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(54) **INSULATING DEVICE FOR A VARIABLE THERMAL RIM INSULATION OF A ROLL**

(76) Inventor: **Heinz-Michael Zaoralek**, Konigsbronn (DE)

Correspondence Address:
Christopher R. Lewis
RATNER & PRESTIA
Suite 301, One Westlakes, Berwyn
P.O. Box 980
Valley Forge, PA 19482-0980 (US)

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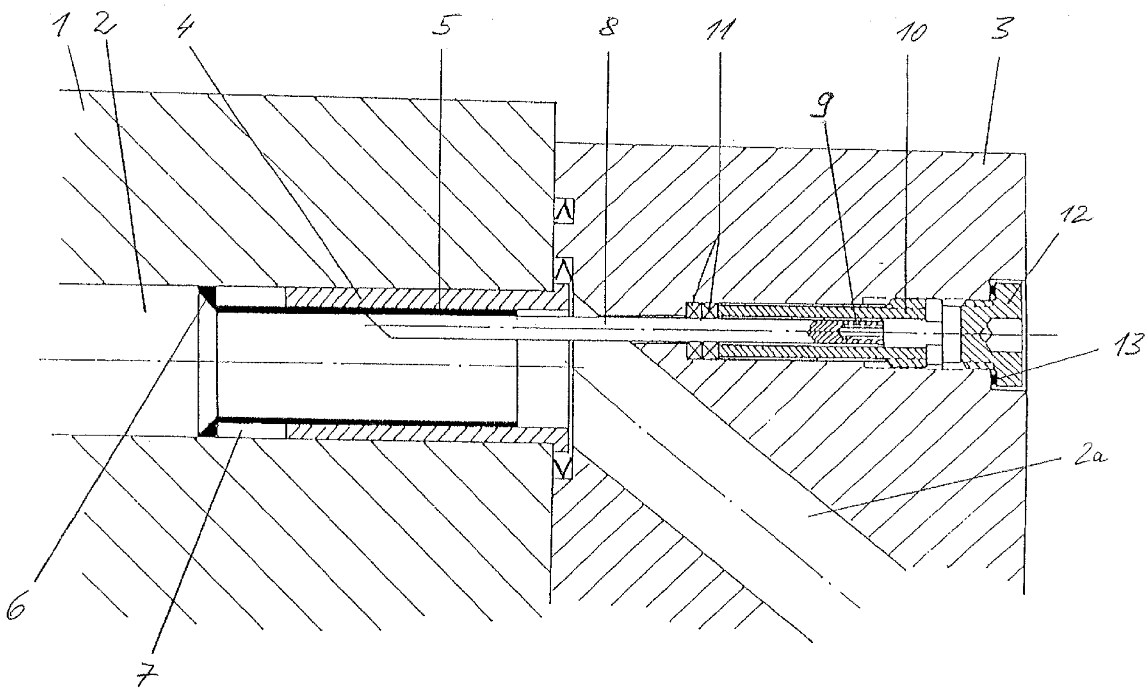
(57) **ABSTRACT**

An insulating device of a roll for thermal and mechanical treatment of a web-shaped product, such as a paper web, provides a variable, thermal rim insulation in a peripheral thermal treatment conduit of the roll. The insulating device is formed in a peripheral thermal treatment conduit of a roll body at at least one end of the roll body and has a shifting insert coupled to a positioner. The insulating device is elongatable in the thermal treatment conduit in the longitudinal direction of the thermal treatment conduit. A roll incorporated the insulating device of the invention also includes a roll body, thermal treatment conduits, and a positioner for the insulating device.



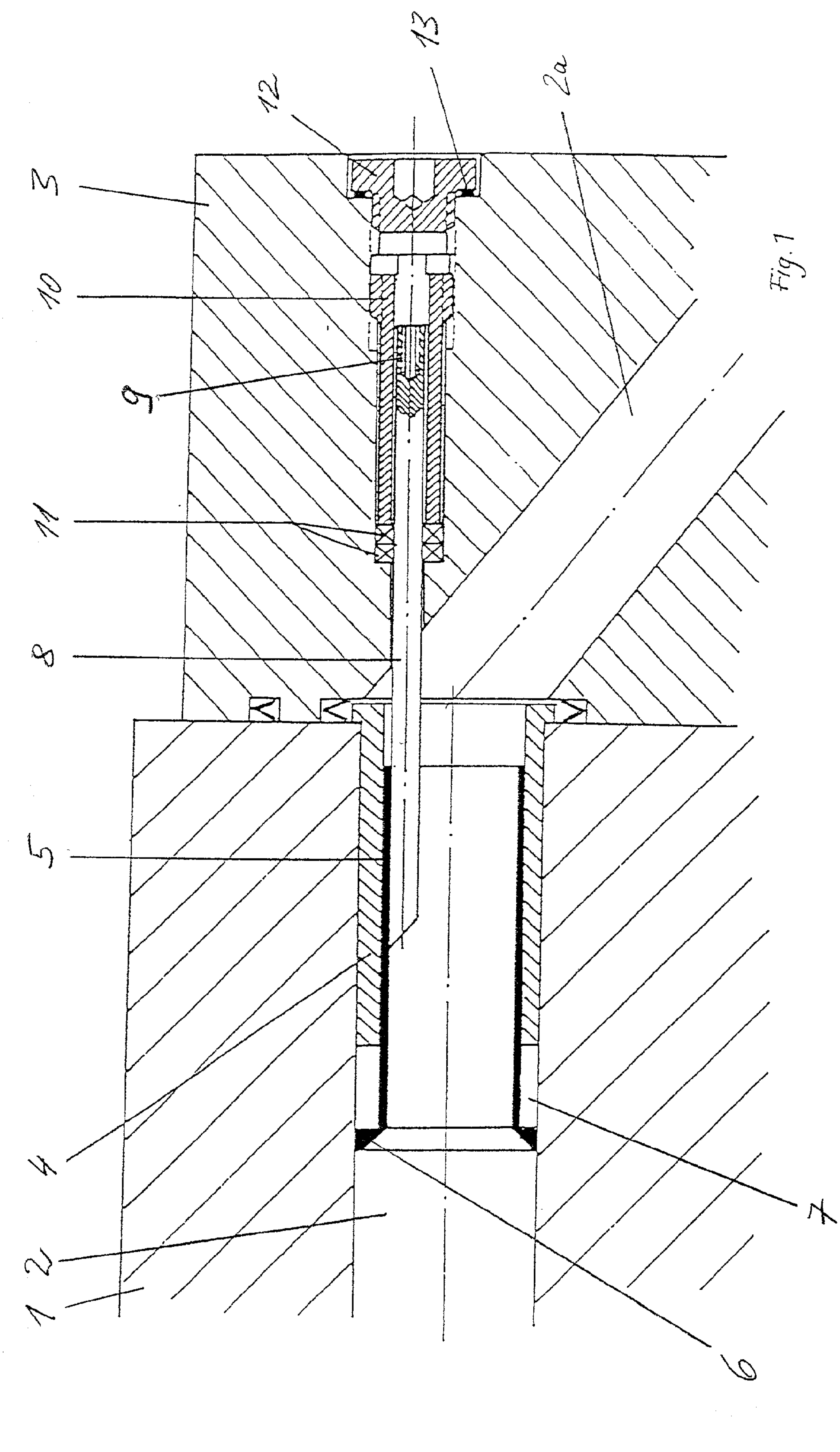


Fig. 1
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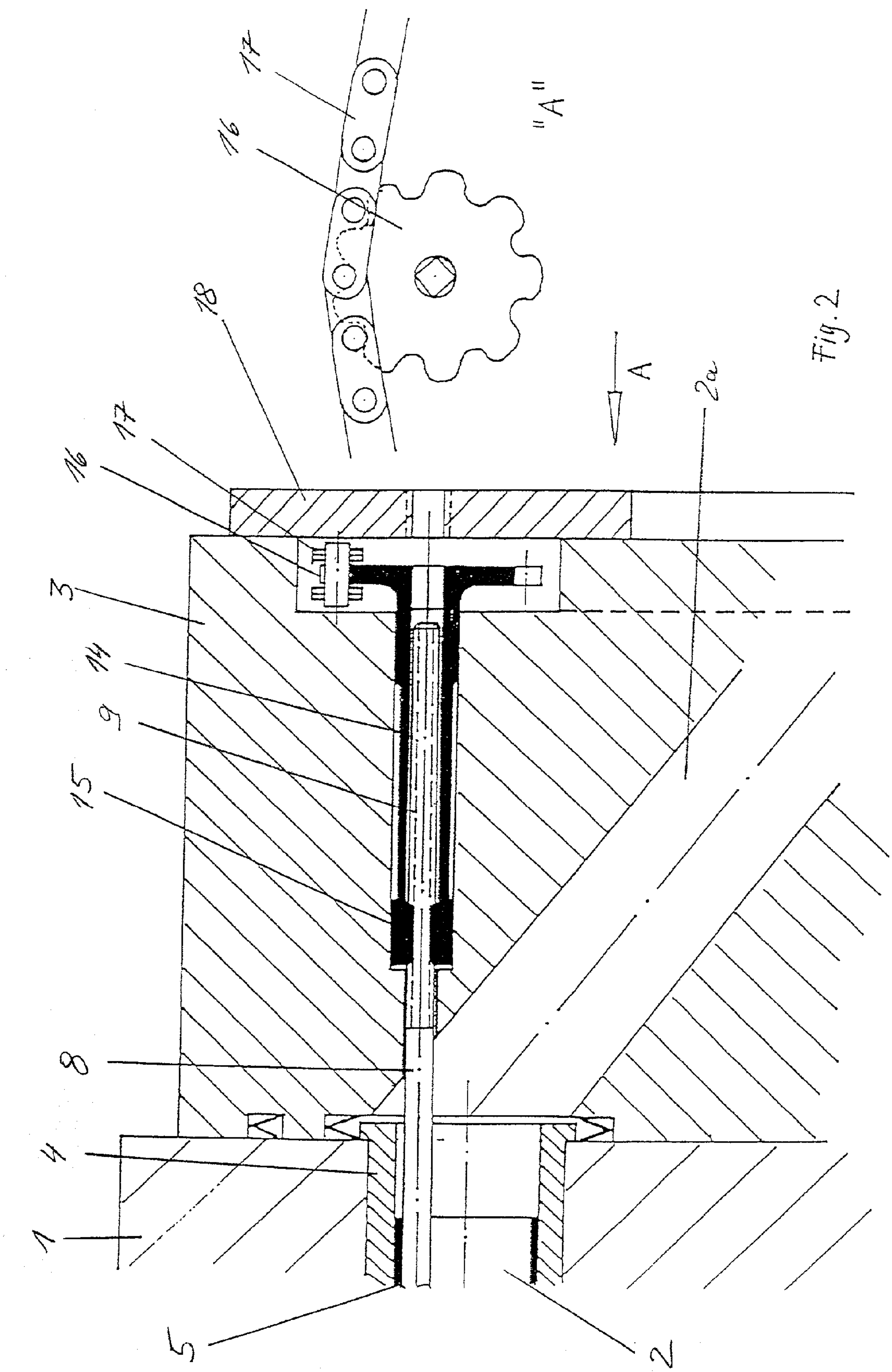

