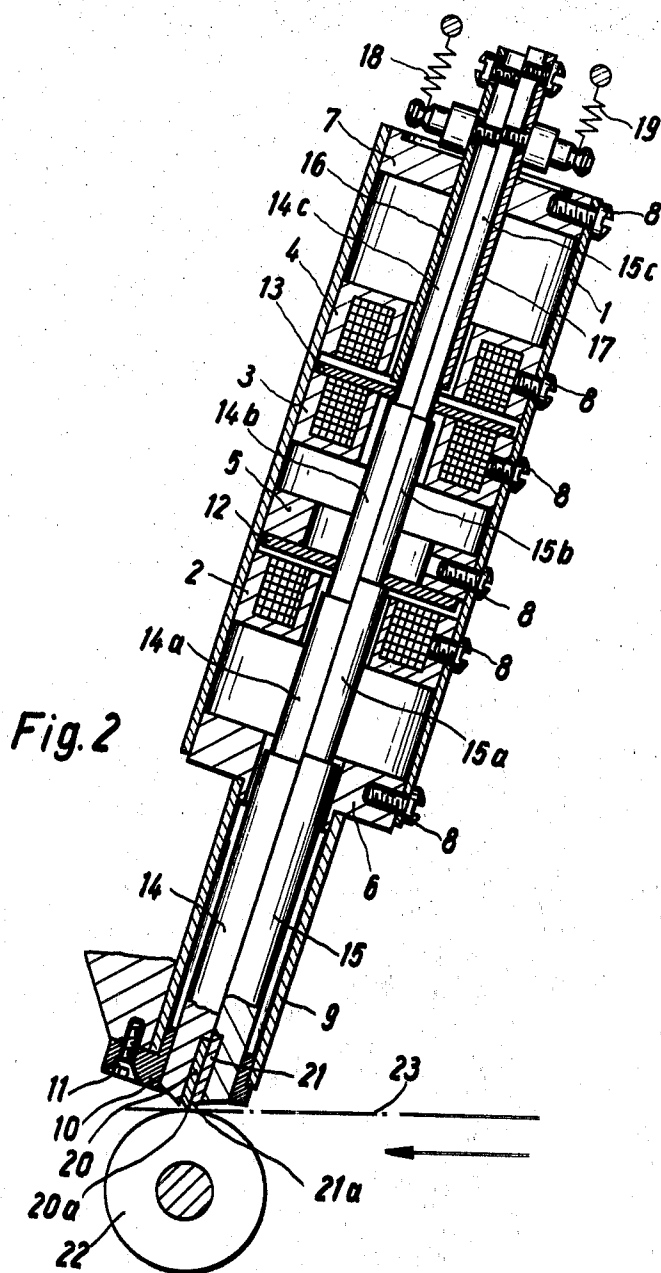
Recorder head for recording code characters by line printing includes a cylindrical housing having forward

