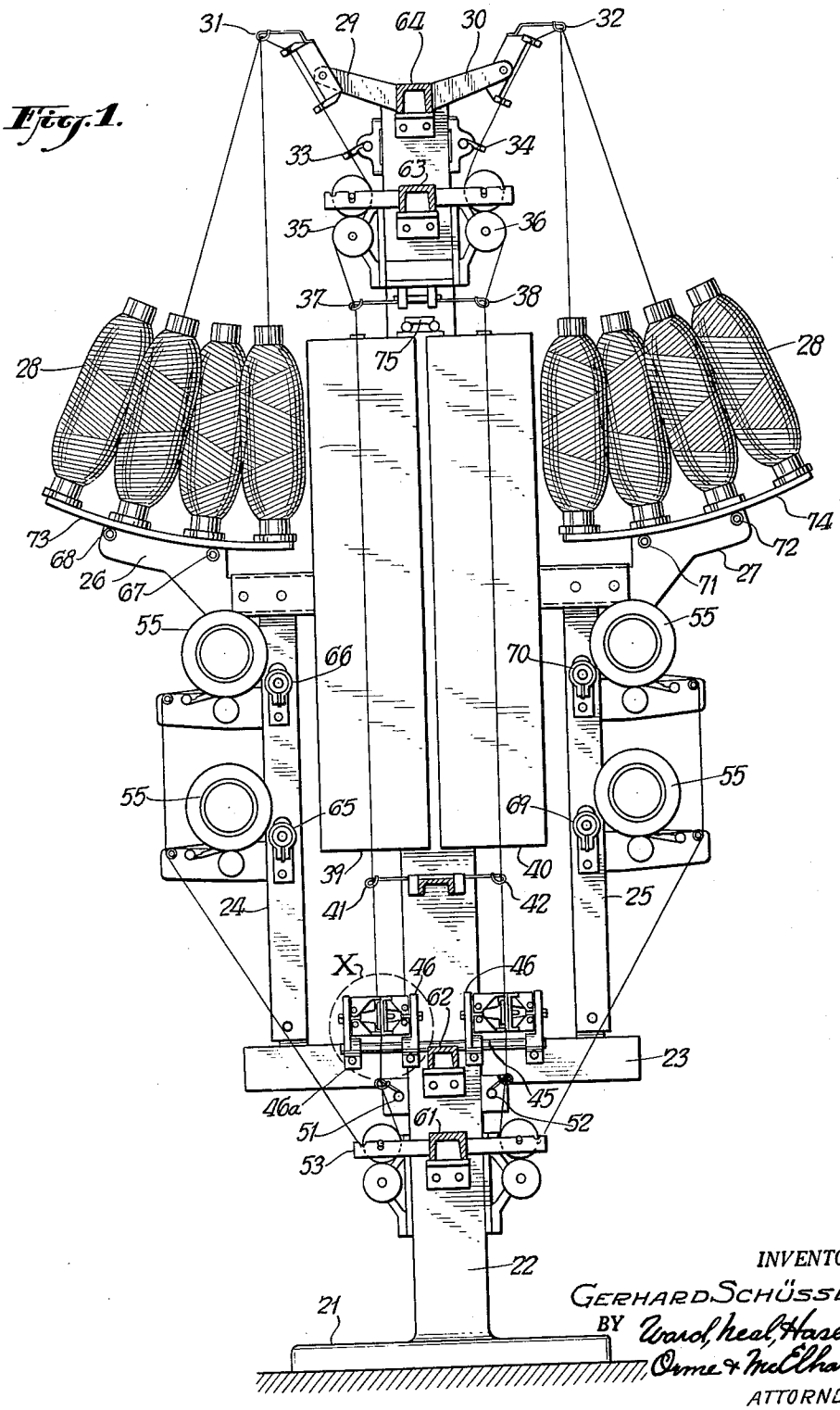
Oct. 23, 1962 G. SCHÜSSLER 3,059,409

APPARATUS FOR INTERRUPTING ROTATION OF ROTATABLE DRIVEN ELEMENTS

Filed April 10, 1961 4 Sheets-Sheet 1

Fig. 1.