Fig. 2

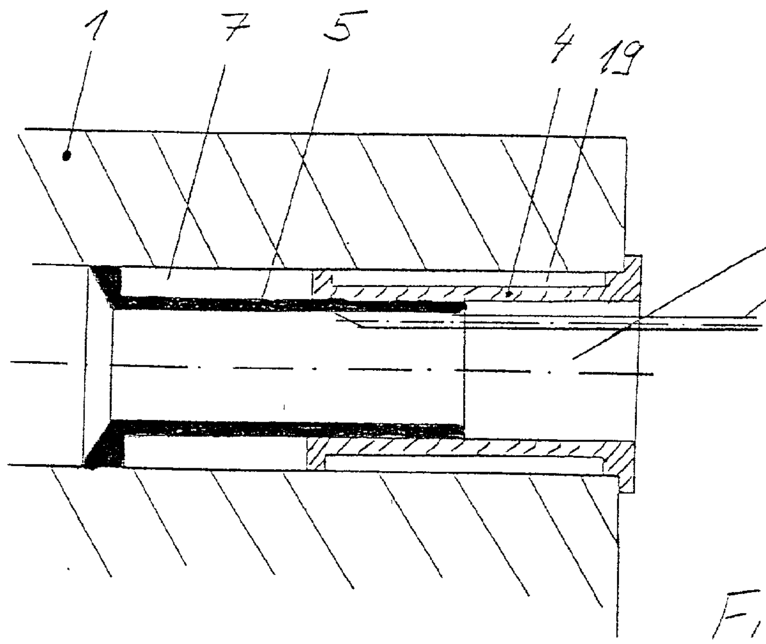

Fig. 3

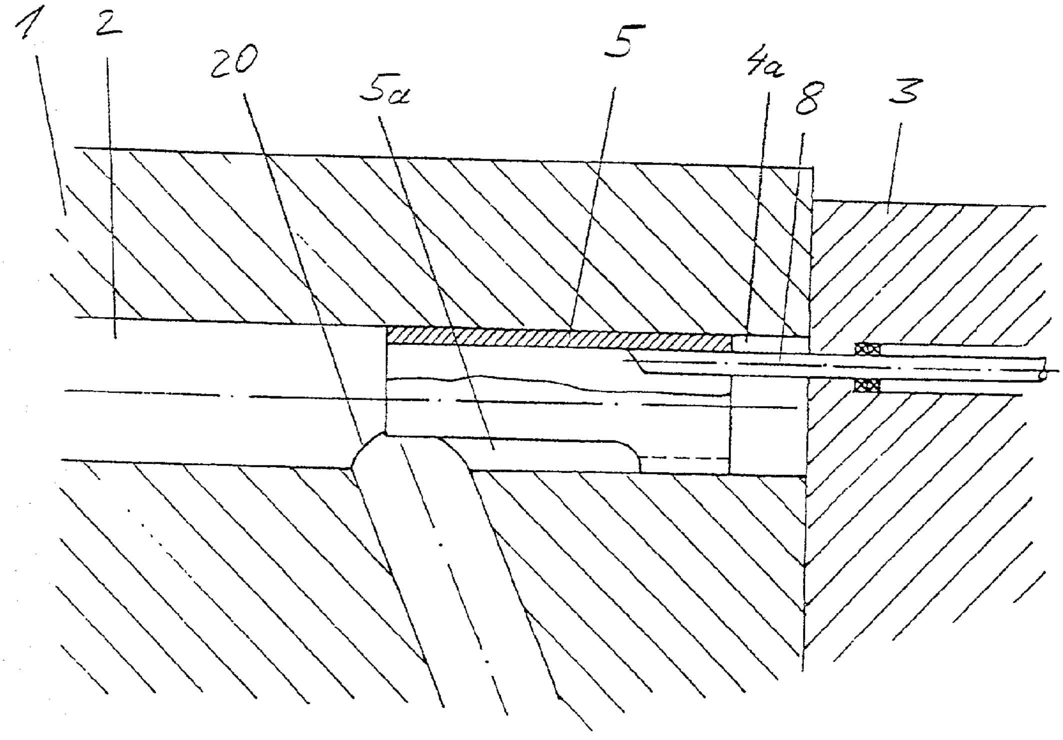

Fig. 4

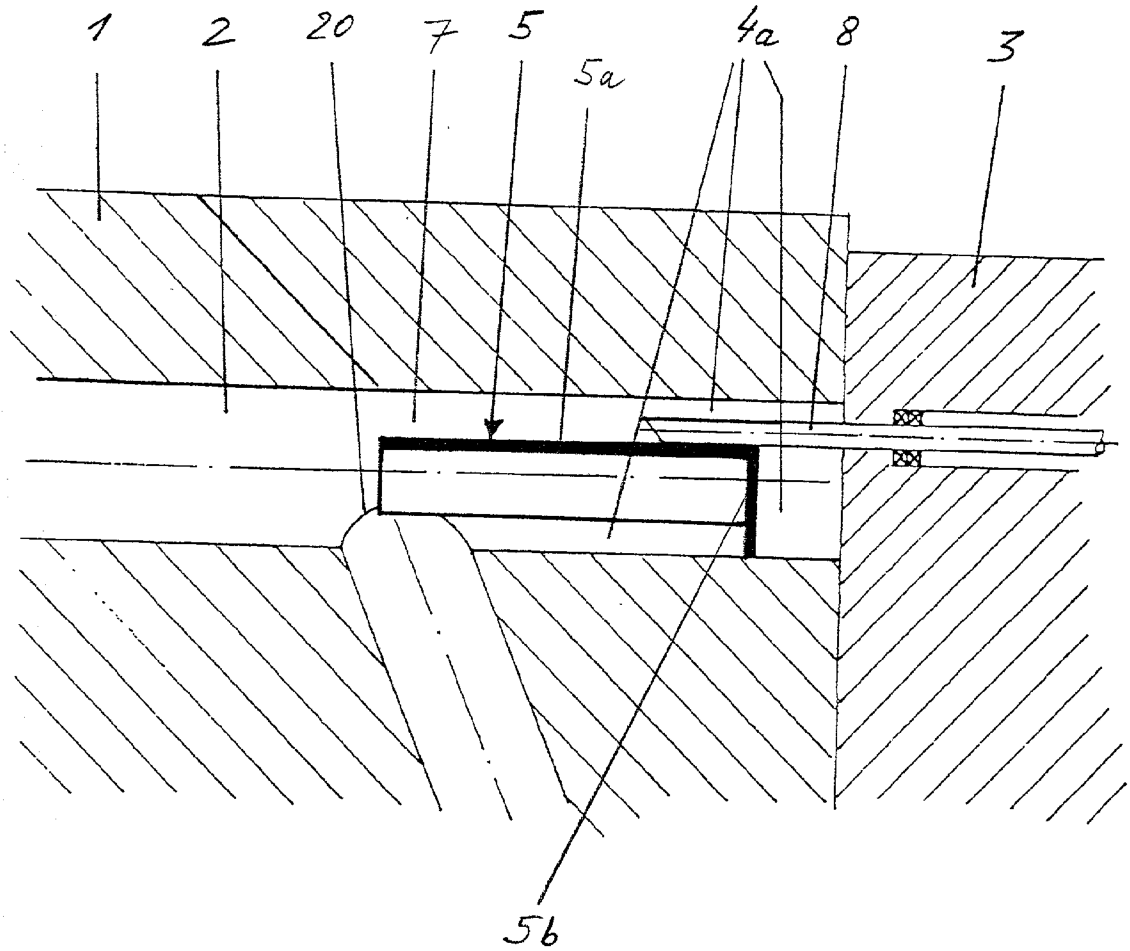

Fig. 5

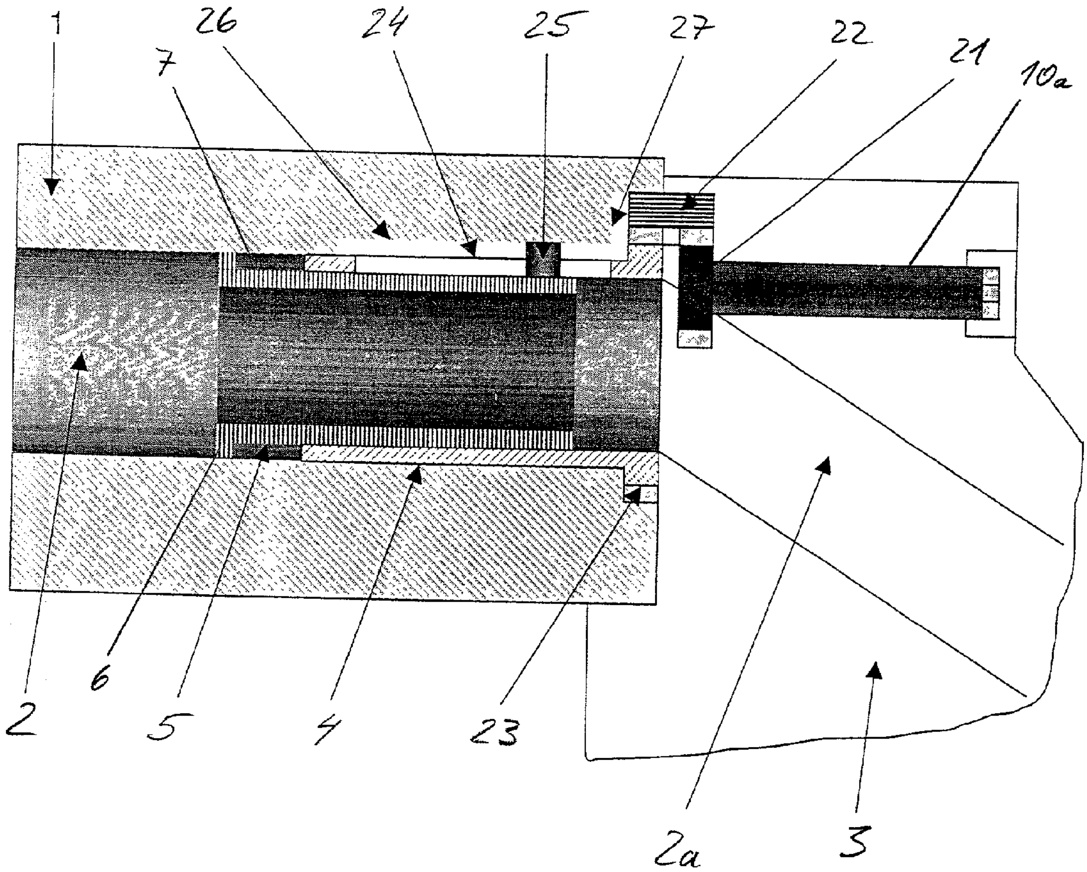

Fig. 6

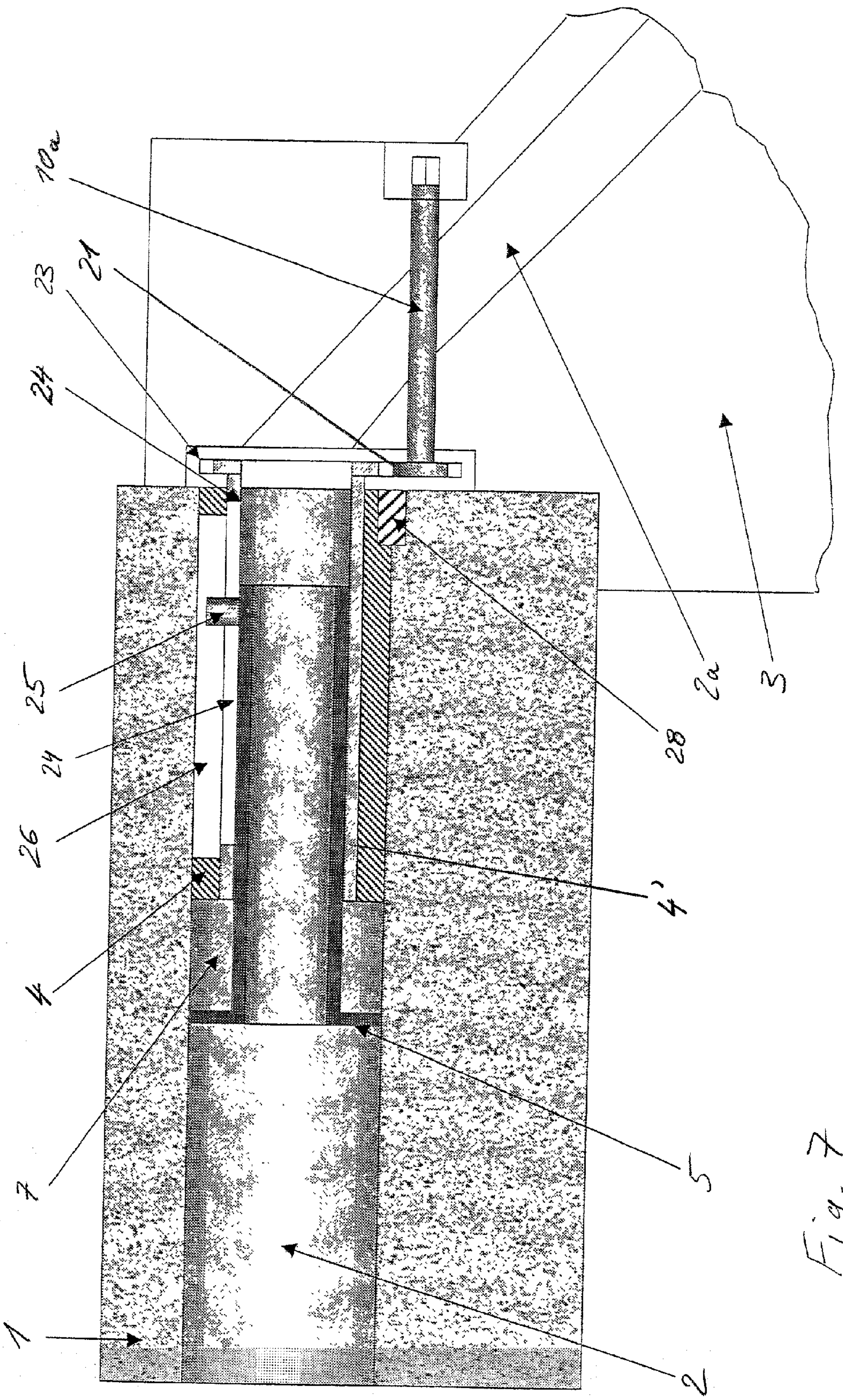

Fig. 7

INSULATING DEVICE FOR A VARIABLE THERMAL RIM INSULATION OF A ROLL

BACKGROUND OF THE INVENTION

[0001] 1. Technical Field

[0002] The invention relates to an insulating device formed to provide a variable, thermal rim insulation in a peripheral thermal treatment conduit of a roll, for a thermal and mechanical treatment of a web-shaped product. The product can, for example, be a paper web. The invention further relates to a roll with peripheral thermal treatment conduits for thermally treating the surface of a roll. The roll is provided with an insulating device in accordance with the invention in each of selected, or preferably all, peripheral thermal treatment conduits at at least one end of the roll body.

[0003] 2. Description of the Related Art

[0004] A regular aim with respect to heated or cooled rolls for thermal and mechanical treatment of web-shaped products is to construct them in such a way that the surface temperature is uniform over the whole contact area. The shape of the roll should also remain as produced at ambient temperature, despite thermal expansion. Only then is the pressure in the roll gap also uniform. The rim area of the roll, or more precisely the area in which the web-shaped medium ends, represents a particular problem in this respect. In heated rolls, for example, this is where the increased heat dissipation through the web ends, and heat only continues to be transmitted to the environment by convection and—usually negligibly—radiation. Since this