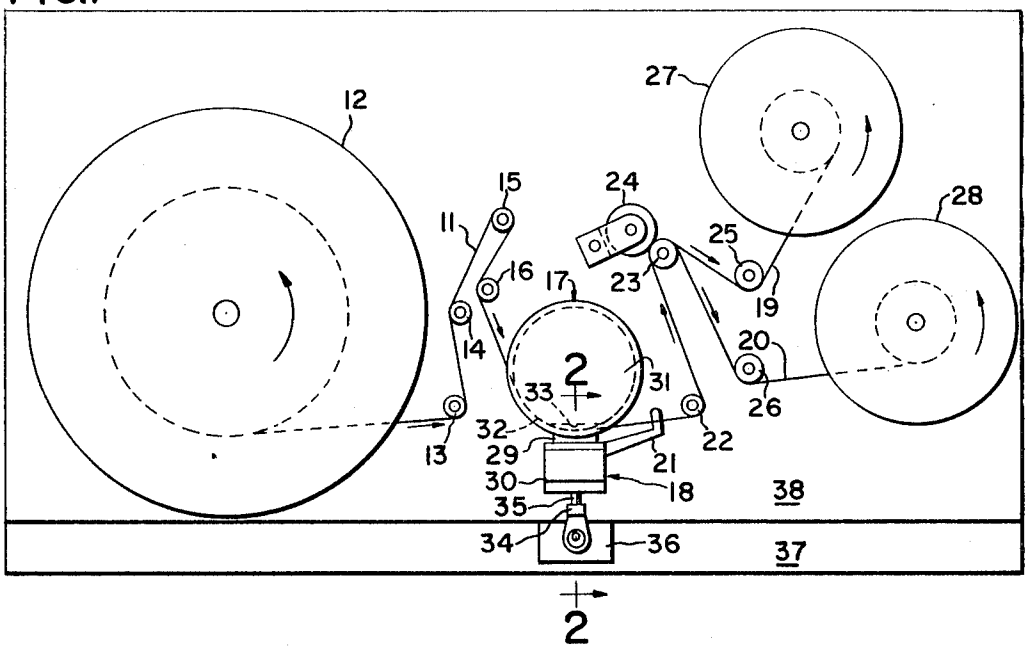
Aug. 9, 1966 W. J. WAITZMAN 3,264,923

TAPE APPARATUS

Filed Feb. 15, 1965

FIG.1



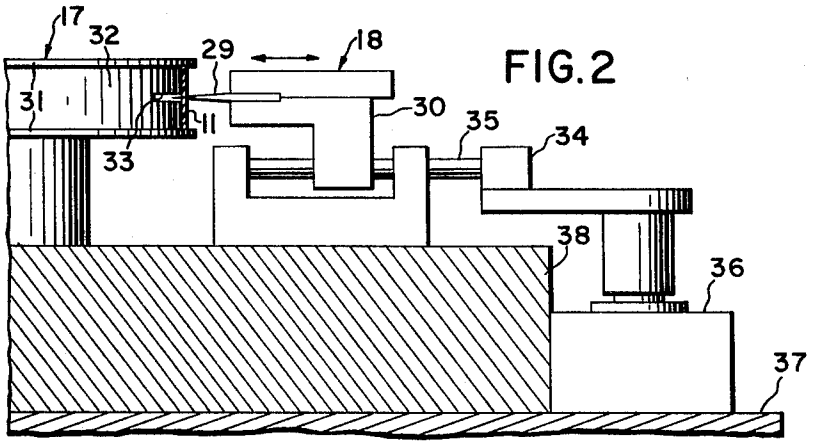


FIG.2

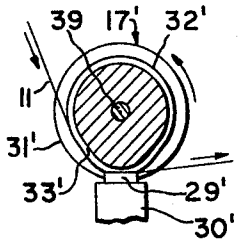


FIG.3

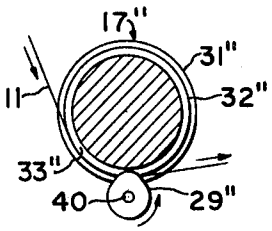


FIG.4

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TAPE APPARATUS

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This invention relates generally to tape apparatus and particularly to improved tape apparatus for slitting a tape lengthwise into portions of predetermined width.