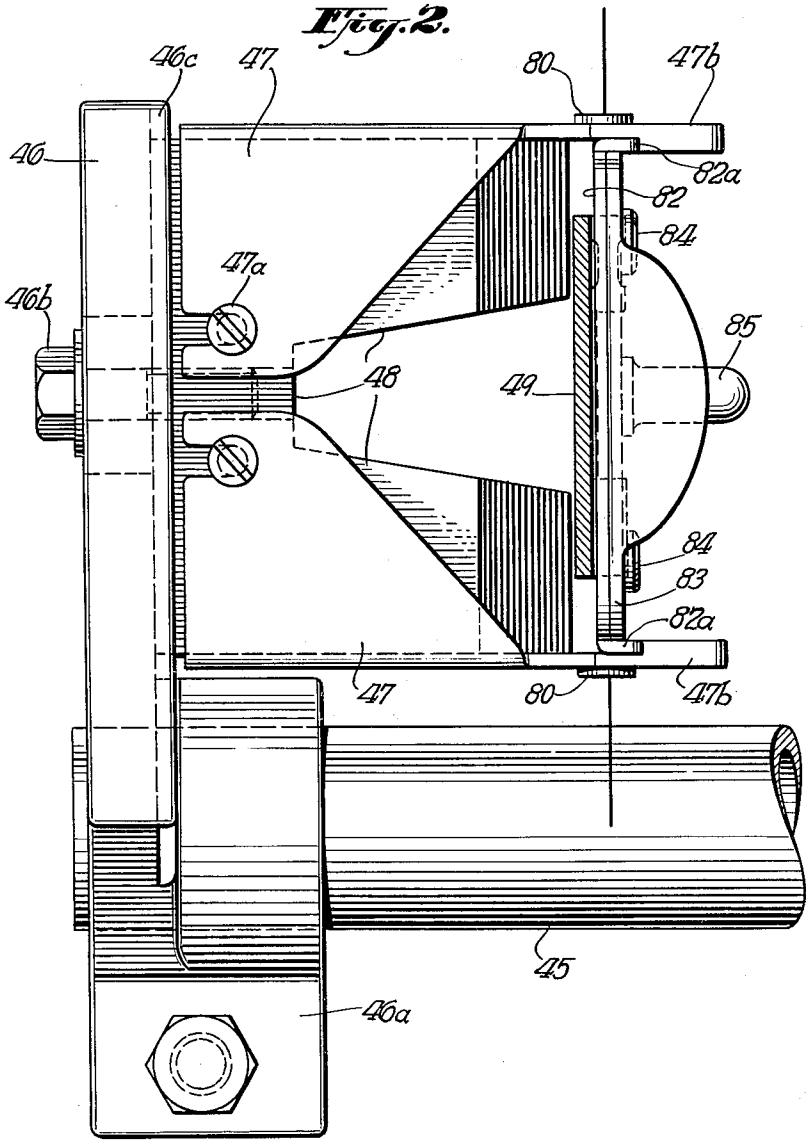
INVENTOR.
GERHARD SCHÜSSLER.
BY Ward, Neal, Haselton, Orme & McElhannon
ATTORNEYS.

Oct. 23, 1962 G. SCHÜSSLER 3,059,409

APPARATUS FOR INTERRUPTING ROTATION OF ROTATABLE DRIVEN ELEMENTS

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Fig. 2.



INVENTOR.
GERHARD SCHÜSSLER.
BY
Ward, Neal, Haselton, Orme & McElhannon
ATTORNEYS.

Oct. 23, 1962 G. SCHÜSSLER 3,059,409

APPARATUS FOR INTERRUPTING ROTATION OF ROTATABLE DRIVEN ELEMENTS

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Fig. 3.

