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PAPER CORE AND REWIND CHUCK THEREFOR

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Fig. 1.

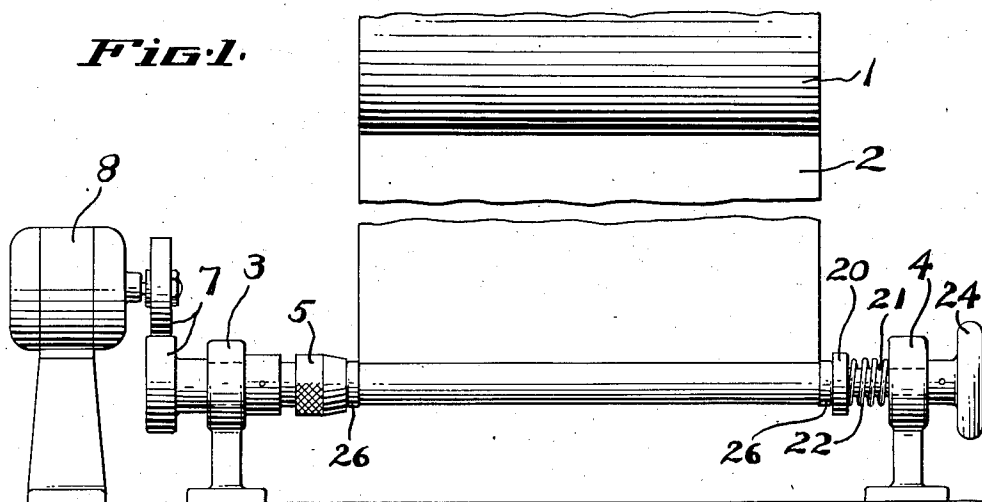


Fig. 2.

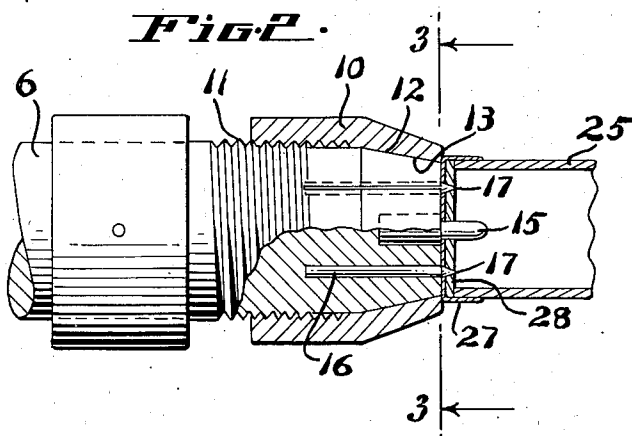


Fig. 3.

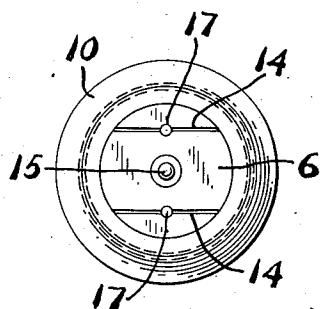
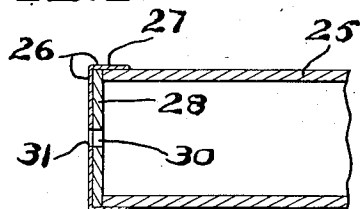


Fig. 4.



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PAPER CORE AND REWIND CHUCK
THEREFOR

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4 Claims. (Cl. 242—68)

My invention relates to paper cores for use in winding sheet material thereon and to a chuck by which said core may be rotated. My invention has specific application in the art of converting paper from large rolls to individual smaller rolls for the purpose, for example, of dispensing paper towels, toilet seat covers and the like.

Among the objects of my invention are: To provide an all-paper core that can be chucked and rotated at high speed to wind paper sheets thereon; to provide a paper core and paper end-cap assembly which is capable of being rotated at high speed under load; to provide a paper core with a penetrable end-cap that can be rotated by a piercing chuck at a relatively high speed under load; and to provide a simple and efficient paper rewinding core.

My invention possesses numerous other objects and features of advantage, some of which, together with the foregoing, will be set forth in the following description of specific apparatus embodying and utilizing my novel method. It is therefore to be understood that my method is applicable to other apparatus, and that I do not limit myself, in any way, to the apparatus of the present application, as I may adopt various other apparatus embodiments, utilizing the method, within the scope of the appended claims.

In the drawing:

Fig. 1 is a front view in elevation, of a core mounted in a rewind chuck, in position to rewind a paper strip from a master roll.

Fig. 2 is a view, partly in section, and partly in elevation, of the driving chuck, showing the type of engagement with the paper core.

Fig. 3 is the face view of the chuck shown in Fig. 2.

Fig. 2 is a sectional view of the paper cap assembly.

In the conversion of paper from large master rolls into smaller individual rolls which can be placed in a dispenser, high rewinding speed is desirable, and the rewinding cores must carry some load in order that the rewinding may be accurate and tight. Furthermore, individual rolls of paper towels or sanitary toilet seat covers, for example, must be converted from a master roll with a minimum of cost, and the core itself, for purely commercial reasons, must be inexpensive. Consequently, it is highly desirable that the cheapest possible core be used. Yet it is also highly desirable that the rewinding power be transmitted to the core in a most efficient manner.

I am aware that rewinding cores have hitherto

been made with hard inserts in the ends thereof, formed, for example, of metal or moldable plastics, and that these hard inserts have been so contoured as to interlock with a chuck so that the driving force may be transmitted to the core. Such inserts, however, are expensive and relatively difficult to assemble in the core as they, of course, must be bonded to the core.

I have been able to form a core and end-cap assembly wholly of paper, or as it may be termed "cardboard," which is practically the universal material of which the cylindrical portion of most rewinding cores are made or of equivalent penetrable material. I have been able to utilize a paper end-cap when properly reinforced, and have been able to rotate the core at high speed and under load by means of a chuck having sharpened inserts therein piercing the paper end-cap and the reinforcement thereof. I have found that reinforcement of the cap is highly advantageous, as paper end-caps on cores must be made of a paper thin enough to be formed or drawn into a cap shape, and I have found that such thin paper will not withstand the driving forces without tearing. By utilizing a penetrable reinforcing disc, however, in conjunction with the paper cap, I have been able to transmit rotational forces to the core from the chuck without tearing or otherwise harming the end-cap assembly.

Furthermore, I have found that when central positioning lugs are used to mount the core ends in a rewinding machine, that the thin paper caps alone are not of sufficient strength to maintain the central aperture exactly coaxial with the core, and the central apertures will, if in the least distorted, cause the core to wobble while rotating. By utilizing a reinforcing disc however, in conjunction with the paper cap on both ends of the core, and by careful assembly of the paper cap and reinforcing disc on the core to insure that the registering apertures therein are exactly coaxial, I have been able to provide a paper core which will run sufficiently true in a rewinding machine so that a tissue paper strip having tear lines cut therein can be wound at high speed without breaking the strip at tear lines. Even a slight out-of-round rotation of the core will cause a variation in rewinding speed with respect to the speed of the parent roll, and intermediate rolls if used, and will break the thin paper at the tear lines.

My invention may be more fully understood by a detailed description of the drawing. In Fig. 1, I have shown a conventionalized setup, with

conversion of paper strip from a master roll 1. Usually, in paper conversion machines, cutters or slitters are customarily used so that the paper strip 2 may be perforated across the strip to form tear lines so that the individual paper units may be torn off the individual rolls or, in the case of sanitary toilet seat covers, the paper is not only perforated to form tear-lines, separating the paper into units, but other cuts are made in the paper to outline the proper and desired flap arrangements.

A pair of opposed rewinding chucks are provided, comprising a pair of bearings 3 and 4; bearing 3 carrying a power chuck 5 mounted on shaft 6. Power chuck 5 is rotated through friction wheels 7 by motor 8. Power chuck 5 comprises a shell 10 screwed to the end of shaft 6 on threads 11. The outer end of shell 10 is provided with an inner conical surface 12 bearing against a similar surface 13 on the end of the shaft 6. The coned end of shaft 6 is provided with two parallel slits 14, by which one on each side of a central positioning lug 15, and cap engaging needles 16 are inserted in said slits 14 having sharpened ends 17 projecting beyond the end of shaft 6 on each side of central lug 15. These needles may be removed by loosening shell 10, and locked in place by tightening shell 10.

The opposite chuck is provided with a cap plate 20, also having a central lug (not shown) mounted on shaft 21 sliding in bearing 4, and forced toward chuck 5 by spring 22. Shaft 21 slides as well as rotates in bearing 4, and the position is under the control of an operator who may grasp hand wheel 24 to retract cap plate 20 against spring 22.

The core itself is shown in Figs. 2 and 4, and comprises a paper or cardboard cylinder 25, having a thin paper cap 26 molded to fit the end of core 25, with the sides of the cap 27 closely fitting the outer surface of the core 25. Such caps are usually cemented to the core 25 by a strong cement, preferably waterproof, such as, for example, cellulose acetate cement or silicate of soda. In accordance with my invention, before cap 26 is cemented on to core 25, I place between the cap and the core a penetrable reinforcing disc 28 such as a paper disc or cardboard extending across the end of the core. This reinforcing disc 28 preferably has a diameter equal to the outside diameter of the core and thus when the cap 26 is cemented on the core, reinforcing disc 28 is firmly cemented both to the cap and to the core end. A central circular lug aperture 30 is provided in the reinforcing disc, and a coinciding circular aperture 31 is provided in the cap 26. Both ends of the core are provided with such cap assemblies, comprising the cap itself and the reinforcing disc, and should be carefully assembled so that all apertures 30 and 31 are coaxial with the core cylinder.

In operation cap plate 20 is retracted against spring 22 and a core is positioned between chuck 5 and plate 20, with lug 15 and the corresponding lug on cap-plate 20 entering apertures 31 and 32 on the cap assembly. Hand wheel 24 is released and points 17 are then driven into the cap assembly mounted on lug 15. The pressure for driving the points 17 into the cap assembly may be provided by the operator himself, by moving hand wheel 24 sharply toward chuck 5 or the spring 22 may be sufficiently strong to cause the points 17 to puncture the cap assembly. Spring 22, however, in either case holds the cap assembly firmly against the rewinding chuck 5

and on the points 17 during rotation of the core. Motor 8 is then started and paper strip 2 is wound from master roll 1 onto the mounted core at such speed as may be desirable. When a sufficient amount of strip 2 has been wound upon core 25, hand wheel 24 is moved outwardly and the full roll removed from the machine. The new core is then inserted and the cycle repeated.

It will be noted that in Fig. 2 I have shown the needle points 17 reaching through the reinforcing disc 28. The actual amount of penetration of the points is not particularly important except that the points should enter the reinforcing disc a sufficient distance to transmit the necessary rotational power to the core without tearing the core assembly. Inasmuch as I prefer to cement the paper cap 26 to the reinforcing disc 28 and the end of the core, it can be seen that the cap assembly material engaged by the points 17 has a thickness equal to the combined thickness of the cap paper, and the reinforcing disc paper. I have found that the combined strength is ample to transmit any rotational power necessary to rewind paper strip upon such paper cores, and to prevent apertures 30 and 31 from being distorted.

There is also another great advantage in using end-cap assemblies that are puncturable by points 17 so that power may be transmitted from the chuck to the core and that is that the operator of the machine does not have to waste time registering the end of the core in chuck 5. The points 17 will enter the cap assembly in any rotational position so that all the operator has to do is to mount the core on the centering lugs and apply force to cause needle penetration. Thus, cores may be inserted and removed with a maximum of speed. I have found that operators on high speed machines are able to rewind paper strip, tissue paper for example, at a rate of approximately 1500 feet per minute and fill six to eight cores per minute.

