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Soderstrom et al.

[11] **3,791,292**

[45] **Feb. 12, 1974**

[54] **TYPE BELT FOR A BELT PRINTER**

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[73] Assignee: **The National Cash Register Company**, Dayton, Ohio

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[21] Appl. No.: **228,415**

Related U.S. Application Data

[63] Continuation of Ser. No. 40,688, May 26, 1970, abandoned.

[52] **U.S. Cl.** **101/111**

[51] **Int. Cl.** **B41j 5/08**

[58] **Field of Search** .... 101/93 C, 111, 368; 74/233, 74/237

[56] **References Cited**

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[57] **ABSTRACT**

A low-cost type belt for a belt printer which includes non-extensible tensile members formed into a continuous loop and elastomeric character blocks secured thereto. The character blocks are equally spaced from one another and encapsulate the tensile members. Each block has a printing portion on which a character is formed and a driving portion enabling it to be driven by a complementary drive pulley.

1 Claim, 3 Drawing Figures

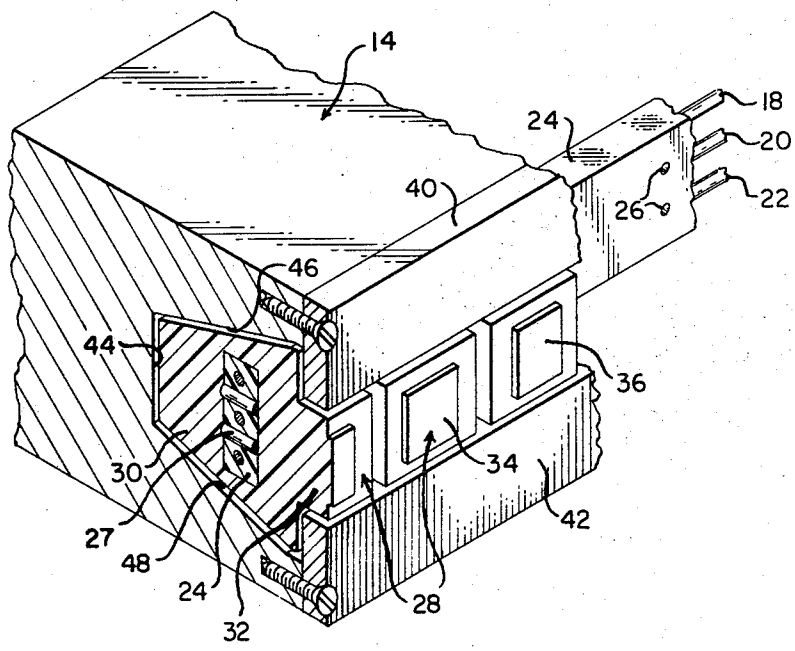


FIG. 2

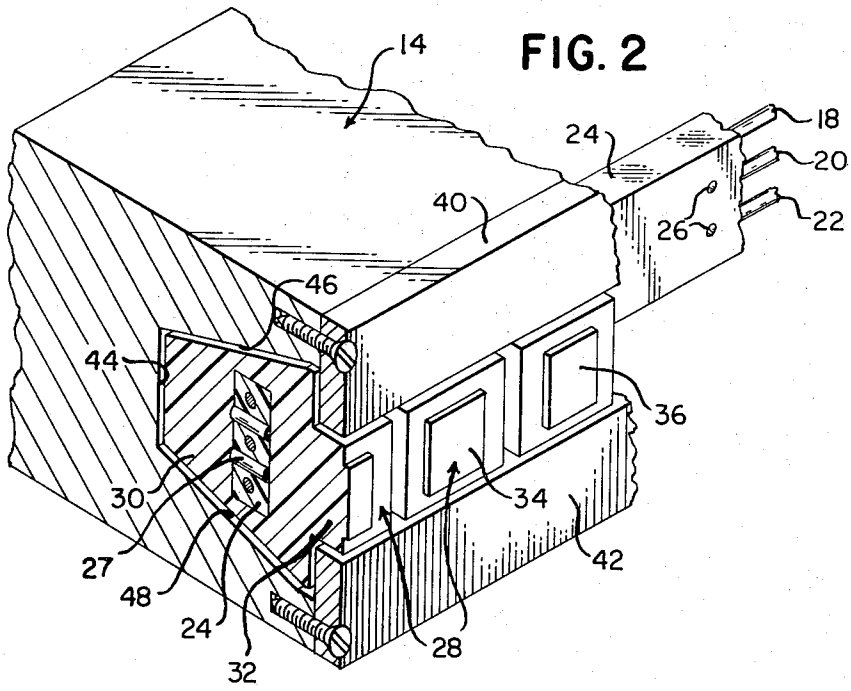


FIG. 3

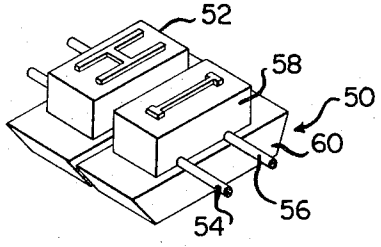
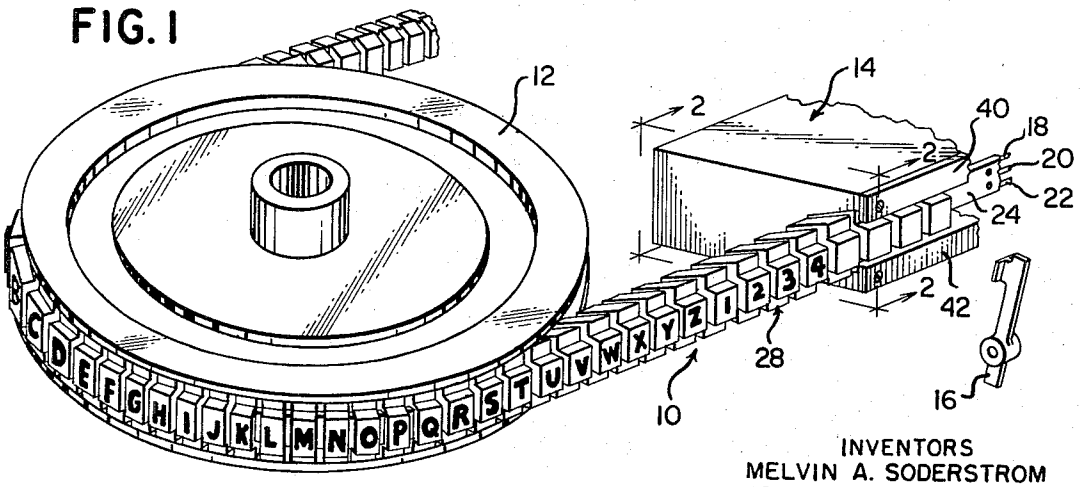


FIG. 1



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TYPE BELT FOR A BELT PRINTER

This is a continuation of application Ser. No. 40,688, filed May 26, 1970, now abandoned.

BACKGROUND OF THE INVENTION

This invention relates to a low-cost type bolt which may be used in high-speed belt printers.

One of the disadvantages encountered with prior-art type belts used in belt printers is the cost of manufacturing them. Another disadvantage is that, at times, elaborate constructions are required to absorb the impact energy during printing when the print hammers of the printer impact against the individual character blocks of the type belt.

