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Ljungberg

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[54] **DUAL CARRIAGE IMPACT PRINTER WITH BELT DRIVE**

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[52] **U.S. Cl.** ..... **197/1 R;** 74/231 J; 101/93.16; 197/49; 197/82

[51] **Int. Cl.²** **B41J 19/00**

[58] **Field of Search** ..... 197/1 R, 16, 49, 82; 101/93.15, 93.16, 93.17, 93.18

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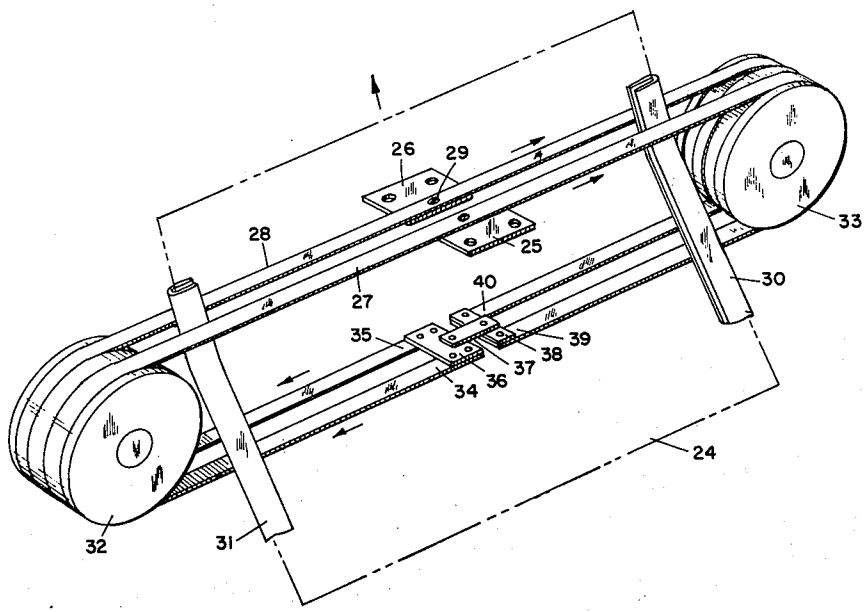
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Primary Examiner—Anton O. Oechsle
Attorney, Agent, or Firm—Alfred E. Miller

[57] **ABSTRACT**

An impact printing device in which two carriages are provided with complementary printing elements that are disposed on either side of the recording medium, such as paper. Each carriage is operatively connected to an elongated drive member and is movable thereby in the length direction of said drive members, while the paper moves in increments at right angles thereto. The carriages are arranged to be immovable with respect to each other and the driving means are belts having coupling elements that compensate for variations in belt lengths.

