

[54] **DRAW ROLL AND TEMPERATURE GAUGE ARRANGEMENT**

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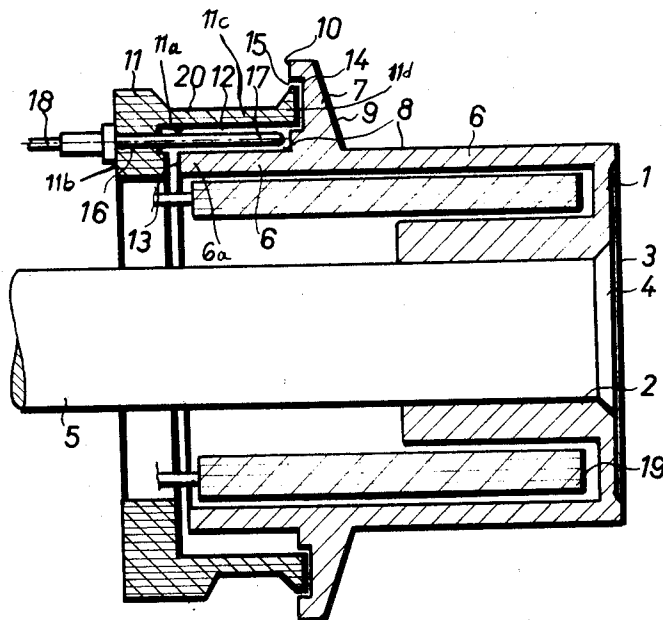
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[57] **ABSTRACT**

A draw roll and temperature gauge arrangement comprising a draw roll member having an outer circumferentially extending roll wall, and a retaining rim member extending circumferentially about said roll wall. The roll wall includes an extended circumferential wall portion to one side of a face of the retaining rim member intended to confront the machine frame. An outer cover member is fixed to the machine frame and is situated opposite the extended circumferential wall portion of the draw roll. This outer cover member extends towards and in close proximity to the aforesaid face of the retaining rim member, the latter overlapping without contact the cover member. Furthermore, this cover member extends towards the retaining rim member in spaced relationship from the aforementioned extended circumferential wall portion of the draw roll member to define therebetween a compartment for receiving a temperature gauge.

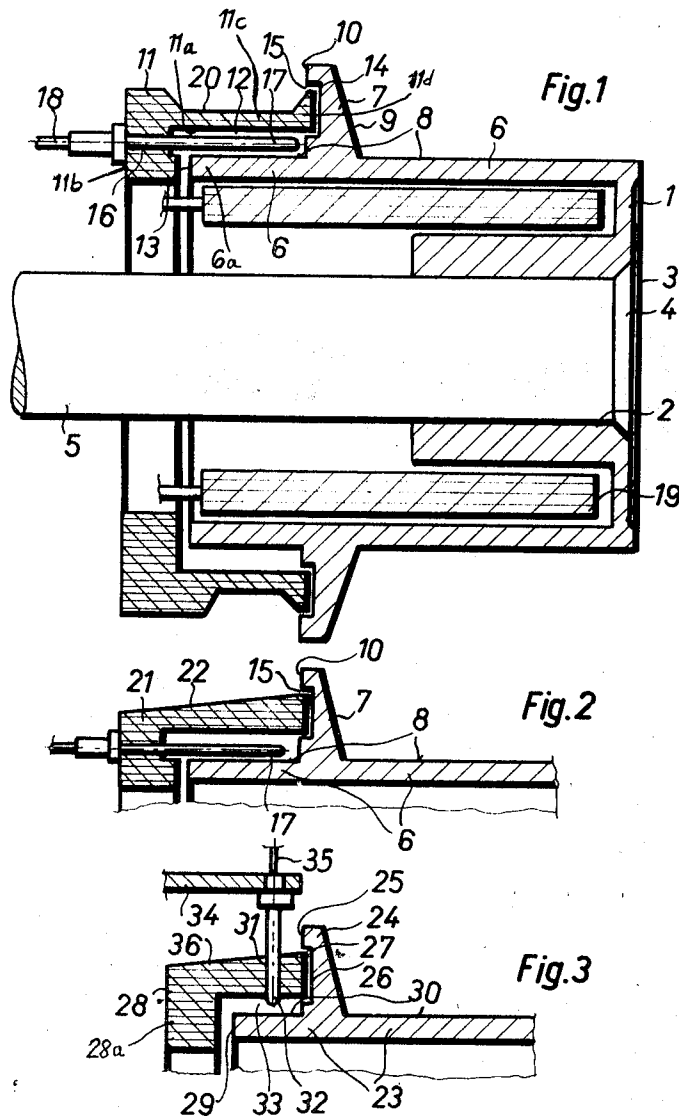
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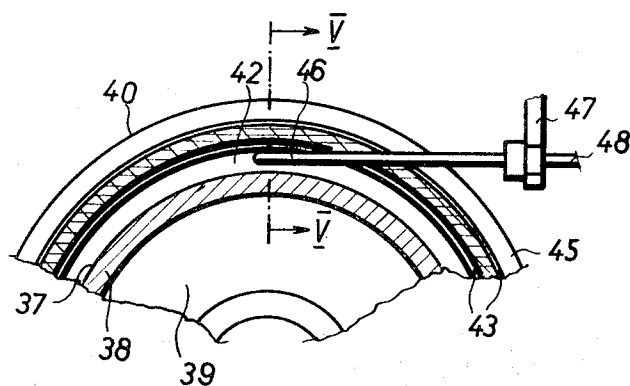
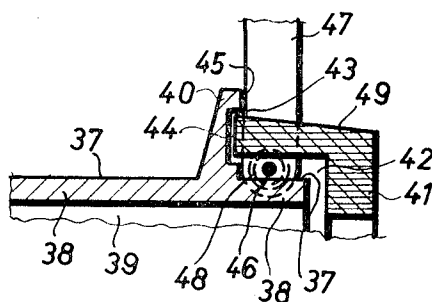