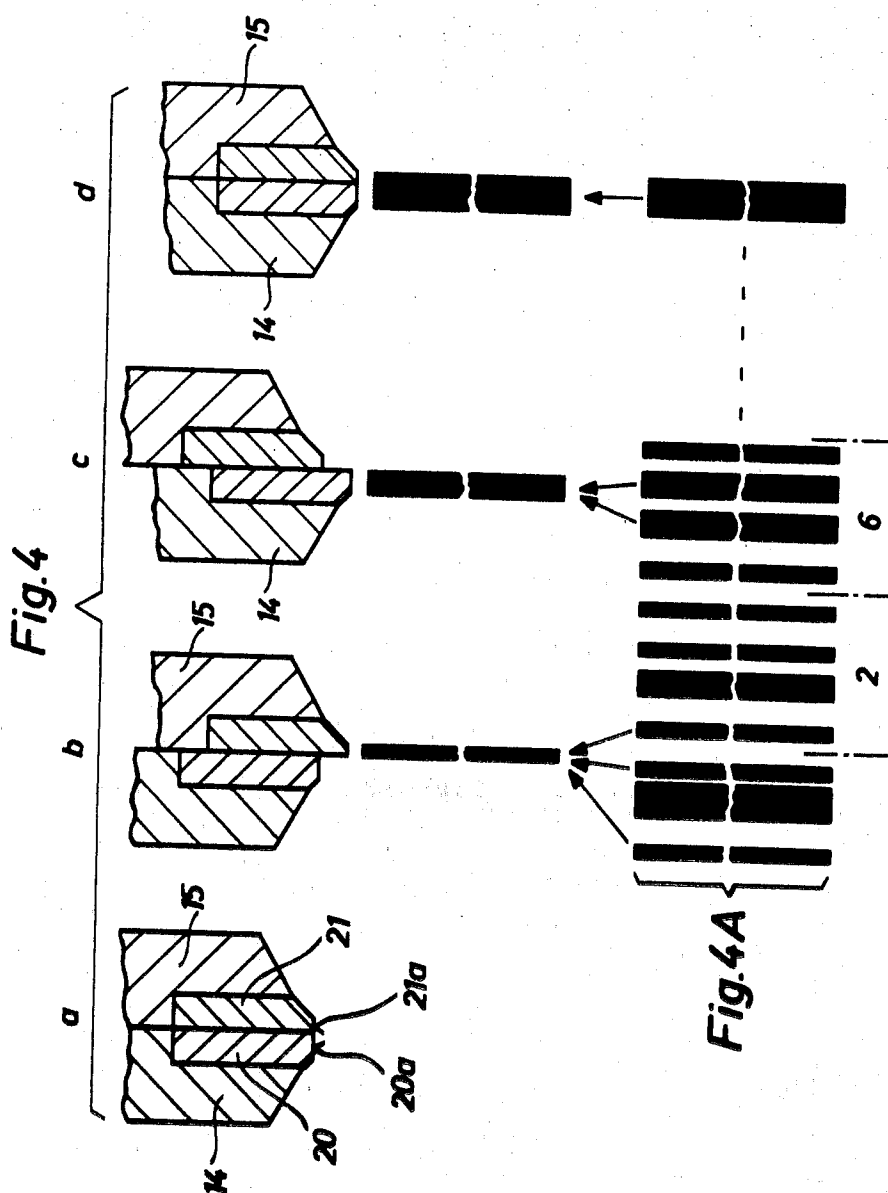
and rearward guide means, a pair of axially displaceable printing rods of substantially equal length disposed adjacent and parallel to one another and guidable by the forward and rearward guide means, means having a line type face located at the forward end of the printing rods, respectively, the line type of the printing rods having a printing width individually and in combination one with the other which embody respectively different line thicknesses for a parallel line code, electromagnet means comprising pot-shaped printing magnets disposed one behind the other and formed with respective core bores, armature plates located adjacent and coordinated with the printing magnets, respectively, the armature plates being also formed with respective bores, the pair of printing rods extending together through the core bores of the printing magnets and the bores of the armature plates, each of the printing rods having a stop operatively engageable by a respective armature plate in response to activation of the printing magnets for axially displacing the respective printing rod into a printing position, the printing rods respectively having a semicircular cross section and being formed with stepped longitudinally extending portions having respective end faces forming the stops for the armature plates of the respective printing magnets, the electromagnet means also including a potshaped restoring magnet having a bore through which the printing rods extend, and abutment means mounted on an end of the printing rods and drivingly engageable by a respective armature plate cooperating with the restoring magnet for displacing the printing rods to a non-printing position.

4 Claims, 5 Drawing Figures









RECORDER HEAD FOR CODE CHARACTERS IN LINE PRINTING

The invention of the instant application relates to a recorder head for recording code characters by line printing and, more particularly, to such a recorder head of the general type disclosed in copending application Ser. No. 287,052 of applicant and A. Hecker, filed Sept. 7, 1972 and assigned to the same assignee as that of the instant application.

In such a recorder head there are provided a pair of printing rods of equal length which extend through core bores formed in pot-shaped electromagnets that are disposed one behind the other and through bores formed in armature plates associated with the electromagnets, a respective armature plate associated with one of the pot-shaped magnets being operatively connected with a respective stop of one of the printing rods for axially displacing the latter, the printing rods being provided with line type at the printing end thereof, the line type having a printing width individually and in combination one with the other which embody respectively different line thicknesses for a parallel line code.

Such an apparatus is necessary in the printing of coded data in order to be able to evaluate the data by machine, such as in electronic data processing or EDP installations. In such a case, assurance must be provided that the printed code picture is free of error and, especially, that the individual lines are inked so as to be readable throughout without trouble.

It is an object of the invention to provide a recorder head for printing coding lines which meets the foregoing requirements and to improve the recorder head of the aforementioned earlier copending application so that it is applicable for higher recording speeds than that of the earlier copending application.