5 Claims, 3 Drawing Figures



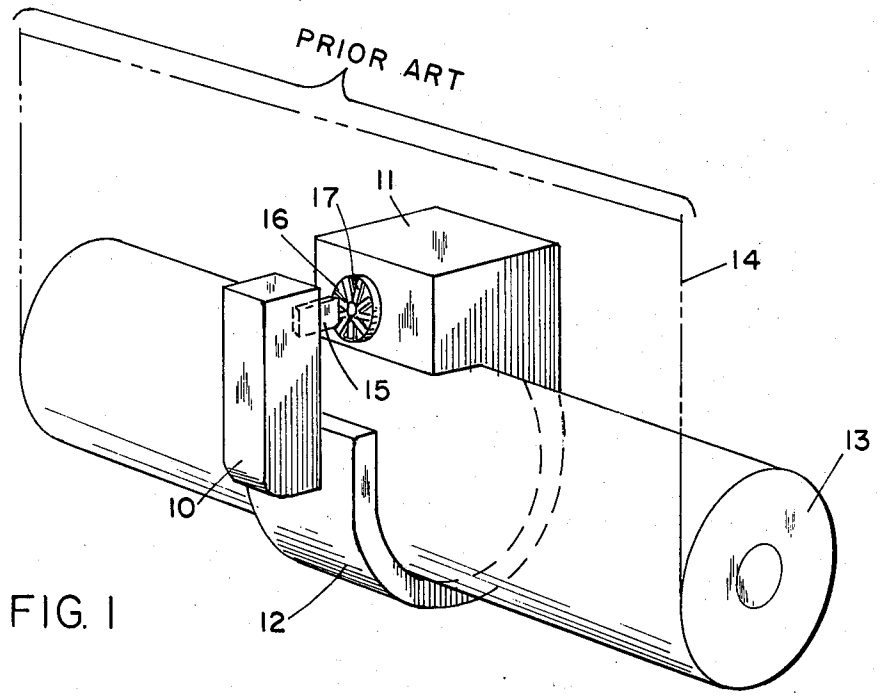

PRIOR ART
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FIG. 1

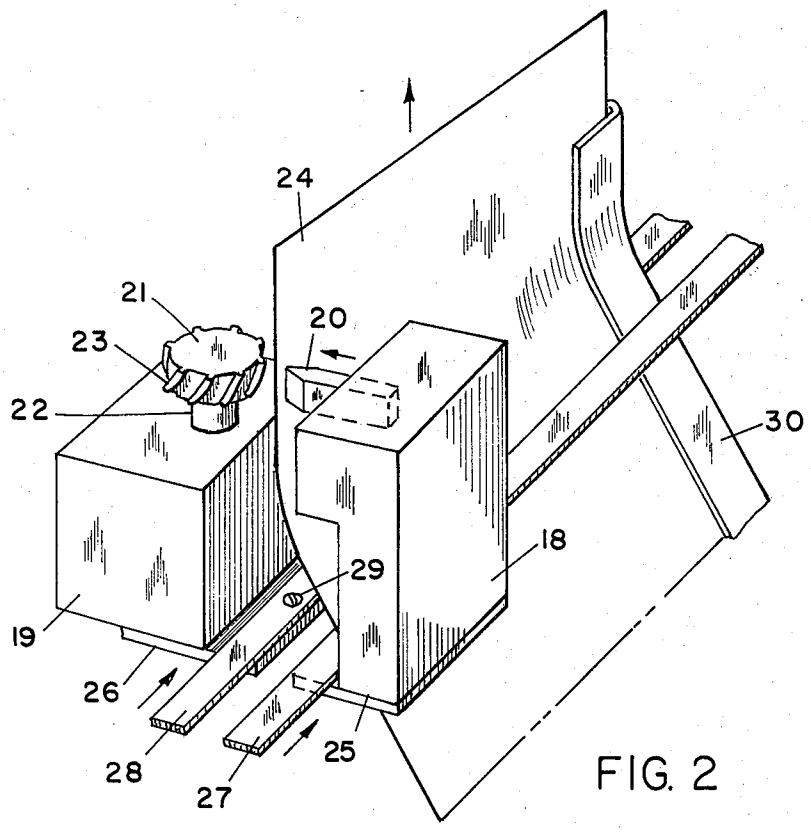

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FIG. 2

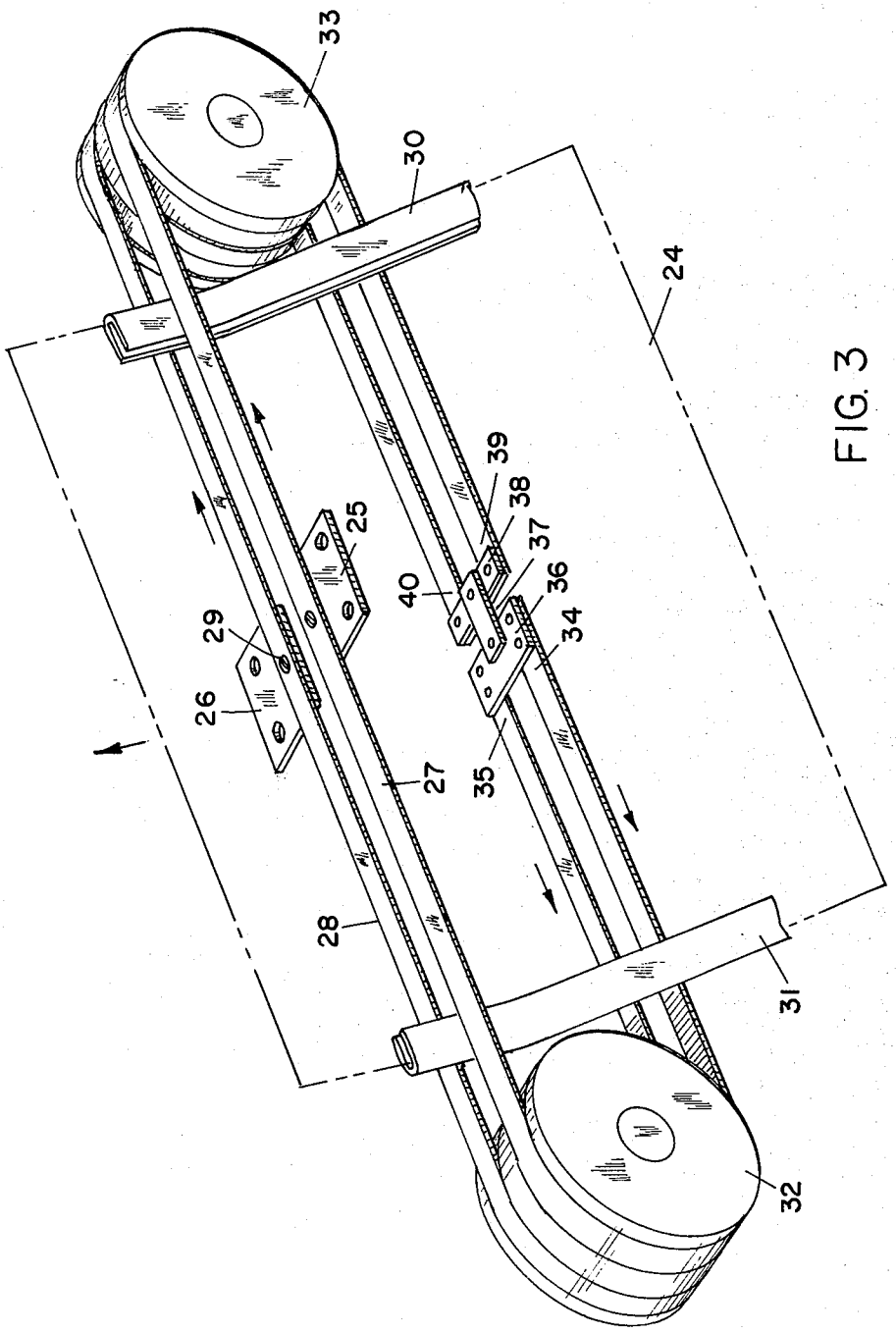


FIG. 3

DUAL CARRIAGE IMPACT PRINTER WITH BELT DRIVE

BACKGROUND OF THE INVENTION

In known impact printers one carriage is fitted with a print hammer while the other carriage is fitted with a rotating backing wheel having peripheral helical ridges. The recording medium, for example pressure-sensitive paper, is inserted between the print hammer and the wheel whereby when the print hammer strikes the paper against the ridges on the backing wheel a dot will appear on the recording paper. If the corresponding print hammer and backing wheel are accurately adjusted relative to one another, characters such as letters formed by dots will be produced when the hammer is actuated at the precise time schedule. As the characters are produced the carriages are moved in unison transversely over the recording medium. In this regard it is imperative that the carriages are rigidly connected together thereby producing the correct printed text material. In known printing devices this requirement is satisfied in that the carriages are rigidly joined together by a common support. However, this known arrangement has a serious drawback in that a recording medium in the form of endless paper cannot be used, but instead replaceable paper rolls must be frequently inserted in the apparatus.

Since there is the overriding requirement in impact printing devices of the present type that the carriages must be rigidly interconnected a satisfactory solution of utilizing endless paper therewith has not been found heretofore. Moreover, when the carriages are driven by chains, sprockets or the like, wear will soon cause misadjustment of the carriages resulting in incorrect printing.

The above-described drawbacks have been overcome by the present invention in which it is an object to provide a printing apparatus having a pair of carriages that are immovable relative to one another, and at the same time an endless recording medium can be utilized with the apparatus.

It is a further object of the present invention to provide drive members constituting endless belts, the ends of which are interconnected by coupling elements that can be adjusted to compensate for variations in belt lengths.

The invention will now be more fully described with reference to the accompanying drawings:

FIG. 1 is a perspective view in diagrammatic form of a prior art impact printing device.

FIG. 2 is a perspective view in diagrammatic form of an impact printing device constructed in accordance with the teachings of the present invention, and

FIG. 3 is a perspective view of certain details of construction of the device shown in FIG. 2 in which manner the drive members of the printing device are immovably mounted relative to each other is shown.

It should be observed that in FIGS. 2 and 3, only those parts of the device that are necessary for a complete understanding of the invention have been illustrated.