flow of heat is significantly lower than the flow of heat into the web, the temperature increases in the surface area of the roll which has no web contact. Due to heat conduction processes beneath the surface of the roll, this increase in temperature also usually extends into the rim area of the web, where it has a negative effect on the results of treatment. This increase in temperature is also connected to a thermal expansion of the roll diameter, resulting in a reduction in the gap width in the rim area of the paper web, where the specific pressure on the web increases and leads to a further undesirable effect on the results of treatment. If, in a paper calender, the web is overpressured at the ends in this way, the paper becomes thinner and loses its stiffness. When the hot rim area of a roll comes into contact with its companion roll, this may also result in damage if, for instance, the companion roll is coated with a temperature-sensitive, flexible coating.

[0005] In DE 31 40 425 A1, it is proposed, for a positive displacer roll, to employ an axially shiftable heat insulating sleeve over a positioning element guided outwards by means of a screw thread, in order to thermally influence the rim area.

[0006] The same idea is to be found in DE 42 44 812 C2, but for a peripherally drilled roll shell, and thus applied to the insulating sleeves used for this. As in DE 31 40 425, the intention is for it to be possible to axially shift a sleeve made of insulating material outwards, by rotating a positioning element guided outwards, on which a screw thread is arranged. Positioning the insulating sleeves jointly on one side of the roll is not possible. Each sleeve has to be moved individually. Furthermore, a sealing problem exists.

