

April 17, 1945.

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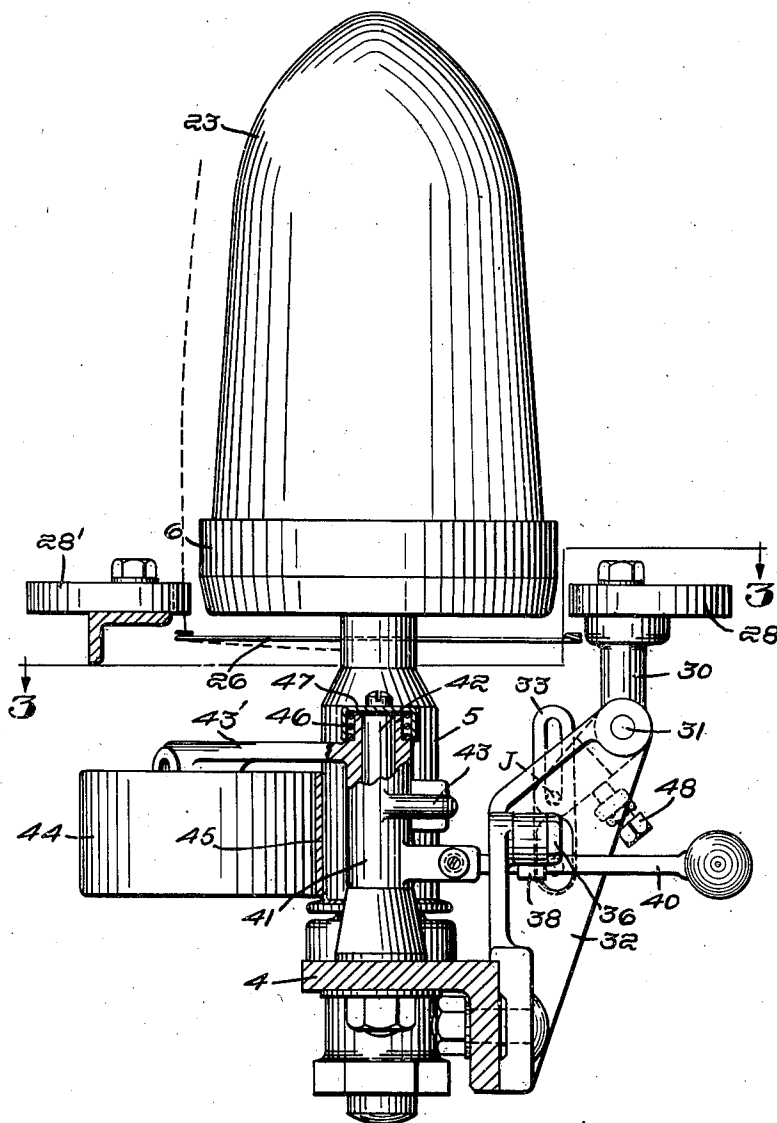
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TWISTER

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5 Sheets-Sheet 1

Fig. 1.



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5 Sheets-Sheet 2

Fig. 3.

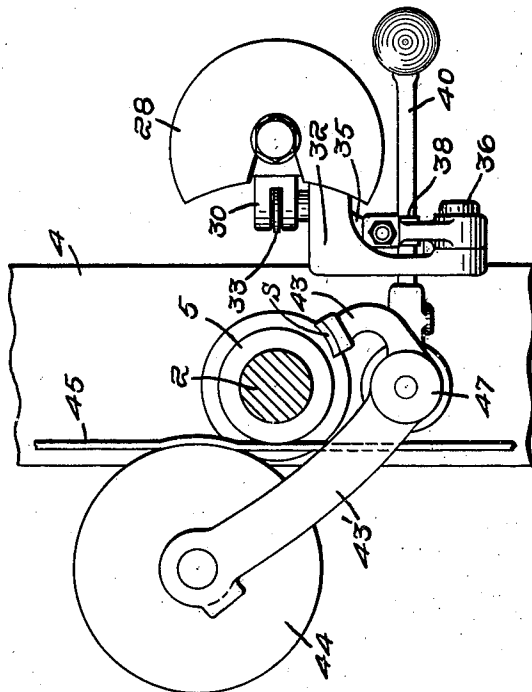


Fig. 4.

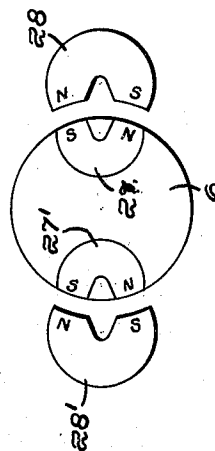
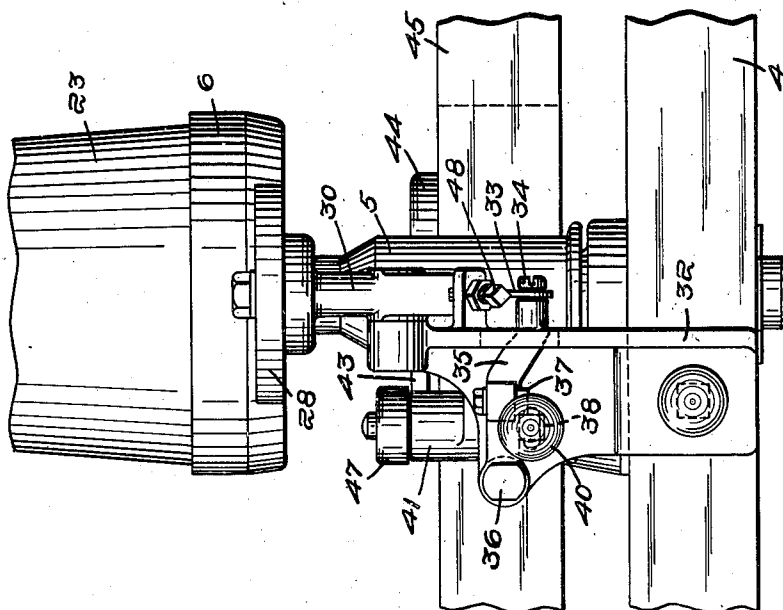


Fig. 2.