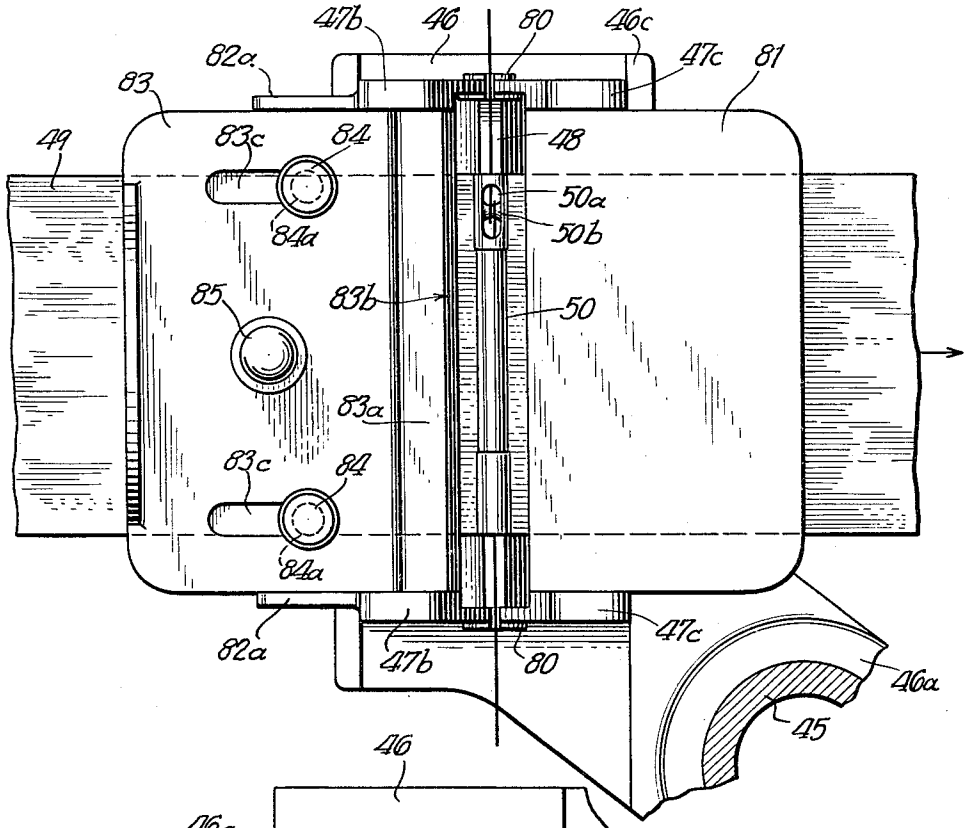
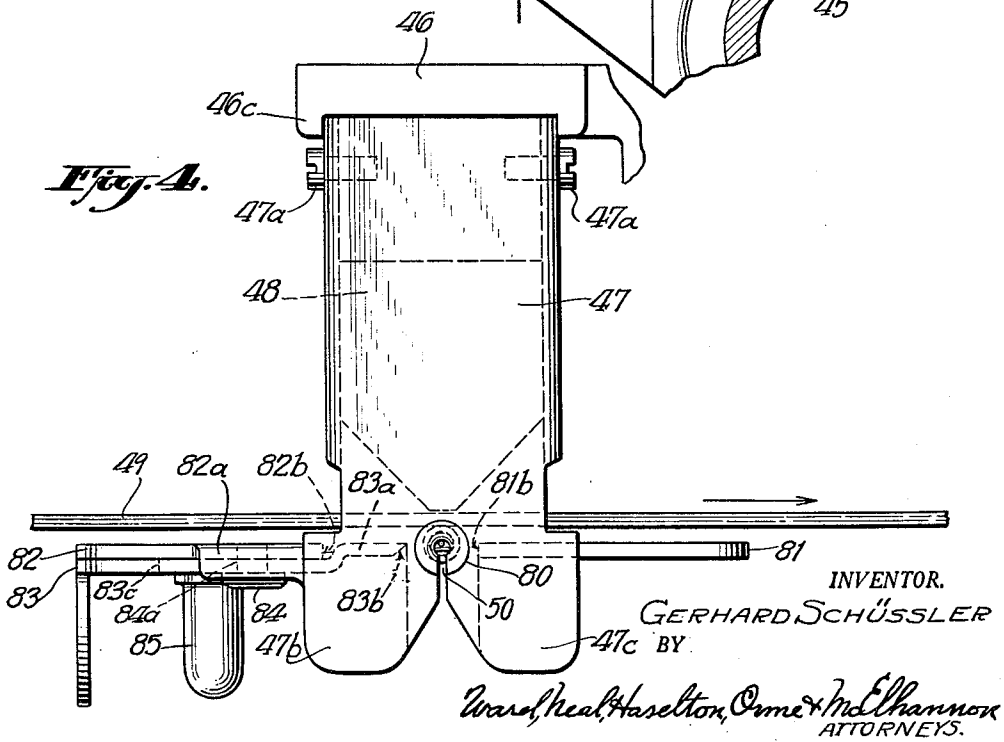


Fig. 4.



INVENTOR.
GERHARD SCHÜSSLER
BY

Ward, Neal, Haselton, Orme & McElhannon
ATTORNEYS.

Oct. 23, 1962 G. SCHÜSSLER 3,059,409

APPARATUS FOR INTERRUPTING ROTATION OF ROTATABLE DRIVEN ELEMENTS

Filed April 10, 1961 4 Sheets-Sheet 4

Fig. 5.