[0007] WO 00/53847 discloses a variable rim insulation by means of rotatable insulating sleeves comprising inclined ends. By changing the rotational angle position of the insulating sleeves, the length of the rim insulation may be varied towards the surface of the roll. The isolating sleeves' capacity to be shifted axially is also mentioned.

SUMMARY OF THE INVENTION

[0008] An object of the invention, for a roll for thermal and mechanical treatment of a web-shaped product comprising thermal treatment conduits for a thermal treatment fluid running near to the surface, is to provide a rim insulation of the thermal treatment conduits which is securely sealable and simple in design.

[0009] A roll, such as the invention relates to, comprises a roll body having peripheral thermal treatment conduits for a thermal treatment fluid which port at or near to at least one facing end of the roll body. The thermal treatment fluid may serve to heat or cool the roll shell and the web-shaped product. A thermal rim insulation between the thermal fluid flowing through the thermal treatment conduits and the roll body is formed at the end of the roll body in each or only in selected thermal treatment conduits by an insulating device.

[0010] The invention also relates to an individual insulating device in one of the thermal treatment conduits. Further insulating devices of the roll are preferably formed like the insulating device in accordance with the invention. The insulating device includes at least one shifting insert which may be moved from a rear position deeper into the thermal treatment conduit, to provide a variable, thermal rim insulation.

[0011] In accordance with the invention, the insulating device is elongatable in the longitudinal direction of the thermal treatment conduit. The length of the insulating device is altered through the shifting movement of the shifting insert. The shifting insert is spaced from a rim of the thermal treatment conduit in a shifting position in which the insulating device exhibits its largest elongation. In a particularly preferred embodiment, the insulating device including the at least one shifting insert is formed in the thermal treatment conduit in such a way that no part of the insulating device, for example an insulating sleeve or other appropriately shaped insulating insert, need be moved beyond the end of the roll body out of the thermal treatment conduit, in order to position the insulating device between its largest and smallest elongation.

[0012] In accordance with a preferred embodiment, this advantage is achieved by forming or arranging a cam mechanism in the thermal treatment conduit.

[0013] The insulating device itself can be formed directly heat insulating in that, as an insulating intermediate layer, it reduces heat transmission between the thermal treatment fluid and the roll. It may also be formed such that it permits direct contact between the thermal treatment fluid and the conduit wall in the conduit area to be insulated, but hinders the flow of the thermal treatment fluid in the area to be insulated and thus reduces the heat transmission between the thermal treatment fluid and the roll, as compared to an unhindered flow.

[0014] In preferred embodiments, the insulating device is formed to be telescopic, with at least two elements. The shifting insert forms one of the elements and is shiftable relative to at least one other of the elements. This at least one other element is an insulating insert, arranged at least partially and preferably completely in the respective thermal treatment conduit and forming a thermally insulating longitudinal area of the insulating device, preferably a rim end area, and preferably fixed against shifting longitudinally. The insulating device, elongatable in itself, may also be formed in that a longitudinal area of the insulating device, preferably a rim end area of the insulating device, is directly formed by a area of the thermal treatment conduit, into and out of which the shifting insert is shiftable. A low-flow insulating space, a dead space so to speak, is formed in the thermal treatment conduit. Such an insulating space is preferably formed as a blind hole having no through-flow downstream of an inlet and/or an outlet. In both embodiments, the shifting insert overlaps a longitudinal area of the insulating device in at least one of its shifting positions, preferably in all shifting positions, said longitudinal area being formed by an insulating insert arranged in the thermal treatment conduit or by flow engineering formation, or by the two measures in combination. In further preferred embodiments, the insulating device may also be formed in one piece, in particular as insulating bellows made for example of a thermally insulating material or made of metal, said bellows being concertined in the longitudinal direction of the thermal treatment conduit. In such a one-piece formation, one end of the insulating device is preferably fixed in the respective thermal treatment conduit, and another end or a section between the ends forms the shifting insert. The individual elements of each insulating device have a heat insulating and/or flow-obstructing effect in all of the embodiments described above.

[0015] An insulating insert, relative to which the shifting insert is shiftable, may consist of a thermally insulating material, such as for example Teflon or a ceramic, and can insulate due to this characteristic. The insulating insert can also only comprise one layer of such a material. The insulating insert may also be formed, equally preferably, by forming an insulating space in the form of an insulating gap between the wall of the thermal treatment conduit and a shell of the insulating insert, wherein the insulating gap can be filled with thermal treatment fluid, but through which the thermal treatment fluid does not flow or does not flow unhindered. The insulating gap is thus cut off from the flow of freshly supplied hot or cold thermal treatment fluid. The advantage of this variant of the embodiment is that the insulating insert may be produced particularly efficiently, for example from steel. In a preferred variant of the embodiment, such an insulating gap is formed by means of an insert sleeve comprising a recess on its outer shell. This recess forms the insulating gap between the sleeve and the inner wall of the thermal treatment conduit.

[0016] The shifting insert may be made of a thermally insulating material, for example Teflon or a ceramic material, and may line the thermal treatment conduit to shield the wall of the thermal treatment conduit from the thermal treatment fluid. The shifting insert too may only comprise an insulating material as a layer. In a preferred variant, the shifting insert is shaped such that it forms an insulating space against the wall of the thermal treatment conduit, which may be filled with thermal treatment fluid, but through which the thermal treatment fluid does not flow or at least does not flow unhindered. In this case, the shifting insert may also be made of a thermally insulating material, however any other material which satisfies the mechanical and thermal requirements may advantageously be used to produce it. The shifting insert may instead also be used to steer the flow of fresh thermal treatment fluid such that an open insulating space arises on the wall of the thermal treatment conduit having no or no appreciable flow velocity. This also significantly reduces heat transmission from the freely flowing thermal treatment fluid onto the roll.

[0017] In preferred embodiments, the shifting insert is a joint element of a cam mechanism which converts a setting movement of a setting means of the roll into a shifting movement of the shifting insert. The cam joint may be formed, for example, by a spindle drive or screw joint or by means of a linkage guide.

[0018] The cam mechanism includes a guideway and a follower which engages the guideway, preferably a radially protruding cam, trunnion or the like. The follower can be formed on the shifting insert, on a shell surface of the roll body surrounding the thermal treatment conduit, or preferably on a positioning insert arranged in the thermal treatment conduit or on the insulating insert cited. The guideway may also in principle be formed on the shifting insert, on a positioning insert or on the insulating insert cited, or on the shell surface of the roll body. For example, the conduit shell surface may be provided with the guideway, and the shifting insert provided with the follower which engages the guideway, so forming a linkage guide and a cam joint directly between the conduit shell surface and the shifting insert. Preferably, however, the guideway is formed by a positioning insert or the insulating insert cited, and the follower, which preferably rigidly extends radially outwards from the shifting insert, engages said guideway.

[0019] If the follower, or more preferably the guideway, is formed by a positioning insert, then in a preferred embodiment such a positioning insert is provided in addition to the insulating insert cited. A positioning insert having no insulating effect of its own can advantageously be used. In a preferred embodiment, the positioning insert is accommodated in the insulating insert, for example by sleeves forming the insulating insert and the positioning insert in a concentric arrangement. If the cam mechanism is formed by means of a positioning insert provided in addition to an insulating insert, then a response member of the cam mechanism may advantageously be formed by the insulating insert instead of directly by the roll body. The insulating insert preferably fulfils its function as a response member by forming the linear guide for the shifting insert.

[0020] The shifting movement of the shifting insert is preferably a linear shifting, although the shifting movement can in principle also be coupled to a rotational movement of the shifting insert, for example when the shifting insert engages a guideway formed by the conduit shell surface of the roll body or by a securely mounted insulating insert, and is rotary driven for the purpose of being shifted about the axis of the shifting movement. Preferably, however, the insulating insert already cited or an additional positioning insert is rotated about the axis of the shifting movement of the shifting insert for the purpose of elongating and shortening the insulating device, while the shifting insert itself performs a purely translational movement through linear guiding when the length of the insulating device is altered.

A further guideway is preferably formed on or in the shell surface of the roll body which forms the thermal treatment conduit and surrounds such an insulating insert, or in or on a non-rotationally arranged insert, wherein a linear guide member formed rigidly on the shifting insert engages said guideway. If the cited follower of the cam mechanism is formed on the shifting insert, and the guideway of the cam mechanism is formed on a positioning insert or on the insulating insert, then the follower preferably penetrates the guideway and engages the linear guide lying radially behind it as seen from the shifting insert, such that the follower simultaneously also serves as a linear guide.

[0021] If, beyond the shifting insert, the insulating device comprises an insulating insert and/or positioning insert arranged in the thermal treatment conduit, then this insert is preferably coupled to the setting means, advantageously via a further cam mechanism, for transmitting the setting movement. For this purpose, the insert in question is provided with a drive wheel on a side close to the end of the roll body, wherein the setting movement, when generated, is diverted from the positioning means onto said drive wheel. The insert in question including its drive wheel, preferably formed as a spur wheel, is the drive member for the shifting insert. The drive wheel is accommodated in a flare on the outer edge of the thermal treatment conduit or in a trunnion flange.

