United States Patent [19]

Rosenkranz et al.

[11] **3,921,419**

[45] **Nov. 25, 1975**

[54] **APPARATUS FOR THE CONTINUOUS TREATMENT OF TEXTILE FIBERS**

[75] Inventors: **Dieter Rosenkranz; Karl Bous,** both of Wuppertal; **Roland Schmidt; Werner Engelhardt,** both of Neviges-Donberg; **Günter Vermehren,** Emesdetten, all of Germany

[73] Assignee: **Hacoba Textilmaschinen GmbH & Co. KG,** Wuppertal, Germany

[22] Filed: **June 14, 1972**

[21] Appl. No.: **262,685**

[30] **Foreign Application Priority Data**

June 22, 1971 Germany 2130759
Nov. 4, 1971 Switzerland 16141/71

[52] **U.S. Cl.** .... **68/5 D;** 28/62; 28/72 HR; 34/23; 34/155; 57/35; 57/157 MS; 68/DIG. 1; 226/184; 242/45

[51] **Int. Cl.²** **B08B 3/12;** D06F 37/00

[58] **Field of Search** .... 57/34 HS, 35, 91, 157 F, 57/157 MS; 226/184; 28/62, 72 HR; 68/5 D, DIG. 1; 34/23, 155

[56] **References Cited**

UNITED STATES PATENTS

2,346,186	4/1944	Poesl	34/155 X
2,539,978	1/1951	Van Dijk	34/155 X
2,597,801	5/1952	Elliott (Jellinek)	34/155 X
3,210,967	10/1965	Schwab et al.	68/5 D
3,316,740	5/1967	Davis	28/62
3,525,205	8/1970	Antoni et al.	28/62 X
3,552,622	1/1971	Frausen	226/184 X
3,606,655	9/1971	Oberlander et al.	28/62
3,770,374	11/1973	Fleissner	68/5 D X

Primary Examiner—John W. Huckert
Assistant Examiner—Charles Gorenstein
Attorney, Agent, or Firm—Karl F. Ross; Herbert Dubno

[57] **ABSTRACT**

A device for continuously treating yarn or the like with a hot gas or liquid comprises a treatment chamber having a yarn-inlet duct, a yarn-outlet duct and means for feeding the treating fluid to the chamber, the outlet duct being point-shaped for returning the yarn upwardly and a thread-feed arrangement comprising conical rollers being employed to feed the yarn into the inlet duct.

