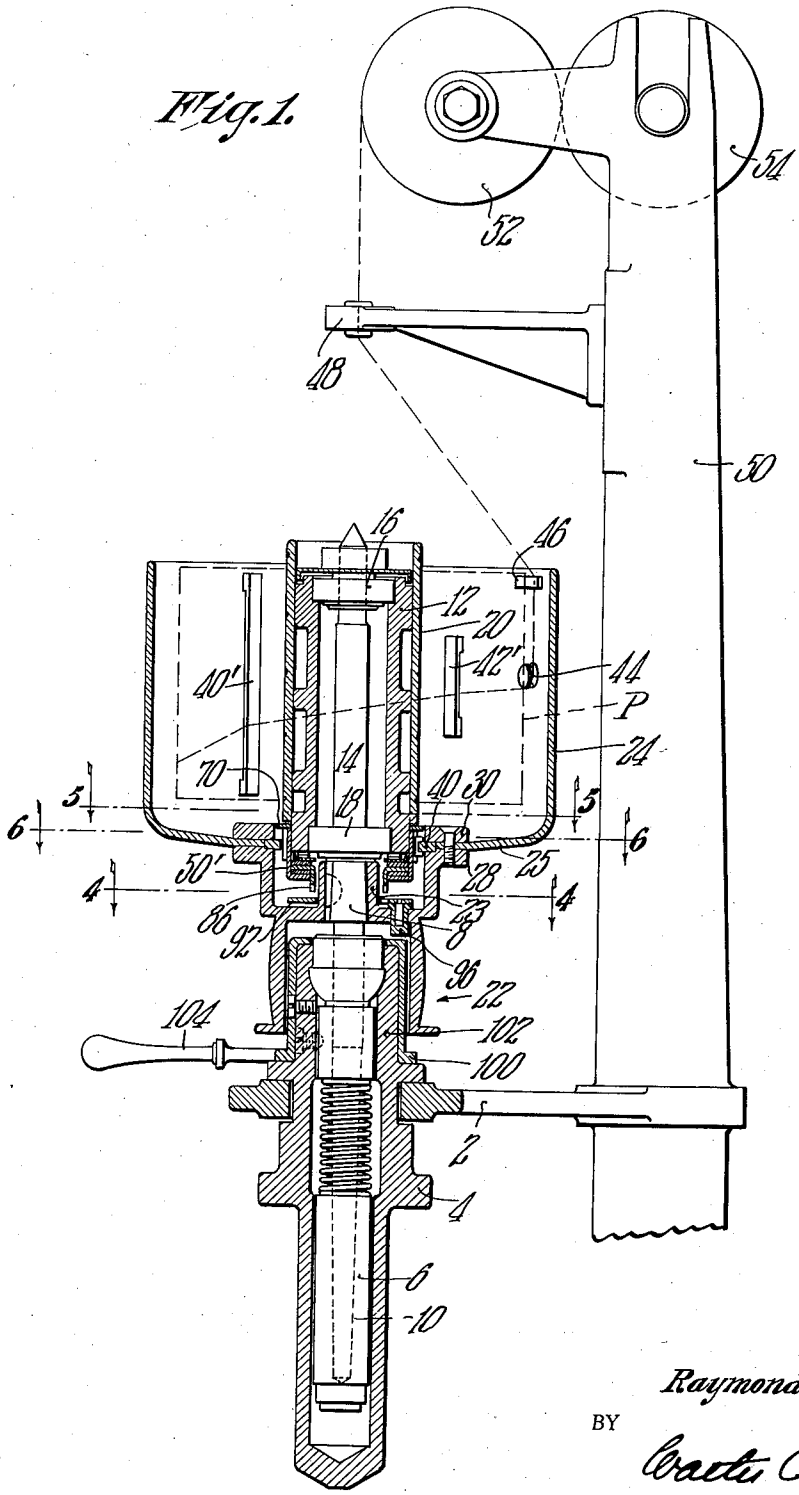
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TWISTING MECHANISM

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Fig. 1.



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Fig. 2.

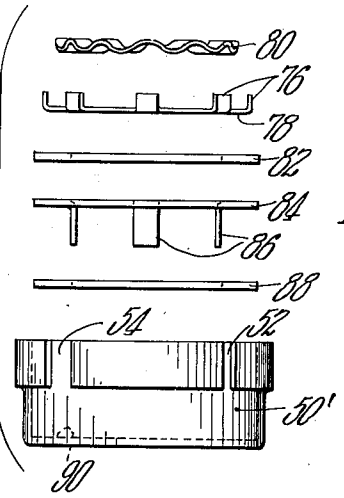


Fig. 3.

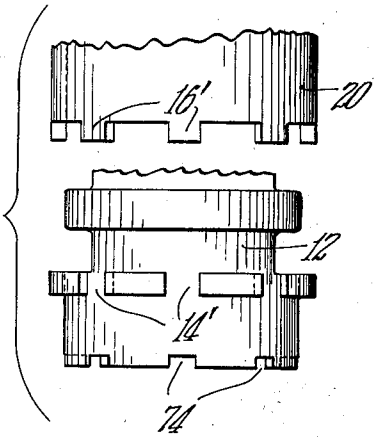


Fig. 4.

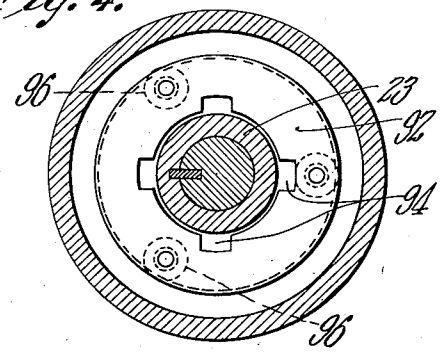


Fig. 5.

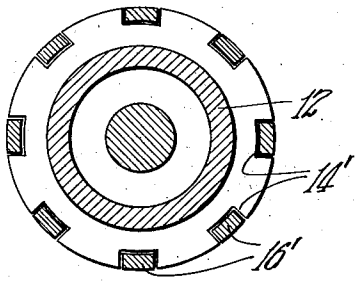


Fig. 6.

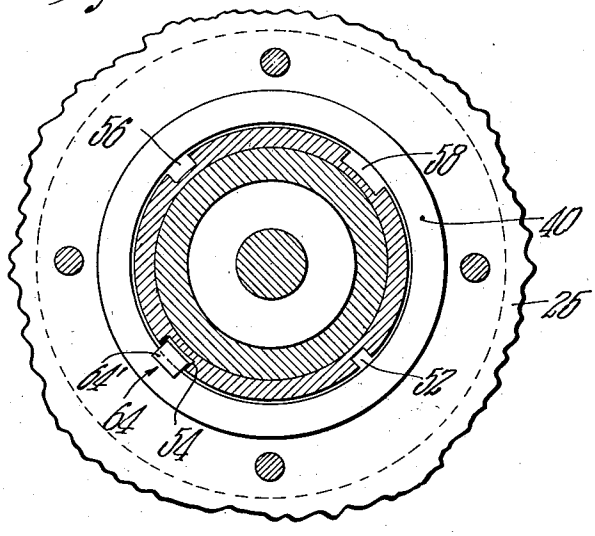
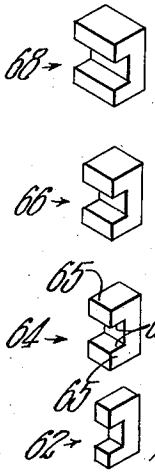


Fig. 7.



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TWISTING MECHANISM

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Fig. 8.

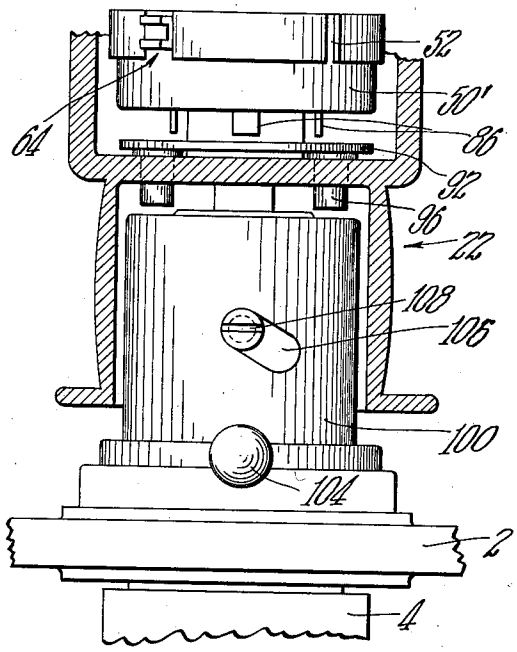


Fig. 9.

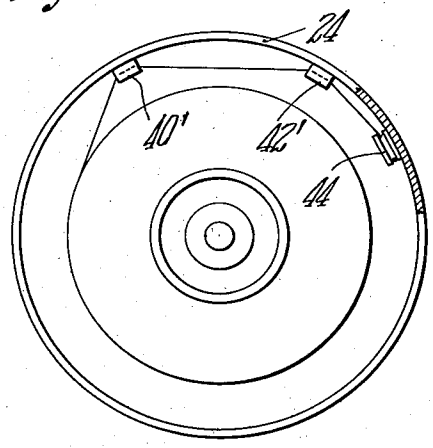


Fig. 10.

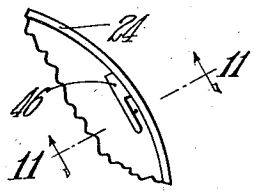
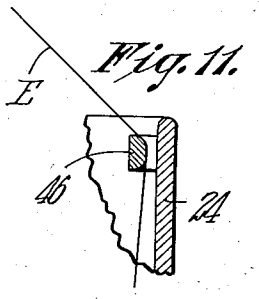


Fig. 11.



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Patented Aug. 13, 1935 2,011,481

UNITED STATES PATENT OFFICE

2,011,481

TWISTING MECHANISM

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Application May 19, 1934, Serial No. 726,490

8 Claims. (Cl. 117—23)

This invention relates to improvements in apparatus for uniting elements and is directed more particularly to improvements in machines for twisting elements about one another.

The principal objects of the invention are directed to the provision of apparatus of the class described wherein a package for supplying an element or elements is rotated for a twisting or winding operation and has novel means associated therewith to facilitate uniformly tensioning of the element or elements being withdrawn from the package for such an operation as uniting two or more elements. Another object of the invention is the provision of apparatus of the class described which has novel means to retard or stop rotation of the yarn package to overcome the tendency of the package to overthrow or over-travel the spindle which brings about the rotation thereof.

A further object of the invention is the provision of an apparatus which is not only simple in form and efficient in its operation but which is operable at high speeds to produce uniformity in respect to the tension of the elements and their relation in the finished product.

Various novel features and advantages of the invention will be hereinafter more fully referred to in connection with the following description of the preferred form thereof taken in connection with the accompanying drawings, wherein:

Fig. 1 is a partial sectional and elevational view of a machine embodying the novel features of the invention,

Fig. 2 is a side elevational view of the parts forming the means to prevent overthrowing or overtraveling of the package and its support with the parts thereof in separated relation,

Fig. 3 is a side elevational view showing the lower portion of the package core and adapter with which it co-operates,

Fig. 4 is a plan sectional view on the line 4—4 of Fig. 1,

Fig. 5 is a plan sectional view on the line 5—5 of Fig. 1,

Fig. 6 is a sectional plan view on the line 6—6 of Fig. 1,

Fig. 7 is a perspective view showing a plurality of the shoe members forming a part of the tensioning mechanism,

Fig. 8 is an elevational view with parts in section to show certain details of the invention,

Fig. 9 is a plan view of the shell showing the element guiding means associated therewith,

Fig. 10 is a partial plan view of the shell showing the uppermost element guiding means, and

Fig. 11 is a sectional elevational view on the line 11—11 of Fig. 10.

Referring now to the drawings more in detail the invention will be fully described.

A support is represented at 2 which carries a tubular member 4 for supporting a spindle bolster 6. This bolster 6 forms no part of the present invention. It is adapted for rotatably receiving a spindle 8, the lower end 10 of which extends into the bolster so that it may rotate freely therein. The bolster 6 and part 4 are preferably non-rotatable relative to one another.

A package adapter 12 is mounted for rotation on the upper end 14 of the spindle as by anti-friction bearings such as 16 and 18. A tubular core member 20 is provided which may be slipped on and off the adapter 12 and this in turn receives a package formed by a winding or windings of yarn or filaments. The package is represented generally by P in Fig. 1.

A whorl or pulley indicated by 22 has a hub part 23 which is fixed to the spindle 8 in any suitable manner and this whorl may be driven as by a belt so that in turn the spindle 14 is rotated. The spindle may be mounted in any other way than in the bolster and it may have a motor associated therewith to facilitate rotation.

A shell 24 which is open at its upper side has a lower wall 25 clamped to a flange such as 28 of the whorl 22 as by a ring 30 whereby the whorl, spindle and shell are rotatable as a unit which may be called a spindle unit, while the core member 20 and the adapter or support for the package may be called the package-support or package-carrier unit. Since the adapter is rotatable relative to the spindle, it will be seen that the package is therefore rotatable relative to the spindle, shell and associated parts.

Adjacent the lower end of the adapter 12, there are provided a plurality of sockets 14' as shown in Fig. 3, in which are receivable tongues 16' provided on the lower end of the core 20 also as shown in Fig. 3 so that the core and adapter are held against relative rotation. A friction ring 40 is preferably disposed concentrically of the axis of the spindle and is clamped between the parts 28 and 30 as shown in Fig. 1 so that it is rotated by the spindle unit.

Vertically disposed guides 40' and 42' are associated with the shell 24 as is a guide member 44 in the form of a button and an upper guide 46 adjacent the upper edge of the shell (see Figs. 1 and 9 to 11 inclusive).

The package P may be formed by windings of one or more elements or yarns which are led

from the package behind the guides 40' and 42' and around the button of guide 44 and then upwardly in back of the guide 46 and upwardly through an apertured guide 48 above the spindle. The guide 48 may be carried by an upright such as 50.

A draw-off drum 52 and a take-up spool 54 rotatable in the upright may in any well-known manner be operated to take up the elements extending upwardly through the guide 48. As the spindle unit is rotated the package P and package support are rotated and elements are unwound from the package to bring about a twisting of the elements together. If, for example, there are three elements, they will be twisted about one another to form what may be called a strand.

It will be noted that the package and its support may rotate relative to the spindle and shell but the package is rotated therewith and at a slightly faster speed as material is unwound from the package. Thus, with the spindle and shell unit rotating at, say, eight thousand revolutions per minute, the package and its support will also rotate at eight thousand revolutions per minute plus such a number of additional revolutions as will be brought about by leading or unwinding material from the package.

In certain twisting operations with the spindle and shell operating at eight thousand revolutions, for instance the package and support have rotated from twenty to ninety revolutions more than the said eight thousand revolutions.

According to this invention, means is provided to bring about constant and uniform tensioning of material being unwound from the package while other means is provided to prevent the package and its support from over-traveling the spindle unit when the spindle unit is slowing down as when the machine is to be stopped. This mechanism will now be described.

A shell 50' is associated with the lower end of the adapter 12 and has spaced around its periphery a plurality of slots or grooves 52, 54, 56 and 58, to receive friction shoes such as 62, 64, 66 and 68 as shown in Fig. 7. Each of the shoes is provided with a horizontal groove such as 64' of the shoe 64 providing lips 65 at either side thereof. These friction shoes may be inserted in their respective slots or grooves after the manner shown in Fig. 8.

When a shoe is located in a groove, the lips at the upper and lower sides thereof overlie opposite sides of the friction ring as shown in Figs. 1 and 6. The shoe is rotated by the package support unit. As the spindle unit rotates and the package and its support rotate therewith the friction shoe is thereby urged outwardly against and frictionally engages the ring 40 so as to act as a brake to retard or impede to some extent the rotation of the package and its support relative to the spindle unit which is brought about by unwinding material from the package.

That is to say, the rotation of the package and support relative to the spindle unit is resisted by the shoe bearing against the ring, whereby the material unwound from the package is thereby tensioned. The frictional action between the shoe and ring is the result of the relatively high speed of rotation of the spindle unit, package and its support. Since the speed may be uniform and constant the pressure of the shoe against the ring is constant and uniform and thereby there is provided a uniform, constant retarding action against rotation of the package relative to the spindle which results in the material being uniformly tensioned as it is led from the package.

It will be noticed that the slots are of different widths and that likewise the shoes receivable therein are of different widths and therefore of different weights. By providing shoes of different weights, it is possible to vary the tension applied to the yarn or elements unwound from the package.

A ring 70 may be provided to overlie the parts just described to conceal the same and prevent foreign matter from interfering with the desired operation of the shoe or shoes on the ring. Means to retard rotation of the package support and prevent its overtraveling the spindle when it is stopped will now be described.

The lower end of the adapter 12 is provided with a plurality of notches 74 which receive prongs 76 of a washer 78 shown in Fig. 2. A washer-like spring 80 of common form is interposed between the washer 78 and lower end of the adapter 12 and a friction washer 82 is preferably disposed below the washer 78. A friction ring 84 is located below the friction washer 82 and has downwardly depending ears such as 86 on the inner side thereof. A member 88 similar to the member 82 is located between the washer 84 and lower wall 90 of the shell 50'.

The parts 78, 82, 84, 88, and lower wall 90 of the member 50 are yieldingly held in frictional engagement by the action of the spring 80 and all these are rotated by member 50' with the package supporting core 20 and adapter 12. The part 84 is held against rotation relative to the spindle and shell by a disc 92 below the part 50' which has grooves 94 for receiving the prongs 86 of the member 84. The disc 92 has buttons 96 associated therewith which are slidable in the upper part of the whorl 22 (see Figs. 1 and 8).

When the spindle and shell is to be stopped and it is desired to prevent the package and its support from over-traveling the spindle unit, the member 84 is held against rotation and, since the parts of the brake mechanism are frictionally engaged, this results in a braking action.

A cam member 100 is oscillatable around a part 102 of the member 4 and may be oscillated by means of a handle 104 extending from a side thereof. A slot 106 in the cam member 100 receives a stud 108 fixed in the part 102 wherefore as the member 100 is oscillated it is elevated by means of the pin and slot so that its upper side brings up against the buttons and elevates the disc 92. As the disc is elevated the prongs 86 of member 84 enter the groove of the disc and in that way the member 84 is held against rotation and thereby the braking action takes place to retard rotation of the package and its support.

It will be observed that the friction shoe acts on the ring with a constant uniform tension to thereby uniformly resist relative rotation of the package and support relative to the spindle unit. In this way the element or elements, which may be called a yarn or yarns, being withdrawn from the package are uniformly tensioned. The tension is uniform whether the package is full or when it is about exhausted, the tensioning being brought about by rotation of the spindle and package and not being affected by their relative rotation. Wherefore it is possible to produce twisted or wound products where the elements are uniformly tensioned and disposed.

While I have described my invention in great

detail and with respect to a preferred embodiment thereof, I do not desire to be limited to such detail or embodiment since many changes and modifications may be made without departing from the spirit and scope of the invention in its broader aspects. Hence, what I desire to claim as new and secure by Letters Patent of the United States is:

1. A machine of the class described comprising in combination, a spindle and a yarn package support relatively rotatable, a friction ring associated with the spindle, a carrier associated with said support provided with means to receive one or more shoes, a plurality of shoes receivable in said means adapted to bear on said ring as the said spindle and support rotate to retard relative rotation thereof and exert tension on yarn being unwound from a package on the support, and independent means acting on said carrier to retard rotation of said support.

2. A machine of the class described comprising in combination, a spindle unit including a shell, a yarn package support rotatable relative thereto, a friction ring associated with the spindle, a carrier associated with said support provided with means to receive one or more shoes, a plurality of shoes receivable in said means adapted to bear on said ring as the said spindle and support rotate to retard relative rotation thereof and exert tension on yarn being unwound from a package on the support, and independent means acting on said carrier to retard rotation of said support, and guiding means including a bar member spaced from said shell for yarn from a package.

3. A machine of the class described comprising in combination, a rotatable spindle having a friction ring associated therewith, a package support rotatable on said spindle having a radially-disposed slot, and a friction shoe movable in said support bearing on said ring, the said shoe having parts engaging said ring to hold the same in said slot.

4. A machine of the class described comprising in combination, a spindle having a friction ring associated therewith, a package support provided with a plurality of separate shoe receiving means, and a plurality of separate shoes independently receivable in said means for bearing on said ring, the said shoes being of different weights whereby a shoe of predetermined weight may be associated with the support.

5. A machine of the class described comprising in combination, a rotatable spindle having a friction ring associated therewith, a package support rotatable on said spindle having a plurality of radial slots of different widths in the lower side thereof, and a plurality of shoes of different widths receivable in said slots for bearing on said ring.

6. A machine of the class described comprising in combination, a rotatable spindle having a friction ring associated therewith, a package support rotatable on said spindle having a plurality of radial slots of different widths in the lower side thereof, and a plurality of shoes of different weights receivable in said slots for bearing on said ring.

7. A machine of the class described comprising in combination, a rotatable spindle, a package carrier rotatable thereon, a ring associated with the spindle, a shoe-receiving means associated with said carrier, a shoe receivable in said means frictionally bearing on said ring whereby the carrier is frictionally held against rotation relative to said spindle, frictional brake means between said carrier and spindle and operating means therefor.

8. A machine of the class described comprising in combination, a rotatable spindle, a yarn package support rotatable relative thereto, a friction ring outside said support rotatable with said spindle, a shoe-support member rotatable with said support, a shoe freely movable radially in opposite directions on said shoe support, said shoe being of a predetermined weight to be moved and bear on said ring by rotation of said shoe-support only and with a degree of radial pressure dependent upon the speed of rotation of said support and the weight of said shoe.

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