# United States Patent [19]

**Greive et al.**

[11] **3,783,597**

[45] **Jan. 8, 1974**


[54] **THREAD-TWISTING APPARATUS WITH DUAL THREAD GUIDE**


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[73] Assignee: **Hamel GmbH Zwirnmaschinen,** Munster/Westf., Germany



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[21] Appl. No.: **264,280**

**Related U.S. Application Data**

[63] Continuation-in-part of Ser. No. 188,335, Oct. 12, 1971.

[30] **Foreign Application Priority Data**

June 21, 1971 Germany ..... G 71 23 827.2

[52] **U.S. Cl.**..... **57/58.52,** 57/58.86, 57/106, 57/116, 242/128, 242/149, 242/157 R

[51] **Int. Cl.**..... **D01h 1/10,** D01h 7/86, D01h 13/10

[58] **Field of Search**..... 57/58.49, 58.52, 57/58.83, 58.84, 58.86, 59, 115, 116; 242/128, 157 R, 157 C, 149



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*Assistant Examiner*—Charles Gorenstein
*Attorney*—Karl F. Ross



[57] **ABSTRACT**

A thread-twisting apparatus has a hollow stem through which the threads to be twisted together are drawn axially. A pair of axially spaced thread brakes are provided in the stem, and a hub carrying a thread guide is rotationally mounted on the stem. This guide is a bent wire having a C-shaped central portion embracing the hub and formed with an inwardly directed finger engaging in a radially open hole in the hub for rotational coupling of the hub and guide. A rotation brake acts on the hub and the adjustment for this brake and for one of the thread brakes can be carried out in a single operation whereby both braking effects are either increased or decreased simultaneously.


**13 Claims, 4 Drawing Figures**

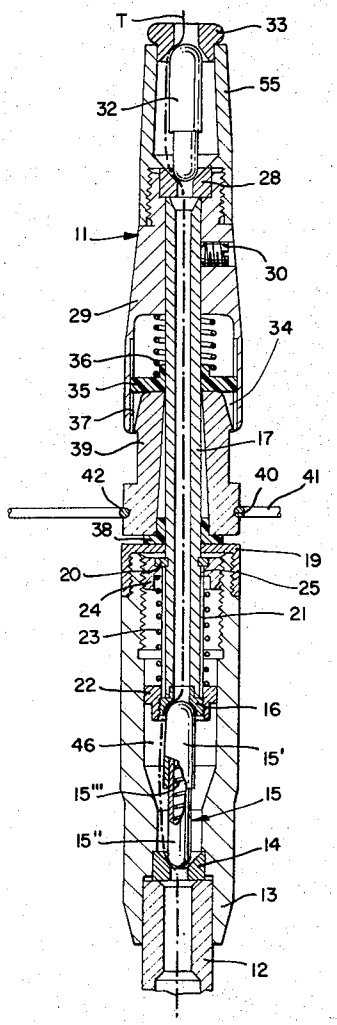
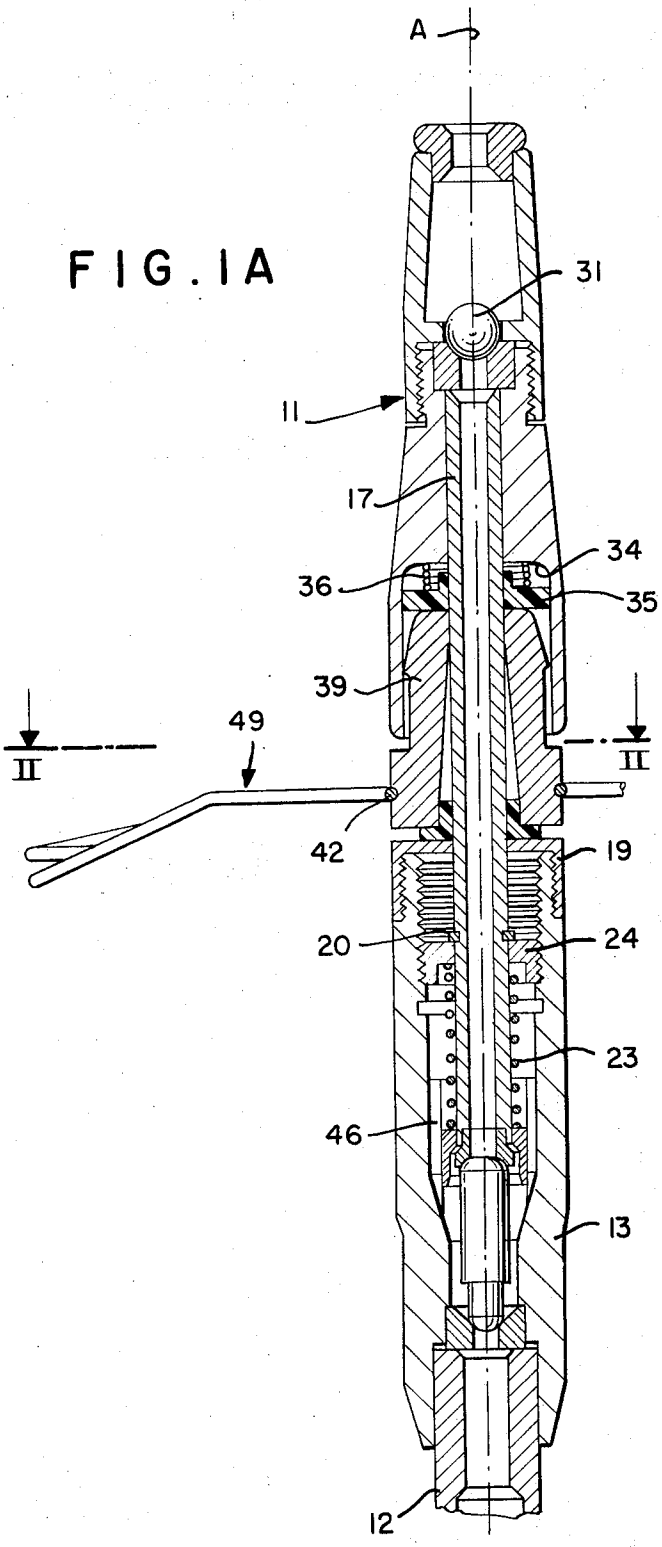


