April 4, 1967 O. STROTHMANN 3,312,410

TAPE WINDING APPARATUS

Original Filed Jan. 28, 1964 2 Sheets-Sheet 1

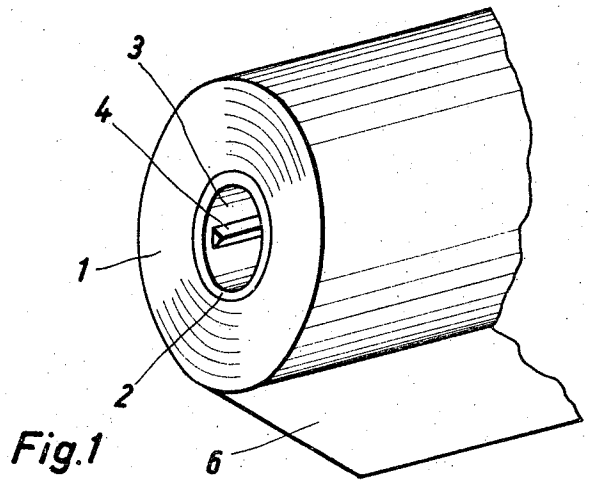


Fig.1

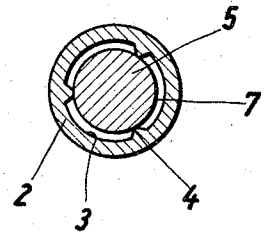


Fig.2

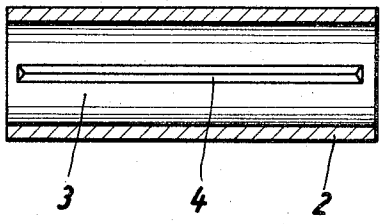


Fig.3

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TAPE WINDING APPARATUS

Original Filed Jan. 28, 1964 2 Sheets-Sheet 2

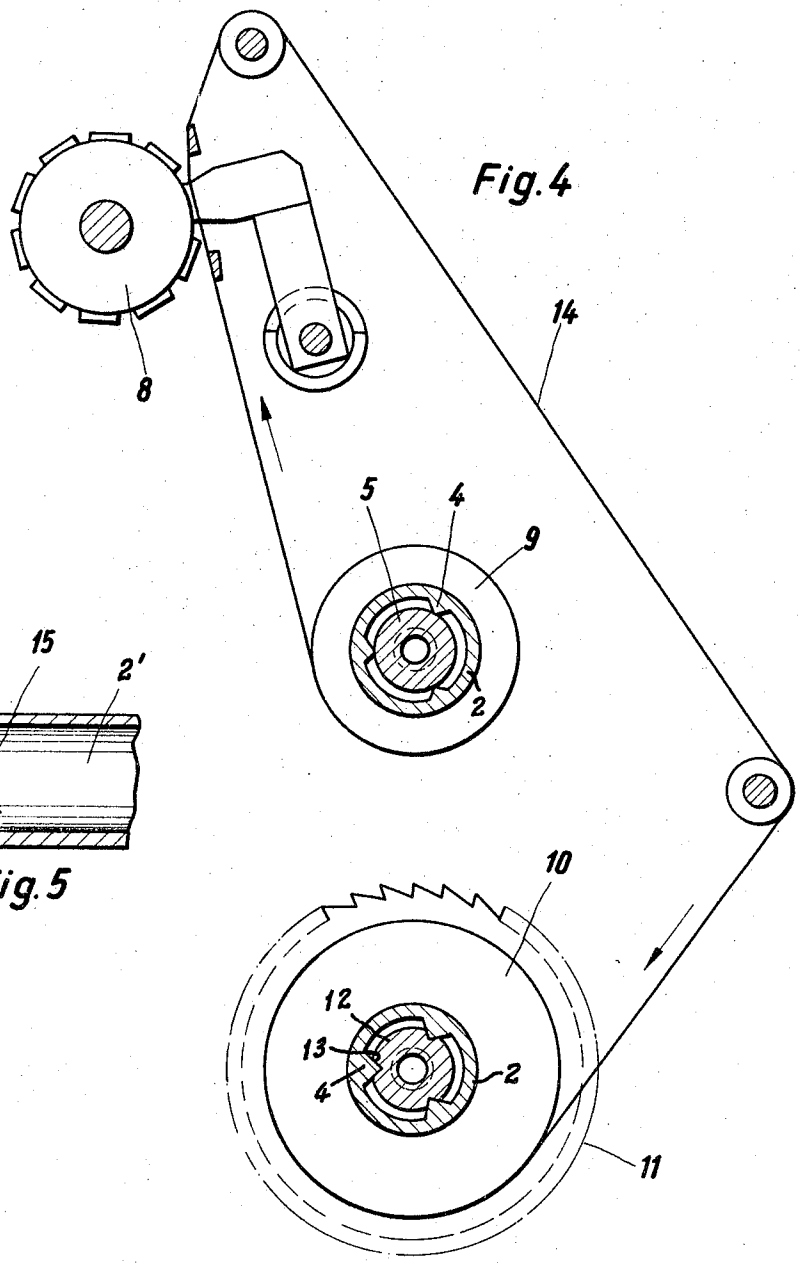


Fig. 4

Fig. 5

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TAPE WINDING APPARATUS

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Continuation of application Ser. No. 340,760, Jan. 28, 1964. This application Feb. 1, 1966, Ser. No. 536,483
Claims priority, application Germany, Feb. 2, 1963, A 42,232
4 Claims. (Cl. 242—67.3)

My invention relates to a spool assembly for accommodating tape-shaped data carriers, such as paper tapes, in cash registers, accounting machines, adding machines, computers, and the like machines in which the tapes are to be imprinted for providing a check, voucher or accounting record. This is a continuation of my application Ser. No. 340,760, filed Jan. 28, 1964, now abandoned.

The spools for such data tapes heretofore employed are made of cardboard, wood or synthetic plastic and possess a central cylindrical bore. As a rule, the spool is fitted upon a sleeve rotatably seated on a fixed pivot pin and prevented from inadvertent rotation by means of an additional retainer or escapement mechanism. The mechanism operates as a brake when the tape is being pulled off the spool and thus prevents excessive unwinding of the roll of paper tape. In addition, the mechanism contributes to the maintenance of paper tape under the desired tension. Generally, the known retainer mechanisms consist of a spring-biased braking device whose braking force is over-dimensioned so that the roll of paper tape will not over-shoot during the tape-advancing operation and also that the tape will not tear with resulting machine trouble.

It is an object of my invention to simplify the construction and performance of tape-spool assemblies for the above-mentioned purposes by eliminating the need for an added braking or escapement mechanism.

It is still another object of my invention to provide a tape-carrying spool structure which is itself assigned the function of operating as a motion-retarding or braking device.

