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Inventor: **Precoma, Giuseppe**
Via Saorgio, 43
I-10147 Torino(IT)

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Representative: **Jorio, Paolo et al**
STUDIO TORTA Società Semplice Via Viotti 9
I-10121 Torino(IT)

Applicant: **BONELLI INDUSTRIE S.r.l.**
Via Susa, 35

An assembly of two members rotating on intersecting axes, and roller table incorporating such assembly.

An assembly (13) of two members, particularly a drive pulley (6) and a driven roller (9) of a roller table for the transport and alignment of sheet material, rotatable on respective intersecting axes and connected for rotation by means of a helical spring (14) which engages them in respective seats (16, 24).

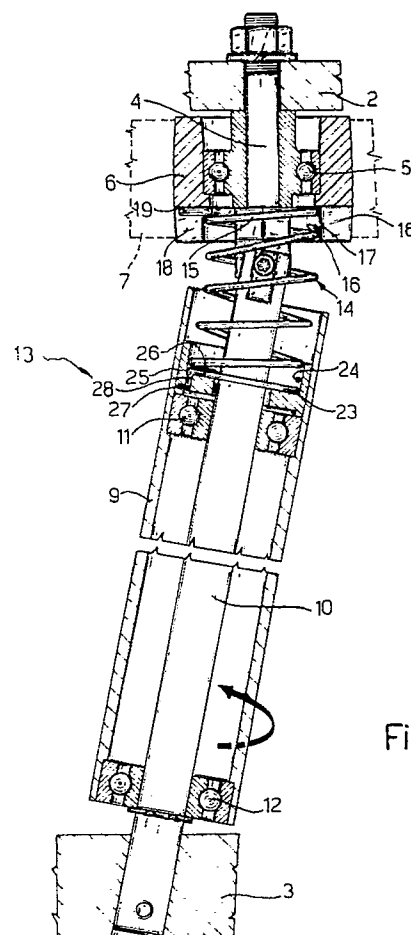


Fig.3

The present invention relates to an assembly of two members rotation on intersecting axes, and particularly, but not exclusively, to an assembly comprising a drive pulley and a driven roller of a roller table for the transport and lateral alignment of sheet material, as well as to a roller table incorporating such assembly.

As is known, in the typographical industry frequent use is made of roller tables which have the dual purpose of transporting sheets of paper from one working station to a subsequent working station and of ensuring an accurate alignment of the sheets themselves against a lateral guide.

Roller tables of the above-mentioned type are known in which the transport of the sheets is achieved by a plurality of rollers inclined with respect to the said lateral guide by an acute angle open towards the destination. The said rollers have associated therewith respective drive pulleys rotatable on respective axes orthogonal to the transport direction, which derive their motion from a common drive belt. Each drive pulley and the associated driven roller defines an assembly of two members rotating on intersecting axes; they are coupled for rotation as is known, by means of a cardan joint or the like. This type of joint is, however, relatively complex and expensive to produce and assemble; this disadvantage assumes particular significance in the specific case mentioned above of roller tables which may comprise up to several tens of drive pulleys, driven rollers and associated joints.

It is intended that the preceding considerations, explained for convenience of reference in relation to roller tables for typographic use and, more particularly, for coupling the drive pulleys to the associated driven rollers of the said roller tables, can be extended to any assembly of two members rotating about non-parallel axes intersecting one another, coupled by means of a cardan joint or the like, which have the same disadvantages as those indicated above.

The object of the present invention is that of providing an assembly of two members rotating about intersecting axes which will be free from the disadvantages associated with the above described known assemblies.

The said object is achieved by the present invention in that it relates to an assembly of two rotating members of the type comprising a drive member rotating about a respective first axis, a driven member rotatable about a second axis intersecting the said first axis, and a coupling for connecting the said members for rotation, characterised by the fact that the said coupling comprises a helical spring axially interposed between the said members and joined to them at respective terminal portions.

The present invention likewise relates to a roll-

er table for the transport and lateral alignment of sheet material, of the type comprising:

- a support structure comprising a pair of elongate structural support elements parallel to and spaced from one another, extending in the transport direction, and a lateral alignment guide for the said material;
- a plurality of drive pulleys actuated by a common drive belt, spaced from one another and rotatable about respective pins fixed to one of the said structural elements and having axes orthogonal to the transport direction;
- a plurality of driven rollers, associated with the said drive pulleys, spaced from one another and rotatable about respective pins fixed to at least one other of the said structural elements and having axes inclined with respect to the said lateral guide in such a way as to form with it an acute angle open towards the transport destination; and
- a plurality of couplings for connecting each driven roller to a respective drive pulley for rotating therewith, characterised by the fact that each of the said couplings comprises a helical spring axially interposed between the respective drive pulley and the respective driven roller and fixed thereto at respective terminal portions thereof.

