

- [54] **PUNCHED-TAPE UNWINDING DEVICE**
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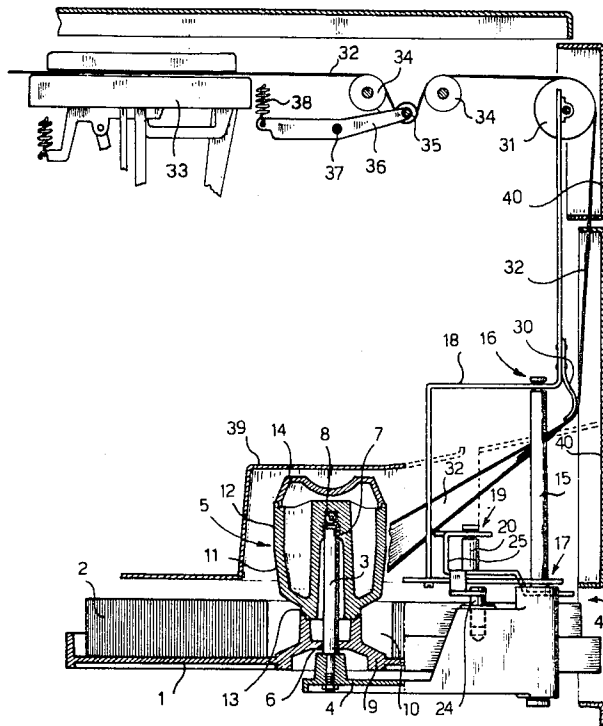
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- [58] Field of Search.....242/55, 55.18, 55.21

[57] **ABSTRACT**

A tape unwinding device having a turntable supporting a reel of tape that has a central opening and is removed from the turntable by the innermost turn in said central opening at an angle to the turntable, and a turntable hub having an annular recess of height substantially equal to the tape width and a frusto-conical tape guide section above the recess. The minor diameter of the frusto-conical section is adjacent the recess, and its apex angle is substantially coincident with the exit angle formed by the innermost turn of tape with the turntable axis during exit in the absence of said hub.

- [56] **References Cited**
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5 Claims, 3 Drawing Figures



