

Nov. 2, 1971

K. H. REUTER ET AL
METHOD OF AND APPARATUS FOR SPINNING, DOUBLING AND
THREADING STAPLE FIBERS AND/OR SILK

3,616,632

Filed May 7, 1969

3 Sheets-Sheet 1

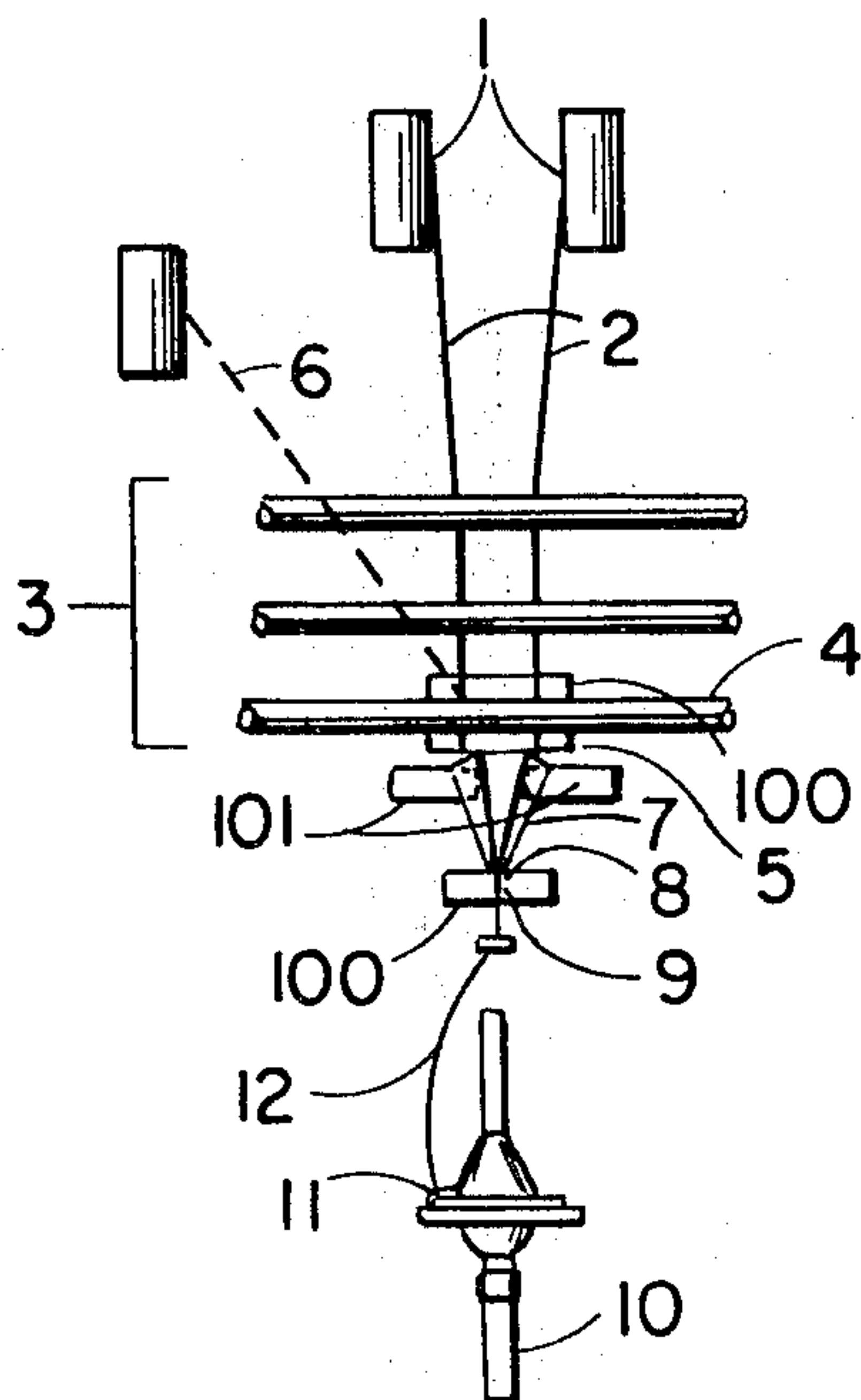


FIG. 1

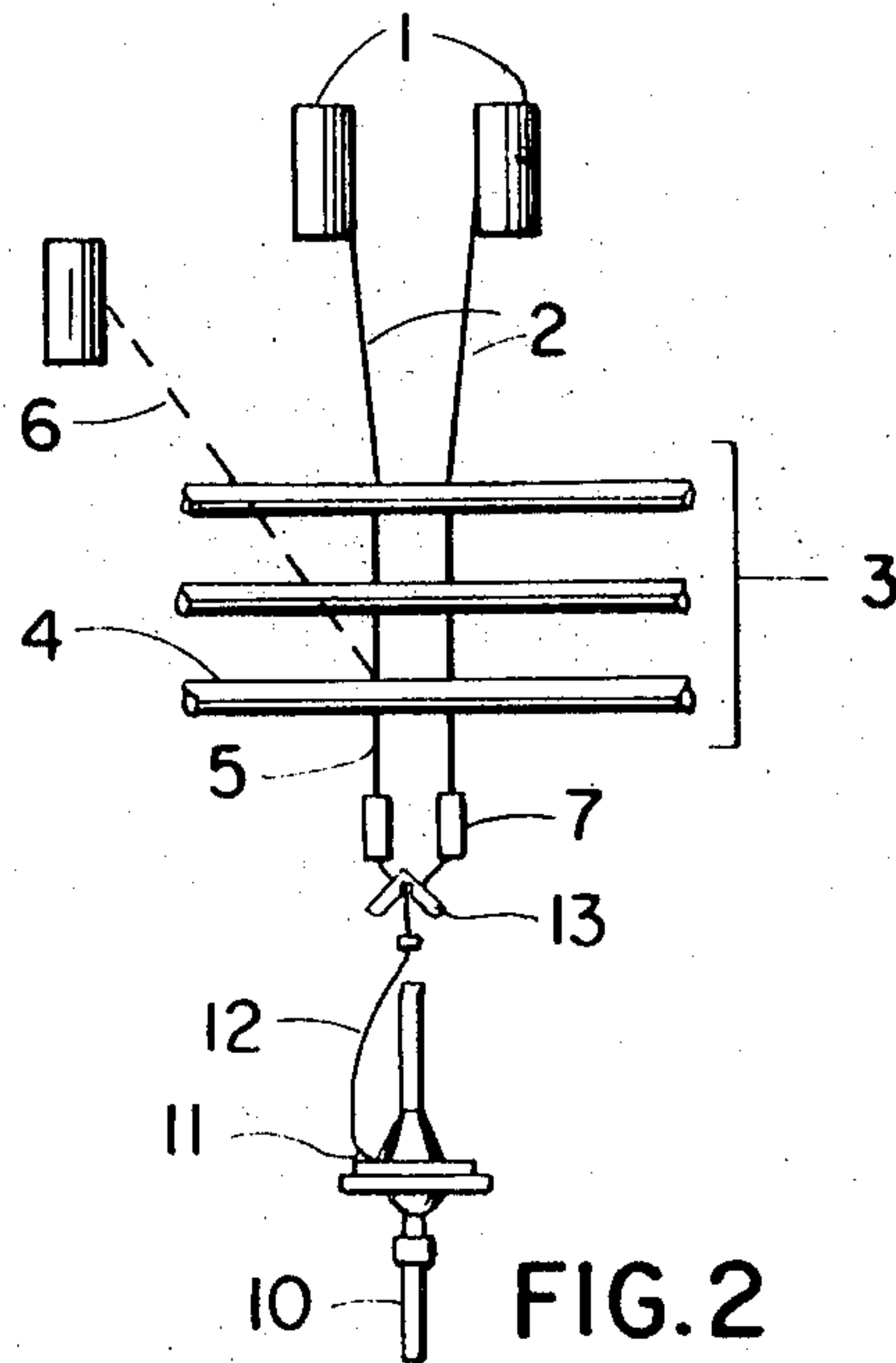


FIG. 2

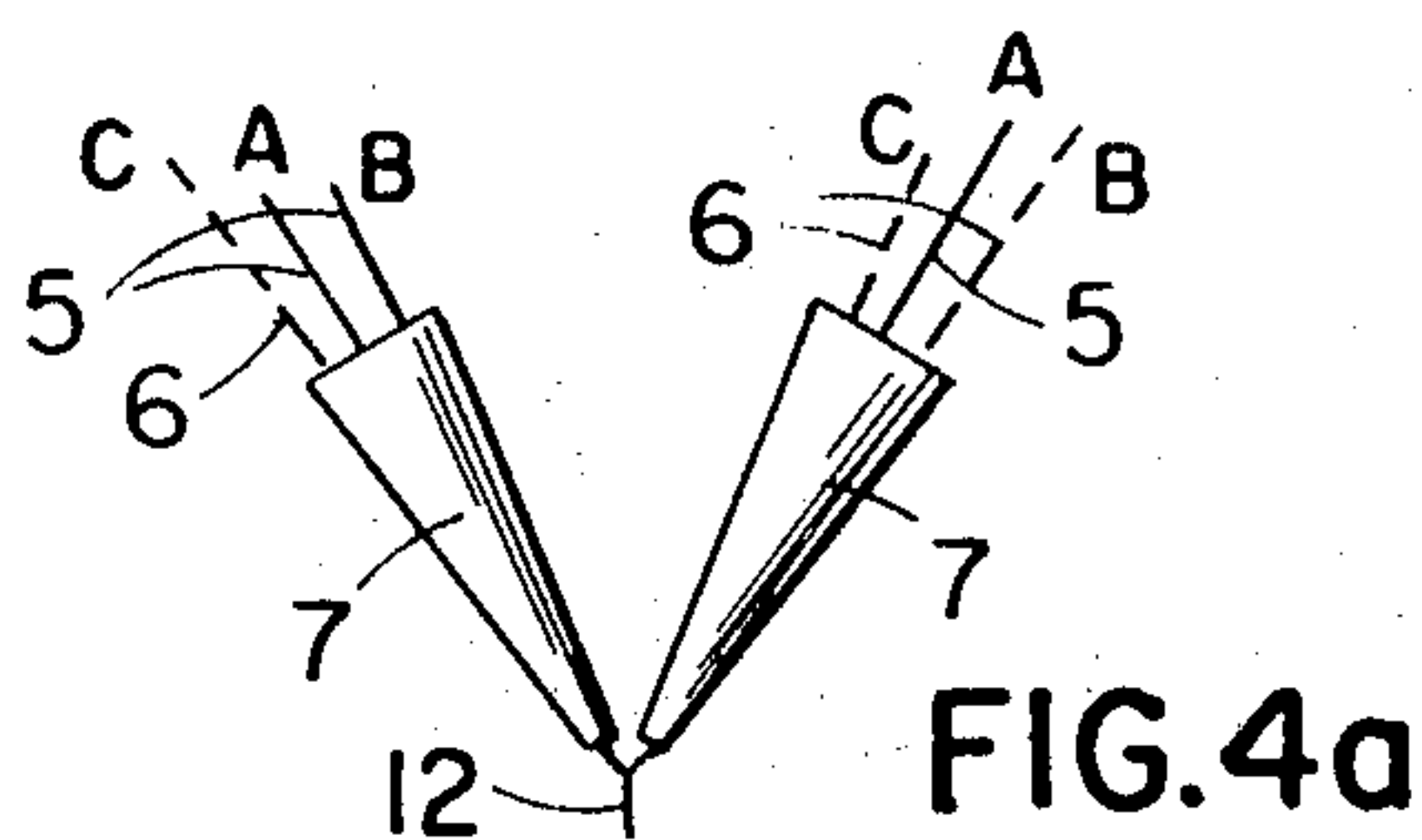