With the foregoing and other objects in view, there is provided, in accordance with the invention, recorder head for recording code characters by line printing comprising a cylindrical housing having forward and rearward guide means, a pair of axially displaceable printing rods of substantially equal length disposed adjacent and parallel to one another and guidable by the forward and rearward guide means, means having a line type face located at the forward end of the printing rods, respectively, the line type of the printing rods having a printing width individually and in combination one with the other which embody respectively different line thicknesses for a parallel line code, electromagnet means comprising pot-shaped printing magnets disposed one behind the other and formed with respective core bores, armature plates located adjacent and coordinated with the printing magnets, respectively, the armature plates being also formed with respective bores, the pair of printing rods extending together through the core bores of the printing magnets and the bores of the armature plates, each of the printing rods having a stop operatively engageable by a respective armature plate in response to activation of the printing magnets for axially displacing the respective printing rod into a printing position, the printing rods respectively having a semicircular cross section and being formed with stepped longitudinally extending portions having respective end faces forming the stops for the armature plates of the respective printing magnets, the electromagnet means also including a pot-shaped restoring

magnet having a bore through which the printing rods extend, and abutment means mounted on an end of the printing rods and drivably engageable by a respective armature plate cooperating with the restoring magnet for displacing the printing rods to a non-printing position.

In accordance with another feature of the invention, the armature plate cooperating with the restoring spring for displacing the printing rods to the non-printing position also cooperates with one of the printing springs for displacing the printing rods to the printing position.

In accordance with a further feature of the invention, the printing rods, in the printing position, are in engagement with a record carrier, the printing rods being displaceable into engagement with the record carrier over a greater distance than the distance traversed by the armature plates for driving the printing rods into printing position.

In accordance with yet another feature of the invention, the line type at the forward end of the printing rods is trapezoidal in cross section and has printing surfaces that are additively alignable one with another.

Other features which are considered as characteristic for the invention are set forth in the appended claims.

Although the invention is illustrated and described herein as embodied in recorder head for code characters in line printing, it is nevertheless not intended to be limited to the details shown, since various modifications and structural changes may be made therein without departing from the spirit of the invention and within the scope and range of equivalents of the claims.

The construction and method of operation of the invention, however, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawings, in which:

FIG. 1 is a partly diagrammatic longitudinal sectional view of a recorder head constructed in accordance with the invention, shown in quiescent or inactive state;

FIG. 2 is a view similar to that of FIG. 1 of the recorder head in an active state of printing; and

FIG. 3 is a cross-sectional view of FIG. 1 taken along the line III—III in the direction of the arrows.

FIG. 4 is, on an enlarged scale in longitudinal section, the front end of printing rods 14 and 15 with the line types 20 and 21 in various positions;

- a. shows the resting position with the withdrawn printing rods 14 and 15;
- b. shows in printing position, the printing rod 15 for imprinting the below represented code line of 0.1 mm width and 160 mm length (length is illustrated in shortened form);
- c. shows in printing position, the printing rod 14 with the impression or imprint of a code line of 0.2 mm width; and
- d. shows in printing position, both printing rods 14 and 15 for making a code line of 0.3 mm. width.

In FIG. 4A is shown a started line coding with the values 2 and 4 according to the code 1-2-4-2, whereby the beginning of the coding is illustrated by three lines and the coding end by a wide line.

Referring now to the Figures of the drawing, there is shown therein a recorder head constructed according to the invention which includes a cylindrical housing 1, which can be provided with non-illustrated cooling ribs or vanes. Three electrical pot-shaped magnets 2, 3 and 4, a ring-shaped plate 5, a forward end plate 6 and a rear guide plate 7 are securely mounted in the housing 1 by means of screws or bolts 8. A casing 9 is located at the forward end plate 6, and a forward guide member 10 is secured by screws 11 therein. An armature plate 12 is located between the pot-shaped magnet 2 and the ring-shaped plate 5, and a second armature plate 13 is located between the pot-shaped magnets 3 and 4. The armature plates 12 and 13 are provided with anti-sticking or anti-adhesive sheets such as of phosphor-bronze, for example, which prevent adhesion thereof to the magnets 2, 3 and 4.

The pot-shaped magnets 2 to 4, the ring-shaped plate 5, the end plate 6, the guide plate 7 and the guide member 10 are formed with respective central bores through which two printing rods 14 and 15, respectively, having semicircular cross sections located opposite one another, as shown in FIG. 3, extend. The printing rods 14 and 15 are provided with stepped portions 14a, 14b and 14c, on the one hand, and 15a to 15c, on the other hand, having cross sections of reduced semicircular dimensions, respectively, the end face of the stepped portion 15a serving as a stop for the armature plate 12 of the pot-shaped magnet 2, and the end face of the stepped portion 14b serving as stop for the armature plate 13 of the pot-shaped magnet 4. The end stepped portions 14c and 15c of the respective printing rods 14 and 15 are respectively provided with a half shell 16 and 17 that extend as bearing shells in the central bore of the rear guide plate 7 and, in neutral or rest condition, extend through the bore of the restoring magnet 4 up to the armature plate 13 and form a stepped portion which serves as a stop of the armature plate 13 for the restoring magnet 4. The printing rods 14 and 15 are provided with restoring springs 18 and 19, that are secured to a stationary frame represented by the pins 24, and are located at the free end 14c and 15c outside the housing 1. The printing rods 14 and 15 are furnished at their forward end with line types 20 and 21, which are trapezoidal in longitudinal section, the printing surfaces 20a and 21a being constructed so as to correspond to the line width that is to be printed, such as 0.2 mm and 0.1 mm wide. Accordingly, due to the construction of the line type, the imprints, when both printing rods 14 and 15 are simultaneously actuated, form a row or are alignable additively without imprinting any space therebetween, and form, for example, a line of $0.2 + 0.1 = 0.3$ mm width on a record carrier 23 passed over a printing roller 22.

The operation and electrical control of such recorder heads are generally known. In the aforescribed recorder head, a restoring magnet 4 is additionally provided. As soon as the pot-shaped magnet 3 is electrically energized, the armature plate 13 engaged with the stepped portion 14b is displaced from the position thereof shown in FIG. 1 to the printing position thereof shown in FIG. 2. It is essential with respect thereto that the armature plate 13 comes into engagement with the pot-shaped magnet 3 before the printing surface 20a of

the printing rod comes into contact with the record carrier 23 so that a free over-stroke of the printing rod 14 up to the contact is achieved. After the imprint is made by the line type 20 or 21, the reversing or restoring magnet 4 is switched on and the armature plate 13 is displaced while engaged with the stop formed by the half shell 16 in direction opposite to the printing i.e., toward the top of FIG. 3.

I claim:

1. Recorder head for recording code characters by line printing comprising a cylindrical housing having forward and rearward guide means, a pair of axially displaceable printing rods of substantially equal length disposed adjacent and parallel to one another and guidable by said forward and rearward guide means, means having a line type face located at the forward end of said printing rods, respectively, the line type of said printing rods having a printing width individually and in combination one with the other which embody respectively different line thicknesses for a parallel line code; electromagnet means comprising pot-shaped printing magnets disposed one behind the other and formed with respective core bores, armature plates located adjacent and coordinated with said printing magnets, respectively, said armature plates being also formed with respective bores, said pair of printing rods extending together through said core bores of said printing magnets and said bores of said armature plates, each of said printing rods having a stop operatively engageable by a respective armature plate in response to activation of said printing magnets for axially displacing the respective printing rod into a printing position, said printing rods respectively having a semicircular cross section and being formed with stepped longitudinally extending portions having respective end faces forming the stops for the armature plates of the respective printing magnets, said electromagnet means also including a pot-shaped restoring magnet having a bore through which said printing rods extend, and abutment means mounted on an end of said printing rods and drivably engageable by a respective armature plate cooperating with said restoring magnet for displacing said printing rods to a non-printing position.

2. Recorder head according to claim 1 wherein one of said armature plates cooperating with a restoring magnet of said electromagnetic means for displacing said printing rods to said non-printing position also cooperates with one of said printing magnets for displacing said printing rods to said printing position.

3. Recorder head according to claim 1 wherein said printing rods, in said printing position, are in engagement with a record carrier, said printing rods being displaceable into engagement with the record carrier over a greater distance than the distance traversed by said armature plates for driving said printing rods into printing position.

4. Recorder head according to claim 1 wherein said line type at said forward end of said printing rods is trapezoidal in longitudinal section and has printing surfaces that imprints from said printing surfaces, when said printing rods are simultaneously actuated, form a row or are alignable additively without imprinting any space therebetween.

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