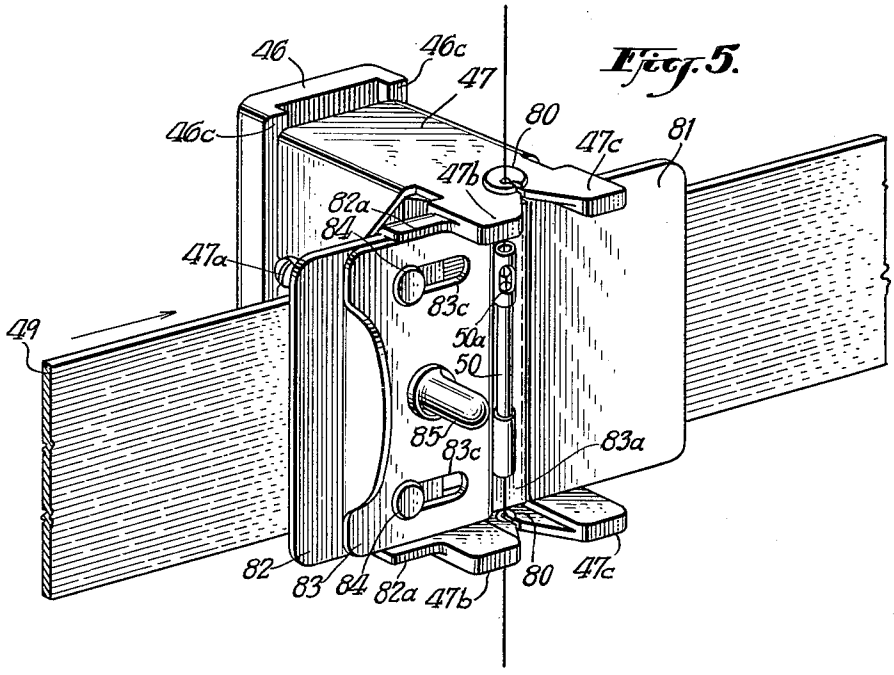
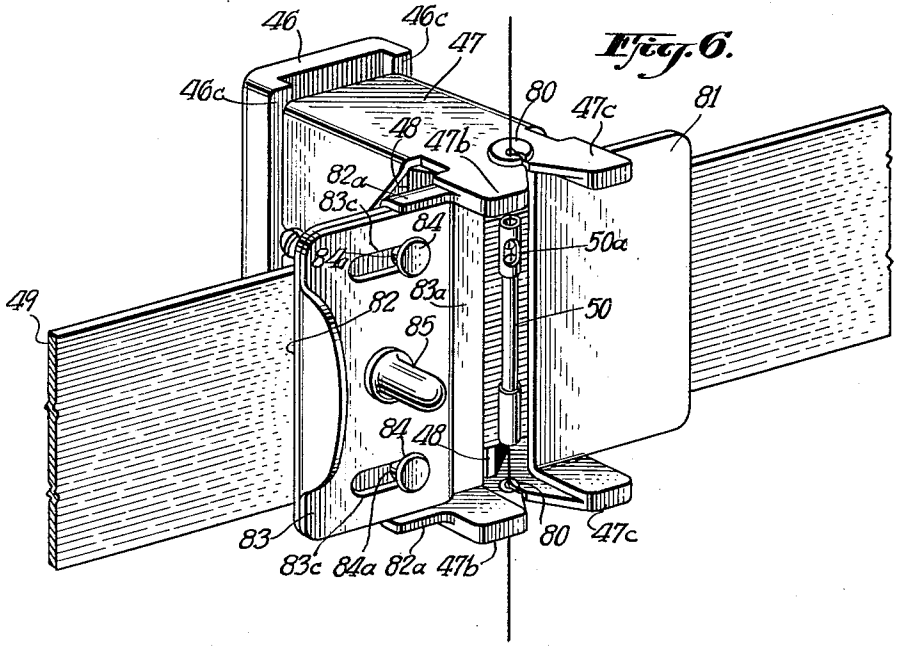


Fig. 6.



INVENTOR.
GERHARD SCHÜSSLER.
BY
Ward, Neal, Haselton, Orme & McElhannon
ATTORNEYS.

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3,059,409

APPARATUS FOR INTERRUPTING ROTATION OF ROTATABLE DRIVEN ELEMENTS

Gerhard Schüssler, Heilbronn-Sontheim, Germany, assignor to Zwirnerei Ackermann Werk der Ackermann-Goggingen A.G., Heilbronn-Sontheim, Germany

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Claims priority, application Germany Oct. 5, 1960
10 Claims. (Cl. 57—77.45)

The present invention relates to drives for rotating driven elements at high speed, such as false twisting apparatus wherein false twist tubes used in the processing of textile filaments are required to be driven at extremely high speeds of rotation. More particularly, the present invention represents an improvement in such drive apparatus whereby the rotation of the rotating element, such as the twist tube, may be conveniently interrupted whenever desired, for purposes of inspection or the like, and restarted, the manner of interruption being such as will not require either stoppage or disturbing of the driving elements of the apparatus.

In co-pending application Serial No. 795,972, filed Feb. 27, 1959, there is described a form of drive means to which the present invention is applicable, which description is hereby incorporated by reference for a better understanding of the present invention. In that application, an elongated, non-magnetic drive means such as a belt is driven at high speed along a predetermined path past a stationary magnet situated at one side thereof. A magnetically permeable driven element, such as a false twist tube, is located on the side of the drive means opposite from the magnet, and is attracted towards the magnet so as to be urged against the drive means to be rotated thereby. The driven element is urged against the drive means exclusively by magnetic force and is normally unsupported in any way during its rotative movement, being maintained in operative relation with respect to the drive means only by the magnet. Moreover, in a preferred embodiment of the invention described in that co-pending application, each such drive means may drive a plurality of driven elements in a textile filament processing machine and it is advantageous to the process to sometime interrupt the rotation of any one such driven element without interrupting the rotation of other driven elements, or without disturbing the operation in other respects of the processing machine. The present invention is particularly useful in providing such facility.