In the prior art device shown in FIG. 1 two carriages 10 and 11 are connected together by a common support 12. Roll 13 of recording medium, for example pressure sensitive paper 14, has the face end thereof passing between the carriages 10 and 11. Furthermore,

the support 12 carrying the carriages 10 and 11 can be moved forward or backwards in a direction transverse to the direction of movement of the end of the paper 14 by means of drive members (not shown). The carriage 10 is shown provided with a print hammer 15 while the carriage 11 has a rotatable wheel 16 having projections or cam surfaces 17. The paper 14 is located between the print hammer 15 and the cam surfaces 17. During the movement of the carriages over the paper 14 characters or other indicia are printed thereon. After a line has been printed, the paper 14 is incrementally spaced one line in a direction perpendicular to the direction of movement of the carriages 10 and 11.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the present invention as shown in FIG. 2 in which two carriages 18 and 19 are shown provided with a print hammer 20 and a rotating so-called helical wheel 21 respectively. The wheel 21 is secured to a shaft 22 and is provided with cam surfaces 23 co-acting with the print hammer 20. It will be observed that the recording medium, for example a pressure sensitive paper 24, runs between the print hammer and the helical wheel. Print characters can be produced on the paper in a manner explained hereinabove. A plate 25 supports the carriage 18 while a corresponding plate 26 supports the carriage 19. The aforesaid plates secure the respective carriages to drive members which in the present construction take the form of drive belts 27 and 28. It should be apparent that it is within the scope of the present invention to use ropes or somewhat flexible bars instead of the above-described belts. The latter are shown secured to the respective plates by means of screws 29.

In accordance with the teachings of the present invention, the belts 27 and 28 are immovable relative to one another and are jointly movable in their length direction in such a manner that the carriages 18 and 19 are moved in a direction substantially transverse to the direction of movement of the paper 24. As seen in FIG. 2, a guide element 30 for the paper 24 is shown provided between the belts 27 and 28. Referring to FIG. 3, a corresponding guide element 31 is shown provided at the opposite edge of the paper. In this manner the paper 24 is movably located between the belts 27 and 28 and between the printing elements on the respective carriages.

The belts 27 and 28 are shown in greater detail in FIG. 3 illustrating the arrangement whereby the belts are immoveable relative to each other. In this connection, the belts pass over the spaced drive rollers 32 and 33. The ends 34 and 35 of the belts 27 and 28 respectively are interconnected with the other ends 39 and 40 respectively by means of a coupling plate 36 having a link piece 37 connected to a yoke 38. The latter is in turn attached to the aforesaid other ends 39 and 40 of the respective belts. The manner of attachment is such that the yoke 38 may pivot slightly relative to the ends of the belts whereby different lengths or variations in belt lengths may be compensated for when the belts are placed around drive rollers 32 and 33. However, when the aforesaid belts are in place on the drive rollers the coupling plate 36 provides for the immovable relative connection of the above-described belts. Because of the present construction, skidding of the belts on the drive rollers will be of no importance, nor will wear, cooling or heating have any effect since the belts 27

and 28 are shortened or lengthened the same amount. Thus, the carriages 18 and 19 are accurately adjusted, relative to one another by the belts 27 and 28.

It is to be noted from FIG. 3 that the guides 30 and 31 are of such a shape and arrangement that the paper 24 moves between the belts 27 and 28 only on that side of the drive rollers 32 and 33 at which the carriages are located.

Other details of construction have not been shown in FIGS. 2 and 3, which are diagrammatic, since they are of known construction and form no part of the present invention. For example, either drive rollers 32 or 33 can be driven by a stepping motor. Furthermore, the paper advance at right angles to the direction of movement of the carriages can be the result of the use of stepping motors. A plurality of guides (not shown) keep the carriages 18 and 19 at a given relative distance in a direction perpendicular to the belts 27 and 28. These guides are arranged so that the carriages move therealong.

What is claimed is:

1. An impact printing device comprising in combination two spaced carriages provided with printing means, a recording medium passing between said spaced carriages, an elongated driving means for each carriage, means securing the respective driving means to each carriage, said carriages being movable in the length direction of said driving means, said recording means being adapted to be moved incrementally in a direction substantially perpendicular to the direction of movement of said carriages, said drive members being a pair of belts, coupling means interconnecting the free ends of said belts, one of said coupling means being a fixed coupling member interconnecting respective free ends of said belts and the other coupling means being a yoke interconnecting second respective free ends of said belts, and a link arm connecting said fixed coupling member and said yoke whereby variations in lengths of the two belts can be compensated for.

2. An impact printing device as claimed in claim 1 further comprising a pair of drive wheels for said drive belts, the latter passing over said wheels to form two endless loops.

3. An impact printing device as claimed in claim 2 wherein said recording medium is a pressure-sensitive paper.

4. An impact printing device as claimed in claim 3 further comprising edge guides located on opposite edges of said paper in order to ensure that said paper is positioned and selectively moved between said drive belts.

5. An impact printing device as claimed in claim 1, wherein said printing means constitutes a rotatable helical wheel provided with cam surfaces mounted on one carriage, a print hammer mounted on the other carriage and adapted to co-act with said cam surfaces, the recording medium being arranged to be moved between said helical wheel and said print hammer.

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