9 Claims, 23 Drawing Figures

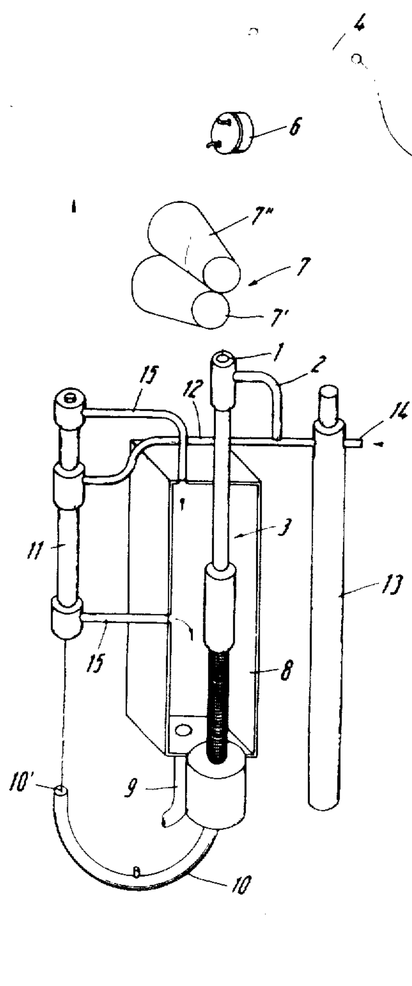


Fig. 1

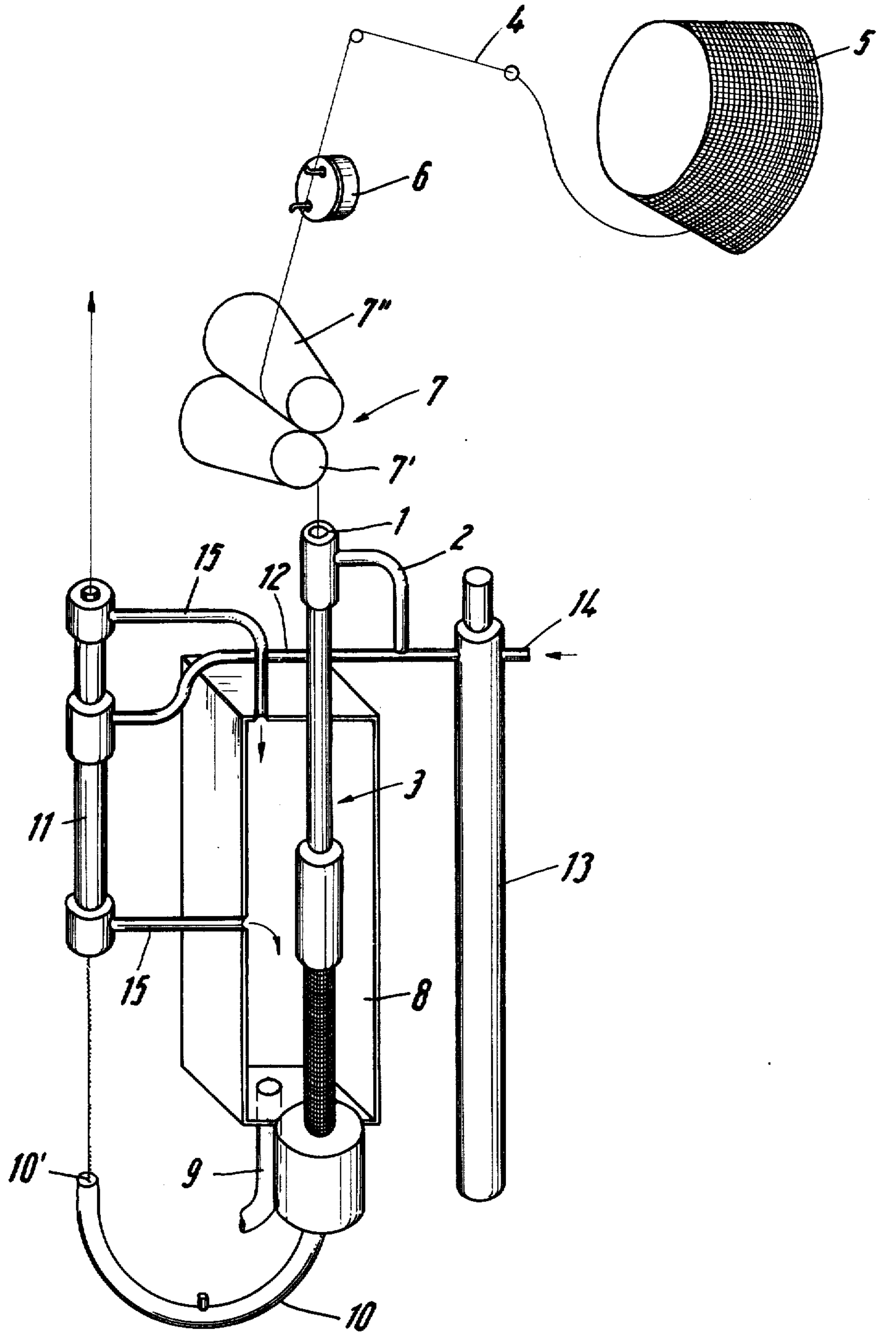


Fig. 2

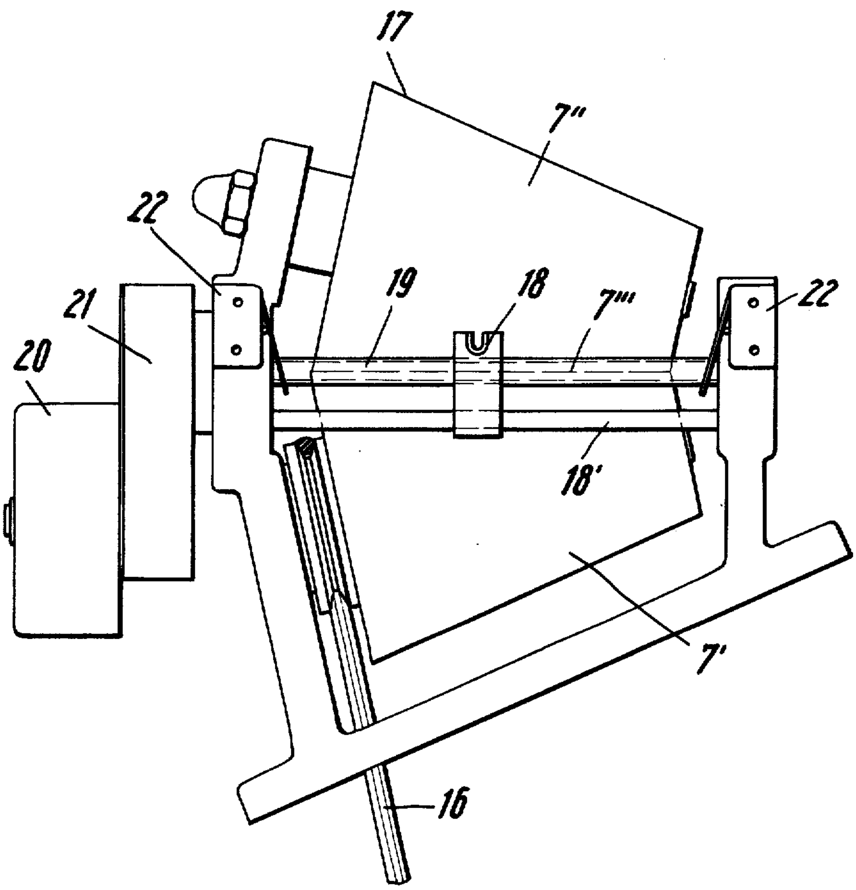


Fig. 3

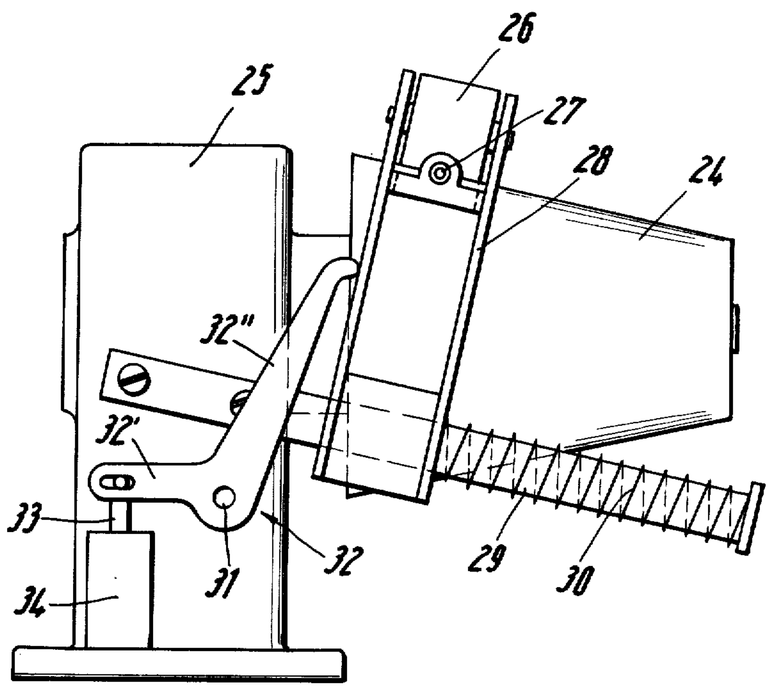


Fig. 4

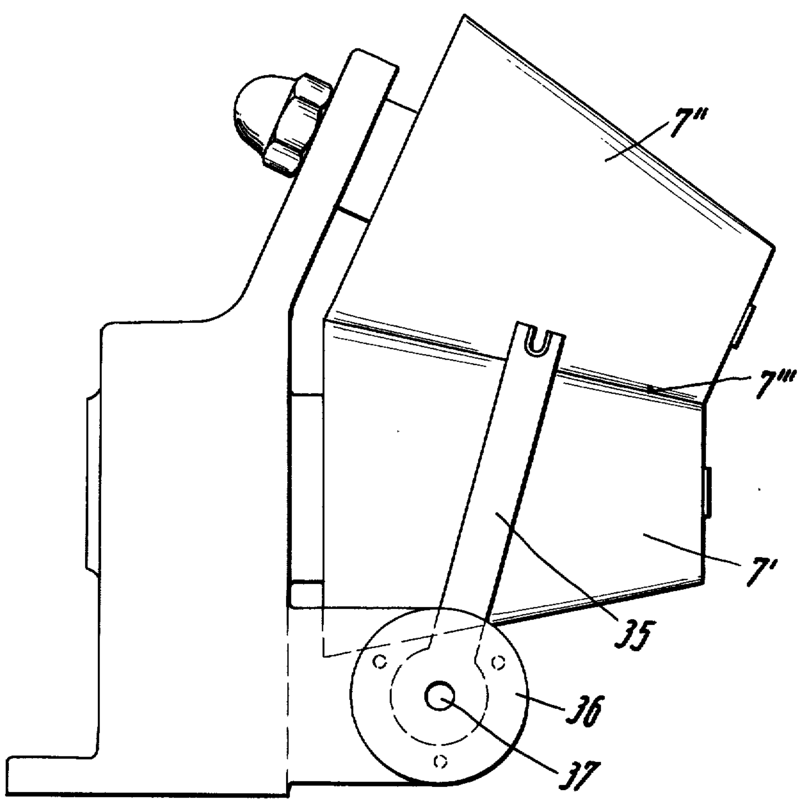
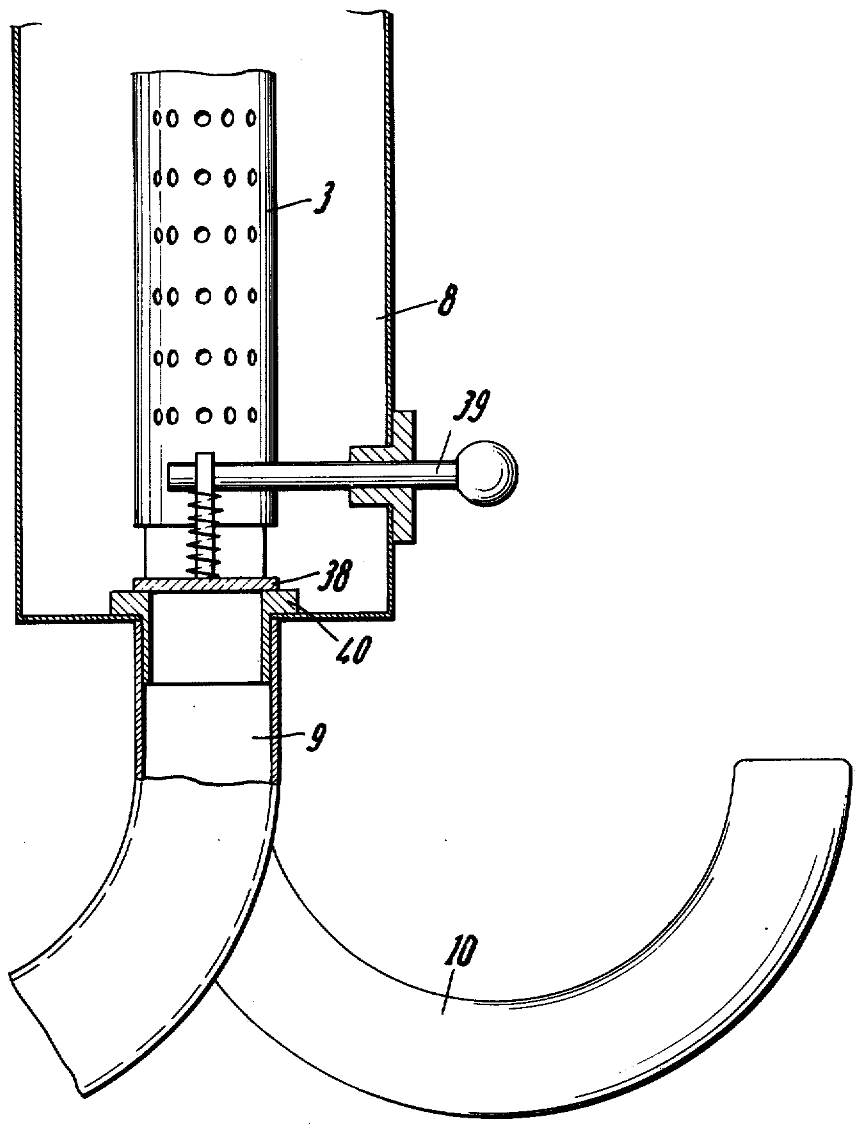