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Fig. 5.

Fig. 6.

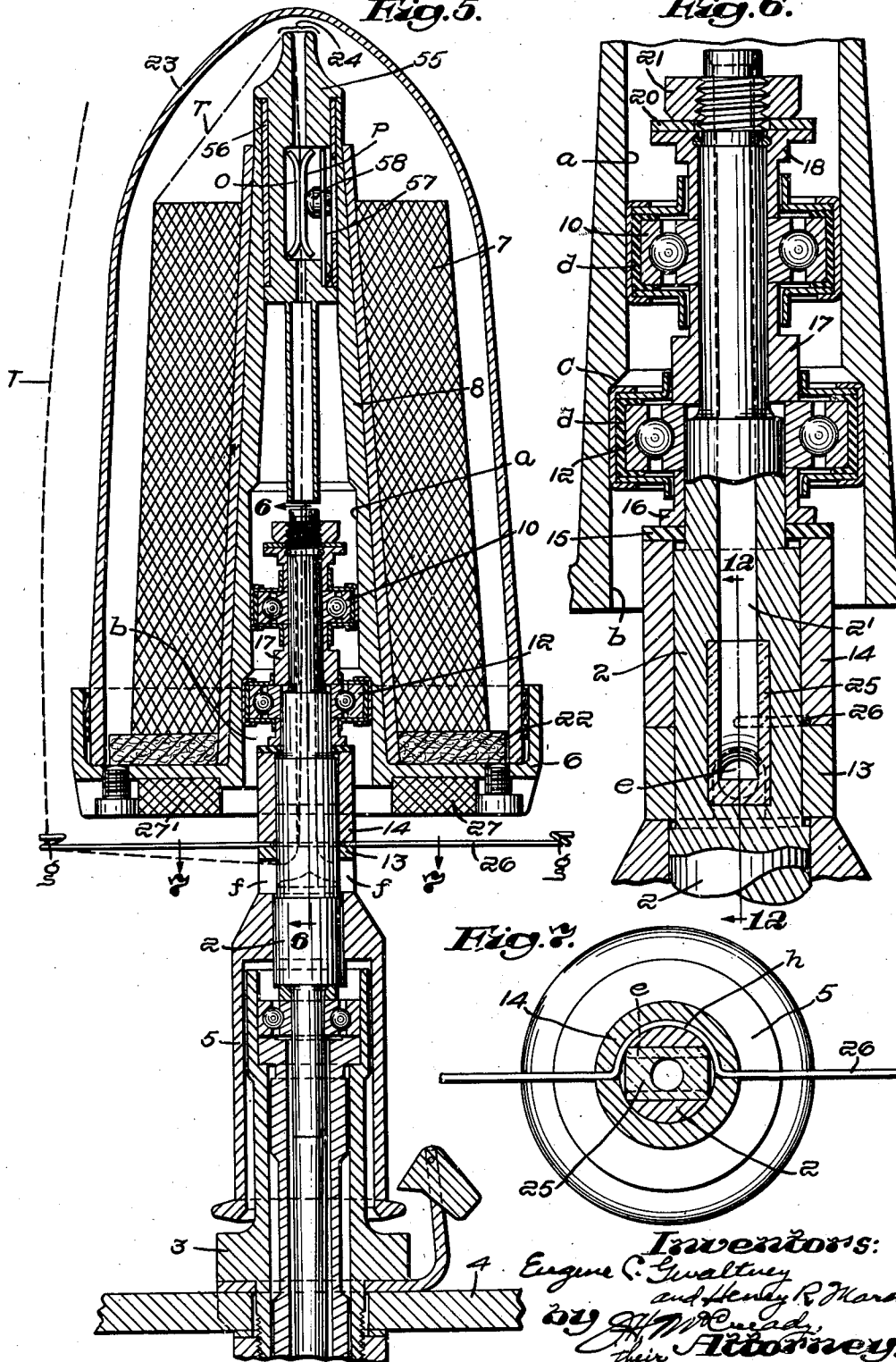


Fig. 7.