Therefore, and although the invention may have other applications, it will be described in connection with its use in textile filament processing apparatus which incorporates at least one false twist tube intended to be rotated at extremely high speed, and wherein interruption and restarting of the rotation of any one false twist tube may be simply and conveniently effected whenever desired.

In accordance with a preferred form of the present invention, means are provided whereby the false twist tube may be moved away from its normal contact engagement with the moving drive belt, without disturbing the movement of the latter or of other false twist tubes, the false twist tube thereupon being supported in non-rotating condition by the same magnetic force which normally would cause it to bear against the drive belt. The false twist tube is then in condition to be inspected or rethreaded, or removed from the machine and replaced, depending upon whether or not malfunction exists.

Briefly describing the present invention, in general terms, a lifting member is provided in association with each driven element and is located on the same side of the drive means as is the driven element. It is so disposed with respect to both the drive means and the driven element that its actuation causes the latter to be lifted away from its normal engagement with the former, thereby stopping its rotation, and permitting it to be supported in non-rotative condition. Opposite actuation of the lifting member causes the driven element to again move into contact engagement with the moving drive means, in response to the forces which normally cause such engagement, whereupon its rotation will again commence.

In its preferred embodiment the lifting member is in the form of a slidable and flat lift plate situated closely adjacent the moving, non-magnetic drive belt which rotates the false twist tube. The lift plate's slidable movement is parallel to the path of movement of the drive belt. It is supported in such position by a stationary lift plate carrier member which may be attached to the machine frame, the carrier member providing a slide surface for the lift plate, between the latter and the moving face of the belt. The lift plate carrier is with its edge located away from the transverse centerline of the magnet. A stationary lift plate coacting member is similarly arranged adjacent the same moving surface of the belt, but its edge is located away from the transverse centering of the magnet, so as to provide a small space between itself and the carrier member sufficient to permit freely rotating contact of the false twist tube with the belt. The lift plate, which is slidably attached to the carrier member, has a chamfered leading edge, exending in length approximately the width of the drive belt, and this edge also normally resides within the space between the carrier and lift plate coacting members. The distance of slidable movement of the lift plate is such that, upon slidable movement thereof, its leading edge moves under the rotating false twist tube and against the stationary edge of the coacting member to traverse and close the referred to space and thereby lift the false twist tube off the belt and on to the outer surface of the lift plate. The magnetic force, which would normally support the false twist tube against the belt, now supports the false twist tube, in motionless condition, against the lift plate surface.

These and other objects and features of the invention will become more fully apparent from the following detailed description of a preferred embodiment thereof, when taken together with the accompanying drawings, in which:

FIGURE 1 is an end elevation of a so-called "field" of a down-twister machine which includes the structure of the invention, the entire machine usually consisting of a plurality of such fields arranged end to end and adjacent each other;

FIGURE 2 is an enlargement of the area indicated in FIGURE 1 by reference character X, showing an end elevation of a magnetic support element for supporting a single false twist tube in the machine, and which incorporates the present invention;

FIGURE 3 is a front view of the magnetic support element shown in FIGURE 2 to show the invention in further detail;

FIGURE 4 is a side elevation of the magnetic support element shown in FIGURES 2 and 3 to show still further details of the invention;

FIGURE 5 is a perspective view of the magnetic support element of FIGURES 2–4, showing the present invention in its actuated position to halt the rotative movement of the false twist tube with which it is associated; and

FIGURE 6 is a perspective view similar to FIGURE 5, but showing the present invention in its deactuated position to permit the false twist tube to rotate freely in response to the movement of the drive belt.

For a better understanding of the general arrangement

of a down-twister machine, and hence the present invention as it may be incorporated therein, reference is first made to FIGURE 1 which shows only one of a plurality of textile filament processing "fields" which are assembled together to form the complete machine. The several fields are assembled on a common frame comprising two end columns 22 on corresponding column bases 21, only one such unit being shown, and longitudinal members 61—64 extending therebetween which support the fields. Each of the columns 22 also carries a transverse bar 23 having vertical supports 24 and 25 erected thereon as shown. Brackets 26 and 27 are attached to the upper ends of vertical supports 24 and 25, respectively. The supports 24, 25 and brackets 26, 27, which are located at the ends of the machine so that the fields are therebetween, are connected by longitudinally extending rods 65—72. To support the yarn supply bobbins 28 of each field, bobbin carriers 73, 74 are attached to the longitudinal rods 67, 68 and 71, 72, respectively.

It will be understood that the yarn, or textile filament, runs via guide loops 31 and 32, which are provided at the respective ends of carrier arms 29 and 30 which, in turn, project within each field from longitudinal member 64, and via additional yarn guides 33 and 34 to the supply mechanisms 35 and 36, respectively, and thence through guide loops 37 and 38 to the filament treating elements 39 and 40, the latter being attached to longitudinal member 75 as well as to other conventional longitudinal members as indicated but not numbered in the drawing and which need not be further described.