FIG. 4a

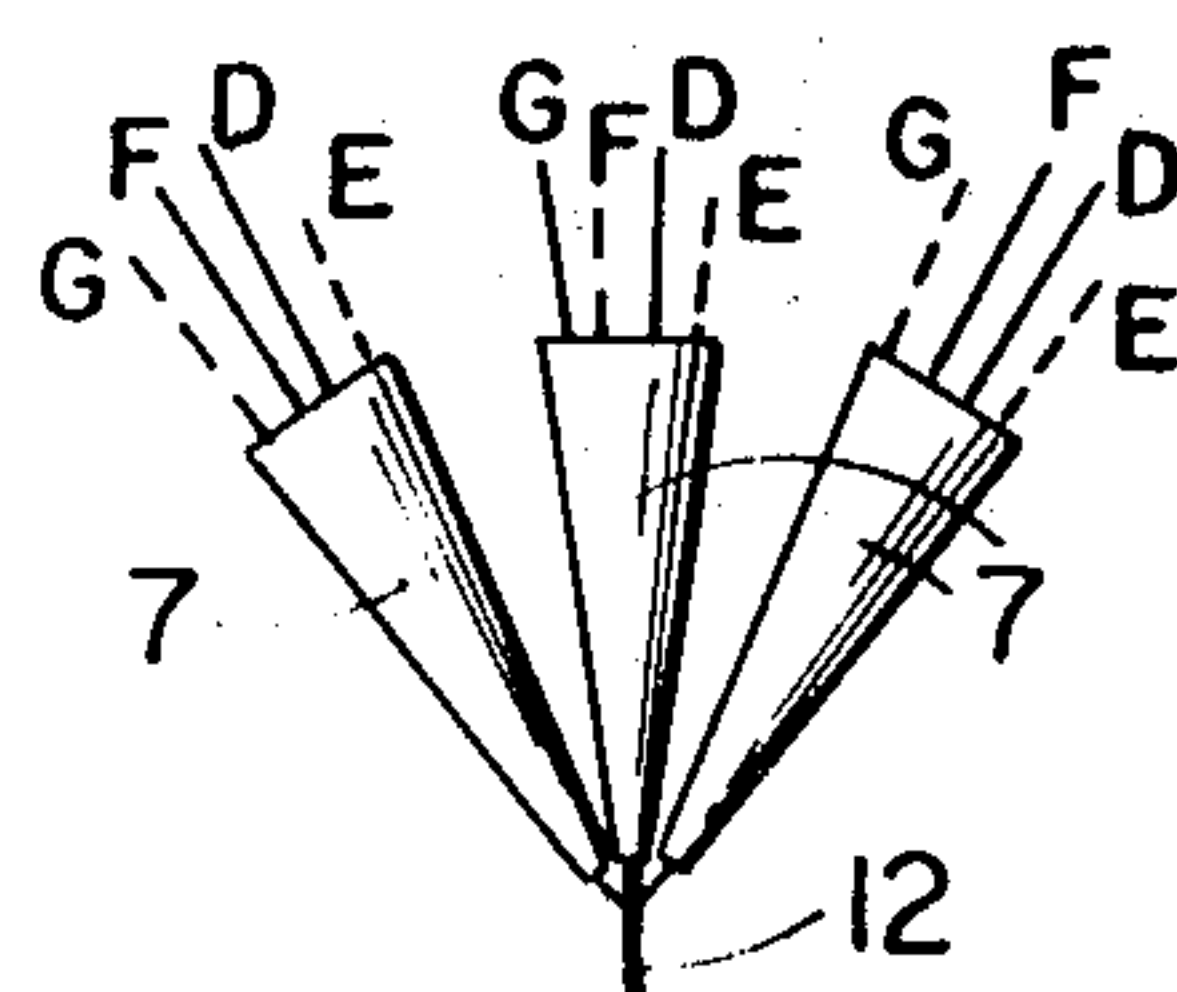


FIG. 4b

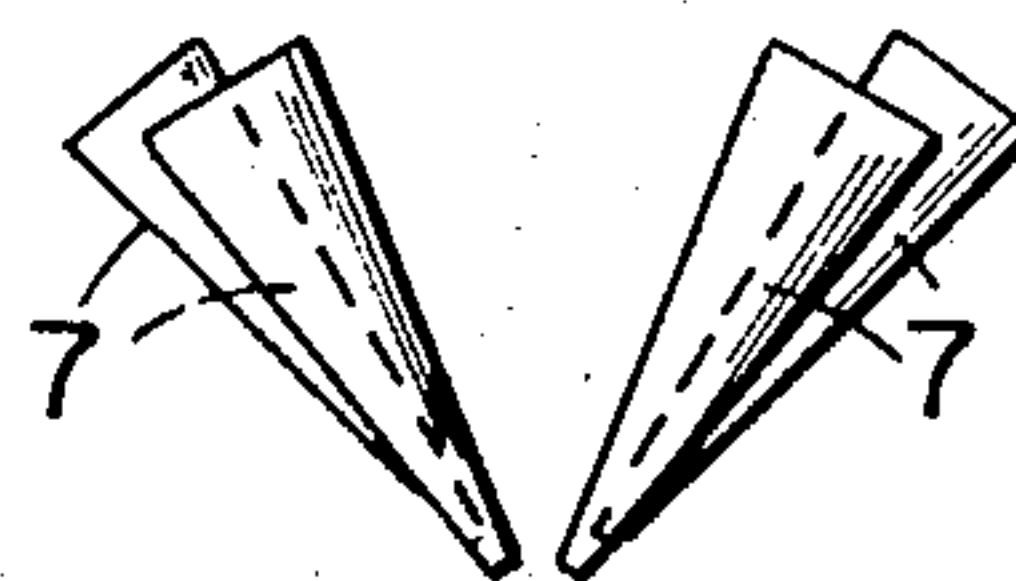


FIG. 4c

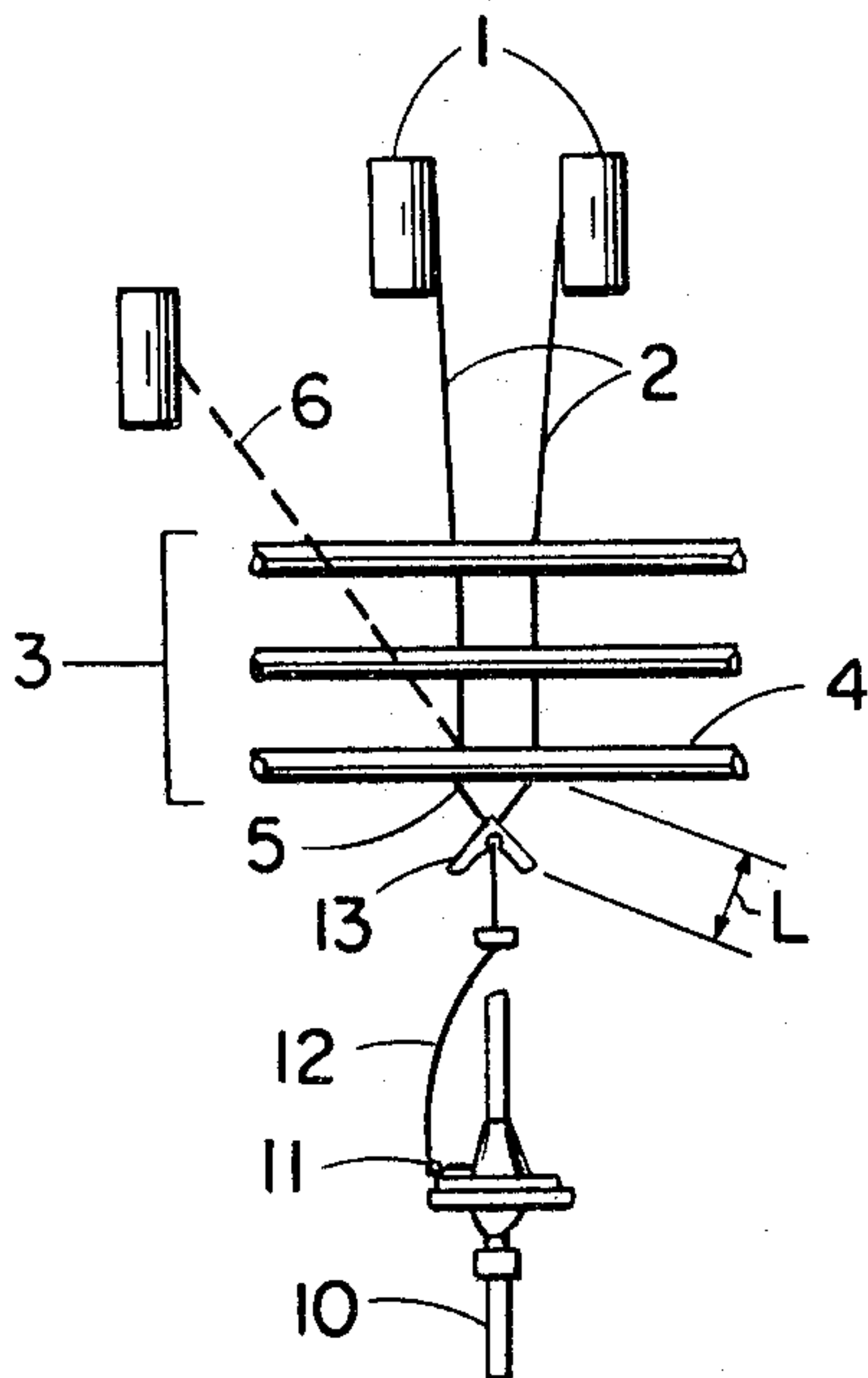


FIG. 3

INVENTORS
KURT HELMAR REUTER
MARIA ELISABETH STEINHAUSER
HORST SACHER
KARL HEINZ SILBERMANN
by *Karl Heinz Silbermann*
ATTORNEY.