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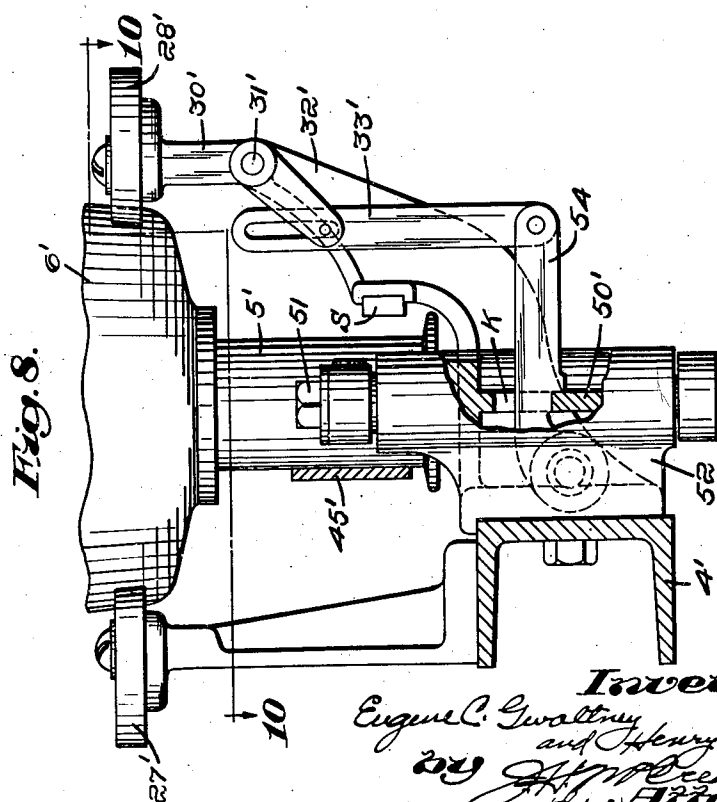
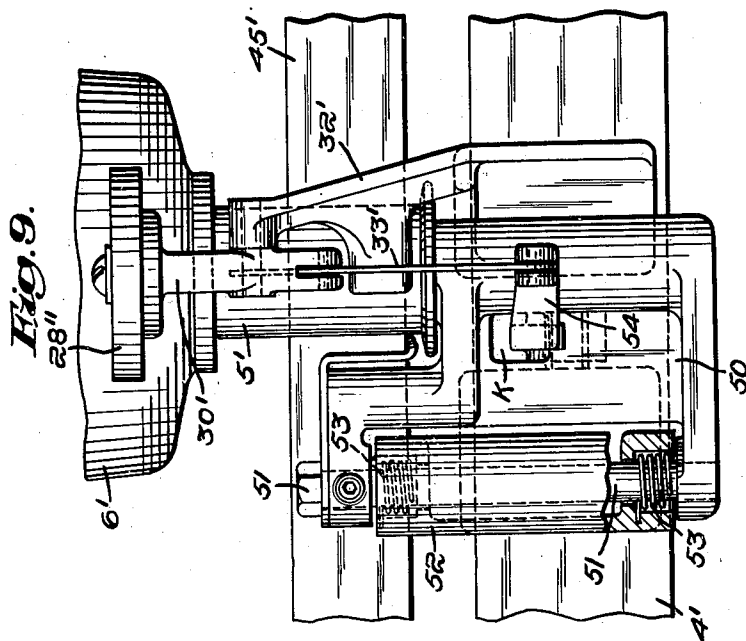
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2,374,085

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5 Sheets-Sheet 4



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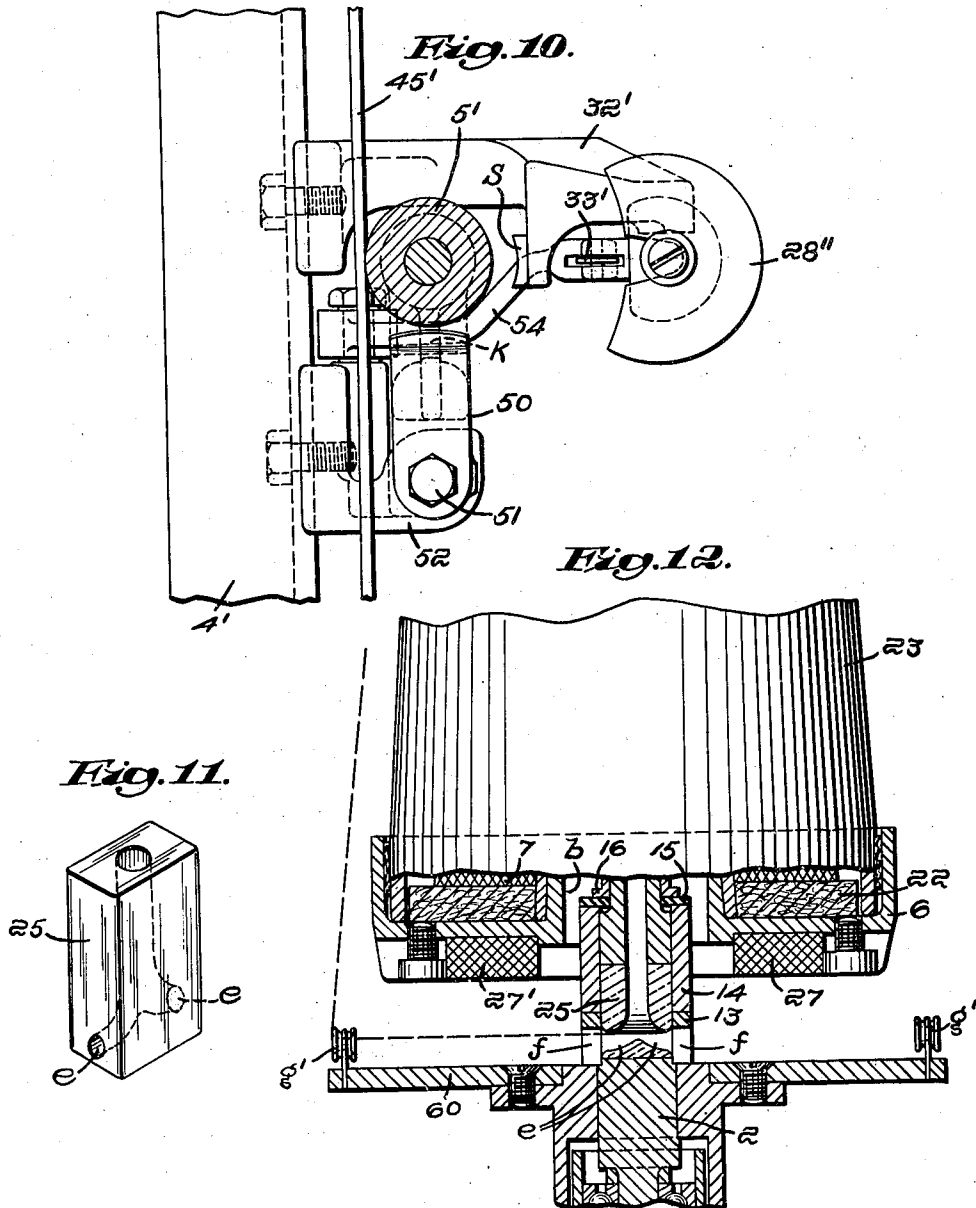
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2,374,085