The reinforcing disc also imparts other advantages to the end cap assembly. The reinforcing disc, being preferably of a thicker and heavier material than the end cap itself, is sufficiently strong when placed on the centering lugs 15 to withstand the rewinding load and to prevent the lug apertures from becoming out-of-round due to that load. Furthermore, the reinforcing discs forms flat surfaces at the ends of the core so that the paper caps when pressed firmly against the reinforcing discs will force the reinforcing disc against the end of the core, so that the paper cap will fit properly over the end of the core so that the two registering apertures 30 and 31 will be exactly coaxial with the cylinder at both ends of the core. Thus, when the core is mounted between two chucks the core will rotate with a minimum of wobble. If the end cap assemblies are cocked or otherwise improperly placed upon the core, then the central apertures 30 and 31 will not be coaxial, and a great loss will occur during rewinding due to breakage of the paper strip being rewound. I prefer therefore to utilize accurate tools in assembling the end cap and disc on the core. Such accurate assembly almost entirely does away with strip breakage during rewinding, and provides a paper assembly as accurate as solid ends.

While I have described my invention as preferably utilizing a paper reinforcing disc for economy, I wish it to be distinctly understood that reinforcing discs of other materials such as soft wood, felt, soft fibreboard, or other materials

that can be readily penetrated by the driving needles without rotational registration, and which will withstand driving forces, are deemed full equivalents.

Thus, I have provided a penetrable core and end-cap assembly which can be rotated at high speed under load with perfect engagement of a rewinding chuck and the core end, due to the use of end-cap assemblies that can be punctured by driving points and which are at the same time of sufficient strength to maintain accurate axial coincidence with chuck lugs. This arrangement makes for low cost and high efficiency of rewinding.

I claim:

1. In a rewinding core adapted to be end driven for winding a strip thereon and having a hollow paper cylinder of uniform diameter from end to end, an end assembly for said core comprising a thin paper end cap having a planar bottom formed to extend across an end of said core at a right angle to the axis of said core, and a cylindrical side wall of uniform diameter formed to fit closely over and coextensive with a cylindrical outside end portion of said core, said bottom having insufficient strength to withstand driving forces applied thereto for winding a strip on said core, a paper reinforcing disc having a diameter equal to the outside diameter of said core and positioned between the core end section and the inside face of said bottom, said side wall of said cap being cemented to the outer surface of said core, said bottom of said cap being cemented to said disc, and said disc being cemented to said core around the end section thereof only, the combined strength of said bottom and said disc being sufficient to withstand driving forces applied to said latter members only, for winding a strip on said core.

2. A core as recited in claim 1 wherein both 40

said bottom and said disc are of a paper readily penetrable by sharp points for complete application of said driving forces to said core through said end assembly.

3. A core as recited in claim 1 in combination with a driving fixture therefor, comprising a driving chuck having a planar end cap face, a plurality of spaced and sharpened points mounted on said chuck face and extending axially beyond said face a sufficient distance to penetrate both the bottom of said end cap and the material of said reinforcing disc when said end cap bottom is registered and in contact with said chuck face and an opposite positioning chuck engaging the other end of said core for holding said core in alinement with said driving chuck with said points fully engaging said end assembly during rotation of said core, and means for rotating said driving chuck.

4. A core as recited in claim 1 in combination with a driving fixture therefor, comprising a driving chuck having a planar end cap face, a plurality of spaced and sharpened points mounted on said chuck face and extending axially beyond said face a sufficient distance to penetrate both the bottom of said end cap and the material of said reinforcing disc when said end cap bottom is registered and in contact with said chuck face, an opposite positioning chuck engaging the other end of said core for holding said core in alinement with said driving chuck with said points fully engaging said end assembly during rotation of said core, and means for rotating said driving chuck, and resilient means continuously forcing said positioning chuck against said other end to maintain engagement of said end assembly and said driving chuck during core rotation.

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