Nov. 2, 1971

K. H. REUTER ET AL
METHOD OF AND APPARATUS FOR SPINNING, DOUBLING AND
THREADING STAPLE FIBERS AND/OR SILK

3,616,632

Filed May 7, 1969

3 Sheets-Sheet 2

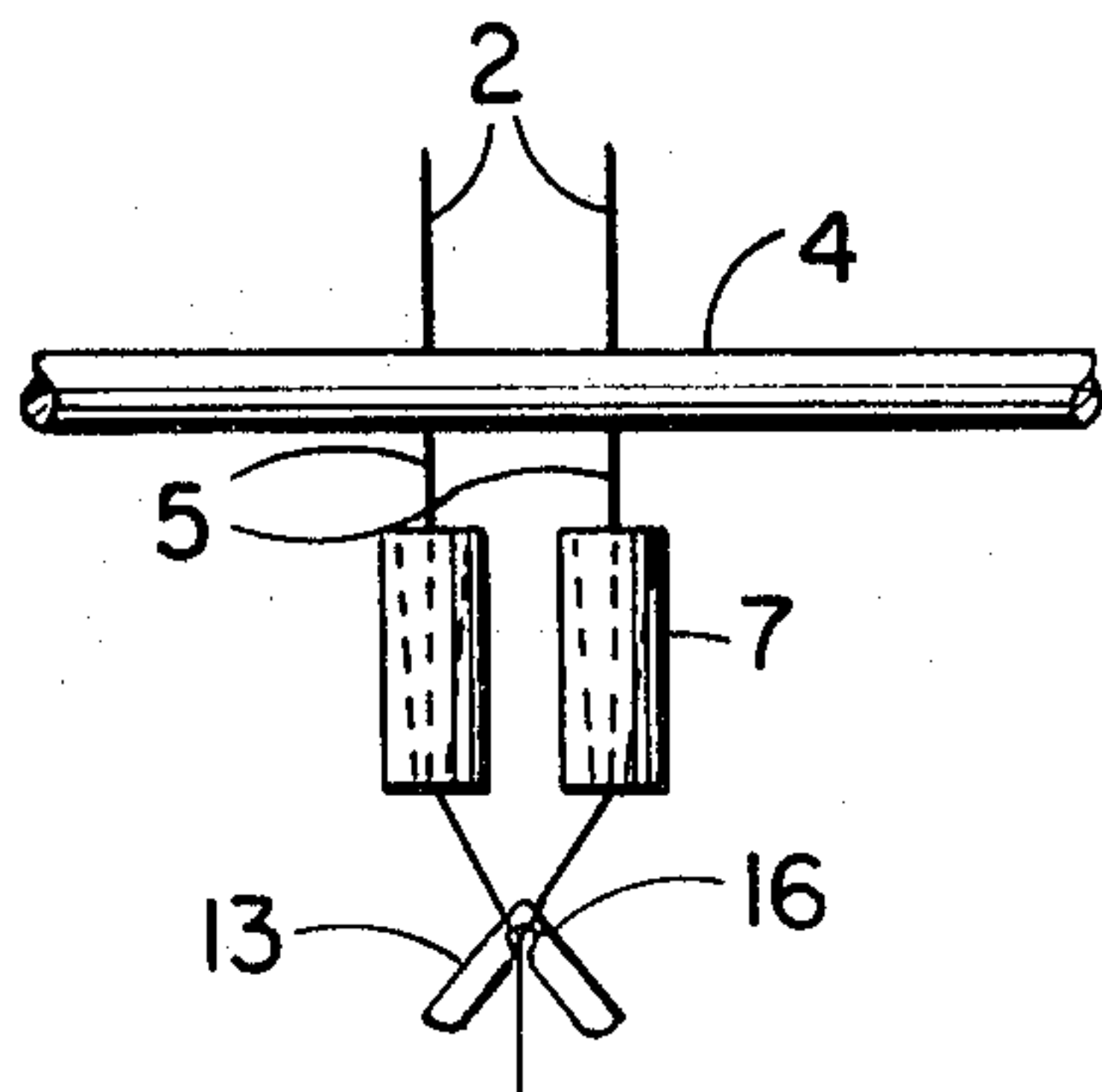


FIG. 6a

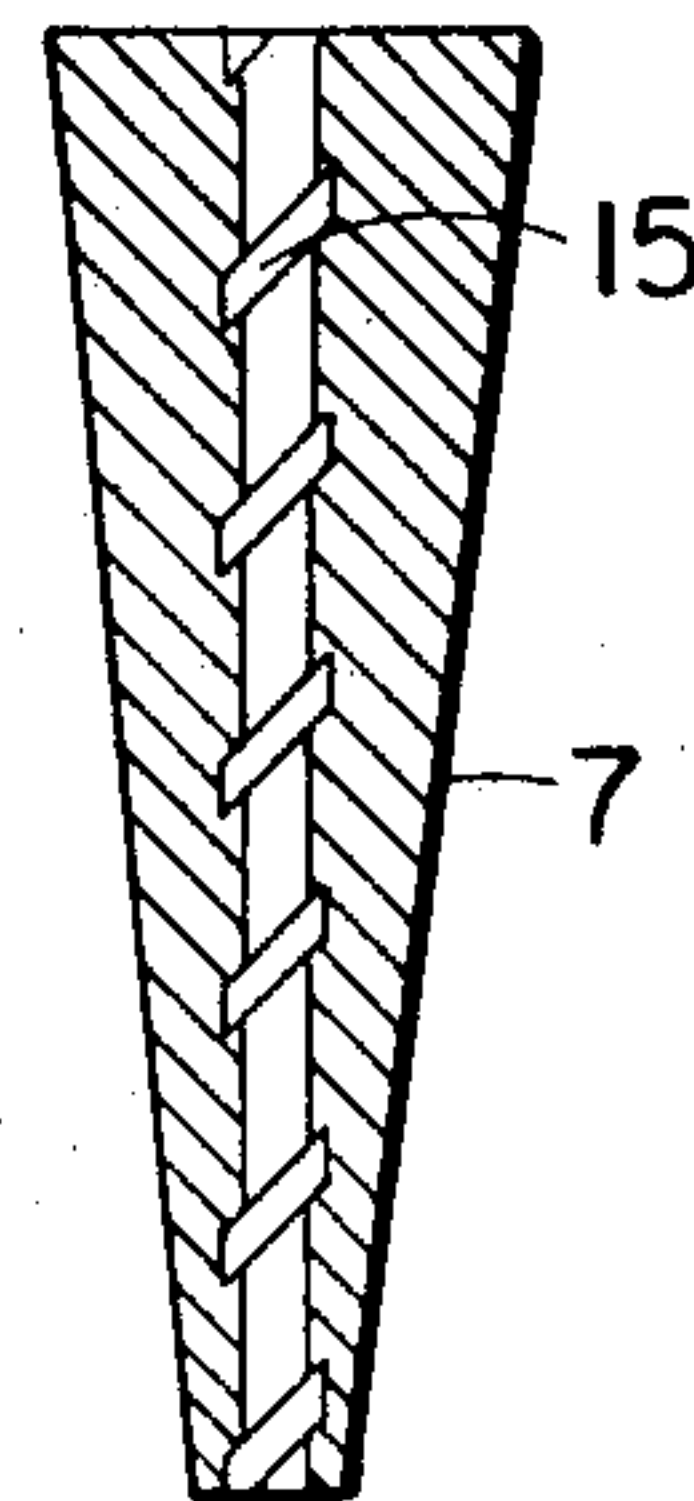


FIG. 5

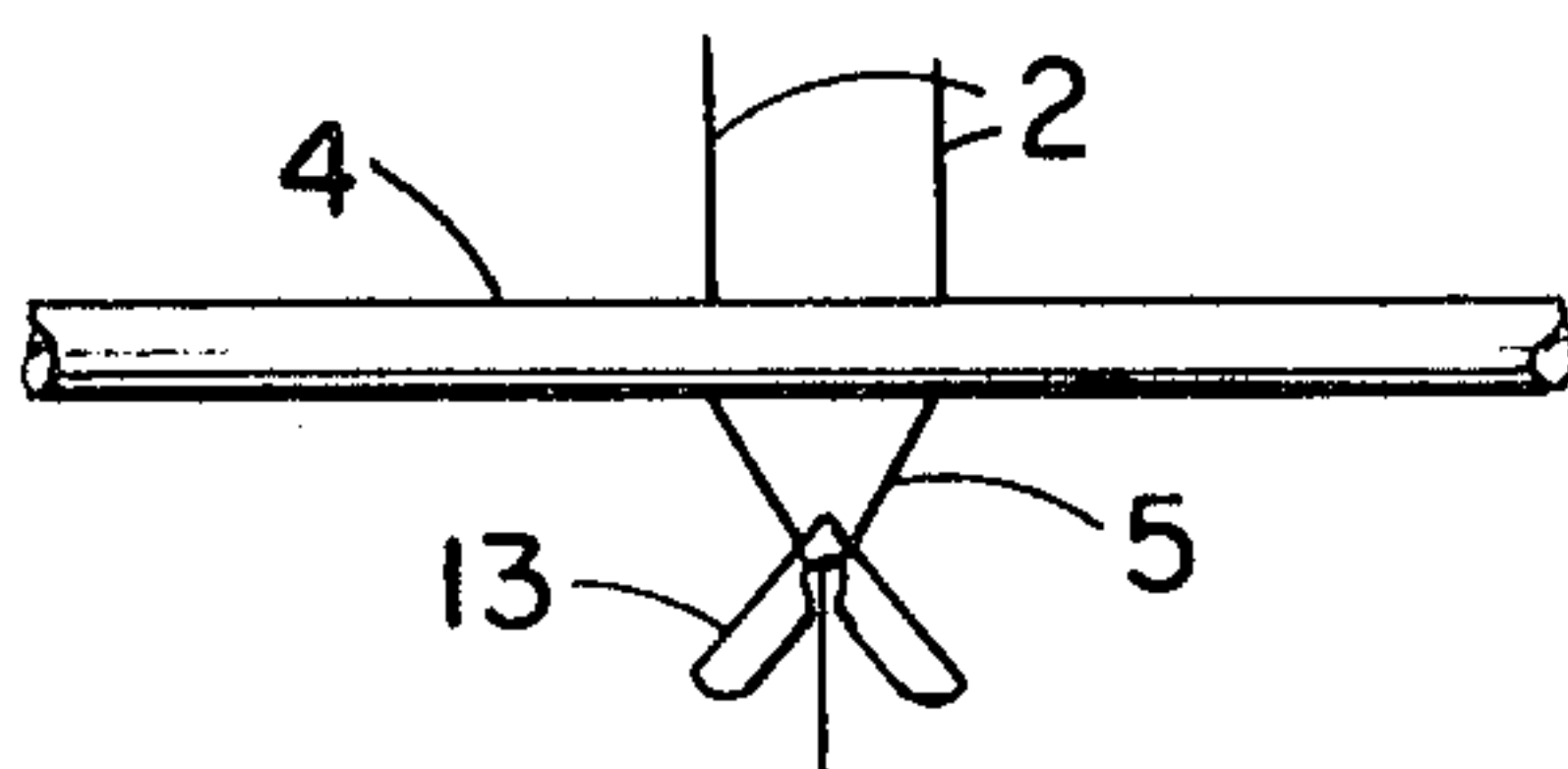


FIG. 6b

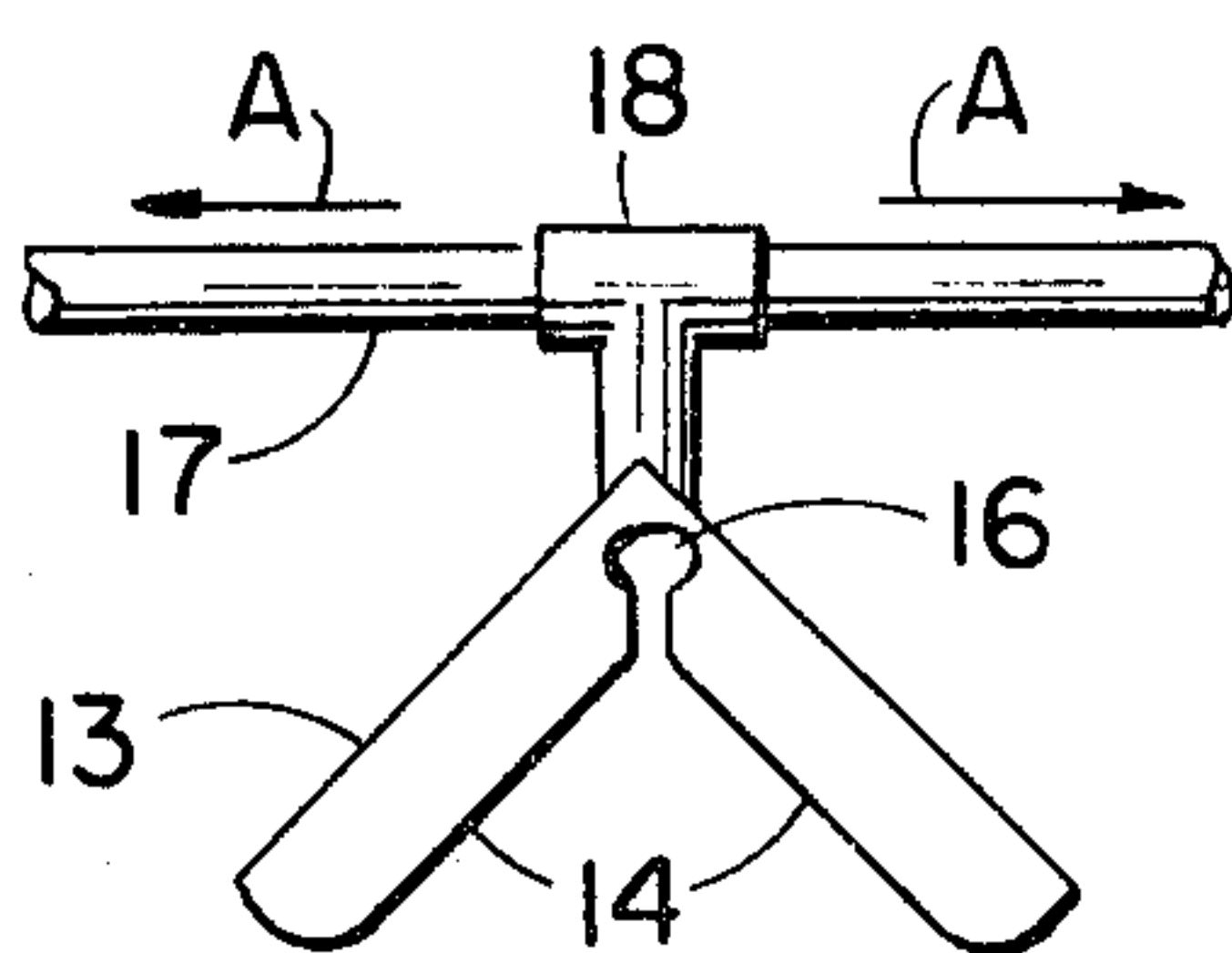


FIG. 7

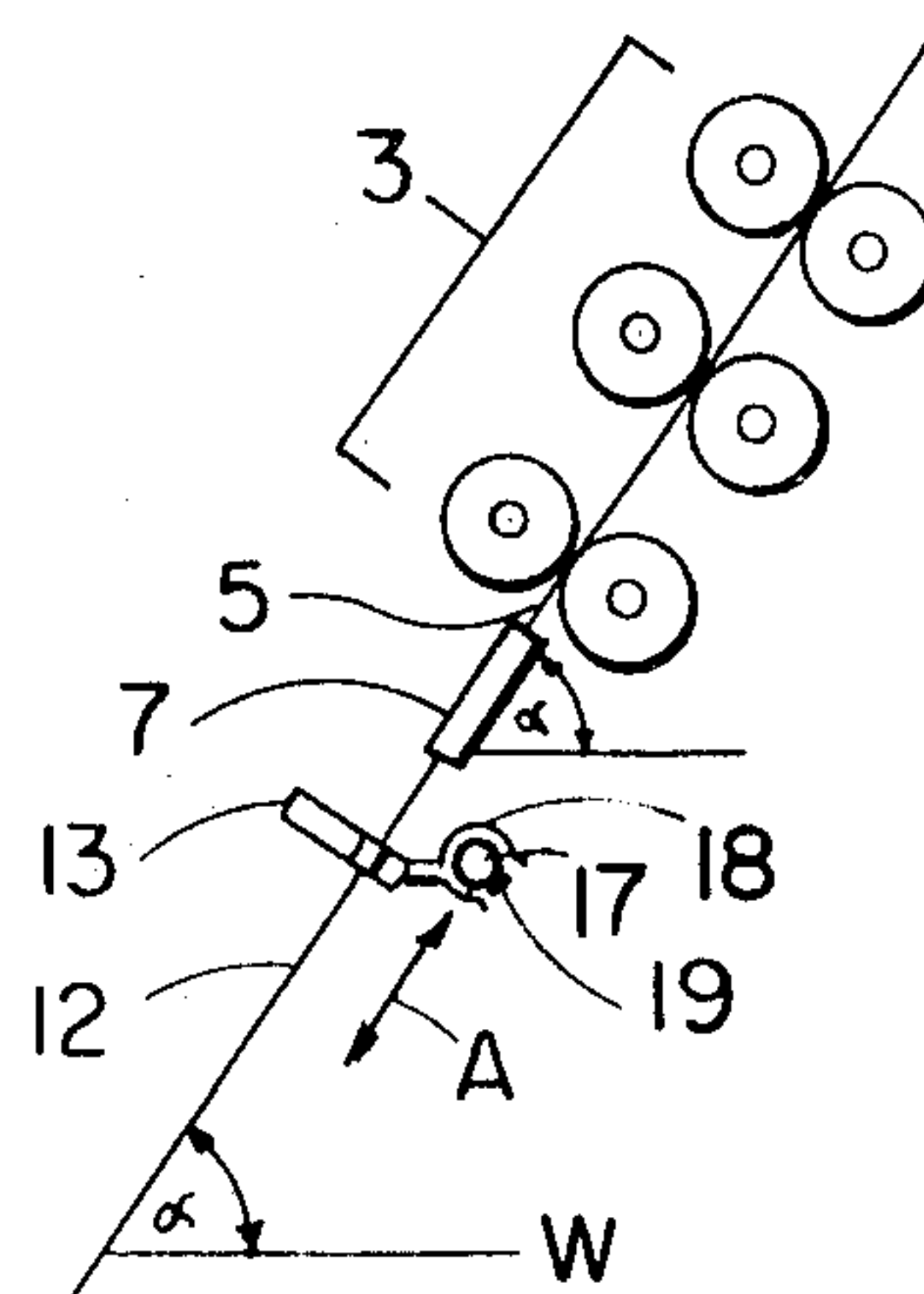


FIG. 8

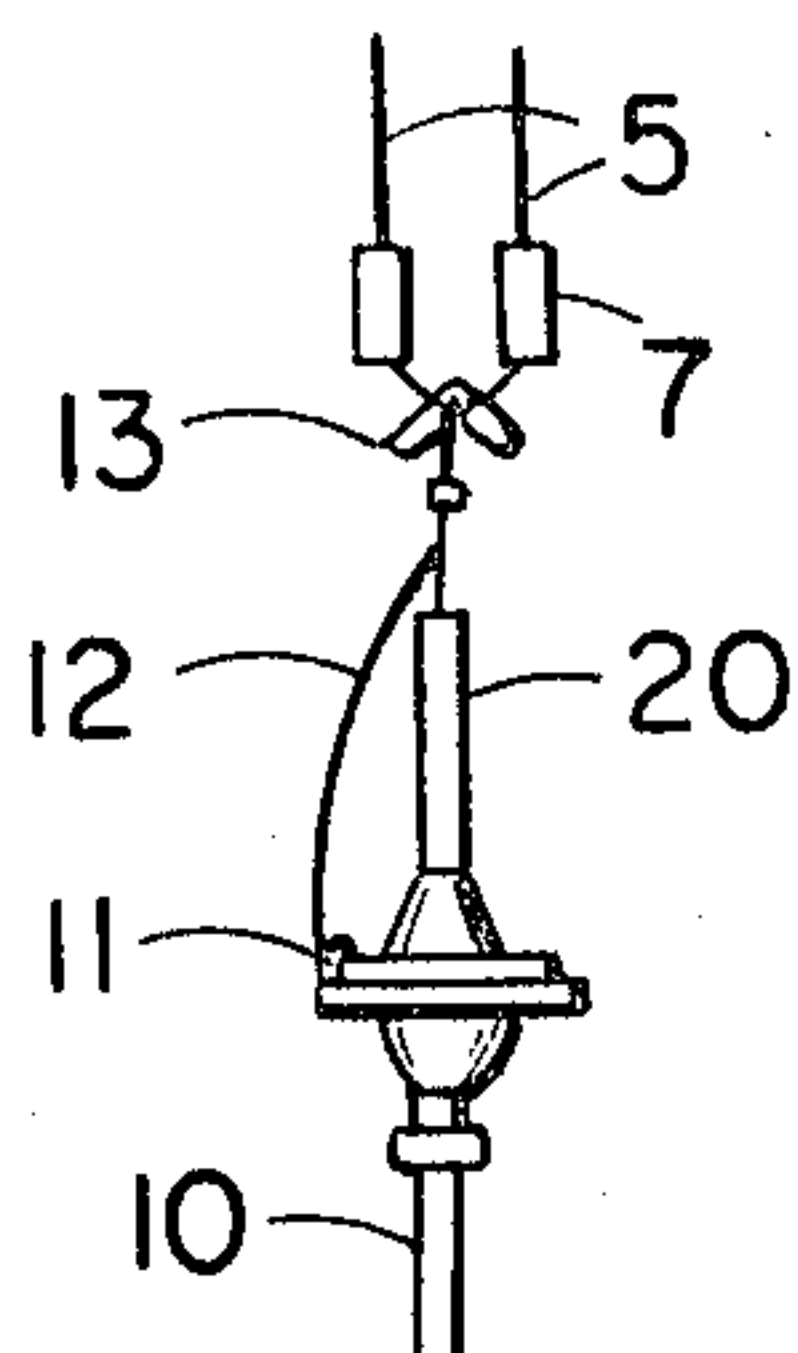


FIG. 9a

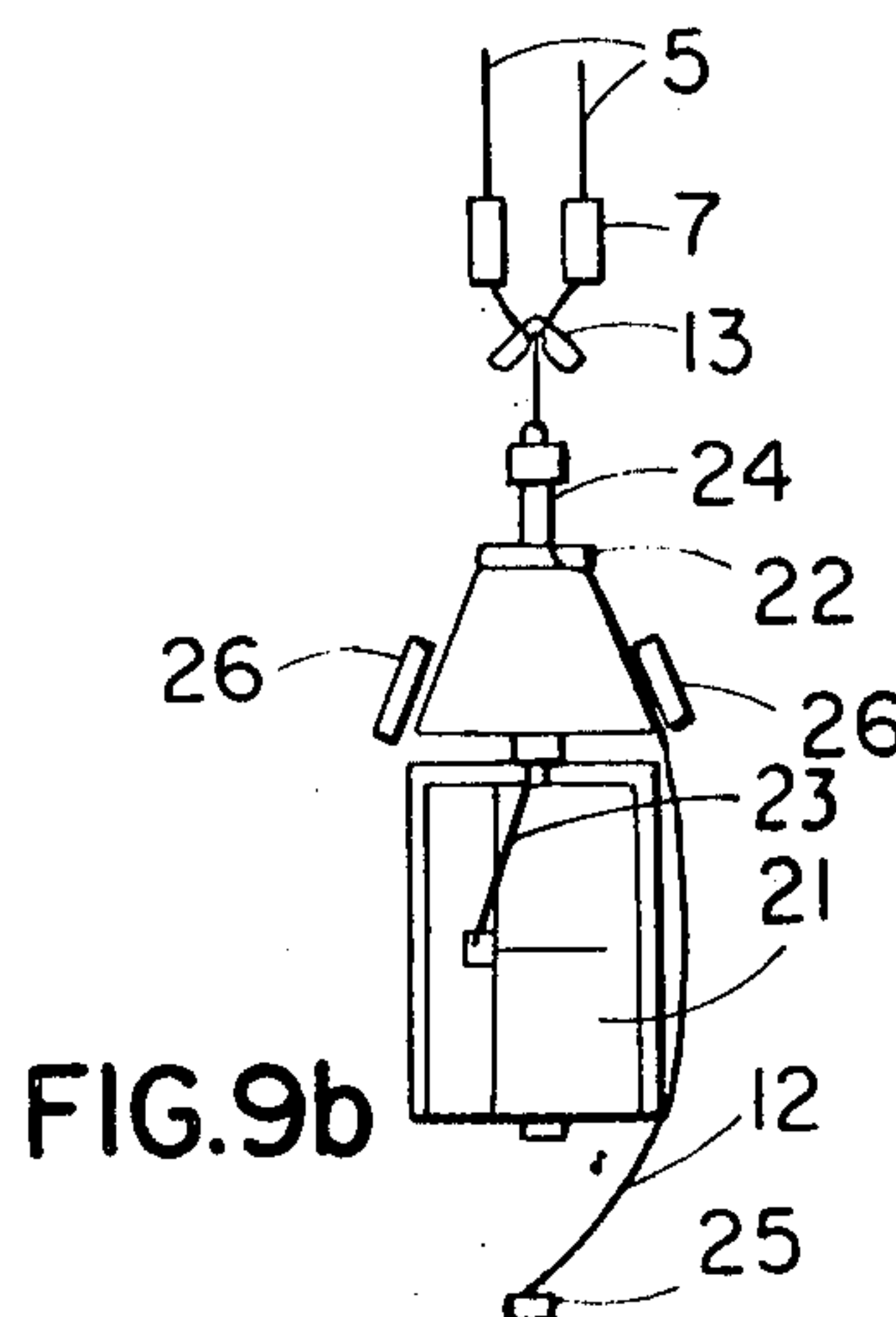


FIG. 9b

INVENTORS
KURT HELMAR REUTER
MARIA ELISABETH STEINHAUSER
HORST SACHER
KARL HEINZ SILBERMANN

by *Kurt Helmar Reuter*
ATTORNEY

Nov. 2, 1971

K. H. REUTER ET AL

3,616,632

METHOD OF AND APPARATUS FOR SPINNING, DOUBLING AND
THREADING STAPLE FIBERS AND/OR SILK