Fig. 4

Fig. 5



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DRAW ROLL AND TEMPERATURE GAUGE ARRANGEMENT

BACKGROUND OF THE INVENTION

The present invention relates to a new and improved arrangement of a temperature gauge or feeler at a heated draw roll.

Draw rolls or godets are roller members which rotate about their lengthwise extending axis. They are used, for instance, on draw-twisting, draw-winding or spin-draw-winding machines, preferably as draw rolls for drawing or, for example, guiding or transporting synthetic threads or endless filaments or strands of filaments wrapped about the godet. Heated draw rolls are especially used for the transfer of heat to the thread or the like, the temperature prevailing at the outside cylindrical roll surface being of significance for the desired heating of such thread.

An arrangement of a temperature gauge at a draw roll is already known to the art, wherein the temperature gauge is rigidly connected to the machine frame and protrudes into an annular groove provided at the end wall or surface of the draw roll facing the machine frame, this annular groove being disposed concentrically with respect to the axis of rotation of the draw roll. In this arrangement, the temperature gauge extends into the heated region of the draw roll heated directly by a heating device arranged therewithin, and without such temperature gauge touching the draw roll. However, this state of the art arrangement exhibits the drawback that the temperature gauge does not measure the temperature prevailing at the outer cylindrical roll surface, merely measures the temperature existing within the cylindrical wall of the draw roll. However, the temperatures inside of the draw roll will be higher than those prevailing on the outer cylindrical roll surface due to the influence, for instance, of heat conductivity or the thermal capacity of the material from which the draw roll is formed as well as because of the close proximity of the heating device. The temperature of the outer surface of the draw roll also is affected by radiation and convection losses and by the heat absorbed by the thread wrapped about the draw roll or godet. Hence, the prior art temperature gauge arrangement under discussion permits measuring the temperature only at those locations of the draw roll where the thermal conditions are approximately the same as prevail at the outer cylindrical roll surface about which the thread is wrapped. Yet, it should be apparent that these limitations which are imposed upon this prior art construction render such arrangement unsatisfactory.

SUMMARY OF THE INVENTION

Accordingly, a real need exists in the art for an arrangement of a temperature gauge or feeler for measuring temperatures of a heated draw roll which is not associated with the aforementioned drawbacks and limitations of the prior art. Therefore, a primary objective of this invention is to provide such arrangement which capably fulfills this need.

Another, more specific object of the present invention contemplates an arrangement of the temperature gauge or feeler at a draw roll in such a manner that the effective temperature actually prevailing at the outer surface of the draw roll can be reliably measured.

Still a further significant object of the present invention relates to an improved draw roll and temperature gauge arrangement enabling measurement of those temperatures actually acting upon a thread or the like wrapped around the draw roll directly on the outer surface thereof.

Still a further significant object of the present invention relates to an improved arrangement of a draw roll and temperature gauge which effectively provides protection of the temperature gauge against external factors which could influence the direct reading thereof and wherein radiation heat losses are substantially suppressed so as to conserve the thermal energy utilized for heating the draw roll.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the inventive draw roll and temperature gauge arrangement will be seen to comprise a draw roll member having an outer circumferentially extending wall, a retaining rim member extending circumferentially about such draw roll wall. This draw roll wall includes an extended circumferential wall portion to one side of a face of the retaining rim member confronting the machine frame. An outer cover member is fixed to the machine frame and is disposed opposite the extended circumferential wall portion of the draw roll. This outer cover member extends towards and in close proximity to the aforementioned face of the retaining rim member. The retaining rim member overlaps without contact the cover member which, in turn, extends towards the retaining rim member in spaced relationship from the aforementioned extended circumferential wall portion of the draw roll member to define therebetween a compartment for receiving a temperature gauge. The temperature gauge is fixed to the machine frame and is disposed at the region of the extended circumferential wall portion, protruding into the aforesaid compartment formed between the cover member and the extended circumferential wall portion of the draw roll member.