The filaments are treated in known manner as they pass through the treating elements 39 and 40, and are then conveyed via guide loops 41, 42 through the false twisting device indicated within the drawing area marked X, and thence via additional guides 51, 52 to the supply mechanisms 53, 54, other conventional winding devices (not shown), and to the winding bobbins 55.

The magnetic supports for the false twisting devices mounted in the drawing area marked X comprise magnet holders 46 which are attached by clamp portions 46*a* thereof to a transversely extending stationary rail 45 attached to longitudinal member 62.

The construction and arrangement of each magnetic support is best understood by reference to FIGURE 2 wherein it is shown that the magnet holder is slidably displaceable along the transverse rail 45 by bolt adjustment of the clamp portion 46*a*. A horseshoe magnet 48 is secured, as by screw 46*b*, in the magnet holder 46, the magnet engaging a slot 46*c* of the holder for proper positioning thereof. A generally U-shaped shoe 47 is adjustably attached in wrap-around relation to each of the two projecting pole portions of magnet 48. The shoes 47 are of non-magnetizable material such as sheet brass, plastic or the like, and adjustment of the height of projection of their respective ends above the pole ends of magnet 48 is provided by their attachment screws 47*a* which reside in slots thereof (not numbered), as shown.

As shown in FIGURES 3–5, the pole ends of magnet 48 are wedge shaped for a purpose as described in copending application Serial No. 795,972 filed February 27, 1959. Referring particularly to FIGURE 4, it is seen that the ends of shoes 47 which project outward of the pole ends of magnet 48 are formed having forked portions 47*b* and 47*c* which provide a funnel-shaped gap for guiding the yarn filament therebetween as will be seen. A disc 80 of ceramic or similar material is inserted at the base of the gap, as shown, for normally guiding the yarn filament in its travel to and from the false twist tube 50 during machine operation. Of course, a radial slit extends from between the forked portions 47*b*, 47*c* of the shoes 47 to the center of the insert disc 80.

In FIGURES 3–6 it is more clearly shown that the forked portions 47*c* of the respective shoes 47 are held in spaced relation by attachment of the lift plate coacting member 81 therebetween, which member 81 coacts with the lift plate 83 as will be described. Note that the member 81 is disposed across the width of the belt 49 and is in close, parallel spaced relation thereto. The member 81 is with its edge 81*b* located away from the transverse centerline of the magnet a short distance sufficient to partially provide the space in which the false twist tube 50 will normally make contact with the belt 49. Similarly, a lift plate carrier member 82 is attached between forked portions 47*b* of the respective shoes 47, its edge 82*b* being located a short distance away from the transverse centerline of the magnet. Note that, in the preferred arrangement, the carrier member 82 is displaced away from the magnet centerline an additional distance sufficient to also accommodate the transverse front end portion 83*a* of the lift-plate 83 for a purpose as will be described. It should further be noted that the carrier member 82 is provided with upturned flanges 82*a* at both sides of belt 49 to provide a guide track for slidable movement of lift plate 83, as will be seen. The carrier and coacting members 82, 81 are made of non-magnetizable material, such as sheet brass, aluminum or the like, as are the shoes 47, and it is seen that the shoes 47 together with the attached carrier and coacting members 82, 81 form a unitary structure which can be conveniently adjusted in height relative to the projecting poles of the magnet 48, or removed without disturbing the normal positioning of the belt 49, such being effected as by the screws 47*a* (FIGURE 2). Moreover, an adequate gap or space is provided, between leading edge 83*b* of the lift-plate 83 and edge 81*b* of the coacting member 81, for the false twist tube 50 to make contact with belt 49 and to freely rotate in response to belt movement.

The false twist tube lifting member is shown in the preferred embodiment to be a lift plate 83, also of non-magnetizable material, which is slidable on the carrier 82, being mounted for such movement by lift plate guide studs 84 which are attached to the carrier 82 and pass through slots 83*c* in the lift plate 83. The length of the slots 83*c* is such as will permit the lift plate 83 to move towards the lift plate coacting member 81 a distance substantially equal to the gap distance between the lift plate leading edge 83*b* in its normal position as shown in FIGURES 3 and 4 and the edge 81*b* of coacting member 81. A finger grip stud 85 is attached to lift plate 83, to project upwardly, for convenient manual sliding of the lift plate 83. The studs 84, 85 are also conveniently of non-magnetizable material.

Referring particularly to FIGURE 4, it is seen that the lift plate front end portion 83*a* is bent in parallel offset relation in direction towards belt 49 with respect to the main body portion of the lift plate, the offset distance being substantially equal to the thickness, or height of the carrier member 82. Moreover, the lift plate leading edge 83*a* is suitably chamfered, as indicated in the drawings. These features tend to facilitate introduction of the lift plate 83, upon slidable movement thereof in direction towards coacting member 81, between the false twist tube 50 and the moving belt 49 whenever it is desired to stop the rotation of the twist tube in accordance with the objects of the invention.