Filed May 7, 1969

3 Sheets-Sheet 3

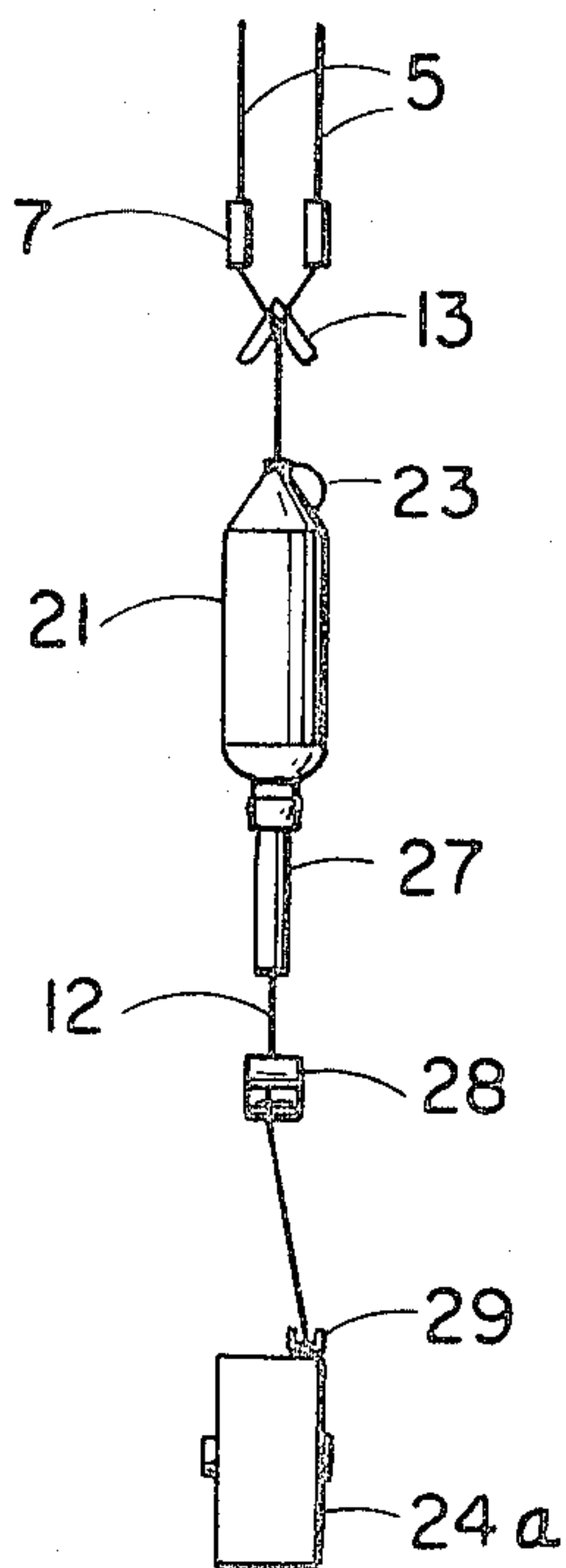


FIG. 9c

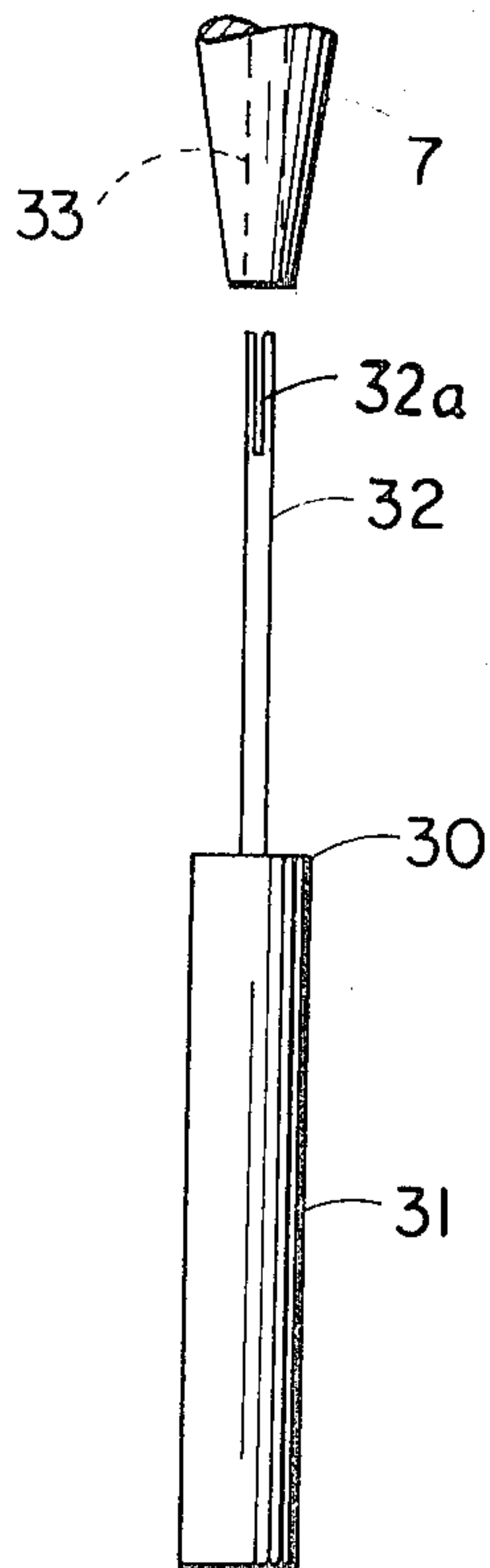


FIG. 10

INVENTORS
KURT HELMAR REUTER
MARIA ELISABETH STEINHAUSER
HORST SACHER
KARL HEINZ SILBERMANN
by *Karl Heinz Silbermann*
ATTORNEY.

1

3,616,632

METHOD OF AND APPARATUS FOR SPINNING, DOUBLING AND THREADING STAPLE FIBERS AND/OR SILK

Kurt Helmar Reuter, Oederan, Maria Elisabeth Steinhäuser and Horst Sacher, Karl-Marx-Stadt, and Karl Heinz Silbermann, Mittweida, Germany, assignors to Vereinigung Volkseigener Betriebe Baumwolle Wissenschaftlich-Technisches Zentrum Baumwollspinnerei und Zwirnerei, Karl-Marx-Stadt, Germany

Filed May 7, 1969, Ser. No. 822,471

Int. Cl. D01h 5/28

U.S. Cl. 57—36

23 Claims

ABSTRACT OF THE DISCLOSURE

A method of and apparatus for spinning, doubling and twisting staple fibers and/or silks, wherein the complete dissolution of false twist is prevented by so-called "fixing" while simultaneously imparting genuine twist upon the fibers or silks by supplying the refined fiber band from the drafting device to a rotating tubular member, or to a rotating tubular member and subsequently to a thread guiding element, or directly to a thread guiding element.

BACKGROUND OF THE INVENTION

The present invention relates to a method of spinning, doubling and threading or twisting for processing staple fibers and/or silk, and to a device for carrying out such method.

More particularly, the invention relates to a method as described above, which can be carried out continuously on a single machine.