[0022] In a first preferred variant, the setting movement of the positioning means is transmitted via a further cam mechanism onto the insulating device. The further cam mechanism preferably couples a number of insulating devices of the type described to each other, in such a way that said number of insulating devices are synchronously positioned when the setting means generates its setting movement. A gearwheel preferably serves as the coupling member, said toothed wheel being rotatably mounted about a rotational axis of the roll and meshing with the drive wheels of a number of insulating devices. The toothed wheel serving as the coupling member is preferably a toothed ring gear comprising an inner toothing or outer toothing for a mating engagement with the drive members of the insulating devices, and is mounted in an annular groove running along the roll body or along a trunnion flange. The toothed wheel which preferably forms the coupling member between the positioning means and the insulating devices comprises a further toothing on its drive side, i.e. on the side of the positioning means, with which toothing said toothed wheel preferably directly engages a setting member of the positioning means. With a single toothed wheel as the coupling member, a rigid coupling, very short in the longitudinal direction of the roll, is obtained between the positioning means and the insulating device or the number of insulating devices. If a trunnion flange is attached to the end of the roll body, through which the thermal treatment fluid is supplied to the thermal treatment conduits, then—in the insulating device in accordance with the invention, and in particular when the coupling toothed wheel described forms the coupling between the positioning means and the insulating device—the trunnion flange can be short in the longitudinal direction of the roll.

[0023] In a second preferred variant, the cam mechanism for converting the setting movement of the positioning means into the shifting movement of the shifting insert is not formed in the thermal treatment conduit, but in a trunnion flange attached—preferably screwed—to the roll body.

[0024] The setting means can also comprise one coupling member per insulating device, said coupling member being mounted rotatable or shiftable in the trunnion flange and fixable with respect to the direction of shifting. A shiftable coupling member is connected to the shifting insert of the insulating device and slaves the shifting insert when shifted itself. The connection is preferably totally rigid and may for example be a weld joint. In principle, however, any non-shiftable connection will suffice. In this variant, the combination of the shifting insert and the longitudinally shiftable coupling member mounted in the trunnion flange can likewise form a joint element of a cam mechanism for converting the setting movement into the shifting movement of the shifting insert, though outside the thermal treatment conduit.

[0025] An advantage of the longitudinally shiftable coupling member is that the shifting position of the shiftable insulating insert is clearly determined by the position of the coupling member. The position of the coupling member can be ascertained very simply by means of a depth gauge, with which the distance between a facing surface of the roll, preferably of the trunnion flange, and a rear facing surface of the coupling member is measured.

[0026] In the case of a longitudinally shiftable coupling member, the cam mechanism is preferably formed by a spindle drive. For this purpose, a positioning spindle is non-shiftably rotatably mounted in the trunnion flange. A screw thread of the positioning spindle and a screw thread of the coupling member form a spindle drive. By rotating the positioning spindle, the linearly guided coupling member can be moved back and forth. It is particularly preferred for a drive wheel to be seated on the positioning spindle, said drive wheel being connected by means of a synchronizing member to positioning spindles of further coupling members, for a common positioning drive.

BRIEF DESCRIPTION OF THE DRAWINGS

[0027] The invention will now be explained by way of preferred example embodiments, with reference to the drawings. Features disclosed by way of the example embodiments, each individually and in any combination of features including any combination of features formed from a number of example embodiments, i.e. a combination of one or more features from one example embodiment with one or more features from another example embodiment, advantageously develop the subjects of the claims. There is shown:

[0028] **FIG. 1** an elongatable insulating device and a positioning means in a first example embodiment;

[0029] **FIG. 2 a** positioning means in a second example embodiment;

[0030] **FIG. 3** an elongatable insulating device in a second example embodiment;

[0031] **FIG. 4** an elongatable insulating device in a third example embodiment;

[0032] **FIG. 5** an elongatable insulating device in a fourth example embodiment;

[0033] **FIG. 6** an elongatable insulating device and a positioning means in a fifth example embodiment; and

[0034] **FIG. 7** an elongatable insulating device and a positioning means in a sixth example embodiment.

DETAILED DESCRIPTION

[0035] **FIG. 1** shows a rim area of a roll in a longitudinal sectional view. The roll comprises a roll body **1** including axial, peripherally drilled thermal treatment conduits **2**, of which one conduit **2** is shown as an example. A trunnion flange **3** is screwed to the facing end of the roll body. The thermal treatment conduits **2** are formed as simple passage bores. The design at the opposite end of the roll body is the same as at the end of the roll body shown. The thermal treatment conduits **2** run parallel to each other and to the surface of the roll, and are uniformly distributed over the circumference of the roll body **1**. For each of the thermal treatment conduits **2**, a separate elongatable insulating device and a positioning means for the same is formed in the same way. Fluid feeders **2*a*** are formed in the trunnion flange **3** in a known way, said feeders extending radially and inclined from a central rotary feeder, and leading to the peripheral thermal treatment conduits **2**. A thermal treatment fluid is directed to the thermal treatment conduits **2** via these feeders, and after having flowed through the thermal treatment conduits **2** is outputted at the opposite end of the roll body by a corresponding drain in just such a trunnion flange. The thermal treatment conduits **2** correspondingly port at both facing ends of the roll body. As an example of the further thermal treatment conduits **2**, an insulating device forming a rim insulation of the thermal treatment conduit **2** will now be described by way of the thermal treatment conduit **2** shown. Rim insulations and positioning means of the same design are also formed at the other end of the roll.

[0036] The insulating device is formed by a two-part insulating insert consisting of an insulating insert **4** arranged non-shiftably in the thermal treatment conduit **2** and a further insert **5**. The insert **5** is shiftable in the thermal treatment conduit **2** relative to the insulating insert **4**. It shields the wall of the conduit **2** from the flow in the conduit **2**. The non-shiftable insulating insert **4** forms a port-side, thermally insulating end area of the rim insulation and is made of a thermally insulating material, preferably Teflon or a ceramic material. Together with the shiftable insert **5**, it is inserted pressurized into the thermal treatment conduit **2** up to a stopper. The non-shiftable insulating insert **4** is a sleeve with a flange at one end which, when inserted, forms the stopper. The insulating insert **4** sits close to the inner wall of the thermal treatment conduit **2** on all sides. It forms a material insulation which permanently reduces the flow of heat between the thermal treatment fluid and the roll body **1** over the length of the insert **5**.

[0037] The shiftable insert **5**—called the shifting insert **5** in the following—is likewise formed as a sleeve. A shaft part of this sleeve is accommodated, slidingly shiftable, in the insulating insert **4**. At a front end which protrudes out from the insulating insert **4**, the shifting insert **5** is flared over its entire circumference by a flange **6**. The flange **6** protrudes over its entire circumference up close to the inner wall of the thermal treatment conduit **2**, but does not hinder the shifting of the shifting insert **5**. Rather, it also serves to guide the shifting insert **5**. In an end position, the shifting insert **5** is inserted into the insulating insert **4** together with its flange **6**, up to the stopper. When the shifting insert **5** is shifted into the thermal treatment conduit **2**, an insulating gap **7** is formed between the inner wall of the thermal treatment conduit **2** and the outer wall of the shaft part of the shifting insert **5**, said outer wall extending out from the insulating insert **4**. In the axial direction, the insulating gap **7** is defined by the flange **6** and a facing side of the insulating insert **4** opposite the flange **6**. The insulating gap **7** is not absolutely sealed, such that it fills with thermal treatment fluid. It is, however, sufficiently sealed such that nothing flows through the insulating gap **7**. The thermal treatment fluid resting in the insulating gap **7** after the gap length has been set, or a gas bubble such as may be formed in it when the insulating gap **7** is elongated, forms/form a thermal insulation. If the flange **6** is omitted, the thermal insulation may also be formed by the shaft part of the insulating insert **5** alone. In this less preferred formation, an exchange of thermal treatment fluid in the then open insulating gap **7** would be at least reduced as compared to the flow downstream from the shifting insert **5**.

[0038] A coupling member **8** in the form of an coupling rod is non-shiftably connected to the shifting insert **5**. In the example embodiment, the shifting insert **5** and the coupling member **8** are connected to each other completely rigidly. For this purpose, the coupling member **8** protrudes a little into the sleeve-shaped shifting insert **5**, and is attached to the inner wall of the shifting insert **5**. The coupling member **8** is mounted shiftably in the trunnion flange **3**, but secured against rotating about its longitudinal axis. It is mounted in a receiving bore which protrudes through the trunnion flange **3** in a linear elongation of the thermal treatment conduit **2**. When assembled, the coupling member **8** protrudes through a short section of the feeder, formed in the trunnion flange **3**, for the thermal treatment fluid. In its cross-section, the coupling member **8** is so thin that it only negligibly hinders the feed flow of thermal treatment fluid and the flow through the thermal treatment conduit **2**.

[0039] A clamping spindle **10** and a clamp **11** are accommodated in the receiving bore of the trunnion flange **3** in which the coupling member **8** is mounted, and arranged concentrically with respect to the coupling member **8**. The clamping spindle **10** and the clamp **11**, arranged at the front end of the clamping spindle, serve to define the coupling member **8** in a shifting position set once. At the rear, free facing end of the trunnion flange **3**, the receiving bore is sealed by a closing stopper **12**. In the example embodiment, the closing stopper **12** is screwed into the receiving bore. An O-ring serves as the seal **13**, sandwiched between a flange of the closing stopper **12** and an opposite surface of the flange. The clamp **11** may be formed as a gland, which together with the seal **13** would provide a double seal in such a formation. Since the closing stopper **12** is not mechanically loaded, a single-acting seal **13** alone would however also suffice in principle.

[0040] For positioning the insulating device **4**, **5**, and therefore the length of the rim insulation, the receiving bore in the trunnion flange **3** is opened by releasing the closing stopper **12**. The coupling member **8**, and thus the shifting insert **5**, may then be shifted axially. By extraction, for example using a screw part screwed into an inner screw thread **9** of the coupling member **8**, the effective insulating length can be shortened. It is lengthened by insertion. The exact shifting position may be determined comfortably and with sufficient accuracy from without by a depth gauge, by measuring the position of the end of the coupling member **8** relative to a defined, rear facing surface of the trunnion flange **3**.