Some of the prior-art type belts used in belt printers are shown in the following U.S. Pat. Nos: 3,041,964, which issued July 3, 1962, on the application of Victor R. Simpson et al.;

3,113,509, which issued Dec. 10, 1963, on the application of Victor R. Simpson;

3,133,497, which issued May 19, 1964, on the application of Claude Raymond Marie Martin;

3,142,249, which issued July 28, 1964, on the application of Rentaro Sasaki;

3,188,947, which issued June 15, 1965, on the application of Walter Griffin Paige;

3,216,348, which issued Nov. 9, 1965, on the application of Kenneth F. Oldenburg et al.;

3,224,366, which issued Dec. 21, 1965, on the application of James M. Cunningham; and

3,402,657, which issued Sept. 24, 1968, on the application of John T. Potter et al.

Another prior-art type belt is shown in the British Pat. No. 1,161,765, which was published on Aug. 20, 1969.

In applicants' type belt, the character blocks included in the belt function as both the driving element and the impact-absorbing member. Because of the simplified construction, the belt may be economically produced. The cross-sectional design of the individual character blocks of the belt provide for quad-directional containment of the block during impact by the print hammers of a printer.

SUMMARY

This invention relates to a low-cost type belt which is used in a belt printer. The belt includes low-cost character blocks or type members which are molded around a dimensionally-stable endless band. In one embodiment, the band is a non-extensible elastomeric band reinforced with metal cables, and, in another embodiment, the character blocks encapsulate a pair of spaced metal cables which are formed into an endless band. The character blocks are formed from an elastomeric material and have drive portions and type portions. The drive portions are compatible with drive pulleys, and the type portions contain the characters to be printed.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a general perspective view of the type belt of this invention used in a belt type printer.

FIG. 2 is an enlarged, perspective view, partly in cross-section, of the type belt and is taken along the line 2—2 of FIG. 1 to show additional details of the belt.

FIG. 3 is a general perspective view of a second embodiment of the type belt of this invention, showing only a few character blocks.

DETAILED DESCRIPTION OF THE INVENTION

The type belt of this invention is shown in a belt printer environment in FIG. 1. The belt, designated generally as **10**, is mounted on a drive pulley **12** and an idler pulley (not shown but similar to the pulley **12**) to form an endless belt, as is typically done in belt printers. The belt passes through a guide member **14**, where printing is effected by print hammers **16**. Because the controls for actuating the print hammers **16** in timed relationship with the belt **10** to effect printing do not form a part of this invention, they are not shown, and consequently any convenient controls may be used.

The construction details of the belt **10** are shown in FIGS. **1** and **2**. The belt **10** includes a plurality of non-extensible cables **18, 20,** and **22,** which are encapsulated by a layer of plastic, like polyurethane, which forms a band **24,** which has the general rectangular shape shown in cross-section in FIG. **2**. The band **24** has a plurality of pairs of spaced holes **26,** which are positioned on opposed sides of the cable **20**. Each of these pairs of holes **26** locates a character block or type member to be affixed to the belt **10**.

The construction of the character blocks designated generally as **28** is best shown in FIG. **2**. Each character block **28** has a drive portion **30** and a print portion **32**. The drive portion **30** has an isosceles trapezoidal shape in cross-section, and the print portion **32** has a rectangular shape in cross-section. Individual characters for the character blocks are formed on the individual faces like **34** and **36** thereof. The character blocks **28** are integrally formed around the band **24,** and portions **27** of the blocks pass through the holes **26** located in the band **24,** so as to help secure the individual blocks to specific locations on the band **24**. The character blocks are identical in size and are equally spaced from one another by a fixed distance to impart flexibility to the belt **10**. The blocks **28** are made of a plastic material, like polyurethane, which is molded around the band **24** to make an integrally-formed assembly. The ends of the band **24** (not shown) are cut at an angle or are spliced so as to maintain a constant area cross-section and several of the character blocks **28** are used to encapsulate the spliced joint to secure the ends of the belt **10** together.

When the type belt **10** is installed in a belt printer, the belt is guided in a horizontal direction by the guide member **14,** whose internal cross-section complements the cross-section of the character blocks **28**. The guide member **14** has removable face plates **40** and **42** (FIG. **2**), which facilitate the insertion of the belt **10** into the guide member.