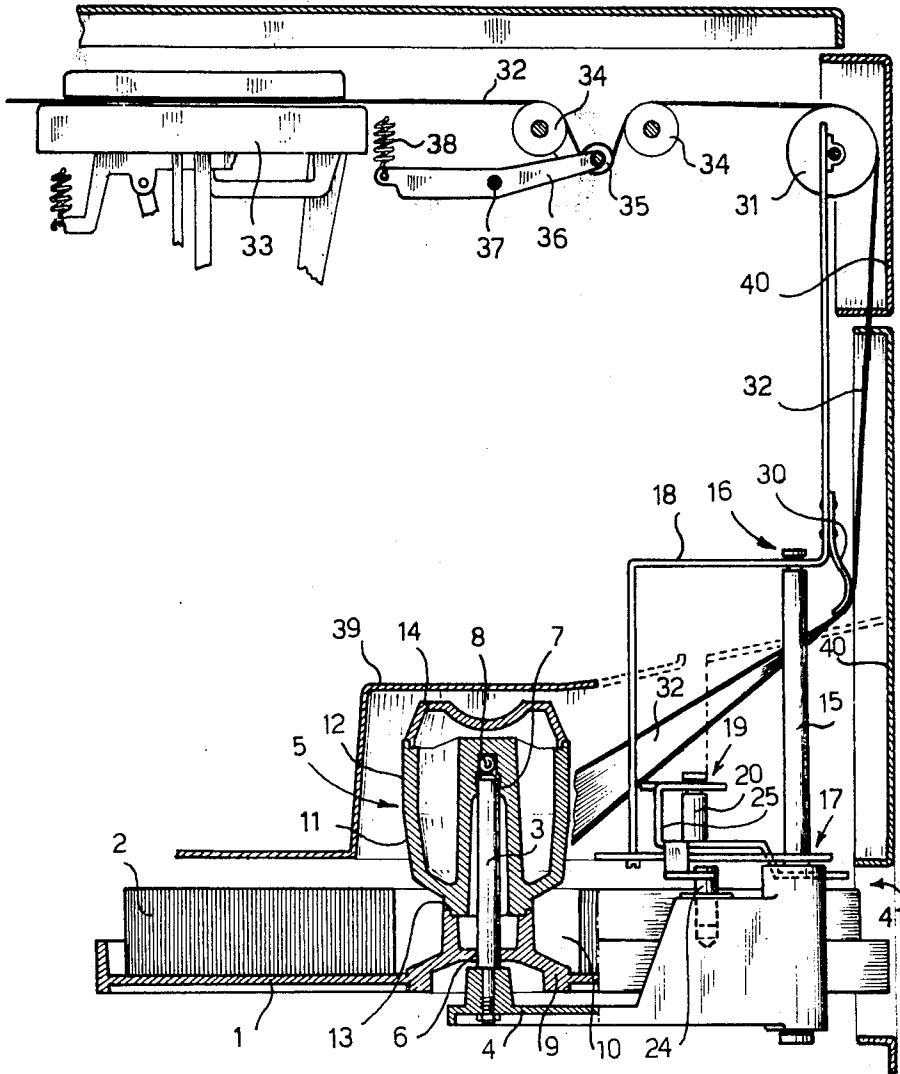


FIG. 1

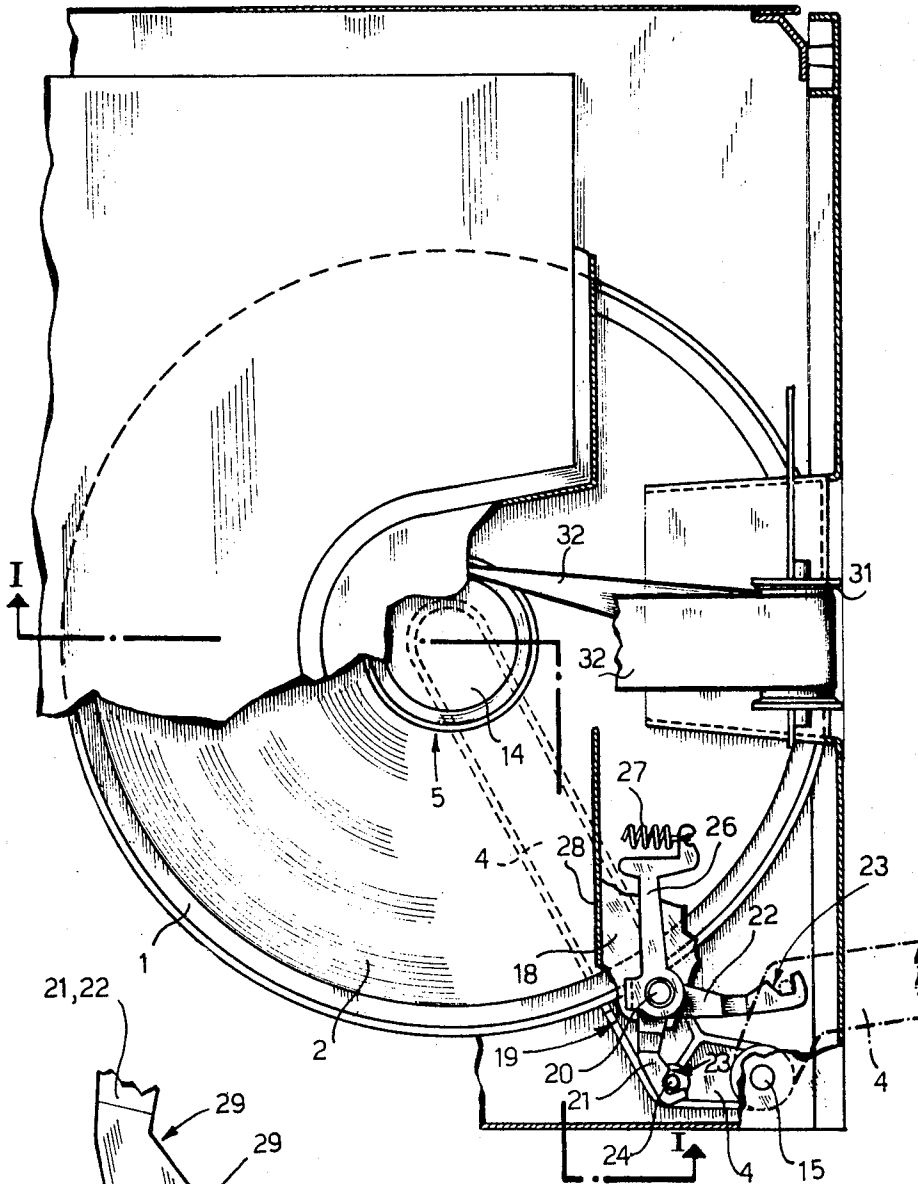


FIG. 2

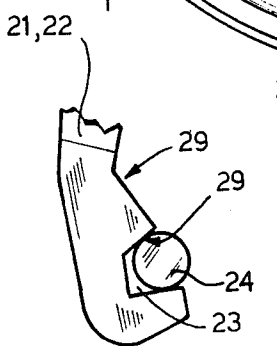


FIG. 3

PUNCHED-TAPE UNWINDING DEVICE**BACKGROUND OF THE INVENTION**

This invention relates to a punched-tape unwinding device which may be used to feed a tape reader, for example, and which enables high feed speeds of the tape to be attained without the occurrence of damage or rupture of the tape.

As is well known, the unwinding operation of a reel of an already punched tape, intended for feeding a tape reader, is accomplished by pulling appropriately on the innermost turn of tape of the reel and simultaneously allowing the reel to rotate. The tape, coming from the inside of the reel is guided on guide members such as rollers or shoes, on which it can slide under the action of the pull applied thereto by suitable entrainment means.

In the middle portion of the reel there is provided a cylindrical recess of diameter corresponding to that of the core of the winding device on which the reel has been wound and, therefore, unwinding of the tape will start from turns which are at a certain distance from the axis of the reel. In known unwinding devices, in order to attain regular unwinding of the tape, inside the aforementioned cylindrical recess of the reel a pin is normally provided, which serves the purpose of guiding the tape from the reel to the guide members, so as to avoid, so far as possible, damage or rupture of the tape.

However, these known devices have not proved fully satisfactory, inasmuch as, particularly with high unwinding speeds of the tape, feeding of the same becomes difficult and often damage or rupture does occur.

The object of the present invention is to overcome this problem.

SUMMARY OF THE INVENTION

According to the present invention, there is provided a punched-tape unwinding device comprising a turntable for supporting a reel of tape of predetermined width and having a hub adapted to be inserted inside the central hole of the reel, the hub comprising an annular recess whose height is substantially equal to the width of the tape, a section immediately above the recess and a cylindrical section of small height compared with the width of the tape immediately above the surface of the turntable on which the reel rests.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be described in more detail, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a side view, partly in section, of an unwinding device embodying the invention as well as of some components of a tape reader fed by the device;