Several methods for manufacturing yarn and threads are known. Customarily, first a yarn is produced and in further working steps, a finished twisted thread is produced. Thus, for instance, the following production methods have become known:

The yarn is produced on ring spinning machines, centrifugal spinning machines or turbine spinning machines, and is subsequently spooled, doubled and twisted or threaded. With certain known methods, the pre-spooling or the doubling can be omitted. The twisting or threading is carried out on ring doubling machines, flyer twisting machines or double twisting machines. Moreover, so called combined spinning and twisting machines are known in which a thread fed from a draft member is combined with a further thread supplied by the discharged member (Ablaufkörper) of the rotating hollow spindle, at the top opening of the hollow spindle. Thereupon, the two threads are passed through the hollow spindle and are fed by drawing rollers to a winding spool. Because of the combination or union of the two threads and in view of the rotation of the spindle, a twist or turn is imparted upon the thread supplied by the draft member, and more particularly, in the same direction as the finished thread created by the combination of the two threads.

The known spinning and twisting methods as well as the just described combined spinning and twisting method are disadvantageous insofar as for the production of a finished thread or yarn, at least two, customarily however, four or five working steps are required. Each interruption requires a new connection of the filaments or threads. At each working stage, also unavoidable breaking of threads or yarns occurs. The quality of the end product is, therefore, harmfully affected. The yarn bodies have to be put up and taken down with each working step. The machines require a lot of space and a high energy consumption. Intermediate transporting, whether manually or mechan-

2

ically, is unavoidable. All these factors require high labor, capital and energy costs.

The above described combined spinning and twisting process eliminates the described disadvantages only partially since still 50% of the yarns required for the production of the threads have to be made according to the well known spinning methods.

It is, therefore, an object of the present invention to provide a method of and apparatus for spinning, doubling and threading of staple fiber and/or silk which will overcome disadvantages of the heretofore known and above-described methods.

It is another object of the present invention to provide a method of and apparatus for spinning, doubling and threading as set forth above, which will result in a major reduction of the heretofore required expense and labor cost for the production of threads.

Still another object of the invention consists in the increased efficiency of the twisting or threading machines with the smallest possible technical and economical expense, and the creation of a finished twisted thread which fulfills high standards of quality with respect to the strength and uniformity of the end product, in order to assure a major upgrading of the end product and to offer to the final consumer textile materials of high quality and long life.

A more specific object of the invention consist in combining the heretofore necessary separate production steps of fine spinning and twisting into one continuous operation and in the provision of a corresponding apparatus for carrying out the production of a finished thread in one working operation on one single machine.

SUMMARY OF THE INVENTION

The method of and apparatus for spinning, doubling and twisting of staple fibers and/or silks according to the present invention solves the problem of preventing the complete dissolution of false twist by a so-called "fixing" while simultaneously imparting a genuine twist upon the fibers or silks.

This is accomplished after the roving is continuously made thinner and thinner in a drafting device by supplying the resulting fiber band either to (a) a rotating tubular member where it is provided with false twist and whereupon it is combined with one or more similarly produced fiber bands and subsequently twisted; or to (b) a rotating tubular member where it is provided with false twist, and subsequently to a thread guiding element, combined with one or more similarly produced fiber bands and twisted; or to (c) a thread guiding element directly, together with one or more fiber bands, the distance of the thread guiding element from the delivery rollers of the drafting device being adjustable and being smaller than the staple length.

BRIEF DESCRIPTION OF THE DRAWING

The invention is illustrated by way of example in the attached drawings, in which:

FIG. 1 is a diagrammatic illustration of a first embodiment of a method according to the present invention for producing a twisted yarn or thread;

FIG. 2 illustrates a second embodiment of the method according to the present invention;

FIG. 3 is a diagrammatic showing of a method similar to the ones illustrated in FIGS. 1 and 2, but for producing a twisted yarn-like thread;

FIGS. 4a, 4b and 4c illustrate several arrangements of rotating tubular members, for use in the methods according to the invention;

FIG. 5 shows a cross-section through a rotating tubular member;

FIGS. 6a and 6b, 7 and 8 illustrate respectively the arrangement, front view and side view of thread guiding

elements, for use in the methods according to the present invention;

FIGS. 9a, 9b and 9c illustrate three different forms of twisting and winding devices, used in connection with the methods according to the present invention;

FIG. 10 shows a device for facilitating the threading of the tubular members of FIGS. 4 and 5.

DESCRIPTION OF A FIRST PREFERRED EMBODIMENT

In a first embodiment according to the invention, a roving is continuously made finer and finer by a well known draft member, is supplied by a pair of delivery rollers as an untwisted fiber band to a so-called "rotating tubular member," well known in principle in the art. In this tubular member, a false twist is created. After leaving the tubular member, the fiber band is united with several similarly prepared fiber bands and is twisted by means of well known spindles. Already one feature showing inventive character will have become apparent, namely that the complete dissolution of the false twist is being avoided. This result has been accomplished by the so-called "fixing" brought about by the fiber bands coming together while simultaneously creating a genuine twist.

The rotatable tubular members are arranged in such a way that the outlet openings thereof coincide exactly or as closely as possible with the following three points: the point of dissolution of the respective rotational movements, the point of doubling, and the point where the twists come together. The "fixing" of a portion of the twist is effected by the coming together of the fiber bands prior to the dissolution thereof and by the rotation of the twist.

The cleaning of the threads can be effected between the draft member and the rotating tubular member by well known thread cleaning elements close to the tubular member. Thread suction units are arranged at the pair of delivery rollers of the draft member and below the outlet opening of the rotatable members. Also, thread break indicating devices may be provided at the same places.

Advantageously, an automatic spooling operation should follow the twisting process.

The device for carrying out the above-described method consists of several well known devices for creating a temporary twist, which have been joined in such a way that the outlet openings of two rotatable tubular members almost coincide. In order to aid in the prevention of thread breaks, the bore of the rotating tubular member may be provided with special devices, such as thread like grooves.

The above mentioned draft member and spindle are very well known per se. Thus, all well known high speed drawing frames and high speed spindles may be utilized. For instance, the use of multiple belt drawing frames with maximum draw is advantageous for the production of fine threads.

As spindles, high speed spindles with ring and runner as well as so-called "double D-spindles" may be utilized, the two last mentioned types of spindles being especially suitable for the production of three-fold or fancy twist.

Referring now to FIG. 1 of the drawing, the rovings 2 coming from the roving spools 1 are refined by the drawing member 3 and are supplied by delivery rollers 4 as an untwisted small fiber band 5. Instead of the roving spools 1, also other elements supplying the roving can be used.

When working with silk (FIG. 1a) the silk threads 6 are delivered directly to the pair 4 of delivery rollers. The then required pretension is produced by additional devices not shown in the drawing.

After leaving the drawing member 3, the fiber bands 5 are fed to a rotating tubular member 7. Depending on the type of the desired end product, the number of tubular members 7 varies. The device is so designed that the addition or elimination of tubular members 7 is easily accomplished. The design of the tubular member 7 is such that the outlet openings 8 of at least two tubular members 7

are so close to each other that the point of junction 9 of the fiber bands 5 leaving the tubular members 7 and receiving a false twist by the tubular members 7, almost coincide with the outlet openings 8. The false twist imparted by the tubular members 7 results in the fiber bands 5 receiving a rotational movement up to a point in very close proximity to the clamping point between the delivery rollers 4 and in avoiding thread breaks to a large degree. The particular feature of the just described thread producing method consists in that the point of dissolution of the temporary rotation produced by the rotating tubular members 7, the doubling point, and the point where the threads come together, are very close to each other or almost coincide. The "fixing" of a portion of the spun yarn is effected prior to the dissolution thereof, by joining of several fiber bands 5 and by imparting of the thread twist. The point 9 shown in FIG. 1, therefore, represents a combination of the just mentioned three points.

Following the joining of the fiber bands 5 provided with a rotational movement, the twisting is effected by means of well known devices, such as a spinning or twisting spindle 10 with ring and runner 11, as shown in FIG. 1.

As shown in FIG. 1, suction devices 100 are arranged below the delivery roller pair 4 and below the outlet openings 8 of the rotating tubular members 7. Also, a cleaning device 101 for the fiber bands 5 provided with the false twist, is shown adjacent the tubular members 7. Well known thread break indicating devices may be provided in addition to or instead of the suction devices 100.

A great number of variations of the arrangement of the tubular members, not shown in the drawing, is of course possible. Thus, for instance, the tubular members may be arranged adjacent to each other or on top of each other. Also, the fibers and/or silk may be fed to the tubular members in various ways. Thus, for example: guiding of two rovings 2 in the drawing frame by means of fiber guiding devices parallel to each other; delivery of the fiber bands 5 to tubular members arranged on top of each other; the joining of four fiber bands 5 to form a four-fold thread; the application of the same principle by eliminating one thread to form a three-ply thread; the combination of one thread of silk 6 with three fiber bands 5 or other variations such as silks 6 alone. However, the most common form has been illustrated in FIG. 1.

Further possibilities should only briefly be mentioned here, such as feeding two or more fiber bands 5 and/or silk strands 6 to the tubular member 7. A multitude of variations will be obvious to an expert in this field depending on the desired applications. It is evident from the above, that the advantages of the method just disclosed go far beyond what could be expected from a combination of two previously separate methods. It is to be emphasized that despite this combination, no reduction in the production in thread or yarn results with respect to the old methods, but quite to the contrary, because of a reduction in thread breaks and a reduction in the number of necessary connections between continuous threads, a higher output is achieved. Further variations in the methods according to the present invention can be obtained for special yarns or threads and special effects, when using special spindles, as for instance, the ones shown in FIG. 9 to be described later such as hollow spindles or so-called double D-spindles.

DESCRIPTION OF A SECOND PREFERRED EMBODIMENT

A second preferred embodiment according to the present invention is diagrammatically illustrated in FIG. 2. The roving is continuously refined by means of a well known drafting frame, is delivered from a pair of delivery rollers of the drafting frame as an untwisted fiber band, is fed to a rotating tubular member well known in the art and provided with a false twist. However, in contrast to the arrangement illustrated in FIG. 1 and described above, the false twisted fiber bands are fed to a thread guiding

element and combined with further fiber bands prepared in the same manner and is finally twisted by means of well known spindles.

Also in this instance, the object of the present invention consists in preventing the complete dissolution of the false twist, which is accomplished by a "flowing" seam or juncture between false twist and genuine twist.

The tubular members are arranged in such a way that two or more such tubular members supply the fiber bands to a thread guiding element while the distance between the thread guiding element and each tubular member is preferably the same and is preferably less than the medium staple length of the fiber material being processed. The complete dissolution of the imparted twist is being prevented by the rotations caused by the spindle being propagated through the thread guiding element in a weakened form and by fixing the rotation which is present by joining the fiber bands in the thread guiding element. The thread cleaning and suction devices are the same as described in connection with the first preferred embodiment.

The device for carrying out the method just described consists of well known devices for imparting a temporary twist, the thread guiding element, drafting members known per se and the likewise well known rotating and winding devices. Preferably, the axis of rotation of the rotatable tubular members coincides with the axis of the thread between the delivery roller pair of the drafting device and the thread guiding element. The distance between the thread guiding element and the tubular members is adjustable, and the thread guiding element is preferably resiliently arranged, for purposes of balancing tensions.