Fig. 5



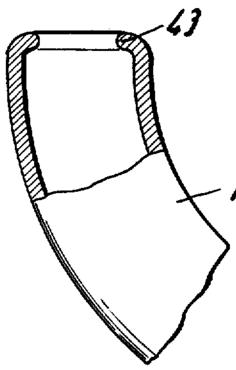
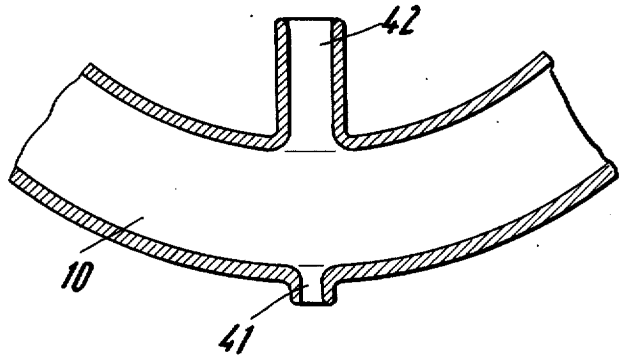


Fig. 7

Fig. 6



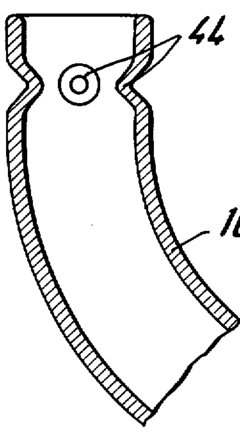


Fig. 8

Fig. 9

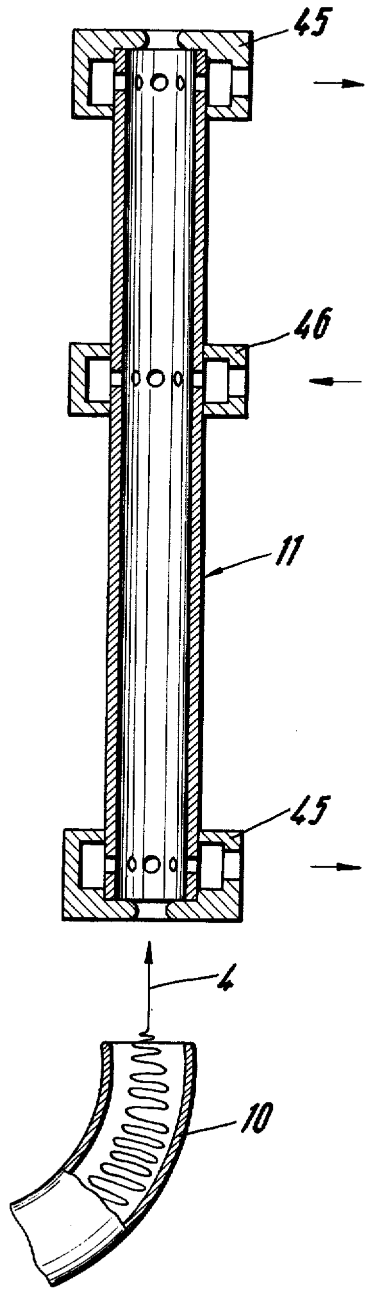
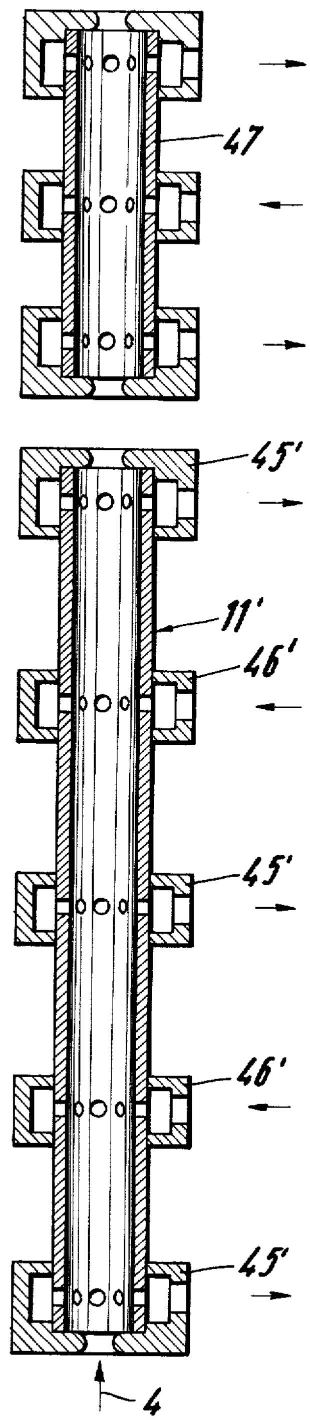