The particular cross-sectional shape of the character blocks **28** enables them to be contained in four directions while being guided through the guide member **14**. The back face of the character block **28** abuts against the back face **44** in the recess of the guide member **14** when a hammer **16** impacts against the face **34** of a character block **28,** and, similarly, the upper and lower tapered faces of the block may be wedged against the upper and lower faces **46** and **48** of the recess (FIG. **2**), respectively, during impact. Because the character blocks **28** are made of elastomeric material, they function as impact-absorbing members. When rebounding

after impact, the character blocks **28** are restrained from moving towards the print hammer **16** by the face plates **40** and **42.**

In addition to functioning as impact members, the character blocks **28** also function as driving elements for the belt **10.** Because the cross-sectional shape of the driving portion of each character block is an isosceles trapezoid, the driving portions **30** can be driven by an ordinary "V"-type drive pulley **12** or a timing pulley to enable the belt **10** to be positively driven.

A second embodiment of the type belt of this invention is shown in FIG. **3** and is designated generally as **50.** The belt **50** includes a plurality of character blocks **52,** which have the same general cross-section as the character blocks **28.** The belt **50** includes two spaced parallel, non-extensible cables **54** and **56,** which form the support structure for the belt. The character blocks **52** are molded around the cables **54** and **56** to encapsulate them. The blocks **52** have a print portion **58** and a drive portion **60,** which function in the same manner as their counterparts in the character blocks **28,** previously described. The character blocks **52** are identical in size, are made of the same plastic material used in the blocks **28,** and are equally spaced from one another to provide flexibility to the belt **50.** The belt **50** may be used in a printer environment similar to that shown in FIG. **1.** The cables **54** and **56** in the belt **50** are multi-stranded metal cables and are located in an imaginary plane passing through the plane where the printing portion **58** and the driving portion **60** of a character block meet. The ends of the cables **54** (which may be stranded) are spliced together, or overlapped, and are encapsulated by several character blocks; the same is true for the ends of the cable **56.** While the portions **60** and **30** of the character blocks have been called driving portions relative to their representative print portions, it is apparent that these portions can also be called driven portions with reference to the drive pulley **12.**

What is claimed is:

1. A high speed printer comprising:

a driving pulley, a driven pulley, and an endless type belt mounted thereon;

a guide member fixed to said printer to slidably receive said type belt as it is driven therepast in a feeding direction by said driving pulley;

a print hammer means located opposite said guide member to impact against said type belt to effect printing on a record medium positioned therebetween;

said type belt comprising:

a dimensionally-stable elastomeric band having a rectangular cross section and being formed into a continuous loop and having a plurality of spaced metallic tensile cables imbedded therein to reinforce said band;

said band having a plurality of pairs of holes therein to define type member locations;

a plurality of elastomeric type members secured to said band at said type member locations, with each said type member completely surrounding a portion of said band and adhering thereto and having portions integral therewith passing through the associated pair of holes to assist in fixing the location of the type member on said band;

each said type member having a printing portion and a driven portion with said driven portion having a cross-sectional shape in the form of an isosceles trapezoid as viewed along a section line including the cross section of said band, with the longer of the two parallel sides of said trapezoid being adjacent to the print portion of the associated type member so as to enable the driven portions to be driven by said driving pulley which has a complementary shape in cross section to receive the driven portions of said type members; and with said elastomeric band being located in said driven portions;

said guide member comprising a block member having a recess in one side thereof with said recess having a cross-sectional shape in the form of an isosceles trapezoid to slidably receive said driven portion of said type members therein;

each said driven portion having two faces lying substantially in a common plane including said longer side and said one side of said guide member;

said guide member also having plates detachably secured to said one side and aligned with said two faces to prevent rebounding of the type member when said print hammer means impacts against the associated printing portion, which printing portion extends from the associated driven portion beyond said two faces and plates.

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