For a better understanding of the present invention a preferred embodiment thereof is described hereinbelow, purely by way of non-limitative example, and with reference to the attached drawings, in which:

Figure 1 is a partial plan view from above of a roller table formed according to the principles of the present invention;

Figure 2 is a section taken on the line II-II of Figure 1; and

Figure 3 is a section taken on the line III-III of Figure 2, on an enlarged scale.

With reference to Figure 1, the reference numeral 1 generally indicates a roller table for the transport and alignment of sheet material, particularly sheets of paper for typographic use.

The table 1 includes a support structure of which only two lateral structural elements 2, 3 are shown, these lying parallel to and spaced from one another, extending in the transport direction of the sheets. This structure further defines a lateral guide, not illustrated, for alignment of the sheets on one side of the table, for example of the same side as the element 2.

Rigidly fixed to the lateral element 2 are a plurality of horizontal pins 4 parallel to one another and equally spaced, having axes orthogonal to the element 2 and to the direction of transport of the sheets; a drive pulley 6 is mounted rotatably, via a

bearing 5 (Figure 3) on each of the pins 4. These pulleys 6, having slightly convex generatrices, cooperate with a common drive belt 7, actuated by drive means not illustrated and pressed against the pulleys themselves by a plurality of freely rotatable rollers 8 (Figure 2).

The table 1 further includes a plurality of driven rollers 9, each of which is connected for rotation to a respective drive pulley 6 in the manner described hereinbelow. Each roller 6, constituted by a cylindrical tubular element of steel, is mounted rotatably by means of a pair of bearings 11, 12 on a respective pin 10 connected rigidly at one end to the pin 4 of the corresponding drive pulley 6, and at its opposite end to the other lateral element 3. The pins 10 have horizontal, parallel axes inclined with respect to the transport direction in such a way as to form with the said lateral guide of the table 1 an acute angle open towards the destination of the motion, indicated with an arrow in Figure 1.

In Figure 3 the assembly indicated with the numeral 13 is illustrated in detail, constituted by a drive pulley 6 and by an associated driven roller 9.

According to the present invention each driven roller 9 is coupled for rotation with the associated drive pulley 6 by means of a helical spring 14 axially interposed between them.

In particular, an end portion 15 of the spring 14 is housed, with a small radial clearance, in a cylindrical seat 16 formed in a front zone of the pulley 6 facing the associated driven roller 9; this seat defines a flat annular axial contact surface for the spring 14. The pulley 6 is provided, in the said frontal zone, with a pair of radial through notches 18 communicating with the said seat 16, one of which houses a radially outwardly bent end section 19 of the spring 14. An opposite end portion 23 of the spring 14 is housed with a small radial clearance in a cylindrical seat 24 formed in a ring 25, mounted forcedly within the roller 9, in axial contact with the outer ring of the bearing 11; this seat 24 defines an annular flat axial contact surface 26 for the spring 14. The ring 25 has an axial through hole 27, communicating with the said seat 24, in which is housed an opposite end section 28 of the spring 14, bent in an axial direction.

The operation of the table 1 is as follows.

The belt 7 drives the drive pulleys 6 to rotate, each of which transmits motion to the associated driven roller 9 by means of the corresponding spring 14 and the ring 25. The deformability of the springs 14 allows the relative inclination between the pins 4 of the pulleys 6 and the pins 10 of the driven rollers 9 to be compensated and therefore obtains a regular transmission of the movement. The sense of rotation of the rollers 9 is that indicated by the arcuate arrows in Figures 1 and 3.