Magnetic tape is widely used by industry for recording information in computing systems. It sometimes becomes necessary or desirable to slit such tape lengthwise into portions of predetermined width. For example, when tape of a given large width is no longer suitable for industrial applications, it could conveniently be slit into portions of smaller width, for subsequent use in magnetic tape recorders of the type commonly employed for home entertainment purposes.

In those tape slitter apparatus characteristic of the prior art, the tape to be slit is normally fed from a supply reel, past a slitting means having a cutting edge fixedly positioned in the path of the advancing tape which divides the tape into lengthwise portions of predetermined width, and finally to a pair of take-up reels. After a relatively short period of use, however, it has been observed that the cutting edge becomes overheated and in general is no longer suitable for use.

It has been found, according to the teachings of the present invention, that if there is a slow relative movement between the cutting edge of the slitting means and the tape in a plane which intersects the tape lengthwise, as the tape is fed from the supply reel to the take-up reels, the cutting edge is not overheated, and its useful life greatly extended. In a preferred embodiment the slitting means includes an ordinary, good quality double-edge safety razor blade retained in a metallic holder, such as brass or some other material which can operate effectively as a heat sink, that covers approximately 90% of the blade area. The cutting edge is reciprocated slowly within the tape at a predetermined speed by means of an eccentric drive motor connected to the slitting means through suitable linkage. The exact operating principle is not clearly understood. However, the slow travel of the blade movement within the tape acting as a shearing action and the large area of the blade contained within a metallic holder acting as a heat sink to dissipate any undue heat buildup within the cutting edge are believed to be cooling the cutting edge thereby leading to its greatly extended lifetime.

In an alternate embodiment of the present invention the tape is moved relative to the cutting edge as it is advanced from the supply reel to the take-up reels. In still other embodiments, the cutting edge may be cam shaped or circular and rotated through the advancing tape.

Accordingly, the principal object of the present invention is to provide a tape slitter of improved operating characteristics, and which has a greatly extended lifetime.

One feature of the present invention is the provision in a tape slitter having a cutting edge interposed in the path of the advancing tape, of means for causing relative movement between said cutting edge and said tape in a plane which intersects said tape lengthwise, as said tape is being advanced.

Another feature of the present invention is the provision in a tape slitter having a cutting edge interposed in the path of the advancing tape, of means for causing relative movement of said cutting edge within said tape in a plane which intersects said tape lengthwise, as said tape is being advanced.

Still another feature of the present invention is the provision in a tape slitter having a cutting edge interposed in the path of the advancing tape, of means for causing relative movement of said tape along said cutting edge, as said tape is being advanced.

Further objects and advantages of the present invention will become apparent to those skilled in the art to which the invention pertains as the ensuing description proceeds.

The features of novelty that are considered characteristic of this invention are set forth with particularity in the appended claims. The organization and method of operation of the invention itself will best be understood from the following description when read in connection with the accompanying drawing in which:

FIG. 1 is a plan view of a preferred embodiment of the present invention;

FIG. 2 is an enlarged cross-sectional view taken along the lines 2—2 of FIG. 1;

FIG. 3 is an alternate embodiment of the novel slitting means of the present invention; and,

FIG. 4 is another alternate embodiment of the novel slitting means of the present invention.

Referring now to the drawing, FIG. 1 shows a preferred embodiment of the present invention. The tape 11 to be slit is fed from a supply reel 12 around a series of guide rollers 13–16 and pulled over a guide block 17 which is so constructed to receive a tape of given width. As will be described in more detail below, the novel slitting means 18 of the present invention is spaced from the guide block 17 and divides the tape 11 into lengthwise portions 19, 20. The slit tape passes over a spreader 21 and around a guide roller 22 to a capstan 23. The capstan 23 drives the tape 11 at a predetermined speed. In a typical embodiment the tape is driven at approximately 100 feet per minute, although even higher speeds are possible without adverse effect. A pinch roller 24 associated with capstan 23 brings the tape 11 into drive engagement with capstan 23. The tape portions 19, 20 are pulled over the guide rollers 25, 26 and wound onto take-up reels 27, 28 respectively.