FIG. 1A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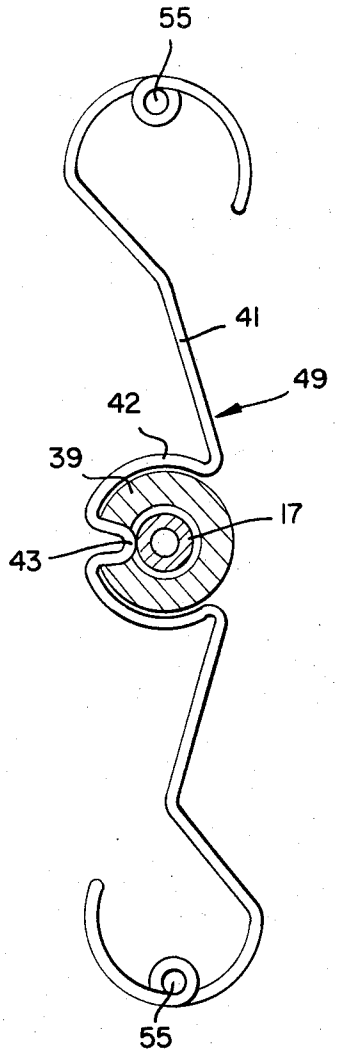
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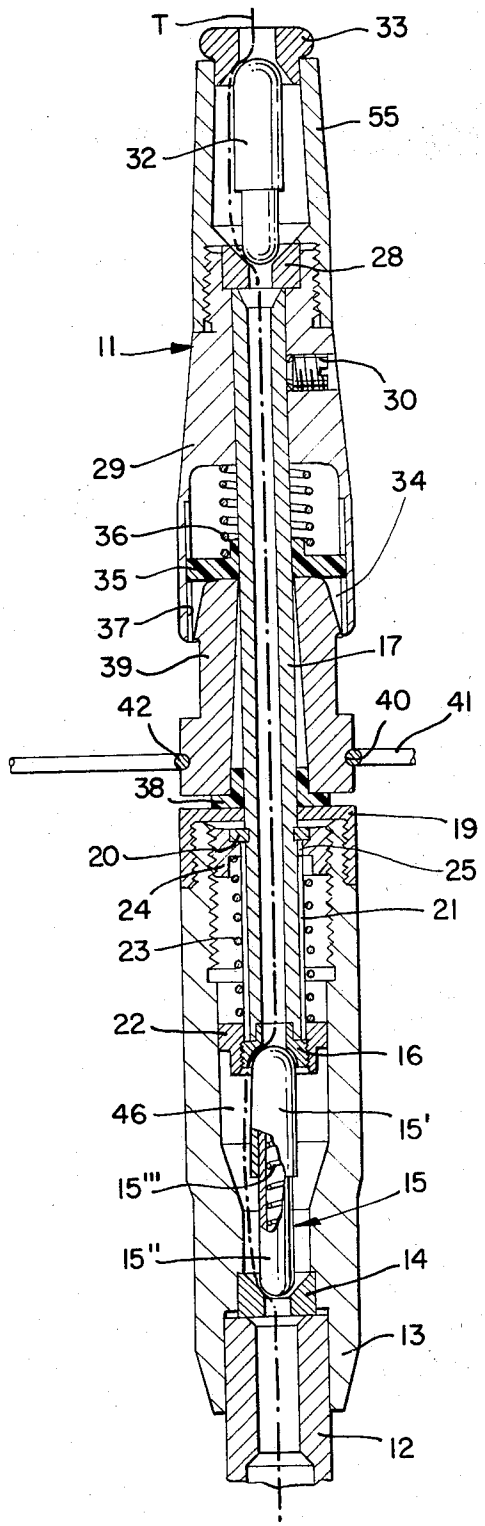
FIG. 2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16
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15'
15'''
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15''
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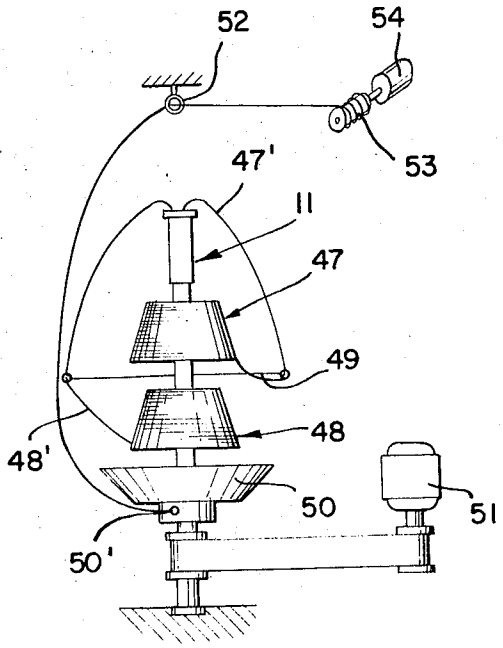
13
12