[0041] The shifting position of the coupling member **8** is fixed by the clamping means comprising the clamping spindle **10** and the clamp **11**. By tightening the clamping spindle **10**, the clamp **11** is activated and holds the coupling member **8** securely in the shifting position set. After the coupling member **8** has been set and securely clamped, the receiving bore is again closed until fluid-tight by screwing in the closing stopper **12**. All the coupling members **8** and insulating inserts **5** of the roll are individually set in this way.

[0042] Jointly setting all the shifting inserts **5** will be explained by way of the example of an individual insulating device **4**, **5** such as is shown in **FIG. 2**. Except for the positioning means for the shifting insert **5**, the roll in the example embodiment in **FIG. 2** corresponds to the example shown in **FIG. 1**. In particular, the insulating device formed by the two inserts **4** and **5** corresponds to the insulating device in the example embodiment in **FIG. 1**.

[0043] The coupling member **8** is again formed as an coupling rod, as in the example embodiment in **FIG. 1**. Unlike the coupling member **8** in **FIG. 1**, the coupling member **8** in **FIG. 2** is provided with an outer screw thread **9** in a rear area. Together with a setting member of a positioning means, the coupling member **8** forms a cam mechanism in the area of the outer screw thread **9**. The setting member is formed as a positioning spindle, formed by a sleeve **14** with a threaded nut **15**. The cam mechanism is thus a spindle drive. The positioning spindle **14**, **15** is non-shiftably rotatably mounted in the receiving bore and concentrically surrounds the coupling member **8**. The threaded nut **15** is seated at the front end of the positioning spindle, the outer screw thread **9** of the coupling member **8** running along said threaded nut **15**. By rotating the positioning spindle **14**, **15** about the longitudinal axis common with the coupling member **8** and linearly guiding the coupling member **8**, the shifting movement of the coupling member **8** and thus of the shifting insert **5** is caused, the coupling member **8** being movable back and forth between two shifting end positions. As in the example embodiment in **FIG. 1**, the shifting insert **5** completely overlaps the non-shiftable insulating insert **4** in one end position, and in the other end position is telescopically extended but still guided with its rear end by a front end of the insulating insert **4**.

[0044] A common drive for all the coupling members **8** of the trunnion flange **3** is formed by means of the positioning spindle **14**, **15**. A drive wheel **16** is seated on the positioning spindle **14**, **15** at the rear end facing away from the threaded nut **15**, said drive wheel **16** being formed by a pinion in the example embodiment. Each of the positioning spindles **14**, **15** is connected, secured against rotation, to such a drive wheel **16**. The drive wheel **16** is concentrically arranged with respect to the positioning spindle **14**. The drive wheels **16** of all the coupling members **8** of the trunnion flange **3** are jointly driven by means of a revolving synchronizing member **17** in the form of a chain. A toothed belt may also serve as the synchronizing member. The drive wheels **16** would then accordingly be formed as toothed belt pulleys. A common drive could also be formed via a spur wheel mechanism, for example in the form of a central drive wheel with which all the drive wheels **16** mate.

[0045] Each of the receiving bores for the coupling members **8** is flared at its rear end, to accommodate one of the drive wheels **16**. The receiving bores and the entire positioning means are sealed by a single sealing plate **18**, for example an annular sealing plate. Detail "A" in **FIG. 2** shows the receiving bore together with the single opening in the closing plate **18** for jointly positioning all the coupling members **8** and shifting inserts **5** of the end of a roll. The sealing plate **18** is sealed against the trunnion flange. The opening is closed tightly by a closing stopper. Since the sealing plate **18** and the closing stopper do not have to receive any mechanical loads, a single-acting seal is sufficient for sealing in each case.

[0046] For positioning the coupling members **8**, at least one of the positioning spindles **14**, **15** is shaped in its rear opening in such a way that rotation is made possible by means of a rotating part with a positive lock, for example a square (detail "A"). By rotating a single positioning spindle **14**, **15**, all the other positioning spindles **14**, **15** and therefore all the other coupling members **8** and shifting inserts **5** are jointly positioned synchronously via the transmission member **17**. A single opening in the trunnion flange **3** is sufficient for access to the positioning means, the rotating part with a positive lock being introduced through said opening into the outer end of the threaded spindle **14**, **15** in question. Once the insulating length of the rim insulation has been positioned and/or set, and possibly verified using for example a depth gauge, this single opening in the trunnion flange **3** is again closed tightly by a closing stopper, for example in the manner of the closing stopper **12** in **FIG. 1**.

[0047] As is evident from the example embodiments, a further advantage of the invention which may be emphasized is that most designs of peripherally drilled thermal treatment rolls can be retrofitted with the rim insulation in accordance with the invention, since engaging the trunnion flange **3** only requires machining peripheral receiving bores with small cross-sections, and since changes are only necessary at locations which typically have no function whatsoever.

[0048] The non-shiftable insulating insert **4** is made of a thermally insulating material, preferably Teflon or a ceramic material, and the shifting insert **5** is preferably made of stainless steel, but may also be made of an insulating material, such as for example Teflon.

[0049] In similarly preferred example embodiments, the insulating end area which is formed stationary in the thermal treatment conduit **2** is not, or at least not only, formed by a thermally insulating material, but is rather thermally insulated from the convection flow of the thermal treatment fluid in other ways. For this purpose, the insulating end area is formed as a non-flow or low-flow area, like the insulating gap **7** in the example embodiments in **FIGS. 1 and 2**. An insulating insert arranged non-shiftably in the thermal treatment conduit can then be made of any material which is dimensionally stable at the working temperatures of the thermal treatment fluid, in particular made of stainless steel, if the insulating end area is formed by or using the same.

[0050] Two example embodiments of this will now be described, wherein reference will only be made to differences to the example embodiments above.

[0051] In the example embodiment in **FIG. 3, a** insulating gap **19** through which there is no flow is realized between a non-shiftable insulating insert **4** and the inner wall of the thermal treatment conduit **2** by a recess in the outer shell surface of the insulating insert **4**. The shifting insert **5** corresponds in shape to the shifting insert **5** in the example embodiments in **FIGS. 1 and 2**. In this case, a shifting insert **5** is preferred which is made of a heat insulating material, for example a shifting insert **5** made of Teflon.

[**0052**] **FIG. 4** shows an example embodiment with just one shifting insert **5** which is made of a heat insulating material, such as for example Teflon. The rear end area **4***a* of the rim insulation is formed by an elongation of the thermal treatment conduit **2**, in the manner of a blind hole.

[**0053**] The rear end area **4***a* forms a flow dead space of the thermal treatment fluid. This is achieved by the thermal treatment fluid feeder **2***a* porting not into the facing end of the thermal treatment conduit **2**, but rather a little before the facing port of the bore for the thermal treatment conduit **2**. In other words, the thermally insulating end area **4***a* is thus formed by an area of the thermal treatment conduit **2** which elongates the thermal treatment conduit **2** beyond the inlet **20** of the thermal treatment fluid feeder **2***a,* counter to the flow direction of the thermal treatment fluid. In this way, a non-flow or at least low-flow insulating space **4***a* is created which forms the thermally insulated end area. At an opposite, outlet end of the thermal treatment conduit **2**, the thermal treatment conduit **2** is correspondingly elongated beyond a lateral outlet in the flow direction. A thermally insulating end area thus also arises at the opposite, outlet end of the thermal treatment conduit.

[**0054**] The shifting insert **5** is as long as the area of the thermal treatment conduit **2** elongated beyond the inlet **20**. To change the length of the insulating device, the shifting insert **5** can be shifted out of the elongated area, out of its rearmost shifting position in which it lines the elongated area of the thermal treatment conduit **2**, beyond the inlet **20**, and into the thermal treatment conduit **2**. In this way, a telescopically elongatable insulating device is created comprising just a single insulating insert which is completely shiftable. The shifting insert **5** is provided with a longitudinal slot **5***a* in the circumferential area in which the shifting insert **5** moves beyond the inlet **20** when shifted. The longitudinal slot **5***a* can extend over the entire length of the shifting insert **5**, or starting from the front face of the shifting insert **5** only along most of the length. Even when the longitudinal slot **5***a* extends over the full length of the shifting insert **5**, sufficient thermal insulation for the surface of the roll body is still ensured.

[**0055**] **FIG. 5** shows an insulating device **4***a,* **5** in a modified form of the example embodiment in **FIG. 4**. In the example embodiment in **FIG. 5**, the insulating device **4***a,* **5** is formed using flow engineering measures only. The thermal treatment conduit **2** is not lined with a thermally insulating material. Rather, the thermal treatment fluid flowing from the inlet **20**, in a radial direction, into the thermal treatment conduit is diverted by the shifting insert **5**. For this purpose, the shifting insert **5** is moved between the inlet **20** and the wall area of the thermal treatment conduit **2** opposite the inlet **20**. The thermal treatment fluid, freshly introduced into the thermal treatment conduit **2**, thus only comes into direct thermal contact with the wall of the thermal treatment conduit **2** opposite the inlet **20** some distance downstream of the inlet **20**.

[**0056**] As in the example embodiment in **FIG. 4, a** thermally insulating end area **4***a* in the form of a dead space is permanently created behind the inlet **20**. The shifting insert **5** may be shifted out of this thermally insulating end area **4***a,* beyond the inlet **20**, into the thermal treatment conduit **2**. Another, low-flow insulating space **7** with an adjustable length is created, which reaches from the inlet **20** as far as a front end of the shifting insert **5**.