Within the space height between the projecting wedge-shaped pole ends of magnet 48 and the carrier and coacting members 82, 81, the belt 49, of non-magnetizable material, moves in the direction of its length to serve as the drive means for rotating the false twist tube 50 at very high rotational speed. The false twist tube 50 is of a magnetizable material, such as steel, and is therefore attracted by the magnet 48 to be thereby supported by magnetic force, which passes through the belt, against the moving belt 49. The magnet field also retains the rotating false twist tube in line with the transverse centerline of the magnet 48. Such are the normal conditions of false twist tube operation when the lift plate 83 is in its deactuated position as shown in FIGURES 3, 4 and 6. The false twist tube is of longitudinally hollowed con-

struction, open at its ends for threading of the textile filament therethrough. In order to impart a false twist to the filament, however, the filament is looped about the small ceramic roller pin 50*b* which extends transversely across the interior of the tube, access to the roller pin 50*b* being had through the window slots 50*a* of the tube on either side thereof. Such manner of operation is conventional and will be well understood without further description by those having skill in the art.

To lift the false twist tube 50 out of contact with the moving belt 50 and thereby stop its rotative movement, yet without the necessity of either stopping the belt movement which would interrupt the rotation of other false twist tubes in the machine also being rotatively driven thereby, or of removing the magnetic field which normally holds the false twist tube in contact with the belt, it is only necessary to manually slide the lift plate 83 forward the short distance necessary to interpose the front end portion 83*a* of the lift plate between the belt 49 and the false twist tube 50. This is done by grasping the finger grip stud 85 and sliding the lift plate 83 forward a distance equal to the length of the lift place slots 83*c*. The chamfered leading edge 83*b* of the lift plate assists the false twist tube in riding up on to the outer surface of the lift plate 83 as the latter moves underneath the tube. To further assure dependency of the lifting nature of the sliding movement, it will be noted that the leading edge 83*b* of the lift plate will contact the edge 81*b* of the coacting member 81 so that the wedging action thereby effected will always cause the false twist tube to mount the lift plate even in the event the movement of lift plate 83 is somehow not in the path close to belt 49, or in the event the false twist tube is otherwise somehow displaced from the centerline of the magnet 48 during the movement of the lift plate. Upon the lift plate 83 having been thus actuated, the apparatus will be in the condition shown by FIGURE 5.

It will be noted that the height above the belt 49 to which the false twist tube 50 need be lifted to stop its rotation is very small, being only approximately equal to the thickness of the lift plate 83. Yet, the false twist tube 50 will continue to be wholly supported by the same magnetic force which would hold the tube against the belt 49 during normal operation of the machine because the magnetic lines of flux will pass through the non-magnetic lift plate 83, in the same manner as they pass through the non-magnetic belt 49, to continue to exert their influence on the tube.

In its non-rotating condition when it is held by magnetic force against the lift plate 83, the false twist tube 50 may be inspected, rethreaded or removed without disturbing other operating elements of the machine which can continue to function in normal manner. When it is desired to again place the false twist tube in operation, normal rotation thereof will be resumed upon sliding the lift plate 83 back to its normal position, as shown by FIGURE 6 for example. Under the influence of the magnetic flux, the tube will be held stationary on the transverse centerline of magnet 48 as the lift plate 83 is slid from beneath the tube, and will be pulled off the lift plate by the magnetic force, again in contact with the moving belt 49, whereupon its normal operating rotation will be resumed.

It will of course be understood that although the driven member, such as the false twist tube, is referred to herein as a magnetizable member, such is intended to include driven members not only which are themselves made from magnetizable material, but also such driven members as may be made predominately of non-magnetic materials and which include attached magnetizable portions, whether removable or otherwise. For example, it may be desirable for one purpose or another to make the twist tube generally of brass, ceramic or other material and to include magnetic portions thereon in the form of rings or the like, and such construction would lie within the contemplation of the invention.

It will be noted that the means provided by the invention facilitate stopping the rotation of any of the false twist tubes in the machine independently of any other such tube.

This application is a continuation-in-part of U.S. application Serial No. 795,972, filed February 27, 1959.

Thus has been described a preferred embodiment of the means for interrupting rotation of rotatably driven elements which is provided by the invention, the full scope of the invention being limited only by the appended claims.

I claim:

1. In drive apparatus for rotating a freely supported, magnetizable driven element by contact engagement thereof with a drive element, said apparatus including magnet means for holding the driven element during its normal rotary movement in contact with the drive element: control means for stopping the rotative movement of said driven element independently of the operation of said drive element, comprising a lifting member mounted for selective interposition between said drive element and said driven element for lifting and supporting the driven element out of its normal contact engagement with the drive element.