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5 Sheets-Sheet 5



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UNITED STATES PATENT OFFICE

2,374,085

TWISTER

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Application July 23, 1943, Serial No. 495,832

19 Claims. (Cl. 57—58)

This invention relates to textile twisting machines of the so-called "2 for 1" type. As is well understood by those skilled in this art, a machine of this type is so organized as to put two turns of twist into the roving, yarn, thread, or other strand to be twisted, for each revolution of the spindle. For convenience the material to be twisted will usually be hereinafter referred to as "yarn," and the supply body from which such yarn is drawn will be referred to as a "cop."

A typical prior art machine of this type comprises a revolving vertical spindle projecting through a support on which is mounted a stationary cop. The spindle and the cop support or carrier have a central passage therethrough for guiding the yarn unwound from the cop to a flier mounted below the support. The arrangement is such that, when the machine is in operation, it draws yarn from the stationary cop and feeds it downwardly through the spindle to the flier. From this member the yarn runs through a stationary guide above the spindle and then to some suitable take-off or winding mechanism. Thus, one turn of twist is put into the yarn after it leaves the cop and during its travel to the flier, and a second turn of twist is imparted to the yarn by each rotation of the flier.

Machines of this type have long been known and they have been used to some extent for coarse work and in a few unusual situations for which they are well adapted, but normally only for relatively slow speed work, as compared with the speeds that are desirable and can be attained by the use of the present invention. While many efforts have been made to develop them into a practical form for general textile twisting in order to obtain the advantage inherent in the nature of their organization, nevertheless they are, so far as I have been able to learn, almost unknown commercially in the textile industry.

One reason for this situation is that they have always been regarded as dangerous machines. It is necessary to the operation of such a machine to hold the supply cop stationary. This has frequently been done by mounting the spindle with its axis inclined or horizontal and holding the cop support stationary by means of an eccentrically mounted weight. In other cases the spindles have been mounted upright and magnetic means, or gearing, have been relied upon to maintain the yarn carrier stationary. Usually, however, in operating such a machine it has happened, sooner or later, that the normally stationary carrier has been picked up in rotation with the spindle. The carrier with its load is practically

always in a highly unbalanced condition, and if it is revolved at a high speed, it is practically certain to "explode." Due to the occurrence or danger of such accidents on 2 for 1 twisters as heretofore constructed, this type of machine has come to be regarded as too dangerous for practical use in a textile mill.

The present invention aims both to insure against the difficulties and dangers just described and also to improve the general organization of twisters of this type with a view to making them easy to thread up, facilitating the piecing up operation, and producing a thoroughly safe machine.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawings, and the novel features will be particularly pointed out in the appended claims.

In the drawings,

Fig. 1 is a side elevation of a twister constructed in accordance with this invention;

Figs. 2 and 3 are front and plan views, respectively, of a stop mechanism provided by this invention;

Fig. 4 is a diagrammatic plan view of a magnet arrangement forming one feature of the invention;

Fig. 5 is a vertical, sectional view, on a larger scale, showing details of construction of the twister mechanism illustrated in Fig. 1;

Fig. 6 is a sectional view on a larger scale taken substantially on the line 6—6, Fig. 5;

Fig. 7 is a horizontal, sectional view on the line 7—7, Fig. 5;

Figs. 8 and 9 are side and front views, respectively, of another form of stop mechanism;

Fig. 10 is a horizontal, sectional view on the line 10—10, Fig. 8;

Fig. 11 is a perspective view of a thread guiding element forming part of the spindle assembly; and

Fig. 12 is a vertical, sectional view taken on the line 12—12, Fig. 6, but illustrating the spindle as equipped with a different form of flier.

Referring more particularly to Figs. 1, 5 and 6, it will be seen that the machine there illustrated comprises a spindle blade 2 mounted in a spindle base 3 which is supported in a spindle rail 4. Any suitable mounting for the spindle blade may be employed, that shown being a commercial construction commonly used in ring twister spindle. A whirl 5 having a pressed fit with the enlargement of the spindle blade just above the

ball bearing provides a convenient means for driving the spindle by the usual tape or belt.

Mounted on the blade 2 is a normally stationary support or carrier 6 for the yarn supply body or cop 7. This support comprises a cup-shaped base with an integral, hollow, tapered extension 8 extending upwardly from the central portion of said base, the bore of this extension being stepped to provide internal cylindrical sections *a* and *b* in which upper and lower ball bearing units 10 and 12, respectively, are positioned. The weight of the carrier is supported chiefly by the lower of these units, and for this purpose the shoulder *c*, Fig. 6, connecting the sections *a* and *b* rests on the bearing 12, while the upper bearing chiefly affords radial support.

This spindle blade and bearing assembly comprises two sleeves 13 and 14, best shown in Fig. 6, both closely encircling the blade 2 and the latter sleeve 14 resting on the former sleeve 13; a washer 15 of rubber, or other resilient material, resting on the upper sleeve and a collar 16 spacing the inner race of the bearing 12 from said washer. Another collar 17 spaces the inner races of the two bearings from each other, and a third collar 18 resting on the inner race of the upper bearing supports a lock washer 20 on which a lock nut 21 bears. This nut is threaded on the upper end of the spindle 2 so that by tightening it down, all of the inner races of the bearings are clamped securely to the spindle blade. Preferably rubber bushings *d* are interposed between the outer races of the two bearings and the metal shells with which they are equipped, thus providing cushioning or yielding elements between the spindle blade and the carrier 6.