[**0057**] The shifting insert **5** comprises a deflecting or rebounding surface **5***a* which points in the longitudinal direction of the thermal treatment conduit **2**, and a closure surface **5***b*. The deflecting surface prevents the fluid from flowing unhindered onto the wall of the thermal treatment conduit **2** by deflecting the flow. The deflecting surface **5***a* protrudes on both sides over its entire length, perpendicular to the longitudinal direction of the thermal treatment conduit **2**, up close to the wall of the thermal treatment conduit **2**. It is placed against the conduit wall on both sides, but could also simply be plane and protrude up close to the conduit wall at its rim. The closure surface **5***b* extends radially from the deflecting surface **5***a* at a rear end of the shifting insert **5**, towards the side of the wall of the thermal treatment conduit **2** on which the inlet **20** ports into the thermal treatment conduit **2**. The closure surface **5***b* protrudes up close to the wall of the thermal treatment conduit **2**. The closure surface **5***b* prevents thermal treatment fluid, held back due to deflection, from bypassing the deflecting surface **5***a* in the end area **4***a* unhindered.

[**0058**] Positioning the insulating devices according to the example embodiments described by way of FIGS. **3** to **5** can be formed as in the example embodiment explained by way of **FIG. 1**, or more preferably, by a cam mechanism **9**, **15**, as explained as an example by way of **FIG. 2**.

[**0059**] **FIG. 6** shows a fifth example embodiment having a telescopic insert formed by an insulating insert **4** arranged non-shiftably in the thermal treatment conduit **2** in the area of the port and a shifting insert **5** guided by the insulating insert **4**. The insulating insert **4** and the shifting insert **5** are each formed by a sleeve, the insulating insert **4** consisting of a thermally insulating material or at least comprising a thermally insulating layer, while the insulating effect of the shifting insert **5** is again based on forming a low-flow ring gap **7**, which is formed between the shifting insert **5** and the surrounding shell surface of the roll body **1** when the insulating device **4**, **5** is elongated. With respect to the insulating effect of the insulating device **4**, **5**, and also with respect to the shape of the insulating insert **4** and the shifting insert **5**, reference is made to the description in the first example embodiment.

[**0060**] A positioning means **10***a,* **21** is formed by means of a positioning shaft **10***a* rotatably mounted in the trunnion flange **3** and a pinion **21** non-rotatably connected to said shaft. The positioning shaft **10***a,* together with the pinion **21**, fulfils the function of the positioning spindle **14**, **15** of the positioning means described by way of **FIG. 2**. With respect to access to the positioning shaft **10***a* via a closing stopper, reference is likewise made to the description re **FIG. 2**.

[**0061**] Deviating from the example embodiment in accordance with **FIG. 2**, however, a cam mechanism for converting the positioning movement of the positioning means **10***a,* **21** into a shifting movement of the shifting insert **5** is arranged in the thermal treatment conduit **2**, i.e. within the bore for the thermal treatment conduit **2**. The cam mechanism is formed as a linkage guide and includes a follower **25** and a guideway **24** which the follower **25** engages. The follower **25** is a linkage block protruding radially outwards from the shifting insert **5**, which is non-rotationally and non-shiftably connected to the shifting insert **5** and is arranged in a rear, i.e. facing the port rim of the thermal treatment conduit **2**, area of the shifting insert **5**. The guideway **24** is relieved as a spiral slot in the shell of the insulating insert **4**, i.e. it runs about the longitudinal axis of the insulating insert **4** with a gradient relative to said longitudinal axis. The insulating insert **4** is rotatably mounted about its longitudinal axis in the thermal treatment conduit **2**. The shifting insert **5** is not rotatable relative to the roll body **1**. To provide a linear guide for the shifting insert **5**, a further guideway **26** in the form of an axial groove is formed in a shell surface of the roll body **1** surrounding the insulating insert **4**. The follower **25** penetrates the guideway **24** formed by the insulating insert **4** and engages the guideway **26**. Because of the narrow, two-fold sliding guide of the follower **25**, on the one hand in the guideway **24** and on the other in the guideway **26** serving as the linear guide, rotationally moving the insulating insert **4** causes the shifting insert **5** to shift linearly, wherein a particular shifting distance of the shifting insert **5** corresponds to each change in the rotational angle position of the insulating insert **4**.

[**0062**] In the example embodiment in **FIG. 6**, the insulating insert **4** forms a drive member of the insulating device. To fulfil this function, the insulating insert **4** comprises an outer toothing at its rim end. The insulating insert **4** is flared like a flange in the area of its outer toothing, and in this way forms a drive wheel **23** at its rear end. This drive wheel **23** is accommodated in a cylindrical flare of the thermal treatment conduit **2** incorporated at the end of the roll body. The rear facing surface of the insulating insert **4** closes plane at the end of the roll body with the facing surface of the roll body **1**.

[**0063**] A coupling between the positioning shaft **10***a* and the insulating insert **4** is formed by a coupling member **22**. The coupling member **22** is a toothed ring gear with an inner toothing. The inner toothing meshes both with the drive wheel **23** and with the pinion **21** sat secured against rotation on the positioning shaft **10***a,* such that a rigid, non-slip coupling is obtained between the positioning shaft **10***a* and the insulating device **4, 5**.

[**0064**] The toothed ring gear **22** not only forms the coupling member between the positioning shaft **10***a* and an individual insulating device **4, 5**, but also a synchronous coupling for the plurality of thermal treatment devices arranged in the thermal treatment conduits **2** at one end of the roll body, said thermal treatment devices each meshing with the same toothed ring gear **22** as the insulating device **4, 5** shown in **FIG. 6**. For this purpose, the toothed ring gear **22** is linearly guided narrowly in a circumferential groove **27** in the facing surface of the roll body **1** surrounding the drive wheels **23** of the coupled insulating device **4, 5**, and thus rotatably mounted about the rotational axis of the roll. An identical circumferential groove is incorporated in the trunnion flange **3** opposite the circumferential groove **27**, the toothed ring gear **22** being similarly rotatably mounted in the trunnion flange **3** through this circumferential groove. Instead of a toothed ring gear **22** with an inner toothing, the coupling member can also be formed by a toothed pulley with an outer toothing or by a toothed ring gear with an outer toothing, which in this case would mesh with the inner sides of the drive wheels **23**. Forming the coupling member as a toothed ring gear **22** with an inner toothing and a receiving groove **27** correspondingly arranged towards the outer shell surface of the roll body, however, has the advantage that the attaching screws of the roll trunnion **3** may be arranged on a larger reference circle.

[**0065**] For the purpose of changing the length of the insulating device **4, 5** or plurality of insulating devices **4, 5** at the end of the roll body shown, the positioning shaft **10***a* is rotated about its longitudinal axis. This rotational setting movement is transmitted onto the insulating insert **4** of each of the coupled insulating devices **4, 5** via the mesh between the pinion **21** and the toothed ring gear **22** and furthermore via the mesh between the toothed ring gear **22** and the drive wheel **23**. The rotational movement of the insulating insert **4** is converted into the axial movement of the shifting insert **5** by the cam mechanism formed by the follower **25** engaging the guideway **24** and by the other guideway **26** which serves as the linear guide.

[**0066**] The setting movement of the positioning shaft **10***a* can be caused manually or using motors. Furthermore, it is also conceivable for the toothed ring gear **22** or one of the insulating inserts **4** of the coupled insulating devices **4, 5** to be positioned directly, if the positioning shaft **10***a* is omitted. In the case of positioning using motors, a temperature-stable actuator, preferably a setting motor, which receives its control pulses for instance via slip rings on the roll, can be arranged in the trunnion flange **3**. In this case, it is also possible to set the insulating length of the insulating device **4, 5**, preferably of a plurality of coupled insulating devices **4, 5**, while the roll is in operation.

[**0067**] **FIG. 7** shows a sixth example embodiment of an insulating device. The shifting insert **5** corresponds to that in the fifth example embodiment. Unlike the fifth example embodiment, however, the insulating insert **4** is not rotatable in the thermal treatment conduit **2**. A grub screw serves as a anti-rotation lock **28** which is screwed down at the end of the roll body on the facing side both with the roll body **1** and with the insulating insert **4**. Instead of a grub screw, the anti-rotation lock could also be formed by a simple inserted pin or the like. As in the other example embodiments, the insulating insert **4** of the sixth example embodiment too is inserted non-shiftably in the thermal treatment conduit **2**, and lines and insulates the thermal treatment conduit **2**. Because of the screw connection, the anti-rotation lock **28** also simultaneously secures against longitudinal shifting.

[**0068**] A positioning insert **4'** serves to convert the setting movement of the positioning means **10***a,* **21** into the shifting movement of the shifting insert **5**. The positioning insert **4'** is formed as a sleeve and inserted into the insulating insert **4**. The insulating insert **4** tightly surrounds the outer shell of the positioning insert **4'**, but does permit the positioning insert **4'** to rotationally move about their common longitudinal axis. The positioning insert **4'** for its part tightly surrounds the shifting insert **5**, but permits shifting movement.