2. Apparatus as set forth in claim 1, wherein said lifting member is arranged and constructed with respect to said driven element and said magnet means whereby the magnet means also holds the driven element in contact engagement with said lifting member when said lifting member is so selectively interposed.

3. Drive apparatus for rotating a magnetizable driven element comprising non-magnetic drive means movable along a predetermined path, magnet means located at one side of, and the driven element located at the opposed side of said drive means whereby the driven element when positioned for its normal rotative movement will be supported in contact engagement with the drive means by the attraction of said magnet means, and a driven element lifting member at said opposed side of the drive means positioned for movement to selective positions intermediate said drive means and said driven element, respectively permitting said contact engagement of the driven element with the drive means and engaging said driven element to lift the same out of its said contact engagement with the drive means, said lifting member in its last said position being disposed with respect to said magnet means whereby said driven element is supported on said lifting member by the attraction of said magnet means.

4. Drive apparatus according to claim 3, wherein said lifting member comprises a flat plate of non-magnetizable material slidably mounted with respect to said magnet means whereby, when in its last said position, said flat plate is interposed between said drive means and substantially said normal position of rotative movement of the driven element.

5. Apparatus as set forth in claim 4, wherein the driven element is a false twist tube.

6. In a false twisting apparatus including non-magnetic drive means movable along a predetermined path, magnet means at one side of said drive means, and a magnetizable false twist tube positioned at the opposite side of said drive means and normally supported in contact engagement therewith by magnetic force emanating from said magnet means thereby causing rotative movement of said false twist tube by the drive means: control means for selectively engaging and disengaging said false twist tube and said drive means comprising, a non-magnetizable lift plate mounted for slidable movement at said opposite side of the drive means, and stationary carrier means mounting said lift plate, said lift plate being slidable into a position thereof between said drive means and said false twist tube for engaging the latter to lift and support the

same out of its said engagement with the drive means but within the magnetic field of said magnet means whereby said magnetic force then holds the false twist tube against the lift plate.

7. In a false twisting apparatus, control means as set forth in claim 7, wherein said carrier means comprises a plate in substantially parallel, closely spaced relation with respect to said path of movement of the drive means and displaced to one side of said normal position of the false twist tube, and said control means further comprising lift plate coacting means at said opposite side of the drive means and displaced to the other side of said normal position of the false twist tube, said coacting means arranged and constructed having a portion for engagement by said lift plate when the latter is in said position.

8. In a false twisting apparatus, control means as set forth in claim 7, wherein said lift plate has a chamfered leading edge portion for engaging said portion of the lift plate coacting means.

9. In a false twisting apparatus, control means as set forth in claim 6, wherein said carrier means comprises a flat plate in substantially parallel, closely spaced relation with respect to said path of movement of the drive means, said carrier displaced to one side of said normal position of the false twist tube, and said lift plate has a front end portion in parallel offset relation, in the direction of said drive means, with respect to the remaining body portion thereof, said front end portion normally residing within the zone of displacement of said carrier from said normal position of the false twist tube.

10. In a false twisting apparatus including a non-magnetic drive belt movable along a predetermined path, magnet means at one side of said belt, and a magnetizable false twist tube normally positioned at the opposite side of said belt and normally supported in contact engagement therewith by magnetic force emanating from said magnet means thereby causing rotative movement of said false twist tube by the drive belt: control means for selectively engaging and disengaging said false twist tube and said drive belt comprising, a non-magnetizable lift plate mounted for slidable movement substantially parallel to the path of movement of said belt at said opposite side thereof, a stationary, non-magnetizable carrier plate mounting said lift plate, and a stationary, non-magnetizable lift plate coacting member, said carrier plate and coacting member each disposed in parallel, closely spaced relation with respect to said belt at said opposite side thereof and respectively displaced from said normal position of the false twist tube so as to provide a space between the carrier plate and coacting member for contact engagement of the false twist tube with the belt, said lift plate having a front end portion in parallel offset relation, in the direction of said belt, with respect to the remaining body portion thereof and a chamfered leading edge portion, said front end and leading edge portions of the lift plate normally residing within the zone of displacement of said carrier plate from said normal position of the false twist tube, said lift plate being slidable into and out of a position thereof whereat its said front end portion is between said drive belt and said false twist tube for engaging the latter to lift and support the same out of engagement with the drive belt but within the magnetic field of said magnet means whereby said magnetic force then holds the false twist tube against said front end portion of the lift plate, said leading edge of the lift plate engaging said coacting member when the lift plate is in said position.

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UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,059,409 October 23, 1962

Gerhard Schüssler

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 7, line 6, for claim reference numeral "7" read -- 6 --.

Signed and sealed this 26th day of March 1963.

(SEAL)
Attest:

ESTON G. JOHNSON
Attesting Officer

DAVID L. LADD
Commissioner of Patents