The invention contemplates that the temperature gauge can be arranged in such a manner that it, for instance, protrudes into the compartment parallel to the outer surface of the draw roll, or such temperature gauge can protrude into such compartment under any angle, for instance perpendicular or at right angles to the outer surface of the draw roll. It is also possible for the temperature gauge to be arranged such that it protrudes into the compartment tangentially with respect to the outer wall surface of the draw roll.

Furthermore, the invention contemplates the possibility of having the outer cover member surround, either completely or partially, the wall portion of the draw roll extending to said one side of the face of the retaining rim member confronting the machine frame. According to one construction of the invention, the cover member, without contacting the draw roll, extends into a recess of the face of the retaining rim member confronting the machine frame, this cover member then being overlapped by the end face, and specifically the boundary walls of the recess of the retaining rim member at the respective sides of the cover member facing towards and away from the outer wall of the draw roll. Moreover, the outer surface of the cover member can also be formed in such a manner that threads which, for instance, have been shifted over the retaining rim member of the draw roll in a direction towards the machine frame, can be collected and/or transported away at the outer surface of the cover member.

Furthermore, this cover member can be formed of a suitable heat insulating material, such cover member preferably extending from the machine frame over the full length of the extended wall portion of the draw roll up to the face of the retaining rim member confronting the machine frame.

By virtue of the inventive arrangement of the temperature gauge or feeler behind the retaining rim member and over the outer surface of the draw roll, it is possible to advantageously ascertain the temperatures actually acting upon a thread wrapped around the draw roll and which are measured directly at the outer surface of such draw roll. A further advantage afforded by the inventive arrangement is not only that the cover member suppresses losses of heat due to radiation, thereby assuring that the temperature at the measuring location is maintained, but further the temperature gauge is protected against the external influencing factors inasmuch as the cover member extends into close proximity to the face of the retaining rim member and is overlapped by such face without touching the draw roll. Furthermore, the inventive arrangement especially excludes, by virtue of the overlapping effect just-described as provided by the face of the retaining rim member, that, for instance a thread or threads shifted over the retaining rim member are caught in the gap between the cover member rigidly connected with the machine frame and the

retaining rim member or the face thereof, respectively, which rotate at high speeds. Hence, it is not possible for there to occur disturbances, such as for instance, lap-ups which might cause undesirable frictional heat in the gap between the retaining rim member rotating at high speed and the cover member rigidly secured to the machine frame.

BRIEF DESCRIPTION OF THE DRAWINGS

The invention will be better understood and objects other than those set forth above, will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawings wherein:

FIG. 1 is a longitudinal sectional view of a first embodiment of inventive draw roll and temperature gauge arrangement;

FIG. 2 is a fragmentary longitudinal sectional view similar to that shown in FIG. 1, but depicting a modified form of draw roll and temperature gauge arrangement;

FIG. 3 is a fragmentary longitudinal sectional view of a still further modified version of inventive draw roll and temperature gauge arrangement;

FIG. 4 is a fragmentary cross-sectional view of a still further embodiment of inventive draw roll and temperature gauge arrangement; and

FIG. 5 is a sectional view of the draw roll and temperature gauge arrangement shown in FIG. 4, taken substantially along the line V—V thereof.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, the exemplary embodiment of draw roll and temperature gauge arrangement illustrated in FIG. 1 will be seen to comprise a draw roll 1 secured by means of a draw roll hub portion 2, a holding plate member 3 and a screw 4 to one end of a shaft member 5 supported in a nonillustrated machine frame. Shaft member 5 rotatably drives the draw roll 1. On the portion of the draw roll 1 facing the machine frame, there is provided a retaining rim member 7 which in this arrangement, surrounds the entire outer circumference of the substantially cylindrically shaped wall 6 of this draw roll 1 in such a manner that the aforesaid wall 6 has a portion extending behind the retaining rim member 7 in a direction towards the machine frame, as shown by the wall portion to the left of the retaining rim member 7 of FIG. 1. The retaining rim member 7 serves to prevent one or a plurality of nonillustrated threads wrapped about the outer circumferential surface 8 of the draw roll 1 from shifting in a direction towards the machine frame. To achieve this result, the retaining rim member 7 is advantageously designed, in this embodiment, as follows: The face 9 of such retaining rim member 7 which is directed away from the machine frame, in other words directed to the right of the illustration of FIG. 1, will be seen to be inclined from the outer surface 8 of the draw roll 1 upwardly in the direction of the machine frame, whereas the opposite face 10 confronting the machine frame forms a right angle with the aforementioned outer surface 8. Of course, if desired, the first mentioned face 9 directed away from the machine frame may also enclose other angles with the outer surface 8 of the draw roll 1, for instance, a right angle.