Fig. 10



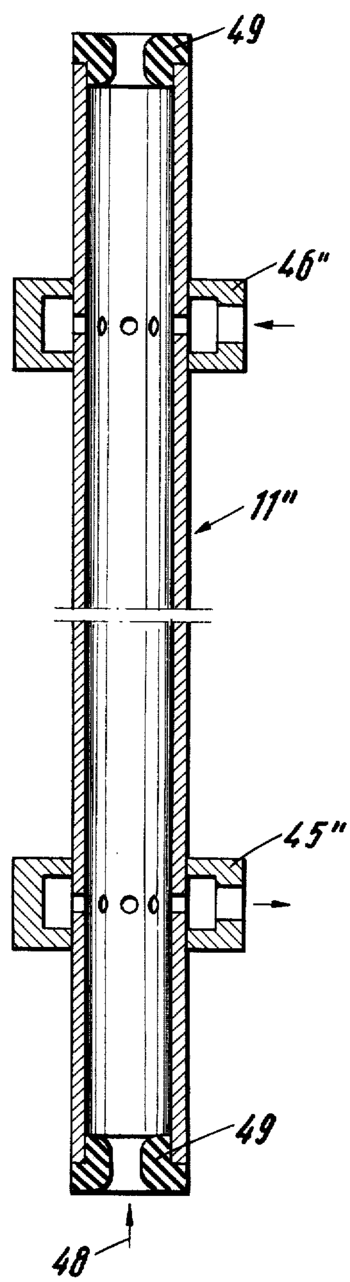


Fig. 11

Fig. 12

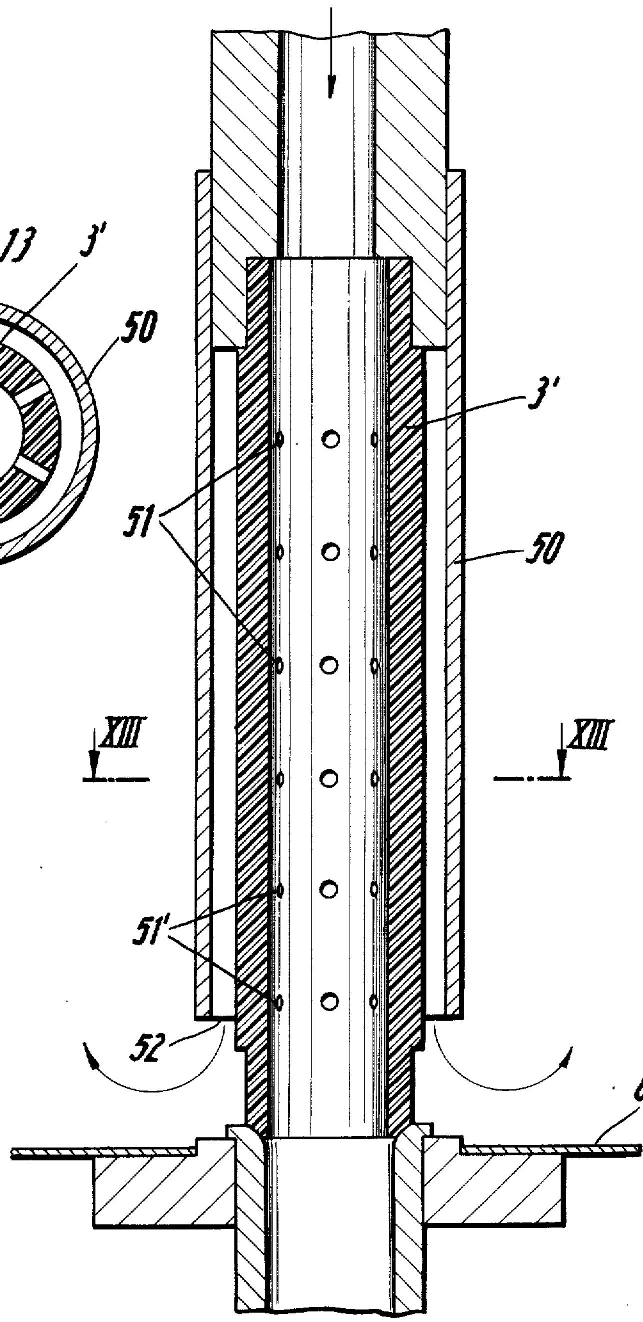
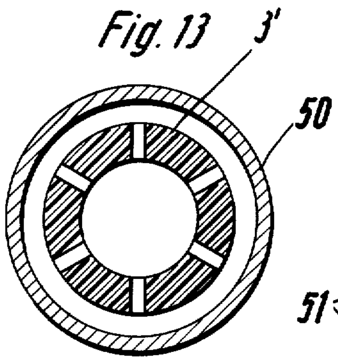


Fig. 13



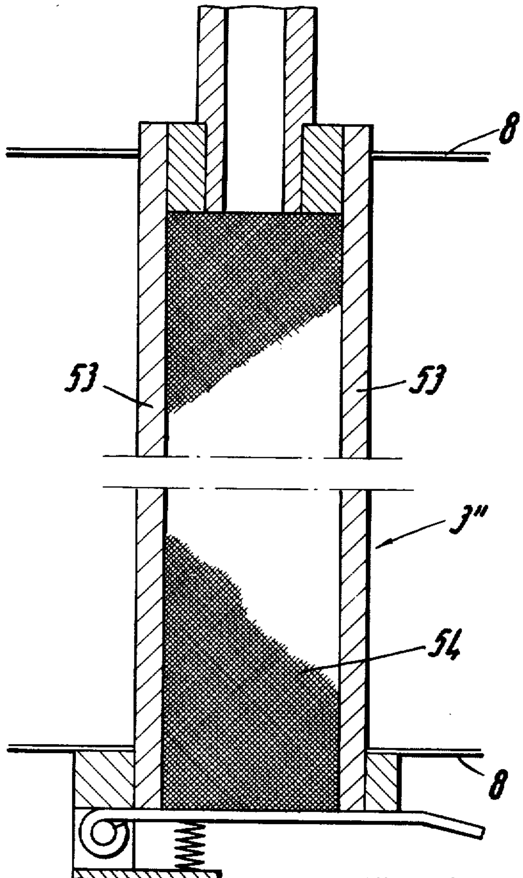


Fig. 14

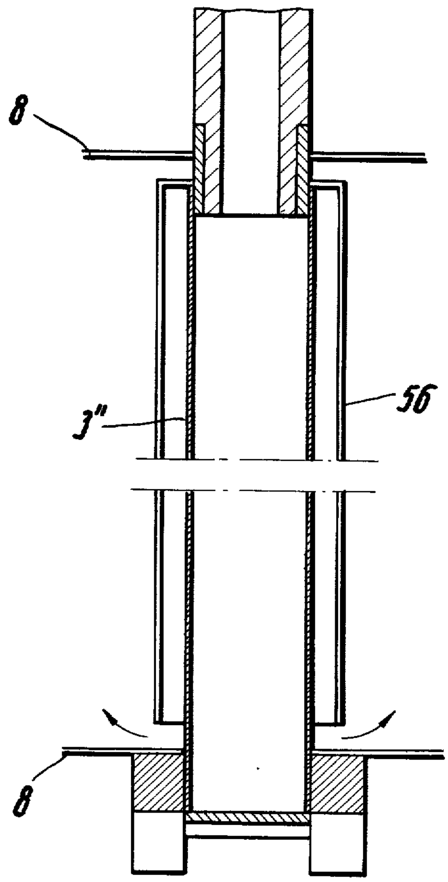
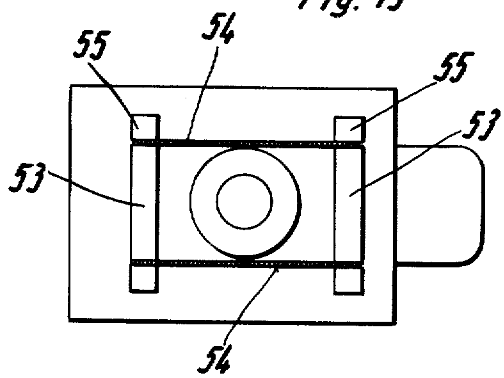