As best seen in FIG. 2 the slitting means 18 includes a cutting member 29, for example, an ordinary, good quality double-edge safety razor blade, having its cutting edge interposed in the path of the advancing tape 11. Cutting member 29 is removably held within a brass holder 30 which covers a substantial portion of the cutting member surface area. The guide member 17 is provided with flanged ends 31 to assure proper alignment of the tape 11 with respect to the cutting member 29, a smooth outer surface 32 over which tape 11 may be advanced and a channel or groove 33 within surface 32 for receiving the cutting edge of cutting member 29. The slitting means 18 is operatively connected by any suitable mechanical or other linkage means 34 which may include a rod link 35 to an eccentric drive motor 36.

The entire apparatus is illustrated as being mounted on a table 37, with the guide block 17, slitting means 18 and linkage means 34 supported on a mounting base 38. In operation, the tape 11 to be slit is fed from the supply reel 12 around the series of rollers or guides 13–16 and pulled over the stationary guide block 17. The edge of the cutting member 29, after initial interposition in the path of advancing tape, is moved back and forth slowly within the tape at a predetermined speed by means of the eccentric drive motor 36. In an actual embodiment constructed the blade moves a distance of approximately $\frac{3}{32}$-inch of total travel. This is accomplished at a rate of speed of one complete cycle every two minutes.

The slit tape portions 19 and 20 now pass over the spreader 21 to the capstan 23 where pressure is applied

by pinch roller 24. From there the slit tape portions 19, 20 are fed over the guides 25, 26 and wound onto separate take-up reels 27, 28 respectively.

FIG. 3 discloses an alternate embodiment of the present invention in which the guide member 17' is provided with a cam-shaped outer surface 32' over which tape 11 may be advanced, and a peripheral groove 33' within the surface 32' for receiving the cutting edge of a fixed, cutting member 29' removably retained within a holder 30'. The guide member 17' is mounted on the shaft 39 of a motor (not shown). Upon rotation of guide member 17', tape 11 may be removed relative to the cutting edge of the fixed cutting member 29', as the tape is being advanced.

In still other embodiments, the cutting member 29'' may be mounted on the shaft 40 of the motor (not shown) and may have a circular or as illustrated in FIG. 4, a cam-shaped cutting edge. Upon rotation or oscillation of the cutting member 29'', the cutting edge is moved relative to the tape 11.

It would be within the spirit and scope of the present invention to employ more than one cutting member to slit the tape into more than two positions. Since many changes can be made in the above construction and many apparently widely different embodiments of this invention could be made without departing from the scope thereof, it is intended that all matter contained in the above description or shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

While the above detailed description has shown, described and pointed out the fundamental novel features of the invention as applied to various embodiments, it will be under stood that various omissions and substitutions and changes in the form and details of the device illustrated may be made by those skilled in the art, without departing from the spirit of the invention. It is the intention, therefore, to be limited only as indicated by the scope of the following claims.

What is claimed is:

1. A tape slitter adapted to slit a tape, advanced from a supply source to a take-up unit, lengthwise into portions of predetermined width comprising:

a guide member having a surface over which said tape is advanced in its path from said supply source to said take-up unit;

slitting means having a cutting edge interposed in the path of the tape between said supply source and said take-up unit and projecting into said guide member, said surface being provided with a channel for receiving said cutting edge, said guide member surface being cam-shaped; and

means operatively connected to said guide member for causing movement of said guide member with respect to said cutting edge as said tape is advanced from said supply source to said take-up unit, thereby causing relative movement of said tape along said cutting edge as said tape is advanced from said supply source to said take-up unit.