FIG. 2 is a plan view, partly in section, of the device of FIG. 1, and

FIG. 3 illustrates a detail of a lever of the device.

DESCRIPTION OF A PREFERRED EMBODIMENT

The unwinding device comprises a turntable 1 on which a tape reel 2 is disposed, the turntable 1 being free to rotate about a pin 3 of a lever 4 which supports the turntable. The turntable 1 is provided with a hub 5 whose height is considerably greater than the width of

the tape of the reel 2. This hub 5 has two spaced sliding bearings 6 and 7, which support the turntable 1 radially. For supporting the axial load a ball 8 is provided between the top of the pin 3 and the hub 5.

The outer surface of the hub 5 is of such a shape as to form a cylindrical section 9 of small height, an annular recess 10, a frustoconical section 11 and a cylindrical section 12. The outside diameter of the cylindrical section 9 is slightly greater than that of the minor base of the frusto-conical section 11.

Preferably, the hub 5 is formed from thermoplastic material by injection moulding and can comprise two separate portions (one of which is integral with the turntable 1) united in any suitable manner at a joint 13. Inside the hub 5 a number of cavities is provided, as seen in FIG. 1, which are necessary for correct shaping of the same; finally, the hub is closed at the top by means of a cap 14.

The lever 4 is pivotally mounted, at one of its ends, on a rod 15 which is fastened to the frame 18 of the device at 16 and 17. Another lever 19, which is pivotally mounted on the same frame 18 by means of a pin 20, comprises two arms 21 and 22 (FIG. 2), whose ends are provided with recesses 23 adapted for cooperation with a projection or pin 24 of the lever 4. A bridge 25 (FIG. 1) of the lever 19 connects the arms 21 and 22 of the lever 19 with an anchor 26 (FIG. 2) which is biased by a coil spring 27 towards a wall 28 of the frame 18; this wall acts as a stop for the anchor 26.

On each arm 21 and 22, in correspondence with the recess 23, a pair of sloping surfaces 29 is provided (FIG. 3), on which the pin 24 is adapted to slide, in a manner to be explained below.