Fig. 16

Fig. 15



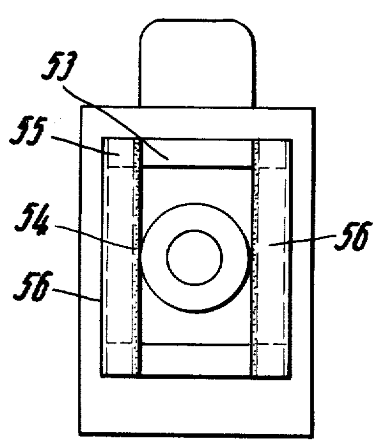


Fig. 17

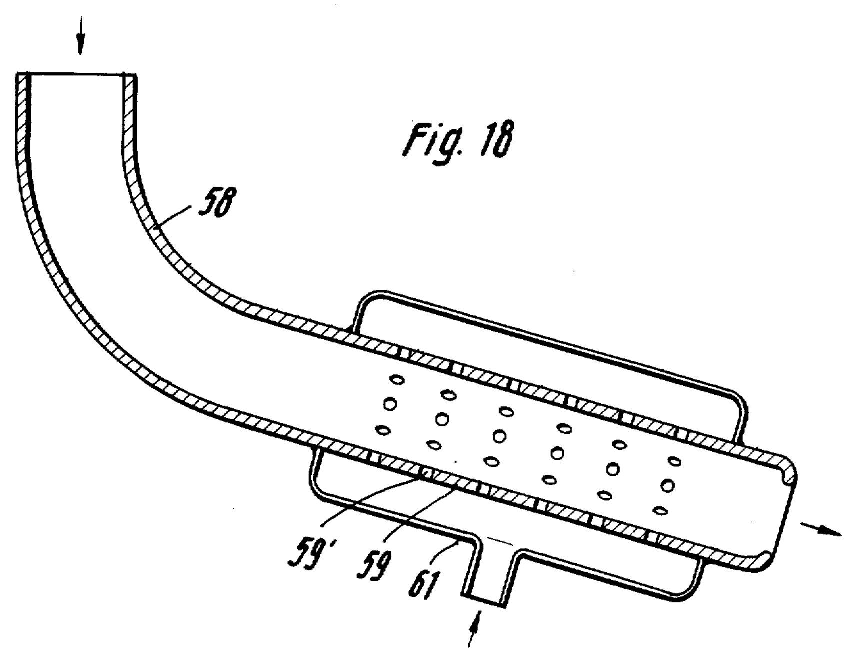


Fig. 18

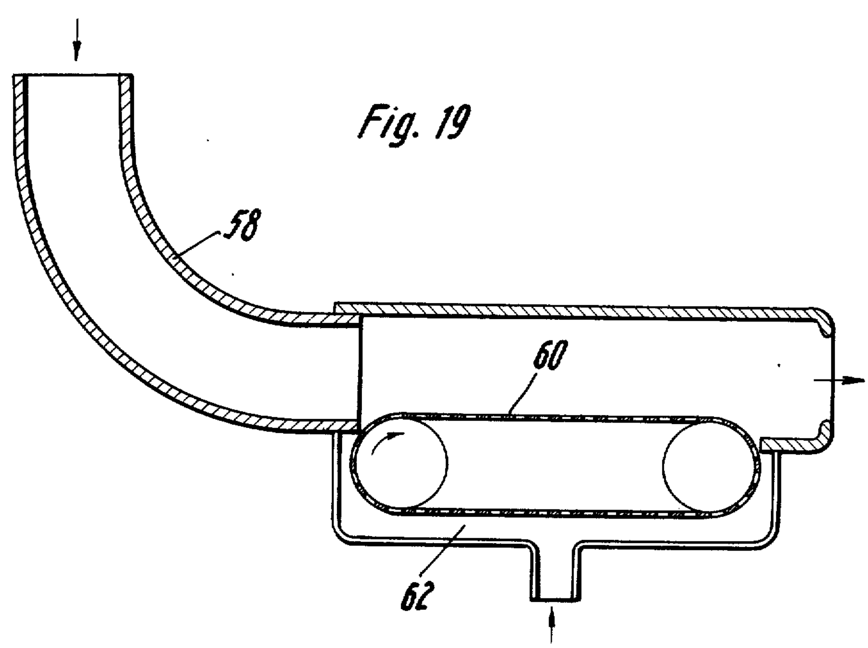


Fig. 19

Fig. 20

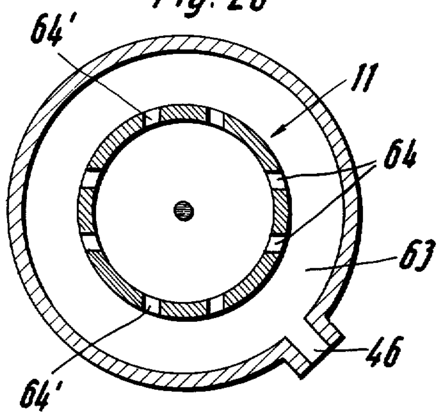


Fig. 21

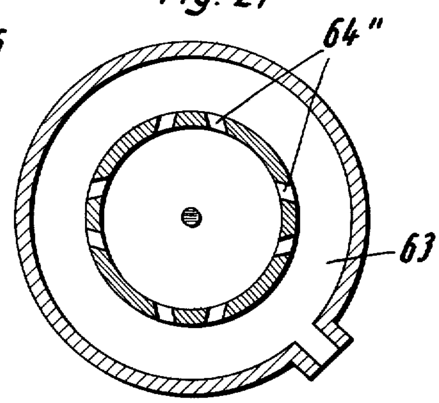


Fig. 22

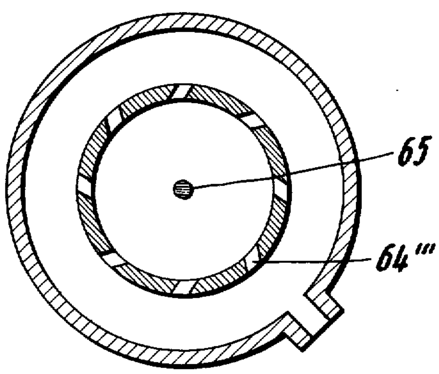
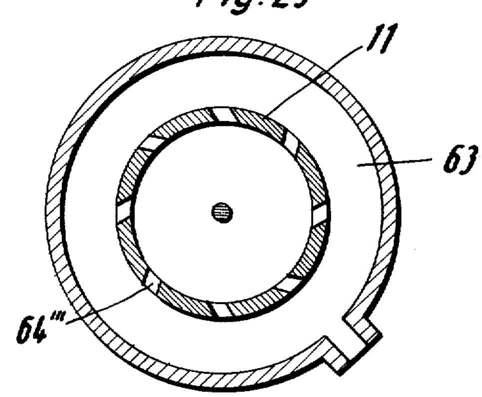


Fig. 23



APPARATUS FOR THE CONTINUOUS TREATMENT OF TEXTILE FIBERS

The invention relates to a device for continuously treating, particularly shrinking, dampening, loosening, and/or fixing, textile thread or yarn material by means of a heated gaseous and/or liquid treating agent. The device comprises a treatment chamber provided with a thread inlet duct, a feed pipe leading into it for the treating agent and respective outlets for the treating agent and the treated thread together with a regulatable thread delivery system upstream of the chamber and a thread advancing or winding device downstream thereof.

It has been found that the above-described device can be considerably improved by additional devices which result in a significant improvement in the quality of various thread and yarn materials to be treated. This improvement is achieved according to the present invention in that the thread delivery system comprises two delivery rollers rolling on one another, at least one of which is cone-shaped, and a thread guide adjacent the line of contact of the rollers and displaceable substantially parallel to it, a U-shaped curved guide tube being arranged at the lower end of the chamber and a tuyere zone tube for the thread to be drawn up above its upwardly-directed outlet end; the tuyere zone tube is provided with suction connections and supply connections for treatment vapor or cold or hot air.

The advantages of these and other features of the invention are described below in conjunction with several embodiments illustrated in the accompanying drawing, wherein:

FIG. 1 shows the new thread or yarn treating device in a part-sectional schematic perspective view partly broken away;

FIGS. 2, 3 and 4 show elevational views of various embodiments of the thread delivery system;

FIG. 5 shows a partial sectional view of the lower end of the treatment chamber and of the condenser surrounding it;

FIGS 6, 7 and 8 show various forms of the U-shaped curve supply tube in cross-section;

FIGS. 9, 10 and 11 show various forms of tuyere zone or stabilizing tubes in vertical longitudinal section;

FIG. 12 shows the perforated part of the treatment chamber with a steam supply tube enclosing it, in vertical section;

FIG. 13 shows a cross-section on the line XIII-XIII in FIG. 12;

FIGS. 14, 15 and 16, 17 show respective vertical sections and plan views of rectangular forms of the treatment chamber in cross-section;

FIG. 18 shows a thread storage tube connected to the treatment chamber and provided with a perforated sleeve;

FIG. 19 shows a thread storage tube with a perforated conveyor belt, in longitudinal section similar to FIG. 18,

FIGS. 20, 21, 22 and 23 show cross-sections through differently formed tuyere zone tubes.

The thread or yarn treatment device shown in FIG. 1 consists essentially of a yarn treatment chamber or tube 3 provided with a thread inlet duct 1 and a supply pipe 2 connected to it for the treating agent, to which tube the thread or yarn 4 to treated is led from the supply

spool 5, via a brake 6 through a thread delivery system 7, at a regulatable speed of advance of feeding rate.

The yarn treatment tube 3 is surrounded, at least at its perforated part, by a condenser 8 so as to define a space, which can be connected to a suction vacuum conduit 9. At its lower part, the treatment; chamber tube 3 passes into a U-shaped curved guide tube 10. Above the exit end 10' of the guide tube 10, there is provided a so-called tuyere zone tube 11, which is connected via a duct 12 to a heating element 13, in which steam or hot air can be produced. Instead of water or cold air, if required, steam or hot air can be passed directly through a duct 14. The tuyere zone tube 11 is connected to the condenser 8 or to its suction conduit 9 by means of the tube 15.

By means of the delivery system 7 whose two conical delivery rollers 7', 7'' roll upon one another, the thread 4 to be treated is led to the treatment chamber tube without slipping, whereby the speed of the thread is varied according to the point (axial locations) at which it passes through the rollers. It is essential for the delivery system 7 according to the invention that, by moving the thread 4 by means of a thread guide along the line of contact of the conical delivery rollers and with a constant rate of rotation of the delivery rollers, a continuous alteration in the speed of the thread is achieved. This continuous alteration is necessary in order to avoid over filling of the chamber, breaking of the thread and the formation of loops and also to enable a constant removal of the thread from the receiver and to ensure, uniformity of the winding diameter of the thread or uniformity of capillary fastening.

The delivery system according to FIG. 2 consists of the two conical delivery rollers 7', 7'', one of which, 7', is continuously driven by a belt 16, gear wheels or other operating means, while the other delivery roller 7'' rests under its own weight on the driven delivery roller 7' and is thereby driven with it. For this purpose, the driven delivery roller 7' is without a covering and the delivery roller 7'' driven by it is constructed with a rubber covering 17. A thread guide 18 is located ahead of the nip, i.e. upstream in relation to the advance of the thread toward the delivery rollers 7', 7'', so that the yarn to be conveyed is led directly to the nip point between the two rollers 7', 7''. The thread guide 18 is displaceably mounted on a rod 18, located parallel to the line of contact 7''' of the two delivery rollers and is connected with a displacement member, for example a threaded spindle 19. This is constantly driven by an electric motor 20 with a gear device 21. The electric motor 20 can have its polarity reversed by a regulating device, which corresponds to the pressure of the treating agent passing into the treatment chamber tube 3. This therefore results in a change in the rotational direction of the threaded spindle 19 and then a changing movement of the thread guide 18, which owing to the conicity of the delivery rollers 7', 7'', causes a continuous alteration in the speed of the thread. In this way, the filling of the chamber tube 3 is constantly regulated. This also ensures that the thread 4 never runs for too long a time at one point on the delivery rollers 7', 7'' and therefore; so far as possible, never damages the rubber covering 17. In order to prevent the filament from running out of the delivery system or staying too long on the outer diameter of the delivery rollers, end stops 22, 23 are provided to limit the thread guide travel, so that these end stops operate at the same time as the required alterations in the rotational direction of the electric motor.

FIG. 3 shows a further delivery system. In this delivery system, a large conical delivery roller **24** with a rubber covering is driven continuously by a motor mounted in a stand **25.** A small cylindrical roller **26** is pressed by contact pressure against this delivery roller **24** and so is driven by it. The thread to be treated is led through the nip point and is positively fed into the treatment chamber 3. A thread guide **27** ensures that the thread is also constantly led to the nip point of the rollers **24, 26.** The small roller **26** and the thread guide **27** are arranged on a sliding carriage **28,** which is displaceably positioned against the effect of a compression spring **30** on a guide rod **29** running parallel to the line of contact of the two rollers **24, 26.** The displacement itself results from a crank lever **32** rotatable around a pivot **31,** one arm **32'** of which is connected with a lifting rod **33,** for example from an electro-magnet **34,** and the other arm **32''** of which rests on the sliding carriage **28** of the roller **26** and the thread guide **27.** When the treatment chamber tube **3** is empty, the small roller **26** rests on the largest diameter of the conical delivery system roller **24.** In this way, the yarn is fed into the treatment chamber at the greatest speed. As soon as the regulating device for detecting the filling of the chamber operates, (See FIG. 3, U.K. Pat. No. 1,164,852 of 24 Sept. 1969), the magnet **34** is actuated. In this way, the crank lever **32** rocks around its pivot **31** and the small delivery roller **26** is pushed toward the smaller diameter of the conical delivery roller **24,** against the effect of the spring **30.** If, when the chamber is filled to a lesser extent, the regulating device operates again, the electric circuit to the electromagnet **34** is broken, and the small roller **26** again contacts the large diameter of the conical delivery roller **24** by means of the compression spring **30.**

FIG. **4** shows a third embodiment of a positive delivery system **7.** In this form, the delivery system again consists of two conical delivery rollers **7', 7''.** On of them, **7',** is constantly driven while the second delivery roller **7''** is pressed against the driven one **7'** and so is driven by it. The thread **4** to be conveyed into the treatment chamber tube **3** is guided by the thread guide **35** to the nip point of the two delivery rollers. The thread guide **35** is rotatably movable along the contact line **7', ''**, whereby the yarn is led to the treatment chamber with a greater or lesser speed, corresponding to the peripheral speed at that point. The thread guide lever **35** is moved here for example by a rotary electro-magnet **36,** which is controlled by the known regulating device for the degree of filling of the chamber. The thread guide lever **35** is mounted on the rotor shaft **37** of the rotary magnet **36.**