FIG. 1B

FIG. 3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# THREAD-TWISTING APPARATUS WITH DUAL THREAD GUIDE

## CROSS-REFERENCE TO RELATED APPLICATION

This application is a continuation-in-part of our co-pending application Ser. No. 188,335 filed 12 Oct. 1971 for YARN-TWISTING APPARATUS FOR FORMATION OF MULTIPLE-PLY THREAD.

## FIELD OF THE INVENTION

The present invention relates to an appartus for twisting yarns. More specifically this invention concerns a yarn guiding and tensioning arrangement for a double spool, two-thread yarn twisting arrangement of the type in which two threads are passed through a central tube.

## BACKGROUND OF THE INVENTION

In the twisting together of a pair of filaments, two bobbins or spools are mounted one above the other on a common axis. A filament is drawn upwardly from the two bobbins, which are prevented from rotating, and then down through a vertical passage in a stem on which the bobbins are mounted. Thence the two threads pass radially out through a side of a spindle onto a rotating drum where they are twisted. From the drum these now twisted filaments are pulled upwardly, forming a balloon around the bobbins. A takeup spool serves to wind up the threads which have been twisted together to an extent determined by the takeup speed and the rotation speed of the flyer. Commonly assigned patent application Ser. No. 34,007 filed 4 May 1970 describes such a system (now U.S. Pat. No. 3,648,489).

Our commonly assigned patent application Ser. No. 188,335, mentioned above, describes a system of this type characterized by the provision of a second independent thread brake, in the upper end of the spindle. Such a brake comprises a gravity-loaded ball resting in a conical seat to pinch and tension the yarns as they are pulled between the ball and the seat. The yarns are further tensioned in the lower region of the spindle by a second thread brake comprising a bullet-shaped body which has a pair of rounded ends and which is compressed between two opposite and axially directed conical seats, the yarns being pinched at each end of the body between it and the seats.