Preferably a layer of felt 22, or other yielding material, rests on the upper surface of the carrier base 6 to support the cop 7 and prevent any rotation of the latter relatively to the carrier. Also, the cop is enclosed in a cover 23 which fits frictionally inside the flange of said base so that it can readily be removed when desired.

As the yarn *T*, Fig. 5, is unwound from the top of the supply body 7, it is guided downwardly along the axis of the spindle through a tension device, indicated in general at 24 but which may be of any suitable form, and it continues downwardly through the bore 2', Fig. 6, of the spindle into and through a guide block 25, preferably made of porcelain and better shown in Fig. 11. The block has a vertical hole *e* to register with the spindle bore 2' and it branches at its lower end to form two lateral outlets leading in opposite directions to the outer surface of the spindle. The lower sleeve 13, above referred to, has openings *f-f*, Fig. 5, registering with these outlets *e-e*, and the yarn travels through one of them to one of the eyes of a flier 26 of a novel form. As best shown in Figs. 5 and 7, it consists of a section of stiff wire provided with pig-tail guide eyes *g-g* at its opposite ends and it also has an intermediate shank portion *h* which is approximately semi-circular in form and fits into a groove of corresponding shape formed in one of the meeting surfaces of the sleeves 13 and 14 where it is clamped securely, but removably, when the nut 21 is tightened up. The outlets *e* and *f* for the yarn are directly under the inner ends of the flier arms; as will be evident from an inspection of Figs. 5 and 7, so that the yarn upon emerging from the smooth surface of the porcelain guide eye travels freely and unimpeded to the guide eye of the flier.

While the carrier 6 is mounted for free rotation around the axis of the spindle 2, it is important

to the normal operation of the machine that it be held in a stationary position while the machine is running; and this applies not only to preventing the carrier from revolving, but also to preventing any oscillating movements of the carrier which would affect tension and disturb the smooth progress of the twisting operation. For this purpose I prefer to employ two horse-shoe magnets 27-27', both secured to the bottom of the carrier 6 in diametrically opposite relationship to each other. Two additional horse-shoe magnets 28 and 28' are mounted in cooperative relationship to them, as best shown in Figs. 1 to 4, inclusive. The latter magnets are supported on parts of the machine frame in stationary positions, and the individuals of the two sets of magnets are arranged in reversed relationship; that is, the north and south poles of the magnet 27 are in juxtaposed relation to the south and north poles, respectively, of its cooperating magnet 28, and the poles of the other two magnets are positioned in like relationship. This not only utilizes the mutual attraction of both sets of magnets to their greatest advantage, but it also provides an arrangement in which even a slight angular rotation of the carrier 6 in either direction away from its normal position brings like poles of the magnets 27 and 28 into mutually repelling relationship.

An important feature of this invention is the utilization of the repulsion so produced to stop the spindle automatically. In other words, a stop mechanism for the spindle is provided in which the magnet 28 is included as a controlling or actuating element.

Referring to Figs. 1 to 4, it will be seen that the magnet 28 is supported on the upper arm of a bell crank lever 30 which is pivoted at 31 on a bracket 32. The lower arm of this lever carries a pin *J*, Fig. 1, positioned in a slot of a link 33 which is pivoted at 34 to a lever 35 fulcrumed on the bolt 36, Fig. 2. A latch block 37 is bolted to the lower side of the lever 35 and normally engages one side of a similar block 38 secured on the upper surface of another lever 40. This lever is secured rigidly to a sleeve 41 mounted to rotate freely on the post 42, Fig. 1, and the sleeve has two arms 43 and 43', Fig. 3, extending therefrom, the former carrying a brake shoe positioned to engage the whirl 5, and the latter carrying a tensioning pulley 44 for engaging the driving belt 45 and holding it pressed against the lateral surface of the whirl 5. A coiled spring 46, Fig. 1, enclosed in a cap 47, acts on the sleeve 41 with a tendency to swing the arms 43 and 43' in a counter-clockwise direction, Fig. 3, so as to apply the brake and simultaneously to release the belt-tensioning pulley 44. An adjustable stop screw 48 determines the normal position of the lever 30 and the magnet 28.

So long as the machine is running normally the parts remain in the positions illustrated in Figs. 1 to 4, with the cooperating latch blocks 37 and 38 preventing the spring 46 from setting the brake, but if the carrier 6 rotates out of its normal position sufficiently to interrupt the mutual attraction of the magnets 27 and 28 and to place the former into a position where it repels the latter, then this force aided by gravity swings the magnet 28 in a clockwise direction, Fig. 1, around its pivot. By the time that the pin *J* strikes the top of the slot in the link 33, the magnet has acquired considerable momentum and these connections then lift the latch lever 35 far enough to release the latch block 38 on the lever 40, whereupon the spring 46 applies the brake and simultaneously releases the pressure of the belt 45

against the peripheral surface of the whirl 5. This action automatically stops the spindle 2.

After the cause for the abnormal movement of the carrier 6 has been cleared and the spindle is ready to be started again, the attendant swings the lever 40 back into its initial position as shown in Fig. 3, at the same time lifting the magnet 28 into its operative position. This releases the brake, again applies tension to the belt, locks the lever 40 in its operative position, and starts up the spindle. At this time the magnet 27 on the carrier will be in position to meet the magnet 28 because the other stationary magnet 28' will have reacted with its cooperating magnet 27' at some time during the rotation of the carrier incidental to the operations just described to hold the carrier in the position shown in Fig. 4 where it is ready for the resetting of the stop motion.