2. A tape slitter adapted to slit tape, advanceable from a supply source to a take-up unit, lengthwise into portions of predetermined width, said tape slitter comprising:

a guide member having a curved surface portion over which said tape is advanced in its path from said supply source to said take-up unit, said curved surface portion including a clearance channel for receiving a cutting edge;

means operatively connected to said tape for advancing said tape from said supply source to said take-up unit, said last named means causing a portion of said tape to huggingly engage said curved surface portion;

slitting means including said cutting edge, said cutting edge being disposed to partially project through said tape into said clearance channel, the portion of said cutting edge projecting through said tape being substantially symmetric with respect to the radius of curvature of the tape portion engaging said curved surface portion and the center of said cutting edge portion; and

means for relatively moving said cutting edge along said radius of the curvature with respect to the tape portion huggingly engaging said curved surface portion as the tape is advanced from said supply source to said take-up unit.

3. A tape slitter adapted to slit a tape, advanceable from a supply source to a take-up unit, lengthwise into portions of predetermined width, said tape slitter comprising:

a guide member having a curved surface portion over which said tape is advanced in its path from said supply source to said take-up unit, said curved surface portion including a clearance channel for receiving a straight cutting edge;

means operatively connected to said tape for advancing said tape from said supply source to said take-up unit, said last named means causing a portion of said tape to huggingly engage said curved surface portion;

slitting means including said straight cutting edge, said cutting edge being disposed to project partially through said tape into said clearance channel and being oriented to extend substantially perpendicular to the radius of curvature passing through the center of the tape portion through which said cutting edge projects; and

means for moving said straight cutting edge relative to the tape portion huggingly engaging said curved surface portion along a direction substantially perpendicular to said cutting edge.

4. A tape slitter adapted to slit a tape, advanceable from a supply source to a take-up unit, lengthwise into portions of predetermined width, said tape slitter comprising:

a guide member having a curved surface portion over which said tape is advanced in its path from said supply source to said take-up unit, said curved surface portion including a clearance channel for receiving a straight cutting edge;

means operatively connected to said tape for advancing said tape from said supply source to said take-up unit, said last named means causing a portion of said tape to huggingly engage said curved surface portion;

slitting means including said straight cutting edge, said cutting edge being disposed to partially project through said tape into said clearance channel and being oriented substantially perpendicular to the radius of curvature of the tape portion huggingly engaging said curved surface portion which forms a right angle with said cutting edge; and

means cooperating with said slitting means for radially reciprocating said cutting edge along the direction of said radius of curvature as the tape is advanced from said supply source to said tape-up unit.

5. A tape slitter adapted to slit a tape, advanceable from a supply source to a take-up unit, lengthwise into portions of predetermined width, said tape slitter comprising:

a guide member having a curved surface portion over which said tape is advanced in its path from said supply source to said take-up unit, said curved surface portion including a clearance channel for receiving a cutting edge;

means operatively connected to said tape for advancing said tape from said supply source to said take-up unit, said last named means causing a portion of said tape to huggingly engage said curved surface portion;

slitting means including said cutting edge which is of cam-shaped configuration, said cutting edge being disposed to partially project through said tape into said clearance channel and being rotatably mounted with respect to said slitting means; and

means for rotating said cam-shaped cutting edge as the tape is advanced from said supply source to said take-up unit to thereby move the active portion of said cutting edge along a direction which is substantially perpendicular to the direction of motion of the tape portion being slit.

6. A tape slitter adapted to slit a tape, advanceable from a supply source to a take-up unit, lengthwise into portions of predetermined width, said tape slitter comprising:

a rotatable guide member having a cam-shaped curved surface over which a portion of said tape is advanced in its path from said supply source to said take-up unit, said curved surface including a clearance channel for receiving a cutting edge;

means operatively connected to said tape for advancing said tape from said supply source to said take-up unit, said last named means causing a portion of said tape to huggingly engage a portion of said curved surface;

slitting means including said cutting edge, said cutting edge being disposed to partially project through said tape into said clearance channel and being shaped

substantially symmetric with respect to the radius of curvature of the tape portion engaging said curved surface portion and passing through the center of portion of the cutting edge projection through said tape; and

means for rotating said guide member as the tape is advanced from said supply source to said take-up unit to thereby radially move said tape with respect to the center of rotation of said guide member.

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