To the frame 18 (FIG. 1) a shoe 30 and a roller 31 are secured, which define the path for the tape 32 which is unwound from the reel 2. The tape, when it has gone some distance from the reel, follows a direction substantially perpendicular to that of the support plane of the turntable 1.

The tape 32 is fed to a tape reader 33, running over guide rollers 34 and a tension roller 35 carried by a tensioning lever 36, which is pivotally mounted on the frame in 37 and pulled by a coil spring 38.

Preferably, the device is enclosed within a housing comprising, for instance, a cowl 39 and side panels 40 which leave an aperture 41 through which the turntable 1 can pass, in a manner to be explained below.

Operation is as follows.

Assume first that the device is in the position shown in the drawings, i.e., wherein the turntable 1 is enclosed within the housing and the pin 24 of the lever 4 is engaged inside the recess 23 of the arm 21 (FIG. 2). The spring 27, which biases the lever 19 anti-clockwise in FIG. 2, generates sufficient force to maintain the lever stationary in the position shown. The tape 32, unwound from the reel 2, is caused to pass over the shoe 30 (FIG. 1) and the rollers 31, 34 and 35, until it is brought, beyond the tape reader 33, into the nip of entrainment rollers (not shown). The path followed by the tape, from the unwinding device to the reader 33, is shown by a thicker line in the drawings.

When entrainment of the tape 32 takes place, the tape is partially wound round the hub 5, the latter rotating together with the turntable 1. In the annular recess 10 several turns or loops of tape are collected; how-

ever, these turns are spaced lightly from one another, as contrasted with the outermost turns of tape which are tightly wound. Starting from the innermost turn of the slightly spaced turns, the tape is wound on the frusto-conical section 11, whose apex angle corresponds to the angle which the turn would form with the axis of the turntable, in the case of free unwinding of the tape (i.e., in absence of the hub 5) by following the same path shown in the drawings. Since the outside diameter of the cylindrical section 9 is slightly greater than the minor diameter of the frusto-conical section 11, the turn or the turns of tape which are wound on the latter will not interfere with the other turns which are collected in the annular cavity or recess 10.

It will be apparent that the annular recess 10 permits a small reservoir of tape to be formed, whose turns are suitably spaced and, therefore, not tightly wound about the hub 5, as is the case with the known unwinding devices. Further, the frusto-conical section 11 provides a guide for the innermost turns of the tape, by causing the same to take the configuration which they would tend to have normally, even in the absence of the frusto-conical section.

Upon completion of the unwinding operation of the reel 2, the turntable 1 can be removed from the housing of the device in order to permit loading of another reel. The lever 4 is rotated about the rod 15 in a clockwise direction as shown in FIG. 2. By exerting adequate force upon this lever, the pin 24 will slide on the sloping surface 29 (FIG. 3) of the arm 21 inside the recess 23, so causing the lever 19 to rotate slightly in a clockwise direction, thereby unlocking the same. Prior to reaching the other end-of-stroke position of the lever 4, shown in broken lines in FIG. 2, the pin 24, by cooperating with the sloping surface 29 of the arm 22, outside the recess 23, will again rotate the lever 19 in a clockwise direction, thereby permitting insertion of the pin inside the recess. Similarly the lever 4 can be swung back into the housing when the new reel has been

loaded.

We claim:

1. A tape unwinding device comprising a turntable for supporting a reel of tape of predetermined width, said reel of tape having a central opening and being adapted to be unwound from said turntable by the innermost turn,

a hub positioned in said central opening on said turntable, said hub comprising,

- i. a cylindrical section of height less than the width of said tape immediately above the surface of said turntable,
- ii. an annular recess of height substantially equal to the width of the tape immediately above said cylindrical section, and,
- iii. a guide section immediately above said recess for contacting and guiding said tape exiting said turntable, said guide section being of frusto-conical shape having its minor diameter adjacent said recess, said cylindrical section having a diameter slightly greater than the minor diameter of said frusto-conical guide section.

2. The device of claim 1 wherein said turntable is supported by a lever pivotable between a first position in which unwinding of said tape takes place and a second position wherein said reel is loaded onto said turntable.

3. The device of claim 2 further comprising a spring loaded positioning means to hold said lever in either of said two positions.

4. The device of claim 3 wherein said positioning means comprises a pair of arms, one of said arms being associated with each of said two positions and each of said arms having a recess for engaging a projection carried by said lever.

5. The device of claim 1 wherein the diameter of said hub at said recess is less than the minor diameter of said frusto-conical section.

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