It will also be seen from an inspection of Fig. 4 that the poles of the magnet 27' are reversed circumferentially with reference to those of the magnet 28. Consequently, if by any chance the magnet 27 is swung past its companion magnet 28 without tripping the latter, and rotation of the carrier continues far enough to bring the magnet 27' into register with the magnet 28, then both north and south poles of the carrier magnet 27' will be opposed to like poles of the magnet 28. This creates a powerful magnetic kick on the latter magnet which will be practically certain to operate the stop mechanism. This arrangement, however, is optional and the poles of both sets of magnets may be similarly placed circumferentially if desired for any reason.

It should also be observed that the arrangement of the magnets and of the other parts mounted on the carrier and which will rotate with it, if it revolves, are in good dynamic balance so that even if all the safety devices should fail (which would seem to be practically impossible) there would still be far less danger of the carrier exploding than with the usual unbalanced prior art constructions.

Another form of stop mechanism for the spindle which sometimes will be found preferable, is illustrated in Figs. 8, 9, and 10. Here the parts essentially like those shown in Figs. 1 to 4 are indicated by the same but primed or double-primed numerals. In this case, however, the spindle structure, instead of being mounted to revolve around a stationary axis, as in Fig. 1, is supported on a swinging bracket 50 which is pivotally connected by a bolt 51 on a stationary bracket 52 secured to the spindle rail 4'. The bolt itself is rigidly secured to the bracket 50 and two coiled springs 53—53, Fig. 9, act on it with a tendency to swing the latter bracket and the parts mounted thereon in a clockwise direction, Fig. 10. Normally, however, a latch lever 54, best shown in Fig. 8, is hooked over a portion 50', Fig. 8, of the web of the bracket 50 and it locks the entire spindle assembly, including those parts carried thereby and those mounted on the bracket 50, in the relationship shown in Figs. 8 and 10, where the whirl 5' is in firm contact with the surface of the driving belt or tape 45'. When the magnet 28' is repelled by its companion magnet on the carrier 6', in the manner above described, it is swung around its pivot 31' and in doing so lifts the link 33' exactly as previously described in connection with the other stop motion, thus raising the latch lever 54 far enough to release the swinging bracket 50. Instantly thereafter the bracket is swung outwardly by the springs 53—53

and the whirl 5' moves out of contact with the belt 45' and into contact with a stationary brake shoe s, Fig. 8, set into a socket formed in the bracket 32', thus stopping the rotation of the spindle.

After the condition causing the knock-off has been remedied, the stop mechanism can be reset merely by lifting the magnet 28' and pushing the whirl 5' back into contact with the driving belt 45'. While the mechanism is knocked off, the lever 54 rests in the hole k, Figs. 8 and 9, in the web of the bracket 50 so that upon resetting, it merely drops into its locking position when the magnet has been restored to its normal position.

As above indicated, any suitable form of thread tension device may be used in the spindle, provided it is reasonably easy to thread up, produces a uniform drag on the yarn, and can be readily adjusted to give a good gradient of drag or tension. The particular tension device shown in Fig. 5 comprises a body 55 resting loosely in the top of the tubular extension 8 of the carrier 6 and preferably encircled by a cushioning sleeve 56 of felt, rubber, or equivalent material. In this body are mounted two substantially flat metal plates o and p having curved ends, and they are pressed together by a knob or button 58 mounted on a leaf spring 57, one end of which is secured to said body. This spring is slotted to receive the shank of a screw which secures the button 58 to it for adjustment lengthwise of the spring. Consequently, as the button is moved downwardly toward the point of support of the spring, its pressure on the plates is increased, while adjustment of it in the opposite direction reduces the pressure with which the plates grip the thread passing between them.

In threading up the machine, the cover 23 is removed, a threading wire is passed downwardly through the tension device and the bore of the spindle, coming out through one of the outlets / below the flier. The thread is inserted through the eye of this threading wire so that by pulling on the lower end of it the thread will be guided down into its running position, after which it is threaded through one of the eyes g, is led up to the usual guide eye (not shown) above the spindle, and from there to the wind-up mechanism.

The threading operation is facilitated by the fact that the entire spindle passage through which it is led is substantially straight and the ends are open and readily accessible. This arrangement also is easy to clear in the event of a jam since the thread tensioning device 55 can be picked out of the top of the thread tube 8 instantly, and this fact, plus the open construction at the exit of the yarn from the spindle, makes it a simple matter to clear out the thread passages completely. Moreover, this construction also applies a minimum of friction to the yarn, both during its passage through the spindle and also after leaving it, practically all the friction being applied in the tensioning device itself. The removability of the latter element and the ease with which it can be adjusted, is of further advantage in making it possible to change the tension on the yarn without breaking it and necessitating re-threading.

The wire flier illustrated in Figs. 5 and 7 can be easily replaced, if desired for any reason, as when a lighter or heavier flier may be preferred to suit the requirements of the particular yarn being run. This is readily accomplished by loos-

ening the upper sleeve 14, Fig. 6, sufficiently to permit the removal of one flier and its replacement by another. In the same way the porcelain eye or guide member 25 can be removed by sliding both sleeves 13 and 14 upwardly on the spindle far enough to permit the porcelain block to be slipped laterally out of the socket in which it is normally retained in the spindle. It can be replaced by a different one and the parts then clamped in their normal positions.