According to the embodiment in FIG. **5,** the amount of steam (the treating agent) which is removed through the suction duct **9** from the condenser **8** is controlled. In this/way with a particularly intensive steam treatment of the yarn to be treated in the chamber tube **3,** an essentially better shrinkage and bulking effect is obtained. The amount of steam to be withdrawn can be regulated by means of a regulating flap or a sliding plate **38** placed before the suction ventilator by which the aperture in the suction duct **9** is altered by means of the positioning lever **39,** the sub-pressure in the condenser **8** thus being influenced correspondingly. The result is that the steam or other treating agent remains for a longer or shorter time in the treatment chamber tube **3.** Through variously positioning the flap or plate **38,** it is possible to keep the sub-pressure constant from the first winding position to the last. The condenser **8** is connected to a central suction system by means of the suction duct **9,** which is connected to the condenser unions **40.** For this purpose, two treatment chamber tubes **3** are accommodated in a condenser **8,** the connecting union for the suction duct **9** being positioned exactly between the two chamber tubes **3.**

FIGS. **6, 7** and **8** illustrate cross-sections of various forms of the U-shaped curved guide tube **10,** through which the treatment of the yarn in the chamber tube **3** can be improved. The yarn is not directly drawn radially from the chamber outlet, but is guided through this U-shaped curved tube **10** and drawn out upwardly. The advantage of this is, by drawing it out from the chamber tube **3,** the whole mass of yarn does not lie on the thread being withdrawn, so that possible flattening, which could result from the filament tension on drawing the thread from the mass of fibers, cannot arise. The U-shaped curved guide tube preferably consists of transparent material, particularly glass and at the lowest point of the bend has a small opening **41** to let the condensation run out. Because of the transparency of the guide tube **10,** it is very simple to control the filling of the chamber and consequently the shrinkage. Furthermore the U-shaped guide tube can have in its bend a connecting limb **4,** through which, in order to treat the mass of yarn in addition, a treating agent for example steam can flow into the tube **10** (FIG. **6**). Naturally it is also possible to provide more than one such connecting limb **42** for additionally introducing treating agents. These connecting limbs **42** can be arranged at the same height on the tube **10** or divided over the length of the tube. It is equally possible to provide, instead of a simple connecting limb **42,** an annular chamber to allow the treating agent to enter.

At the outlet end of the tube **10,** preferably internally, either a reinforcement rim or lip **43** (FIG. **7**) and/or several inward projections **44** (FIG. **8**) is/are provided, in order to check or somewhat retard the mass of yarn. Withdrawal of the yarn is therefore made easier, because several layers cannot immediately be removed at once, which is enhanced by the formation of a backwash of the treating agent in the chamber tube **3.**

It has been found very advantageous for the appearance, the bulking and the form of the treated material, to pass the latter, through a tuyere zone against, after it has left the perforated chamber tube **3.** The advantage is that the bulked or shrunken yarn coming out of the chamber tube **3,** is subjected as individual threads to the effect of steam in the tuyere zone during the continual movement of the thread. The yarn thus acquires the pearl character known from non-continuous shrinking, the thread or fibre structure is improved, a fibrous soft yarn is obtained and the yarn has an ideal round shape. The tuyere zone itself, according to FIG. **9,** consists of a tube **11** with suction unions **45** to the side at each end and a steam inlet connection **46** in between. In this way, the steam which has passed through effects the thread passing through partly in countercurrent and partly in cocurrent, which has proved very advantageous. In case the yarn passing through should not be subject to any turbulence, the steam supply and also its extraction can be effective in a radial direction near the end points of the tuyere zone tube **11.** Apart from other constructional measures, the formation of the suction and inlet connections **45, 46** as annular chambers with perforations or flow bores correspondingly arranged in the tuyere zone tube **11** can be mentioned here for example. Of course the steam supply as well as the suction device can be regulatable. Together with this simplest formation of the tuyere zone, a modified form of construction is shown in FIG. **10.** Here the tuyere zone tube **11'** is provided with a number of steam inlet connections **46'** and suction connections **45'**. A stabilizing tube **47** is connected to this tuyere zone tube **11'**, which is formed like the simple tuyere zone tube **11,** but operates however with hot or cold air in order to stabilise the bulked yarn.

If hot or cold air is blown through the middle inlet connection **46** instead of stream, then the tuyere zone tube **11** works as a drying or cooling channel. This can be very advantageous because the yarn must certainly be fixed before being wound. FIG. **11** shows a very advantageous and simple embodiment of a drying or cooling channel. In this hot or cold air is blown through the annular connecting channel **46''** into the drying or cooling tube **11''**, which release the air through the annular outlet channel **45''**. The yarn feed direction is marked at **48.** The tube **11''** thus operates countercurrently. Because of the length of the drying or cooling tube **11''** (it can be 1,000 to 1,500 mm long), it preferably is made to be openable for easy insertion of the yarn and has thread guide eyelets **49** at both of its openings. It is understood that additional heating stages can be provided for use as a drying channel.

It has been found in many cases that it is advantageous if the treating agent flows around the thread material deposited in the chamber tube **3** and also that the agent continually penetrates as deeply as possible into the material accumulated in the chamber tube. In this way an undesired compression of the mass of yarn by the treatment chamber can be avoided as shown in FIG. **12** and **13.** This consists essentially of a perforated tube **3'**, as the previously known treatment chamber, and of a tube **50,** when encircles the treatment chamber tube **3'** proper at a small distance and extends over its entire length down to just above the base **8'** of the condenser **8.** The steam flowing out of the upper bores **51** of the chamber tube **3'** therefore does not simply proceed into the condenser **8,** but is led along the chamber tube **3'** until it finally passes out via the annular clearance **52.** The treatment chamber tube is thus first heated by the steam flowing past its exterior. The yarn material in the chamber tube cannot so easily lose its temperature and the steam in the chamber tube cannot so easily condense. Besides this, by means of the sloping bores **51'** formed in the chamber tube **3'**, a certain amount of steam is passed into the yarn material situated in the chamber tube.

Another embodiment of the treatment chamber is illustrated in FIGS. **14** to **17.** Here the treatment chamber is no longer round, but is of a rectangular cross-section. In this, the two narrow or shorter sides opposite one another are formed by rectangular bars **53,** whilst the two longitudinal sides of the rectangular treatment chamber are formed by sheets **54** of very fine-meshed wire netting. These wire mesh sheets **54** can be screwed on to the rectangular bars **53.** However, it is even simpler to attach the wire mesh sheets by clamping them between the bars **53,** which form the narrow sides of the chamber, and covers bars **55,** which are screwed on to the rectangular bars **53.** A treatment chamber is thus obtained, which is very simple in its construction and is very easily made. If the steam or other treating agent

cannot flow directly into the condenser **8,** then by means of simple bent cover sheets **56** a cover can easily be applied to the sides **54** of the wire netting (FIG. **16, 17**). In any case, this ensures that the steam can affect all the yarn material in the treatment chamber **3'**. The introduction of yarn and the withdrawal of it can follow in one of the ways described. Of course the surface of the wire netting **54,** that is the surface of the treatment chamber **3''** allowing the steam to pass through, can also be limited, e.g. by coverings, such as sheets, which are placed directly on the wire netting **54** and are screwed together with this on to the rectangular bars **53.** This is particularly necessary for the yarn input side of the treatment chamber **3''** and is shown in the figures.