In order to facilitate the threading, tubular members of a special design may be used. The drawing frame and the spindles can have the same design as outlined with regard to the first preferred embodiment.

When intertwining fiber bands of unequal staple length or silk, the distance between the thread guiding element and the individual tubular members may be varied. To this end, the thread guiding element is preferably adjustable in two planes. This method is particularly advantageous when producing so-called "core covering products" (Kernmantelerzeugnis). Also, the processing of bands of varying thickness is preferably accomplished according to this method.

For purposes of producing multiple twist threads, more than two tubular members may cooperate with one thread guiding element. Depending on the circumstances, two or more fiber bands are fed from a drafting frame parallel to each other to one tubular member each. The simultaneous feeding of several fiber bands to one tubular member is likewise possible. In this instance, however, the cleaning of the threads poses certain problems so that this variation is particularly suitable for use in connection with artificial fibers. This method permits the use of cleaning devices for the thread, which are preferably arranged closely adjacent to the thread guiding element. For practical reasons, the cleaning of the thread should be effected during the automatic spooling process.

Referring now more specifically to FIG. 2, the method illustrated therein deviates from the method according to FIG. 1 in that a thread guiding element 13 for combining the fiber bands is provided behind the rotating tubular member 7. In this instance, the point of dissolution of the temporarily imparted rotation or twist, the doubling point, and the point of intertwining, are somewhat spaced from each other. It is characteristic for this method the fact that at least two tubular members 7 supply a fiber band to one thread guiding element 13. The twist provided by the spinning or twisting spindle 10 extends in a somewhat weakened form through the thread guiding element and the rotations of the individual fiber bands 5 upon their combination are fixed within or following the thread guiding element 13.

In detail, the formation of the thread will take the following course:

The roving 2 continuously refined by means of the draft frame 3, is discharged by the roller pair 4 as an untwisted fiber band 5. Between the thread guiding element 13 and the pair of rollers 4, tubular members 7 are provided by means of which the fiber bands 5 are provided with a false twist. In view of the fact that at least two fiber bands 5 are combined in the thread guiding element 13 the rotation or twist is fixed. The created thread 12 is further processed by well known spindles, such as spinning or twisting spindles 10 and a ring and runner 11. The just described method permits likewise the various possibilities described in connection with the method according to FIG. 1 so that a repetition thereof does not appear to be necessary.

DESCRIPTION OF A THIRD PREFERRED EMBODIMENT

According to a third preferred embodiment, the roving is continuously refined by a well known draft member and is discharged as an untwisted fiber band. Two or more such fiber bands are delivered to a thread guiding element, the spacing of which with respect to the delivery rollers of the drafting member is adjustable and is shorter than the length of the fibers.

Preferably, the space between the pair of delivery rollers and the thread guiding elements is not to exceed the medium or average staple length of the material being processed. Following the thread guiding element, the customary twisting is effected by well known devices such as spinning or twisting spindles, double twist spindles, or hollow spindles. The required "fixing" of the fiber bands between the pair of delivery rollers of the drafting frame and the thread guiding element is accomplished by the propagation of the rotation imparted by the respective spindle, beyond the thread guiding element. This method, therefore, represents a modified twisting method.

The advantage of the just described method over the methods of the first and second preferred embodiments consists in a further reduction of necessary equipment. The application of this method depends on the purpose to which the finished product is to be put.

Referring now more specifically to FIG. 3, in this method the elements for creating a false twist are omitted, i.e., the fiber bands 5 are directly fed to the thread guiding element 13. The fiber bands 5 are united there and are twisted by means of well known spinning or twisting spindles. This method, therefore, actually represents a modified twisting method since the individual fiber bands are rotated only to a minor extent, namely to the extent that the rotation extends through the thread guiding element 13. This fact stresses the importance of the distance between the thread guiding element 13 and the pair of delivery rollers 4 of the drafting member 3, so that this distance becomes the decisive criterion. For this reason, the thread guiding element 13 is adjustable in three planes. The distance between the thread guiding element 13 and the pair of delivery rollers 4 should not be larger than the length of the average or medium staple fiber of the fiber material being processed. Therefore, the adjustment of this space or distance is depending on the so-called "staple diagram."

The roving 2 being unwound from supply bodies 1 is refined by the drafting frame 3 and is fed by the pair of discharge rollers 4 to the thread guiding element 13 as an untwisted fiber band 5. A certain distance L is provided between the thread guiding element 13 and the pair of rollers 4, the distance L preferably corresponding to the length of the average staple fiber.

The combination of a plurality of fiber bands 5 is effected in the thread guiding element 13. After leaving this element 13, the combined fiber bands 5 are twisted by well known spindles, such as a spinning or twisting spindle 10 with a ring and runner 11. With this method,

it is impossible to clean the fiber bands 5, this can only be done in the finished thread. As far as the thread suction is concerned, the second suction device can be omitted. As far as the supply of silk to the device is concerned, reference is being made to the description of FIG. 1a.

Because of the omission of the rotating tubular members 7 the number of possible variations is smaller than with the methods according to FIGS. 1 and 2, however, the reduced number of elements saves labor and construction costs.

FIG. 4 illustrates several possible arrangements of the tubular members 7 in combination with several possibilities of guiding fibers into the tubular members 7. For carrying out the method according to FIG. 1, the arrangement of the tubular members 7 is effected in such a way that as large a number as possible of variations can be carried out. As illustrated in FIG. 4a, with two tubular members 7 arranged next to each other and having a conical outer shape, forming the simplest solution, the following variations are possible:

- (A) The processing of two fiber bands 5;
- (B) The processing of one fiber band 5 and one silk 6;
- (C) The processing of two silks 6.

Further variations are possible, of course, based on more than one fiber band 5 or silk 6 being fed to each rotating tubular member 7.

As illustrated in FIG. 4b, with three rotating tubular members 7 adjacent to each other, the following variations are possible:

- (D) Three fiber bands
- (E) Three silks
- (F) Two fiber bands, one silk
- (G) Two silks, one fiber band

The number of such variations rises of course considerably if a plurality of threads or silks are fed to each tubular member 7, such as two fiber bands, one fiber band and one silk, or two silks etc.

As will be evident, no doubt, from the above, a multitude of variations are made possible. This is of importance for the processing of artificial fibers since thus various fiber components may be intermixed so that desired properties of the end product may be achieved to exact specifications and to the finest detail. This facilitates efforts to give the end products optimum useful properties. In view of the fact that prior to, during, or after the intertwisting of the threads or yarns also a texturing process may be used, such as a thermal treatment, chemical treatment or treatment by air stream, the invention satisfies also these requirements. This method brings about the advantage of an absolutely uniform distribution of the individual fiber components in the final product, which distribution can be controlled up to the minutest detail.

A further variation (FIG. 4c) is possible depending on the arrangement of the tubular members 7. Thus, two tubular members 7 may be arranged on top of each other. It is to be understood that also three such rotatable tubular members 7 may be provided such as two members 7 on top of each other and one adjacent thereto. It would appear to be superfluous to show these various modifications since every expert in this field is in a position to develop such variations from the basic arrangements shown. For this reason also, no effort is being made here to show further variations in the feeding of the fiber bands 5 and/or the silks 6 to the tubular members 7.

FIG. 5 illustrates one example of a rotatable tubular member 7 in cross section. The conical shape of this tubular member 7 makes possible characteristic the features of the method according to FIG. 1, namely to have approximately coincide the point of dissolution of the respective temporary rotations of the doubling point, and the point of intertwining. As a device for facilitating, the threading of the tubular member serves a helical or winding groove 15. The direction of the helical pitch (to the

right or to the left) depends on the direction of rotation of the tubular member 7 and is identical to the same. The helix angle may have a certain relationship to the rotational speed of the tubular members 7.

Referring to FIGS. 6a and 6b, the arrangement of the thread guiding elements 13 shown therein follows from FIGS. 2 and 3. While on one hand the arrangement of the thread guiding element 13 is dependent on the rotatable tubular members 7—the thread guiding element 13 preferably is arranged behind the tubular members 7 and centrally arranged thereto—on the other hand the arrangement of the thread guiding element 13 is determined by the fiber length of the material being processed and by the manner in which the material is being fed to the thread guiding element 13.

The arrangement of the thread guiding element 13 for carrying out the method according to FIG. 2 is characterized primarily by the fact that element 13 is located behind the tubular members 7 and centrally thereto (FIG. 6a). It is immaterial whether two tubular members, or three or four such tubular members cooperate with the thread guiding element 13.

The arrangement of the thread guiding element 13 for carrying out the method according to FIG. 3 is preferably such that the clamping points of, for instance, two fiber rovings 2 between the pair of delivery rollers 4 of the draft frame form an equilateral triangle with the point where the fiber bands 5 are joined in the thread guiding element 13 (FIG. 6b). In order to assure the proper adjustment, the thread guiding element 13 is adjustable in three planes. The length of one side of the just mentioned triangle should preferably be smaller or equal to the medium or average staple length of the fiber band 5, but should not be longer than the same.

FIG. 7 illustrates in detail a thread guiding element 13. The guiding rails 14 which are arranged at an angle to each other and lead to a rounded portion 16 serve for catching thread or yarn 12. Since the thread guiding element 13 shown does not completely surround the thread 12, the customary thread guiding eyelet is necessary as in the past. The rounded portion 16 is provided for reducing the frictional resistance for the fiber bands 5 to a minimum and makes possible a sliding propagation of the rotation. The thread guiding element 13 is mounted by means of a clamping spring 18 on a support 17 for lateral adjustment, said support 17 being adjustable in two planes. This adjustment is indicated in FIGS. 7 and 8 by arrows A.

FIG. 8 also shows among other things a side view of the thread guiding element 13. It is evident that the thread 5 in the drafting frame 3, in the rotatable tubular members 7, and up to the thread guiding element 13 forms the same angle L to the horizontal indicated by the reference character W. The clamping spring 18 makes it possible to laterally displace element 13 on the support 17 and simultaneously in combination with a guiding key 19 brings about that the thread guiding element 13 is resilient and can yield to compensate for excessive thread tensions. The indicated adjustability of the thread guiding element 13 towards the tubular members 7 (in the method according to FIG. 2) is equivalent to the adjustability of the thread guiding element 13 towards the pair of delivery rollers 4 (in the method of FIG. 3).

FIGS. 9a to 9c illustrate three twisting and winding devices for carrying out the methods of FIGS. 1 to 3. FIG. 9a shows an arrangement with a well known ring spinning or ring twisting element. More specifically, this arrangement includes a spinning or twisting spindle 10 with a ring and runner 11, a sleeve 20 and the already described thread guiding element 13, and tubular members 7. The combined fiber bands 5 form the finished thread 12.

FIG. 9b shows an arrangement with so-called double D-spindles comprising a discharge body 21, a rotatable disc 22, a collecting body 24 and magnets 26, aside from

showing the tubular members 7, thread guiding element 13, as well as the fiber bands 5, and thread 12.

Finally, FIG. 9c illustrates a twisting and winding device with a hollow spindle. This device comprises a winding body 21, a hollow spindle 27 and withdrawing rollers 28 as well as a spooling body 24a and a thread guide 29.