According to this earlier application the compressed body comprises a pair of telescoping cylindrical sleeves with hemispherical ends and a compression spring received between these sleeves to urge them outwardly toward their respective seats. In addition the upper seat is formed on the lower end of an elongated element threaded into the nonrotatable spindle, the upper end of the element being provided with markings cooperating with a scale. The element is threaded in the spindle so that rotation of it relative to the spindle moves the upper seat axially relative to the lower seat, compressing the spring in the brake body more or less to vary the braking effect. The upper brake is mounted on this adjustment element, which itself is hollow.

## OBJECTS OF THE INVENTION

It is an object of the present invention to advance the principles disclosed in our earlier application Ser. No. 188,335 and provide a further-improved thread-twisting apparatus

Another object of the present invention is the provision of a thread-twisting apparatus wherein the threads



or filaments are pulled off their respective bobbins in such a manner that their fouling together is virtually impossible and in such a manner that, on thread breakage, an excessive length of these filaments is not wound around the bobbins several times.

## SUMMARY OF THE INVENTION

These objects are attained according to the present invention by an apparatus whose hollow spindle is provided with a hub that can rotate relative to the spindle, a brake being provided between the rotatable hub and the nonrotatable spindle. A thread guide is removably mounted on this hub so that the device may be used for twisting a single filament or for twisting two or more filaments, depending on how many eyes are provided in this guide.

Such an apparatus is especially advantageous in installations where sometimes one and sometimes several yarns are to be twisted since simple removal or mounting of the guide allows the changeover to be executed in seconds. Such a guide is necessary to keep the two filaments apart until they enter the upright axial passage through the stem since if they touch each other just as they are being pulled from their respective bobbins it is almost inevitable that they will foul and completely upset the twisting operation.

According to a feature of this invention the hub is formed with a circumferential outwardly open groove and with a radial notch opening into this groove. The flyer is a bent wire having a pair of arms each formed at the end with a thread-guiding eye and both joined together at the center by a C-shaped region which snaps into the groove in the hub. In addition this C-shaped central region is formed with an inwardly directed spike-like portion which is received in the notch and rotationally couples the flyer to its hub.

In accordance with yet another feature of this invention the hub is carried on a hollow upright tube through which the filament passes. A friction member rotationally coupled to the tube engages the upper side of the hub and another such member mounted below the hub engages its bottom. A nut is threaded in the lower member and is nonrotatable relative to the tube which itself is displaceable axially between two positions in only one of which it is nonrotarable to the lower member. When the tube is axially displaced into what will be called its adjustment position in which it is rotatable relative to the lower support member, its rotation will screw the nut in the lower member, displacing it therein.

A cartridge-type thread brake comprising an axially resiliently compressible body bears in one direction on a seat formed in the lower member and in the other direction on a seat formed on the lower end of the tube which is downwardly biased by a spring engaging the above mentioned nut. Thus when the tube is moved into its adjustment position and rotated it varies the pressure which the spring exerts on the compressible cartridge by displacing the nut axially.

Another spring is provided between the upper member and the friction ring bearing against the top of the hub. Since the pressure exerted on the cartridge by its spring determines how far into the lower member the tube projects, the compression of the spring bearing on the hub is affected as the thread brake is adjusted. As the thread brake is loosened the tube rises in the lower member, which decompresses the spring bearing on the

hub. On original assembly a specific ratio is established between these two springs, with this ratio remaining essentially constant on adjustment of the device.

## DESCRIPTION OF THE DRAWING

The above and other objects, features, and advantages will become more readily apparent from the following description, reference being made to the accompanying drawing in which:

FIG. 1A is a vertical section through a first embodiment of the apparatus, according to the present invention, in the operative position;

FIG. 1B is a similar section showing another embodiment of the device in the adjustment position;

FIG. 2 is a section taken along line II—II of FIG. 1A; and

FIG. 3 is a perspective view illustating how the apparatus according to the present invention is employed.

## SPECIFIC DESCRIPTION

With reference to FIG. 3 a pair of bobbins **47** and **48** of yarn are mounted one above the other on a common stem **11** and their respective filaments **47'** and **48'** are drawn through eyes in the end of a guide **49** carried on a hub **39** rotatable on this stem **11.** Thence the two filaments **47'** and **48'** are drawn through this stem **11** and pass out through a hole **50'** in a flyer **50** which is driven by a motor **51.** This twists the two filaments together. Thereafter they pass up around the entire assembly forming a ballon and through an eyelet **52** to a takeup spool **53** driven by a motor **54.** The amount of twist imparted to the two filaments is determined by the rotation rate of the flyer **50** and the takeup speed of the spool **53.** The spindle **11** is prevented by magnets or the like from rotating and contains two thread brakes which maintain a predetermined amount of tension in the filaments to ensure even twisting and to prevent the balloon from becoming excessively large.