The quality of the shrunken yarn can be further improved by an additional device, as is shown in FIG. **18** and **19.** In this it is essential that the material to be shrunk and bulked in the treatment chamber tube **3** only remains for a short while and consequently is only pre-bulked. The final appearance of the yarn is obtained in the additional device according to the invention. For this purpose, the yarn is not removed as individual filaments from the chamber tube **3,** but is loosely placed in a storage tube **58** on a sloping, perforated sleeve **59** or on a horizontal, preforated conveyor belt **60.** The material is exposed in a completely tension-free state, by the perforated sleeve **59** or by the preforated conveyor belt **60,** to the treating agent, e.g. steam, which flows through the chamber **61** or **62.** Thus a completely shrunken, voluminous and round yarn is obtained. In the device according to FIG. **18,** the yarn to be treated comes out of the treatment chamber **3** in a mass form on to the sloping perforated sleeve **59,** from which it slowly slides off, until it rests at the end of the sleeve against a fixed stop. If the sleeve **59** is only slightly tilted, the yarn is practically not compressed, so that it remains in a completely free condition and without tension, since it is continually removed from the end of the sleeve in accordance with the introduction of the yarn and the shrinking.

Since the treating agent e.g. steam, affects the deposited yarn through the perforations **59'** over the entire length of the sleeve **59,** the material remains for a long time in the treating agent, apart from being treated without any tension. In the case of FIG. **19,** the sloping sleeve is replaced by the perforated conveyor belt **60.** The advantage of this is that this apparatus need not necessarily be arranged at a slope. Above all, there is no friction between the yarn material and the material support. Also with this variation, the yarn material to be treated moves slowly and continuously completely without tension through the shrinking and steam zone and is in the end continuously withdrawn through the known delivery systems and is led to the next operating position, e.g. a winding stage.

The device for the continuous bulking and shrinking of yarns, that is the treatment chamber tube with the yarn input duct, the connections for the treating agent, the condenser, suction pipe and regulating device, can often be installed in machines which are already available. In many cases, installation is possible in existing winding machines, which represents a capital saving and the best possible usage of the production area. It is particularly advantageous to locate the continuous bulking and shrinking process in the double yarn twisting process. Whilst the yarn coming from the double twisting spindle is led immediately into the treatment chamber (shrinking container) and is there exposed to the treatment agent, the twisting, bulking and winding are grouped together to form a continuous working process.

By installation in winding machines, it is also possible to wind up the bulked yarn material coming from the treatment chamber into very soft yarn coiling which is eventually to be made into hosiery or to be wrapped therein, which is particularly necessary in dyeing. This is facilitated in that on drawing the yarn material from the treatment chamber no ball of yarn is formed, as arises in conventional withdrawal from a winding apparatus, and the tension of the yarn can be kept extremely low.

As has been shown, in many cases it can be desirable to subject the yarn in the tuyere zone tube **11** not only to the treating agent, but at the same time to subject it to a mechanical operation. For example, by twisting, it is possible to ensure, by loosening the mass of fibres, that not only are the outer capillary tubes of the thread subject to the treating agent in the tuyere zone, but also that the treating agent easily reaches the inner capillaries. This mechanical treatment of the yarn can also be effected by means of a particular arrangement of the inlet bores for the treating agent in the tuyere zone tube, whereby a turbulence zone arises in its core, in which the yarn is found if it is fed in centrally. The yarn thus undergoes a mechanical treatment by means of the treating agent, which leads to the desired loosening of the thread. For this purpose, four different embodiments are shown in FIGS. **20** and **23**, which are cross-sections through the tuyere zone tube **11** in the area of its annular chambers **63** with the inlet connections **46** for the treating agent. Common to all of these arrangements is the fact that the inlet bores **64** do not run in a radial direction, but run tangentially to an imaginary internal circle.

In the embodiment according to FIG. **20**, two opposed inlet bores **64'** are aligned to each other, so that the streams of treating agent flowing in meet violently. The desired turbulence is thereby obtained. FIG. **21** shows a variation in this method. Here the bores **64'** are not aligned to one another but the streams of the treating agent meet at a predetermined angle. The bores **64''** run alternately oppositely tangentially. In FIGS. **22** and **23**, the treating agent is led into the tuyere zone tube **11** so that the thread **65** is twisted up to a small extent. The bores **64',''** run tangentially in the same direction and can be adapted to the hand of the thread, namely, either to the left or to the right.

A further possibility for subjecting the yarn to be treated to a mechanical operation is given if the yarn is led into the tuyere zone tube **11** so that it strikes the wall of the tube. Abutments can be arranged on the inner surface of the tuyere zone tube e.g. projections, breaker plates and so on, against which the yarn to be treated strikes during its passage through the tuyere zone and is thereby loosened.

Finally, it can be desirable to introduce the yarn into the tuyere zone with a specific moisture content. For this purpose, a known wetting device is connected to tuyere zone tube **11.** In the simplest form, this can be for example a roller which can dip or be submerged into a wetting agent. The yarn is led over this roller and, by contact with the surface of the roller, takes up the wetting agent adhering to the roller.

What we claim is:

1. A device for continuously treating a strand of textile material with a fluid, comprising:

an elongated treatment chamber connectable with a source of said fluid:

a pipe extending through said chamber for conducting said strand therethrough;

a strand — feed mechanism disposed at one end of said pipe and including a conical roller, a second roller resting on said conical roller, and a thread guide shiftable along the line of contact of said rollers for feeding said strand between the nip thereof into said pipe through said one end;

a U-shaped guide tube connected to the other end of said pipe beyond said chamber and having an upwardly directed outlet;

a tuyere zone tube disposed above said outlet for receiving said strand therefrom and having suction connections and supply connections for selectively introducing and removing a treatment fluid and air into and from said tuyere zone tube;

a suction duct connected to the bottom of said chamber and communicating with a suction source; and

a flap in said chamber for varying the effective cross-section of said duct at the communication thereof with said chamber.

2. The device defined in claim **1** wherein both of said rollers are cones.

3. The device defined in claim **2** wherein said guide is mounted on a guide rod, said device further comprising a threaded spindle connected with said guide for driving same along said rod, a motor operatively connected with and driving said spindle, and means for reversing the polarity of the electric currents supplied to said motor.

4. The device defined in claim **1,** further comprising a rocking lever for swinging said guide, a rotary electromagnet operatively connected with and swingably displacing said lever, and means for electrically operating said magnet in opposite senses.

5. The device defined in claim **1** wherein two such chambers are provided, said device further comprising a condenser common to said chambers, said duct communicating with said condenser.

6. The device defined in claim **1** wherein said U-shaped tube is composed of transparent material and is formed with a condensation discharge opening and at least one connecting member by supplying a treating fluid to the U-shaped tube.

7. The device defined in claim **1** further comprising means for reinforcing the end of said U-shaped tube forming said outlet.

8. The device defined in claim **1** further comprising a steam supply tube closely surrounding said chamber.

9. The device defined in claim **1** wherein said chamber has a rectangular cross-section with shorter sides of the rectangle being formed with rectangular angular bars and the longer sides being formed of wire mesh.

* * * * *