It is still a further object of my invention to reduce the manufacturing cost as well as the space requirements of the spool accommodating and operating portions in the business machine to be so equipped by eliminating the heretofore conventional spool-retarding or braking mechanisms. On the other hand, the production cost of spool bodies according to my invention is not increased because such spools are generally manufactured in very large numbers and it becomes necessary only to replace conventional molds by correspondingly modified molds.

To these ends, and in accordance with a feature of my invention, the tape-spool body proper is provided with elastically yieldable projections that extend toward the pivot pin or other fixed structure on which the spool is rotatably seated. When the tape-carrying spool body is then assembled with the appertaining journal-forming structure of the machine, the elastic projections of the spool body are in frictional engagement with the fixed structure, thereby producing a frictional braking action in opposition to the relative rotation between spool body and structure.

The spool body may consist of synthetic plastic, cardboard or various other materials used heretofore for such purposes. However, according to another feature of my invention the spool body, including the elastic projections, preferably consist of synthetic plastic material such as polyvinyl chloride, polypropylene and the like. Other substances may also be used which, by the addition of filler material and suitable hardeners can be given the desired rigidity, and at the same time possess the desired elastomer property at the projections that produce braking friction.

According to still another feature of my invention, the elastically yieldable projections are located on the inner surface of the tubular journalling portion formed by the spool body, and these inwardly protruding projections are uniformly spaced about the spool axis and are elongated in a direction parallel to the axis.

The foregoing and more specific objects and features of my invention will be apparent from, and will be described in, the following with reference to the embodiments of spool assemblies according to the invention and illustrated by way of example on the accompanying drawings in which:

FIG. 1 shows schematically and in perspective a portion of a spool body according to the invention, carrying a paper tape.

FIG. 2 shows the spool in cross section and the appurtenant pivot pin.

FIG. 3 shows the spool body in longitudinal section.

FIG. 4 illustrates two spool assemblies according to the invention in conjunction with a printing and feeding device for a data-recording tape in a business machine; and

FIG. 5 shows a modified spool body according to the invention in longitudinal section.

As shown in FIG. 1, the paper tape 6 to be imprinted in a business machine is wound upon a tubular spool body 2 consisting of thermoplastic synthetic material as mentioned above. The tubular body 2 is provided with elastic projections 4 in the form of longitudinal ridges which protrude inwardly from the cylindrical inner wall 3 (FIGS. 2, 3) of the spool body 2. The journal pin 5 is fastened in the business machine (FIGS. 2, 4) and the axially elongated projections 4 are uniformly distributed about the journal axis and in elastic engagement with the cylindrical peripheral surface of the journal pin 5. The smallest inner diameter of the spool body 2 as defined by the common tip circle 7 of the projections 4 is somewhat smaller, in the disassembled condition of the spool, than the outer diameter of the journal pin 5. Consequently, when the spool 2 is seated upon the pin 5, the ridges 4 are slightly compressed and exert pressure upon the pin surface. When the paper tape is being pulled off the spool, thereby causing the roll of paper with the spool body to rotate about the pin 5, the resulting friction between the projections 4 and the outer surface 7 of journal pin 5 opposes such rotation by frictional braking. Consequently, some amount of pulling force must be exerted upon the paper tape 6 in order to overcome the frictional resistance. By corresponding dimensioning of the ridge-shaped projections 4 and corresponding machining or other preparation of the peripheral surface 7 on pin 5, the intended frictional action can readily be adapted to any desired operating conditions. However, the amount of frictional force is not critical and may vary within wide limits without affecting the operating conditions so long as the spool is not arrested so rigidly as to cause tearing of the tape.

As shown in FIG. 4, the spools 2 can be employed in mechanisms for printing of accounting or data recording tapes, in two places. First for accommodating the roll of paper tape 9 to be unwound, and second for the roll of paper tape 10 that is being wound upon the take-up spool. The tape coming from roll 9 is imprinted with data by a printing mechanism 8 before it passes over guide rollers onto the take-up spool.

The take-up spool is seated on a pin 12 which is driven by means of the ratchet 11 from the tape-feed drive (otherwise not illustrated) of the machine. The pin 12 is provided with longitudinal grooves 13 matching the shape of the protruding ridges 4 so that the take-up spool, to which the paper tape 14 is fastened, can be fitted over the pin 12 being held on the pin by frictional force due to the elasticity of the protruding ridges 4. To facilitate

assembling the spool with the pin, the edges at the crests of the protruding ridges 4 are preferably bevelled or rounded.

While in the embodiment of the spool shown in FIG. 3, the elastic projections 4 extend virtually over the entire axial length of the tubular spool body, it is sufficient to provide the spool with only two groups of such projections 15, 15 which according to FIG. 5 are located close to the respective axial ends of the spool body, each group consisting of three projections of uniform peripheral distribution.

A similar effect is also obtainable by providing radially directed elastic projections according to the invention on one or both of the axial end sides of the spool body, so that these projections protrude in a direction parallel to the spool axis away from the main body 16 of the spool. The projections then cooperate with a brake disc fastened on the journal pin 5.

To those skilled in the art it will be obvious upon a study of this disclosure, that such and other modifications are available and will result in embodiments of the invention other than particularly illustrated and described herein, without departing from the essential features of my invention and within the scope of the claims annexed hereto.

I claim:

1. Apparatus for winding data tape in business machines comprising a supply spool assembly and a take-up spool assembly spaced from said supply spool assembly and adapted to be wound with data tape carried by said supply spool assembly, each of said spool assemblies having journal-forming structure and a tape-spool body coaxially engageable with said structure, the spool bodies of said take-up and said supply spool assemblies being of substantially similar construction and having a plurality of

elastically yieldable projections extending radially inwardly from the inner surface thereof, the projections of said spool body in said supply spool assembly being in yieldable frictional engagement with the peripheral surface of the respective journal-forming structure, and the journal-forming structure in said take-up spool assembly comprising a tubular body having a pluarlity of radially inwardly extending depressions, the projections of the respective spool body being in locking engagement with said depressions.

2. Tape-winding apparatus according to claim 1 wherein at least the spool of said take-up spool assembly consists of synthetic plastic material and the projections of said last-mentioned spool are integral therewith and distributed about the spool axis.

3. Tape-winding apparatus according to claim 1 wherein the projections of at least one of said spools is three in number, and said three projections extend over substantially the entire axial length of said spool body.

4. Tape-winding apparatus according to claim 1 wherein as least one of said spool bodies has a total of two axially spaced groups of said projections, each of said groups having three projections angularly spaced from each other near one of the respective axial ends thereof.

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