As shown in FIG. 1A and 1B, the stem **11** is mounted on a support rod **12** which is carried on the flyer **50** and carries a lower sleeve member **13** and a seat **14** with a conical surface for a cartridge brake **15.** This brake **15** is an axially elongatable cartridge formed by two telescoping sleeves **15'** and **15''** between which is provided a compression spring **15'''**, each sleeve' and sleeve **15'** having a hemispherical end bearing on its respective conical seat.

A tube **17** has its lower end received in the lower member **13** and passes through a cover **19** into the lower end of an upper sleeve member **29** to which it is rotationally secured by a set screw **30.** This tube **17** is provided with a snap ring **20** which prevents it from being pulled axially out of the lower member **13** by engagement with the screwed-on cover cap **19.** In addition an axial groove **21'** is formed in the tube **17** into which fits a tongue **25** on an adjustment nut **24** which is threaded into the lower member **13** and surrounds the tube **17.** Thus the tube **17** and the nut **24** are rotationally coupled in all possible axial positions of the tube **17** relative to the lower member **13** as defined by the snap ring **20.**

The tube **17** carries on its lower end a seat **16** for the upper hemispherical end of the braking body **15** and a ring **22** which is rotationally coupled to this seat element **16** and which is formed with axially extending fins fitting into complementary grooves **46** formed on the inside of the lower member **13.** These grooves **46** only extend part of the way up in the member **13** so that in the FIG. 1A position the ring **22** fits into them and is therefore rotationally coupled to them whereas in the FIG. 1B position (adjustment position) they do not engage each other and therefore the tube **17** can rotate relative to the element **13.** A compression spring **23** surrounding the tube **17** is braced between the ring **22** and the nut **24** to pull the tube **17** down into the lower member **13** with a force determined by how much it is compressed by the nut **24,** and of course by how much its spring force is greater than that of the spring **15'''** in resilient brake body **15.** The upper member **29** is provided at its top with a threaded-in receiving eye **33.** FIG. 1A shows how a ball brake **31** as described in the above-mentioned Ser. No. 188,335 application can be used here. Alternately, as shown in FIG. 1B, a cartridge brake **32** identical to the brake **15** may be employed, in which case the distance by which eye **33** is screwed into the member **29** determines the degree to which it is compressed and, therefore, and the magnitude of the tension it imparts to the thread whose path is shown at T. In both cases a seat **28** is provided at the upper end of the tube **17** for the brake. All of the seats **14, 16, 28,** and even **33** can be made of a synthetic-resin material or a particular metal whose friction characteristics are especially adapted to the particular needs.

The hub **39** for the wire guide **49** (FIG. 2) is carried between the elements **13** and **29.** This hub is a short sleeve which is rotatable relative to the tube **17** and which rides on the cap **19** via a friction washer **38** and against whose top another washer **35** bears. The member **29** receives the upper end of the hub **39** at **34.** The inner walls of this member **29** are once again formed with grooves **37** which interfit with the washer **35** so that the washer **35** is rotationally coupled to it. In addition a spring **36** is braced between the washer **35** and the member **29** to urge this washer **35** against the hub and thereby brake its rotation relative to the member **29.** A radially inwardly extending projector **43** of the wire guide extends into a radially outwardly open hole **43'** of the hub.

In order to adjust the upper brake **31** the eye **33** is removed and a heavier or lighter ball is exchanged with the existing ball. The brake **32** is adjusted by screwing the eye **33** in or out.

The brake **15** is adjusted by grasping the upper member **29** and lifting it until the ring **22** is pulled out of engagement with the grooves **46** in the lower member **13.** Then, while holding the device in this adjustment position as shown in FIG. 1B with the spring **23** compressed, the upper member **29** is rotated relative to the lower member **13** to screw the nut **24** in the lower member **13.** Screwing the nut **24** down in this lower member **13** will compress the cartridge **15** more and thereby increase the braking effect and vice versa.