In operating on heavy yarn, such as tire cord, it may be desirable to use a heavier flier construction, in which event that above described can be replaced by a flat disk 60, Fig. 12, secured on the spindle whirl just below the sleeve 13. Two porcelain guide eyes g' — g' are mounted at diametrically opposite points on this disk. An important advantage of the wire flier construction, however, is that the aerodynamic drag or "windage" which it creates is very low indeed, and the saving in power which follows from this fact is valuable even as compared to a relatively simple disk type of flier, as shown in Fig. 12.

It should also be observed that both forms of fliers are so mounted that they are entirely outside the magnetic field. This is an important factor when a strong magnetic field is maintained to hold the carrier normally in a stationary position. Any conducting element cutting that field will set up eddy currents, and if the conductor has a large continuous area and its speed is high, those currents may easily attain sufficient value to raise the temperature of such member to a red heat. This difficulty is avoided by the present invention because the path of revolution of the flier is entirely outside of the magnetic field. It should also be noted that all of the magnets are in substantially the same horizontal plane so that any tendency to create an end thrust in either direction is avoided. Moreover, the use of two sets of permanent magnets, normally located in mutually attracting relationship, provides not only an exceptionally dependable and safe construction but one in which oscillation of the carrier is prevented. In addition, because of the relationship between the magnets above described and their cooperative action when the carrier is rotated out of its normal position for any reason, the repulsive effort or kick then created, provides an exceptionally reliable method of initiating the action of the stop mechanism. This, as above described, is of the greatest importance in a machine of this type because of the tendency which these machines have to "run away" and blow up.

While we have herein shown and described a preferred form of our invention, it will be evident that the invention, and particularly some features thereof, may be embodied in a variety of forms without departing from the spirit or scope of the invention.

Having thus described our invention, what we desire to claim as new is:

1. In a twister of the character described, in combination, a normally stationary carrier for a yarn body, a spindle mounted for rotation within said carrier and about its own axis, a flier secured to said spindle, said carrier, although normally stationary, being mounted for rotation about the axis of said spindle and relatively thereto, means for guiding yarn drawn from said body to said flier whereby the flier revolves the yarn around said axis, and a plurality of magnets including one mounted on said carrier and

another supported in a normally stationary position outside the carrier, said magnets having poles positioned to operate by mutual attraction to hold said carrier normally stationary.

2. In a twister of the character described, the combination with a spindle mounted for rotation about its own axis, a flier secured to said spindle, a normally stationary carrier for a yarn body, said carrier being mounted for rotation around the axis of said spindle, and means for guiding yarn drawn from said body to said flier whereby the flier revolves the yarn around said axis, of means for normally holding said carrier stationary comprising cooperating magnets, one mounted on said carrier and another supported in a normally stationary position outside the path of rotation of said carrier, the north and south poles of one magnet being positioned in juxtaposed relationship to the south and north poles, respectively, of the other magnet.

3. In a twister of the character described, the combination with a spindle mounted for rotation about its own axis, a flier secured to said spindle, a normally stationary carrier for a yarn body, said carrier being mounted for rotation around the axis of said spindle, and means for guiding yarn drawn from said body to said flier whereby the flier revolves the yarn around said axis, of a plurality of magnets including one mounted on said carrier and another supported in a normally stationary position outside the carrier, said magnets having poles positioned to operate by mutual attraction to hold said carrier in a normally stationary position and to be relatively moved by the rotation of the carrier out of said position into mutually repelling relationship, and means operated by said repelling action to stop the rotation of the spindle.

4. In a twister of the character described, the combination of a spindle mounted for rotation about its own axis, a carrier for a yarn body, normally stationary, but supported for rotation around said spindle, a flier carried by said spindle and serving to revolve the yarn around said carrier, means for guiding the yarn drawn from said body along the axis of said spindle to said flier, means for holding said carrier normally stationary comprising a plurality of magnets one of which is mounted on said carrier and another is positioned in cooperative relationship to it outside the carrier, and a stop mechanism for said spindle in which one of said magnets is included as an actuating element.

5. In a twister of the character described, the combination with a spindle mounted for rotation, a flier secured to said spindle, a normally stationary carrier for a yarn body, said carrier being mounted for rotation around the axis of said spindle, and means for guiding yarn drawn from said body to said flier whereby the flier revolves the yarn around said axis, of means for normally holding said carrier stationary comprising a plurality of magnets mounted on said carrier and additional normally stationary magnets, the poles of which are positioned in mutually attracting relationship to the poles of the magnets on the carrier, the two sets of magnets being so related that rotative movement of the carrier brings like poles in the two sets into mutually repelling relationship, and mechanism arranged to be actuated by the repelling action of two of said magnets for stopping the rotation of said spindle.

6. In a twister according to preceding claim 5, a construction in which said magnets include two horse-shoe magnets mounted on said carrier

and two normally stationary horse-shoe magnets supported outside the path of revolution of said carrier and in cooperative relationship to the respective magnets on the carrier, the north and south poles of each of the carrier magnets being positioned in opposed relationship to the south and north poles, respectively, of its cooperating stationary magnet.

7. In a twister according to preceding claim 5, a construction in which said magnets include two horse-shoe magnets mounted on said carrier and two stationary horse-shoe magnets supported outside the path of revolution of said carrier and in cooperative relationship to the respective magnets on the carrier, the north and south poles of each of the carrier magnets being positioned in opposed relationship to the south and north poles, respectively, of its cooperating stationary magnet, and the polarity of one of said magnets on the carrier being reversed circumferentially with reference to the other.

8. In a twister according to preceding claim 1, a construction in which one of said magnets is normally stationary but is mounted for swinging movement outside the path of rotation of said carrier when it is freed from the magnetic pull of the magnet on the carrier, and means arranged to be brought into action by said swinging movement for stopping the rotation of the spindle.