[**0069**] The positioning insert **4'** forms the drive wheel **23** at an end protruding out from the thermal treatment conduit **2**. The drive wheel **23** directly meshes with the driven wheel **21** of the positioning means **10***a,* **21**. In the sixth example embodiment, the plurality of insulating devices **4, 5** are not mechanically coupled at the end of the roll body. Rather, a positioning means **10**_a_, **21** is provided for each of the insulating devices. However, a coupling could equally be formed, for example, by a toothed ring gear with an inner toothing which meshes with the drive wheels **23** of the individual insulating devices. Unlike the fifth example embodiment, the drive wheel **23** is accommodated in the trunnion flange **3**, and correspondingly a coupling member common to the insulating devices at this end of the roll body would likewise be accommodated in the trunnion flange **3**. Of course, the coupling could also be formed between just one single positioning means **10**_a_, **21**, just as in the fifth example embodiment.

[**0070**] The positioning insert **4'** forms the guideway **24** in the same way as the insulating insert **4** does in the fifth example embodiment. The roll body **1** does not, however, directly serve as the response member of the cam mechanism, but rather the insulating insert **4**, by forming the guideway **26** serving as the linear guide for the shifting insert **5**. As in the fifth example embodiment, the guideway **26** is a linear groove on the inner shell surface of the insulating insert **4** or a linear slot which cuts through the insulating insert **4**. An advantage is that a guideway does not have to be incorporated into the roll body **1**. The effect of the cam mechanism is the same as in the fifth example embodiment, such that reference is made to the statements there.

[**0071**] In the example embodiment, the positioning insert **4'** and the shifting insert **5** are each made of a thermally non-insulating material, for example steel. The insulating effect of the shifting insert **5** is again based on the formation of the insulating gap **7** which the thermal treatment fluid is in. The positioning insert **4'**, as too the shifting insert **5**, could in principle be made of an insulating material. Furthermore, it is in principle also conceivable for the insulating insert **4** to be made of a thermally non-insulating material, if the positioning insert **4'** is made of a thermally insulating material. The insulating insert **4** can also be formed as in the second example embodiment described by way of **FIG. 3**, independent of whether the positioning insert **4'** insulates or not.

[**0072**] Further combinations of shifting inserts **5**, insulating inserts **4** or insulating end areas **4**_a_ formed by flow engineering, with or without a positioning insert **4'**, in which the setting movement of a positioning means is converted into the shifting movement of the shifting insert **5** by means of a cam mechanism arranged in the thermal treatment conduit, may be formed from the example embodiments described. Thus, the positioning means in the second example embodiment described by way of **FIG. 3** can be directly replaced by the positioning means in the fifth example embodiment. Furthermore, an inner positioning insert **4'** could for example cause the shifting movement of the shifting insert **5** in the example embodiments described by way of **FIGS. 4 and 5**, to name but a few of the resultant combination possibilities.

[**0073**] In the foregoing description preferred embodiments of the invention have been presented for the purpose of illustration and description. They are not intended to be exhaustive or to limit the invention to the precise form disclosed. Obvious modifications or variations are possible in light of the above teachings. The embodiments were chosen and described to provide the best illustration of the principals of the invention and its practical application, and to enable one of ordinary skill in the art to utilize the invention in various embodiments and with various modifications as are suited to the particular use contemplated. All such modifications and variations are within the scope of the invention as determined by the appended claims when interpreted in accordance with the breadth they are fairly, legally, and equitably entitled.

Reference Numerals	
1	roll body
2	thermal treatment conduit
2a	thermal treatment fluid feeder
3	trunnion flange
4	insulating longitudinal area, non-shiftable insulating insert
4a	insulating end area, insulating space
4'	positioning insert
5	shifting insert
5a	deflecting surface
5b	closure surface
6	flange
7	insulating space, insulating gap
8	coupling member, coupling rod
9	screw thread of the coupling member
10	clamping spindle
10a	positioning shaft
11	clamp
12	closing stopper
13	seal
14	sleeve
15	threaded nut
16	drive wheel, pinion
17	synchronizing member, chain
18	closing plate
19	insulating space, insulating gap
20	inlet
21	driven wheel, pinion
22	coupling member, toothed ring gear
23	drive wheel
24	guideway
25	follower
26	guideway
27	circumferential groove
28	anti-rotation lock

What is claimed is:

1. An insulating device of a roll for thermal and mechanical treatment of a web-shaped product, said device being formed in a peripheral thermal treatment conduit of a roll body at one end of the roll body and comprising at least one shifting insert which is coupled to a positioning means in such a way that a setting movement of the positioning means causes a shifting movement of the shifting insert from a rear position deeper into the thermal treatment conduit, to provide a variable, thermal rim insulation, characterized in that

the insulating device is elongatable in the thermal treatment conduit in the longitudinal direction of the thermal treatment conduit.

2. The insulating device as set forth in claim 1, characterized in that the insulating device comprises an insulating insert, relative to which the shifting insert is shiftable, and which is preferably arranged non-shiftable in the thermal treatment conduit.

3. The insulating device as set forth in the preceding claim, characterized in that the insulating insert consists of a thermally insulating material, preferably Teflon or a ceramic material, or comprises such a material as an insulating layer.

4. The insulating device as set forth in claim 2, characterized in that the insulating insert forms a thermally insulating longitudinal area of the insulating device by forming an insulating space through which the thermal treatment fluid does not flow or does not flow unhindered.

5. The insulating device as set forth in the preceding claim, characterized in that the insulating insert is made of stainless steel.

6. The insulating device as set forth in claim 1, characterized in that the insulating device comprises a thermally insulating longitudinal area in which an insulating space is formed through which the thermal treatment fluid does not flow or does not flow unhindered.

7. The insulating device as set forth in the preceding claim, characterized in that the thermally insulating longitudinal area is formed in a area of the thermal treatment conduit which elongates the thermal treatment conduit beyond an inlet or outlet of a thermal treatment fluid feeder, towards the end of the roll body.

8. The insulating device as set forth in claim 1, characterized in that the shifting insert forms an insulating space through which the thermal treatment fluid does not flow or does not flow unhindered, and in that the length of this insulating space is changed by the shifting movement of the shifting insert.

9. The insulating device as set forth in claim 1, characterized in that the shifting insert comprises a layer made of a thermally insulating material or consists entirely of such a material, preferably Teflon or a ceramic material, or is made of stainless steel.

10. The insulating device as set forth in claim 1, characterized in that a guideway or a follower is formed by a shell surface of the roll body forming the thermal treatment conduit or by an insert arranged in the thermal treatment conduit, the shifting insert engaging with said guideway or follower, to linearly guide the shifting insert.

11. The insulating device as set forth in claim 1, characterized in that the shifting insert forms a joint element of a cam mechanism which converts the setting movement of the positioning means into the shifting movement of the shifting insert.

12. The insulating device as set forth in the preceding claim, characterized in that the cam mechanism is formed in the thermal treatment conduit.

13. The insulating device as set forth in claim 11, characterized in that the cam mechanism comprises a guideway and a follower which engages and is guided by the guideway, and in that the follower or the guideway is connected to the shifting insert immovably, at least with respect to the shifting movement and the setting movement.

14. The insulating device as set forth in the preceding claim, characterized in that an insulating insert or positioning insert arranged movably in the thermal treatment conduit for coupling with the positioning means forms the guideway or the follower of the cam mechanism.

15. The insulating device as set forth in the preceding claim, characterized in that the insulating insert or the positioning insert forms the guideway and the shifting insert forms the follower, and in that the follower, penetrating the guideway, engages another guideway which forms a linear guide for the shifting insert.

16. The insulating device as set forth in claim 11, characterized in that a follower connected to the shifting insert to form the cam mechanism engages a guideway formed on a shell surface of the roll body, said shell surface forming the thermal treatment conduit.

17. The insulating device as set forth in claim 11, characterized in that the insulating device comprises an insulating insert and a positioning insert which are at least partially arranged in the thermal treatment conduit, wherein the insulating insert forms a thermally insulating longitudinal area of the insulating device and the positioning insert is coupled to the positioning means and forms a guideway or a follower of the cam mechanism.

18. The insulating device as set forth in the preceding claim, characterized in that the insulating insert forms a response member of the cam mechanism.

19. The insulating device as set forth in claim 1, characterized in that a coupling member which revolves or is rotatably mounted about a rotational axis of the roll body engages with a drive wheel of the insulating device and a driven wheel of the positioning means with a positive lock, for a non-slip transmission of the setting movement of the positioning means into the shifting movement of the shifting insert.

20. The insulating device as set forth in claim 1, characterized in that a coupling member is mounted shiftable and fixable in the longitudinal direction of the thermal treatment conduit in a trunnion flange arranged on the roll body, the coupling member being connected non-shiftably to the shifting insert.

21. The insulating device as set forth in the preceding claim, characterized in that the positioning means comprises a positioning spindle which is non-shiftably rotatably mounted in the receiving bore of the trunnion flange and forms a spindle drive with the coupling member for shifting the shifting insert.

22. The insulating device as set forth in claim 1, characterized in that the insulating device is formed by bellows.

23. A roll for thermal and mechanical treatment of a web-shaped product, said roll comprising:

a) a roll body;

b) thermal treatment conduits for a thermal treatment fluid, said conduits running in the roll body near to the surface of the roll body;

c) insulating devices formed in the thermal treatment conduits at one end of the roll body and comprising shifting inserts which may be moved deeper into the thermal treatment conduits from rear positions, to provide a variable, thermal rim insulation; and

d) a positioning means for the insulating devices;

characterized in that

e) the insulating devices are elongatable in the thermal treatment conduits in the longitudinal direction of the thermal treatment conduits.

24. The roll as set forth in the preceding claim, characterized in that the insulating are each formed by an insulating device as set forth in any one of claims 1 to 22.

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