The springs are precompressed upon assembly

in such a way that the torque is transmitted substantially by tangential friction between the end turns of the springs 14 and the corresponding axial contact surfaces 17 and 26. Angular slip between the springs 14 and the corresponding seats 16, 24 is prevented by the engagement of the terminal sections 19, 28 with the notch 18 and the hole 27 of the ring 25 respectively. This function is also performed by the contact friction between the side walls of the cavities 16, 24 and the terminal portions 15, 23 of the springs 14 in the case in which, as in the attached drawing, the sense of rotation of the pulleys 6 in relation to the direction of coiling of the springs is such that during the transmission of motion the torque transmitted stresses the turns of the springs in flexion thereby producing a radial expansion or, more simply, the springs tend to "unwind" in the case of slowing of the associated rollers 9 with respect to the pulleys 6.

In use, because of the inclination of the rollers 9 with respect to the transport direction, the sheets carried by the rollers themselves are guided towards the lateral guide of the table 1 and become disposed in alignment with one another with one edge in contact with the said guide.

From a study of the assembly 13 described and of the roller table 1 incorporating a plurality of such assemblies, the advantages associated with the present invention will appear evident. In particular, the coupling between the rotating members on intersecting axes is achieved by means of a simple helical spring; the connection is particularly simple, economical and rapid to effect whilst being equivalent from a mechanical point of view to the cardan joints or the like generally utilised for this purpose.

Finally, it is clear that the assembly of rotating members described, as well as the table incorporating such assembly, can have modifications and variations introduced thereto which do not depart from the ambit of protection of the present invention. In particular, if the sense of rotation of the pulleys is such as to produce, in relation to that of the coiling direction of the springs, adhesion of these latter to the associated seats, as specified above, the anchorage of the spring 14 to the pulley 6 and/or to the ring 25 can be omitted.

Claims

1. An assembly of two rotating members, of the type comprising a drive member rotating about a respective first axis, a driven member rotatable about a second axis intersecting the said first axis and a coupling for connecting the said members for rotation, characterised by the fact that the said coupling comprises a helical spring (14) axially interposed between the said members (6, 9) and fixed to it at

respective end portions 15, 23.

2. An assembly according to Claim 1, characterised by the fact that the said spring (14) is precompressed upon assembly between the said drive and driven members (6, 9). 5
3. An assembly according to Claim 1 or Claim 2, characterised by the fact that the said members (6, 9) include respective cylindrical seats (16, 24) housing the said respective terminal portions (15, 23) of the said spring (14) with a small radial clearance and defining respective flat axial contact surfaces (17, 26) for the said terminal portions (15, 23). 10 15
4. An assembly according to Claim 3, characterised by the fact that at least one (16) of the said seats includes at least one radial recess (18) housing an end section (19) of the said spring (14) bent outwardly in a radial direction. 20
5. An assembly according to Claim 3 or Claim 4, characterised by the fact that at least one (24) of the said seats includes at least one axial cavity (27) housing an end section (28) of the said spring (14) bent in an axial direction. 25
6. An assembly according to any of Claims from 3 to 5, characterised by the fact that at least one of the said seats (24) is formed in an annular element (25) mounted in a respective cavity of the corresponding said rotating member (9). 30 35
7. An assembly according to one of Claims from 3 to 6, characterised by the fact that the direction of rotation of the said drive member (6) in relation to the direction of coiling of the said spring (14) is such that, during transmission of movement, the torque transmitted stresses the turns of the said spring (14) in flexion producing radial expansion thereof and a consequent adhesion of the said end portions (15, 23) to the said respective seats (16, 24). 40 45
8. An assembly according to any preceding Claim, characterised by the fact that the said drive member and the said driven member are respectively constituted by a drive pulley (6) and a driven roller (9) of a roller table (1), particularly for the transport and guidance of sheet material. 50
9. A roller table for the transport and lateral alignment of sheet material, of the type comprising: 55
 - a support structure including a pair of elongate structural support elements par-

- allel to and spaced from one another extending in the transport direction, and a lateral alignment guide for the said material;
- a plurality of drive pulleys actuated by a common drive belt, spaced from one another and rotatable about respective pins fixed to one of the said structural elements and having axes orthogonal to the transport direction;
- a plurality of driven rollers associated with the said drive pulleys, spaced from one another and rotatable about respective fixed pins and at least one other of the said structural elements and having axes inclined with respect to the said lateral guide in such a way as to form with it an acute angle open towards the transport destination; and
- a plurality of couplings for connecting each driven roller to a respective drive pulley for rotation therewith, characterised by the fact that each of the said couplings comprises a helical spring (14) axially interposed between the respective drive pulley (6) and the respective driven roller (9) and secured to them at its respective terminal portions (15, 23).