9. In a twister according to preceding claim 5, a construction in which the magnets on said carrier are spaced apart by substantial angular distances and one of said normally stationary additional magnets is operable to initiate the action of said stop mechanism, whereby one pair of the magnets tends to hold said carrier positioned for the resetting of the movable magnet after it has actuated the stop mechanism.

10. In a twister of the character described, the combination with a spindle mounted for rotation, a flier secured to said spindle, a normally stationary carrier for a yarn body, said carrier being mounted for rotation around the axis of said spindle, and means for guiding yarn drawn from said body to said flier whereby the flier revolves the yarn around said axis, of two magnets mounted, respectively, on said carrier and on the machine frame, means supporting the latter magnet for movement relatively to said carrier, said magnets having poles positioned to operate by mutual attraction to hold said carrier normally stationary and to be relatively moved by the rotation of the carrier into a mutually repelling relationship, a brake for stopping the rotation of said spindle, means for applying said brake, and a latch normally preventing such application but arranged to be released by said movable magnet when the latter is repelled by the magnet on the carrier.

11. In a twister of the character described, the combination with a spindle mounted for rotation, a flier secured to said spindle, a normally stationary carrier for a yarn body, said carrier being mounted for rotation around the axis of said spindle, and means for guiding yarn drawn from said body to said flier whereby the flier revolves the yarn around said axis, of two magnets mounted, respectively, on said carrier and on the machine frame, means supporting the latter magnet for movement relatively to said carrier, said magnets having poles positioned to operate by mutual attraction to hold said carrier normally stationary and to be relatively moved by the rotation of the carrier into a mutually repelling

relationship, a brake for stopping the rotation of said spindle, means for applying said brake, a latch normally preventing such application, and connections between the latter magnet and said latch for causing the movement of the magnet out of its operative position to trip the latch and permit the application of the brake by the means for operating it.

12. In a twister of the character described, the combination of a spindle mounted for rotation, a carrier for a yarn body, normally stationary but supported for rotation around said spindle, a flier carried by said spindle and serving to revolve the yarn around said carrier, means for guiding the yarn drawn from said body along the axis of said spindle to said flier, said spindle having a transverse slot therein and said guiding means including a guide block removably positioned in said slot and having a hole therethrough for guiding said yarn laterally away from said axis toward the flier.

13. In a twister of the character described, the combination of a spindle mounted for rotation, a carrier for a yarn body, normally stationary but supported for rotation around said spindle, a flier carried by said spindle and serving to revolve the yarn around said carrier, means for guiding the yarn drawn from said body along the axis of said spindle to said flier, said spindle having a transverse slot therein and said guiding means including a guide block removably positioned in said slot and having a hole therethrough for guiding said yarn laterally toward said flier, and means for securing said flier to said spindle comprising two sleeves positioned on said spindle one above the other, one of said sleeves encircling said guide block and holding it in said slot, and means for clamping said sleeves upon said flier.

14. In a twister of the character described, the combination with a spindle and a flier mounted thereon for rotation therewith, of a carrier for supporting a yarn cop in concentric relationship to said spindle and encircling a portion thereof, said carrier including a disk-like body and a stationary tubular member rigid with said body and extending upwardly from the central portion thereof, the upper portion of said spindle extending into said tubular member, a plurality of ball bearings mounted on said spindle and supporting said tubular member, said member having an internal shoulder resting on the outer race of one of said bearings and carrying the greater part of the weight of said carrier, and means for clamping the inner races of said bearings securely to said spindle.

15. In a twister according to preceding claim 14, a construction in which cushioning means is interposed between said bearings and said tubular member.

16. In a twister of the character described, the combination with a spindle and a flier mounted thereon for rotation therewith, of a carrier for supporting a yarn cop in concentric relationship to said spindle and encircling a portion thereof, means supporting said carrier for rotation around said spindle, means for guiding the yarn drawn from said cop along the axis of said spindle to said flier, magnetic means for maintaining said carrier normally in a stationary position but adapted to release it under excessive torque applied to said carrier, said magnetic means including a permanent magnet mounted on said carrier, and a second permanent magnet supported in a normally stationary position in cooperative rela-

tionship to the magnet on the carrier but outside the path of rotation of the latter when the carrier is revolved, the poles of each of said magnets being positioned closely adjacent to and in opposed but reversed relationship to those of the other magnet.

17. In a twister according to preceding claim 11, a construction in which said spindle is mounted for rotation around a stationary axis; said brake is mounted for swinging movement into engagement with a part revolving with said spindle; and a spring tends constantly to swing said brake into contact with said member but normally restrained by said latch.

18. In a twister of the character described, the combination with a spindle and a flier mounted thereon for rotation therewith, of a carrier for supporting a yarn cop in concentric relationship to said spindle and encircling a portion thereof, means supporting said carrier for rotation around said spindle, means for guiding the yarn drawn from said cop along the axis of said spindle to said flier, a driving member for said spindle, means supporting said spindle for swinging move-

ment into and out of driving relationship to said member, means for maintaining said carrier normally in a stationary position but adapted to release it for rotation when excessive torque is applied to said carrier, a relatively stationary brake mounted in an inactive relationship to said spindle, a spring acting on said supporting means for the spindle to swing it into contact with said brake, a latch normally restraining said movement of the spindle and holding it in its driven position, and means arranged to be actuated by the rotation of said carrier out of its normal position to release said latch, whereupon said spring will swing the spindle into engagement with said brake and automatically stop the rotation of the spindle.

19. In a twister according to preceding claim 5, a construction in which said magnets mounted on said carrier are located in dynamically balanced relationship and their poles are positioned substantially at the edge of the carrier.

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