At the same time that the braking effect in the brake **15** is increased the braking effect exerted by friction washer **35** on the hub **39** is increased and vice versa. This is because, with increasing compression of spring **23** the capsule or cartridge **15** will be more compressed and therefore the tube **17** will extend further into the lower member **13.** Since this tube **17** drops and the hub **39** (FIG. 2) cannot, the upper member **29** will therefore compress the spring **36** more and cause greater braking on the thread guide to take place. Decreasing of the braking effect at brake **15** similarly decreases the braking effect on the hub **39.** Since the braking effects

both so adjusted are mainly responsible for the degree of tension in thread, it is extremely advantageous that they be adjustable in one operation.

We claim:

1. A guiding and braking arrangement for a thread-twisting apparatus comprising:
an axially elongated hollow stem;
a pair of axially spaced thread brakes in said stem;
a hub rotatably mounted on said stem;
a thread guide removably mounted on and rotationally fixed to said hub; and
means for braking rotation of said hub relative to said stem, said guide being a bent wire having a C-shaped central portion snugly embracing said hub.

2. The arrangement defined in claim 1 wherein said hub is formed with a radially open hole, said guide being provided in said portion with a radially inwardly extending projection receivable in said hole.

3. The arrangement defined in claim 2 wherein said guide has a pair of substantially diametrically opposite arms each provided with a thread-receiving eye.

4. The arrangement defined in claim 1, further comprising means interconnecting one of said thread brakes with said braking means for simultaneous adjustment of both.

5. The arrangement defined in claim 4 wherein said one of said thread brake comprises a pair of axially open conical seats and a compressible body engaged there between.

6. The arrangement defined in claim 5 wherein said braking means includes a first spring bearing axially against said hub.

7. The arrangement defined in claim 6 wherein said means interconnecting said one brake to said braking means includes:
an axially elongated tube in said stem carrying an abutment, and provided at one end with one of said seats of said
one brake, said first spring bearing against said abutment and against said hub;
a nut threaded into said stem and formed with a central hole, said tube passing through said central hole;
means rotationally coupling said tube to said nut for rotation and axial displacement of said nut relative to said stem on rotation of said tube;
a second spring braced between said nut and said one seat whereby axial displacement of said nut changes the pressure exerted by said one seat on said body and thereby axially displaces said tube; and
means for permitting rotation of said tube relative to said stem in a first axial position of said tube and for pre-venting rotation therebetween in a second axial position of said tube.

8. The arrangement defined in claim 7 wherein said hub has one end turned toward said one seat and an end turned away there-from, said first spring bearing against said end turned away therefrom.

9. A guiding and braking arrangement for a thread-twisting apparatus comprising:
an axially elongated hollow stem;
a pair of axially spaced thread brakes in said stem;
a hub rotatably mounted on said stem;
a thread guide removably mounted on and rotationally fixed to said hub;
means for braking rotation of said hub relative to said stem; and
means interconnecting one of said thread brakes with said braking means for simultaneous adjustment of both, said one of said thread brakes comprising a pair of axially open conical seats and a compressible body engaged there between.

10. The arrangement defined in claim 9 wherein said braking means includes a first spring bearing axially against said hub.

11. The arrangement defined in claim 10 wherein said means interconnecting said one brake to said braking means includes:
an axially elongated tube in said stem carrying an abutment, and provided at one end with one of said seats of said one brake, said first spring bearing against said abutment and against said hub;
a nut threaded into said stem and formed with a central hole, said tube passing through said central hole;
means rotationally coupling said tube to said nut for rotation and axial displacement of said nut relative to said stem on rotation of said tube;
a second spring braced between said nut and said one seat whereby axial displacement of said nut changes the pressure exerted by said one seat on said body and thereby axially displaces said tube; and
means for permitting rotation of said tube relative to said stem in a first axial position of said tube and for pre-venting rotation therebetween in a second axial position of said tube.

12. The arrangement defined in claim 11 wherein said hub has one end turned toward said one seat and an end turned away therefrom, said first spring bearing against said end turned away therefrom.

13. The arrangement defined in claim 12 for a double-spool two-thread twisting machine, wherein said means rotationally coupling said tube to said nut and said means for permitting rotation and for preventing rotation of said tube both include axially extending interfitting formations on said tube, nut and stem, said guide being unitarily bent from a single wire with a spreadable C-shaped central protion, a pair of arms extending outwardly from said central portion, and a pair of guide eyes bent into the ends of said arms, said hub having a portion of noncircular cross-section releasably engageable by said central portion of said wire for rotational coupling of said wire to said hub.

* * * * *