Referring now to FIG. 10 the device shown therein and designated with the reference numeral 30 serves for facilitating the threading of a tubular member 7. It comprises a needle 32 rotatably supported in a handle 31, said needle being elastic and having a forked front end 32a. The needle 32 is somewhat thinner than the bore 33 of the tubular member 7. In order to prevent the breaking of threads, the needle 32 is passed through the rotatable tubular member 7 up to the pair of delivery rollers 4 (not shown in FIG. 10). The broken fiber band 5 is grasped by applying slight pressure against the rotatable member 7, the needle 32 starts to rotate and grasps the fiber band 5. Thereafter, the fiber band 5 is pulled from the rotatable member 7 and is led directly either to another fiber band 5 or silk 6 or is first led to a suction device below the tubular members 7 and is then upon retrieval of a second or third fiber band 5 or silk 6 connected to the latter by a simple thread end rotation.

It is, of course, to be understood that while three preferred embodiments of the method and apparatus according to the present invention have been described above, the invention is not limited thereto, but comprises any modifications within the scope of the appended claims.

What is claimed is:

1. A method of spinning, doubling and twisting fibers, from strands of fibers, in one single operation, comprising the steps of imparting a false twist to each one of said strands, doubling said strands at a point, and preventing the complete dissolution of the false twist by fixing at the point of doubling while imparting a genuine twist on said doubled strands.

2. The method according to claim 1, wherein said fixing includes the step of causing the point of dissolution of the false twist, the point of doubling, and the point of twisting to substantially coincide.

3. The method according to claim 1, wherein said fixing includes the step of creating a floating fusion zone between the false twist and the genuine twist.

4. A method according to claim 2, which includes the steps of preparing a plurality of rovings, refining each of said rovings by drafting so as to form fiber bands, supplying said refined fiber bands each to a rotating tubular member, imparting the false twist onto said fiber bands in said tubular members, combining said fiber bands, and twisting the same.

5. A method according to claim 4, wherein said fibers consist of staple fibers.

6. A method according to claim 4, wherein said fibers consist of silk.

7. A method according to claim 4, wherein said fibers selectively consist of staple fibers and silk.

8. A method according to claim 3, which comprises the steps of preparing a plurality of rovings, refining each of said rovings by drafting into fiber bands, supplying said fiber bands to one rotating member each, imparting a false twist onto said fiber bands, combing said fiber bands within a thread guiding element, and twisting said combined fiber bands.

9. An apparatus for spinning, doubling and twisting fibers, such as staple fibers and silks in one single operation, which comprises: a drafting member for refining a plurality of rovings therein into fiber bands, a false twisting device including a plurality of tubular members arranged adjacent said drafting member to receive the re-

fined fiber bands therefrom, and a twisting spindle having means for receiving the fiber bands from said tubular members and means for twisting the same.

10. An apparatus according to claim 9, wherein said tubular members are exchangeably arranged in a substantially horizontal plane, the tubular members having exit openings closely adjacent to each other.

11. An apparatus according to claim 8, wherein said tubular members are exchangeably arranged in a substantially vertical plane with their exit openings closely adjacent each other.

12. An apparatus according to claim 9, which includes a thread guiding member arranged between said tubular members and said spindle.

13. An apparatus according to claim 9, wherein said tubular members are exchangeably arranged in two planes with the exit openings of said tubular members closely adjacent each other.

14. An apparatus according to claim 12, wherein said thread guiding member and said tubular members are in axial alignment with each other.

15. An apparatus according to claim 9, which includes means for adjusting said thread guiding member in three planes, and means for resiliently journalling said thread guiding member.

16. An apparatus according to claim 12, wherein said thread guiding member is provided with two guiding grooves and a rounded portion interconnecting said two grooves.

17. An apparatus according to claim 9, wherein said tubular members are provided with means for facilitating the threading thereof.

18. An apparatus according to claim 9, which includes thread suction means arranged below the exit end of said tubular members.

19. An apparatus according to claim 9, which comprises thread break indicating means below the exit ends of said tubular members.

20. An apparatus according to claim 9, which includes thread cleaning means arranged between said drafting member and said false twisting device, closely adjacent said tubular members.

21. An apparatus according to claim 12, which includes thread cleaning means between said thread guiding member and said spindle.

22. A method according to claim 4, which includes the step of texturing said fibers selectively prior to and subsequently of twisting the same.

23. A method according to claim 8, which includes the step of texturing said fibers selectively prior to and subsequently of said twisting.

References Cited

UNITED STATES PATENTS

2,061,498	11/1936	Bird	57—36
2,608,817	9/1952	Reinicke	57—38.4
2,838,903	6/1958	Sutter	57—51
2,990,673	7/1961	Adkins, Jr.	57—36

FOREIGN PATENTS

120,152	12/1930	Austria	57—51
1,150,000	1/1958	France	57—51

STANLEY N. GILREATH, Primary Examiner

W. H. SCHROEDER, Assistant Examiner

U.S. Cl. X.R.

57—75, 77.3, 156

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,616,632

Dated November 2, 1971

Inventor(s) Kurt Helmar Reuter et al.

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

In the grant (only) insert Sheet 3 of the drawings.

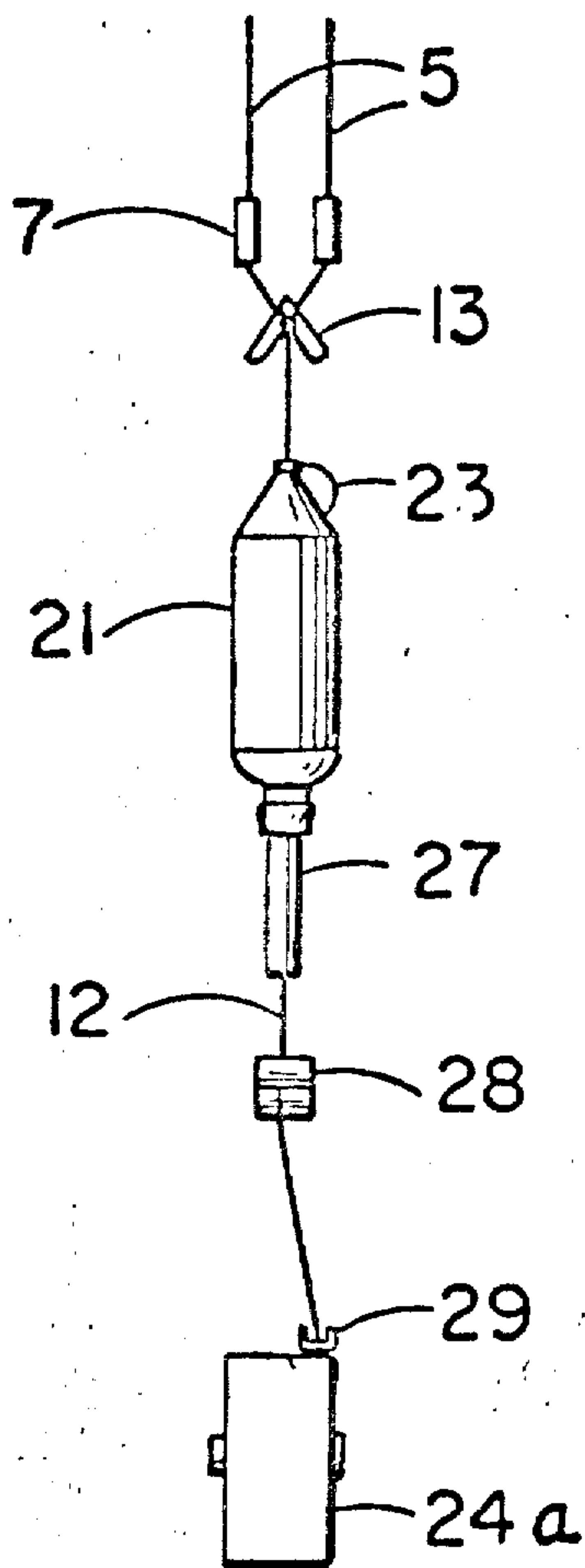


FIG. 9c

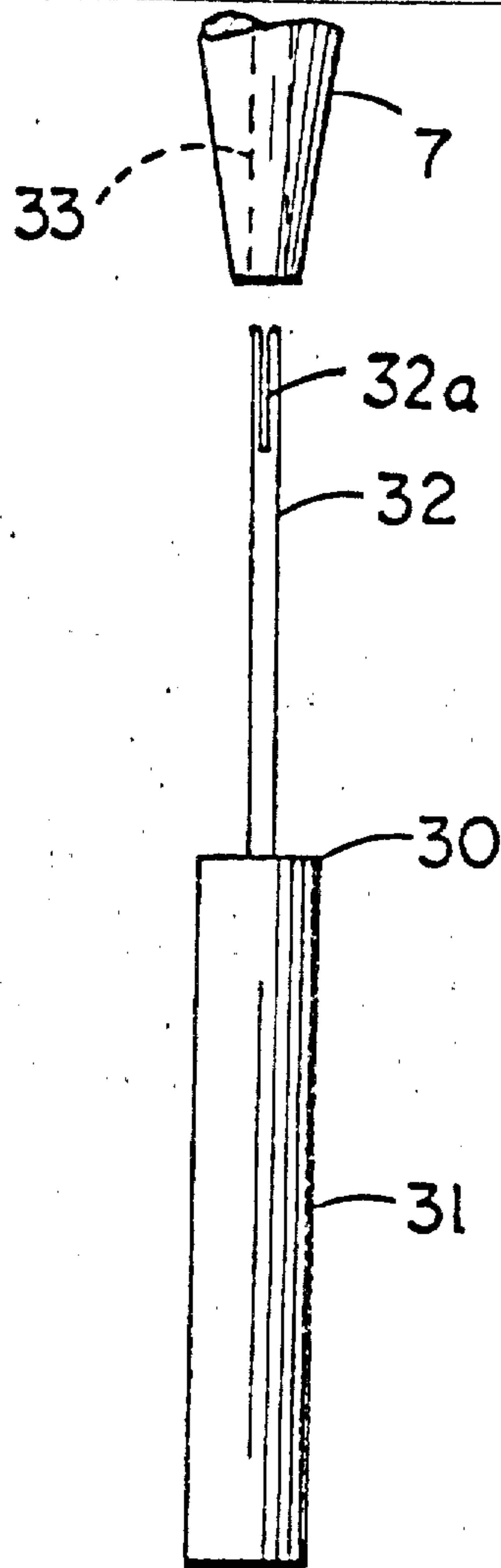


FIG. 10

INVENTORS
KURT HELMAR REUTER
MARIA ELISABETH STEINHAUSER
HORST SACHER
KARL HEINZ SILBERMANN

by *[Signature]*
ATTORNEY.

UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,616,632 Dated November 2, 1971
Inventor(s) Kurt Helmar Reuter et al. PAGE - 2

It is certified that error appears in the above-identified patent
and that said Letters Patent are hereby corrected as shown below:

Signed and sealed this 8th day of August 1972.

(SEAL)
Attest:

EDWARD M. FLETCHER, JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents