

12 **EUROPEAN PATENT APPLICATION**

21 Application number: **81302764.6**

51 Int. Cl.³: **B 41 J 9/00**

22 Date of filing: **19.06.81**

30 Priority: **09.07.80 GB 8022458**

71 Applicant: **PA Management Consultants Limited, Hyde Park House 60a Knightsbridge, London SW1X 7LE (GB)**

43 Date of publication of application: **13.01.82**
Bulletin 82/2

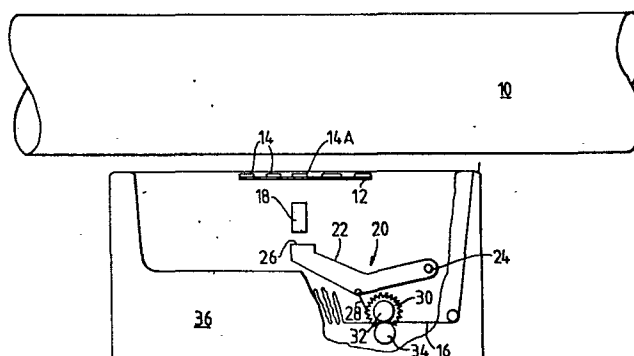
72 Inventor: **Avison, Gerald, 36 Victoria Park, Cambridge (GB)**

84 Designated Contracting States: **AT BE CH DE FR GB IT LI LU NL SE**

74 Representative: **Nash, Keith W., KEITH W. NASH & Co. 22 Hills Road, Cambridge CB2 1JP (GB)**

54 **Impact printers.**

57 An impact printer such as a typewriter, of the kind wherein the printing surface is impacted by the type face (14A) through an impregnated ribbon (16) under the drive of a hammer (18), wherein a rebound mechanism (20) is provided to absorb the kinetic energy present in the hammer when it rebounds after imprint, this mechanism comprising a pivoted rebound arm (22) driving a ratchet device (28, 30) which is coupled to a ribbon feed wheel (32) in order to increment the ribbon. The rebound mechanism may alternatively be operated by rebound energy derived from a prime mover which actuates another movable part of the printer, such as a carriage escapement mechanism, with an impulse drive. The invention is especially aimed at a low cost printer adapted for battery operation, and enables the use of a separate actuator for ribbon increment to be avoided.



-1-

Title: Impact PrintersField of the invention

This invention relates generally to printers, and more specifically but not exclusively to an impact printer having a hammer for impacting a type face against
5 a printing surface backed by a platen through the intermediary of an impregnated ribbon.

Background to the invention

In an impact printer as referred to above, it is required to advance the ribbon so that the stream of
10 type-face characters are printed through fresh sections of ribbon. More particularly, it is usual to advance the ribbon by a small increment after each imprint.

A conventional means for incrementing the ribbon is an electromagnetic actuator such as a solenoid or a
15 stepping motor which drives pinch wheels which grip the ribbon in order to advance it by the desired increment each time the actuator is operated. This conventional ribbon feed actuator is separate from the print head actuator, and has to be operated in timed relationship
20 therewith.

The provision of a separate ribbon feed actuator can be disadvantageous when a low cost printer is

required, and also when battery operation is desired, as for example in a toy typewriter or a portable typewriter which is to be capable of use in the field when a mains electric supply is not available. Indeed, 5 when battery operation is employed, a separate ribbon feed actuator will usually necessitate a separate power source and drive circuit, thus further increasing costs. Also, although the energy required to effect ribbon incrementation is in itself small, the efficiency of 10 electromagnetic actuators is low, so that each ribbon increment requires a relatively high total energy representing a considerable drain on the battery.

Object of the invention

It is an object of this invention to provide a 15 printer which does not require a separate actuator to effect ribbon feed.

The invention

According to the invention, there is provided a printer having a printing mechanism for impacting a type 20 face against a printing surface backed by a platen through the intermediary of an impregnated ribbon wherein, for incrementing the ribbon after imprint, a rebound mechanism is provided which is operated solely by the rebound energy derived from a prime mover which provides an

-3-

impulse drive to actuate a movable part of the printer,
and said mechanism is connected to a ribbon feed to
advance the ribbon by one increment each time said
mechanism is operated by the residual energy remaining
5 from said impulse drive after said movable part has been
actuated.

The prime mover may be a solenoid which actuates a
carriage escapement mechanism, such as an escapement
mechanism which acts on a carriage carrying the platen.

10 Preferably, however, the prime mover actuates a
printing mechanism which includes a hammer actuated by
the prime mover, and said rebound mechanism is operated
solely by the residual impact energy which is possessed
by the hammer as the kinetic energy of rebound after
15 impact.

Thus, in a preferred embodiment the invention makes
use of the fact that the hammer is given an initial
impact energy more than sufficient to effect the imprint.
Normally, the excess energy, which produces hammer rebound,
20 is wasted, and indeed many printers are provided with
means for reducing the rebound energy of the hammer to
zero in a controlled manner. In this embodiment
therefore, the invention thus serves for the additional
purpose of controlling hammer rebound.

It is to be understood, however, that the invention is also applicable to any printer wherein, as is usually the case, a prime mover actuating a movable part of the printer with an impulse drive provides excess
5 energy producing rebound.

Preferably the rebound mechanism acts to advance the ribbon by one increment after each imprint. For this purpose, in the preferred embodiment, said mechanism may comprise a rebound arm mounted to move when struck by
10 the hammer during rebound, and a ratchet device coupled between said arm and the ribbon feed. The ratchet device preferably comprises a ratchet tang carried by the rebound arm, and a ratchet mounted to turn coaxially with a ribbon feed wheel. The rebound arm may be mounted for
15 movement in various ways, but in a simple case said arm is pivotally mounted at one end and has a hammer impact-receiving face at the other end.

The invention is, therefore, especially suitable for an impact printer such as a typewriter wherein the
20 type face is carried by a daisy wheel and the hammer is adapted to rebound after impacting each selected character petal on the daisy wheel. In such a printer, the impregnated ribbon may be in the form of a continuous loop contained in a removable housing, and the invention

-5-

is well suited to incrementing such a continuous loop ribbon. It is to be understood, however, that the invention is also applicable to other types of printer, employing different types of printing mechanism,

5 wherein a type face is utilised to effect character imprint through an impregnated ribbon.

In the accompanying drawing:

the single figure diagrammatically shows an impact printer incorporating one embodiment of a hammer
10 rebound-actuated mechanism in accordance with the invention.

Description of embodiment

The drawing shows only the basic components of an impact printer relevant to the invention. Thus, a
15 platen 10 is shown, together with a daisy wheel 12 having character petals 14. The character petal 14A is in an operative position ready for imprinting the type face thereon through an impregnated ribbon 16 against a printing surface (not shown) backed by the
20 platen 10.

In use, the character petal 14A is impacted against the printing surface by means of a hammer 18, to which is imparted a high initial impact energy sufficient to ensure reliable and uniform printing.

Consequently, the hammer 18 rebounds, after each imprint, away from the platen 10.

In accordance with the invention, a rebound mechanism generally designated 20 and adapted to increment the ribbon 16, is provided in the path of the rebounding hammer 18 to absorb the kinetic energy therefrom, which kinetic energy represents the residual impact energy remaining from the high initial impact energy after consumption of the imprint energy.

10 The mechanism 20 comprises a rebound arm 22 pivotally mounted at one end 24, said arm having a hammer impact-receiving face 26 at its other end. The arm 22 carries a ratchet tang 28 cooperating with a ratchet wheel 30 mounted coaxially with a ribbon feed
15 wheel 32 to cause the latter to turn with said ratchet wheel 30. The feed wheel 32 is one of a pair of pinch wheels, of which the other is designated 34, adapted to grip the ribbon 16 to effect an incremental advance thereof each time the rebound arm 22 is struck by the
20 rebounding hammer 18. Although the amount of kinetic energy contained in the rebounding hammer can vary to a limited extent, the ratchet mechanism ensures equal incremental ribbon advances after each imprint.

The reference 36 denotes a removable housing for

-7-

the ribbon 16, which ribbon is in the form of a continuous loop. Conveniently, the rebound mechanism of the invention may also be covered by the housing 36, which is therefore partly cut away to enable said
5 mechanism to be shown.

The invention is not restricted to a rebound mechanism as described with reference to the drawing. It is possible, for example, to incorporate a latching spring mechanism therein to store the rebound energy
10 absorbed from the hammer, the latched spring mechanism being periodically released to increment the ribbon. In this case, the ribbon may be incremented only after each two or three imprints. While ribbon increment-
ation is preferred after each imprint, the provision of
15 an energy store in the rebound mechanism can enable utilisation of a relatively small hammer rebound energy in itself insufficient for incrementing the ribbon.

Furthermore, the invention can be applied to any printer, whether or not having daisy wheel print head,
20 wherein a movable part is impulse driven by a prime mover to provide available rebound energy. For example, said movable part may be a carriage escapement mechanism, e.g. for a carriage carrying the platen, which carriage escapement mechanism is actuated by a solenoid.

Rebound of the escapement mechanism can then be utilised to operate a rebound mechanism for effecting ribbon incrementation in accordance with the invention.

Claims

1. A printer having a printing mechanism for impacting a type face (14A) against a printing surface backed by a platen (10) through the intermediary of an impregnated ribbon (16) characterised in that, for incrementing the ribbon
5 (16) after imprint, a rebound mechanism (20) is provided which is operated solely by the rebound energy derived from a prime mover which provides an impulse drive to actuate a movable part (18) of the printer, and said mechanism is connected to a ribbon feed (32) to advance the ribbon (16)
10 by one increment each time said mechanism is operated by the residual energy remaining from said impulse drive after said movable part has been actuated.
2. A printer according to claim 1, characterised in that said prime mover is a solenoid which actuates a carriage
15 escapement mechanism.
3. A printer according to claim 2, characterised in that said carriage escapement mechanism acts on a carriage carrying the platen (10).
4. A printer according to claim 1, characterised in that
20 said prime mover actuates the printing mechanism.
5. A printer according to claim 4, characterised in that said printing mechanism includes a hammer (18) actuated by

the prime mover, and said rebound mechanism (20) is operated solely by the residual impact energy which is possessed by the hammer (18) as the kinetic energy of rebound after impact.

6. A printer according to claim 5, characterised in that
5 said mechanism (20) comprises a rebound arm (22) mounted to move when struck by the hammer (18) during rebound, and a ratchet device (28, 30) coupled between said arm (22) and the ribbon feed (32, 34).

7. A printer according to claim 6, characterised in that
10 the ratchet device (30) comprises a ratchet tang (28) carried by the rebound arm (22), and a ratchet (30) mounted to turn coaxially with a ribbon feed wheel (32).

8. A printer according to claim 6 or claim 7, characterised in that the rebound arm (22) is pivotally mounted at one end
15 (24) and has a hammer impact-receiving face (26) at the other end.

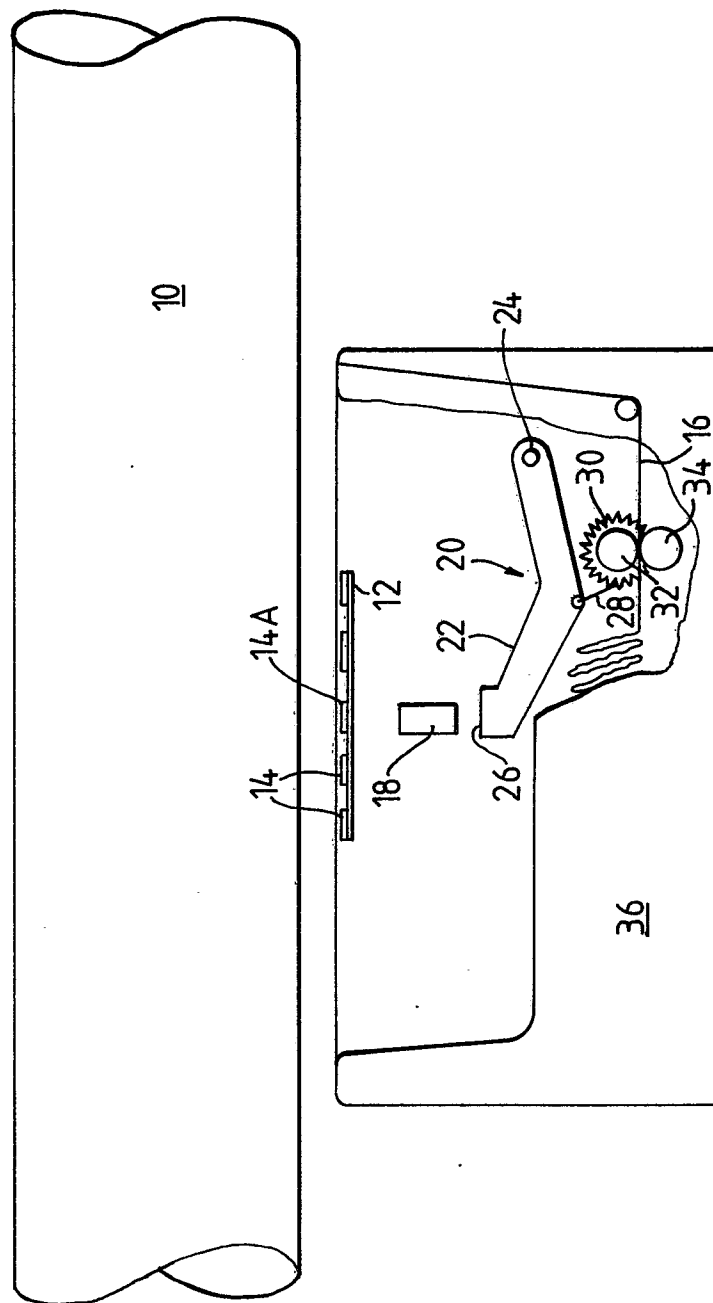
9. A printer according to any of claims 5 to 8, characterised in that the type face is carried by a daisy wheel (12) and the hammer (18) is adapted to rebound after impacting each
20 selected character petal (14) on the daisy wheel (12).

10. A printer according to any of claims 1 to 9, characterised in that the impregnated ribbon (16) is in the form of a continuous loop contained in a removable housing (36) which

0043664

-11-

also covers the rebound mechanism (20).





European Patent
Office

EUROPEAN SEARCH REPORT

0043664

Application number

EP 81302764.6

DOCUMENTS CONSIDERED TO BE RELEVANT			CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	
	No relevant documents have been disclosed. -----		B 41 J 9/00
			TECHNICAL FIELDS SEARCHED (Int. Cl.)
			B 41 J 9/00 B 41 J 33/00
			CATEGORY OF CITED DOCUMENTS
			X: particularly relevant A: technological background O: non-written disclosure P: intermediate document T: theory or principle underlying the invention E: conflicting application D: document cited in the application L: citation for other reasons
X	The present search report has been drawn up for all claims		&: member of the same patent family, corresponding document
Place of search VIENNA		Date of completion of the search 15-09-1981	Examiner KIENAST