Now, the invention contemplates the provision of a cover member 11 which is disposed over the extended portion 6a of the outer surface 8 of the draw roll which portion, as previously explained, extends behind the retaining rim member 7 in the direction of the machine frame. Cover member 11 is destined to be fixedly connected with the nonillustrated machine frame, and the diameter of such cover member is larger than the outside diameter of the wall 6 of the draw roll 1. Further, cover member 11 concentrically surrounds the complete circumference of the wall 6 of this draw roll 1 so that between the inner surface 11a of the cover member 11 and the outer surface 8 of the draw roll wall 1 there is formed an annu-

lar space or compartment 12. Cover member 11 will also be seen to possess a portion 11b which extends radially towards the inside in a direction substantially parallel to the end face 13 of the wall 6 of the draw roll 1, and further incorporates the portion 11c which extends axially in spaced relation from the outer wall 8 of the draw roll 1 in a direction towards and into an annular recess 14 provided at the face 10 of the retaining rim member 7. But, it will be observed that the portion 11c of the cover member 11 extends into the annular recess 14 without, however, touching the boundary walls of such recess. Thus, the end 11d of the cover member 11 confronting the face 10 of the retaining rim member 7 overlappingly protrudes into the recess 14 such that a gap or space 15 appears between the cover member 11 and the retaining rim face 10, insuring for free rotatability of the draw roll 1. Cover member 11 preferably contains or is completely formed from a suitable heat insulating material.

Continuing, at the wall portion 11b of the cover member 11 which faces the machine frame there is provided an opening 16 disposed in parallelism with the outer surface 8 of the draw roll 1. A temperature gauge or feeler 17 is inserted through opening 16 either with a tight fit or slidably, so that it protrudes into the annular compartment 12 in a direction, which in this embodiment, is parallel to the draw roll surface 8. The temperature gauge 17 is rigidly connected to the machine frame through the agency of the cover member 11 and furthermore can be connected via a suitable connection piece 18 with an appropriate measuring instrument (not shown) and/or via a nonillustrated control device with the heating mechanism 19.

Moreover, the outside surface of the cover member 11 is provided with a recess 20, as shown, so that threads which, for instance, have shifted over the retaining rim member are guided away therefrom and collected in the recess 20. The overlapping feature of the cover member 11 protruding into the recess 14 as aforesaid, considerably prevents threads which may have shifted over the retaining rim 7 from penetrating into the gap 15. Should, nonetheless, a thread become caught in the gap 15, any further penetration of this thread into the compartment 12 is rendered highly unlikely or completely prevented by virtue of the further inside overlapping feature of the inside surface 11a of the cover member 11 facing the roll surface.

FIG. 2 illustrates in fragmentary longitudinal sectional view details of a modified form of inventive draw roll and temperature gauge arrangement utilizing a draw roll 1 having the draw roll wall 6 provided with the retaining rim member 7, and for which reason the same reference numerals have here been employed as used for the same or analogous elements of the arrangement of FIG. 1. Moreover, just as with the arrangement of the prior embodiment, here also there is provided a temperature gauge 17. However, in contrast to the draw roll and temperature gauge arrangement of FIG. 1, here the temperature gauge 17 which likewise protrudes into the compartment 12 in a direction parallel to the outer surface 8 of the draw roll 1, is covered by a cover member 21 which is formed slightly different from the cover member 11 of FIG. 1. Yet, this cover member 21, just as is the case in the prior arrangement, is likewise rigidly connected with the nonillustrated machine frame. Here, the outside surface 22 of cover member 21 is indicated to be slightly inclined in the direction of the outer surface 8 of the draw roll 1, and will be seen specifically to extend conically from the retaining rim member 7 towards the inside, that is, in a direction towards the lengthwise axis of the draw roll 1 at the side of the face 10 of the retaining rim member 7 directed towards the machine frame. The thread passing over the retaining rim member 7 thus will deposit itself onto the conical outside surface 22 behind the retaining rim member 7 and will tend to slide upon such surface 22 in a direction towards the machine frame, where at the end of the conical external surface 22 this thread can be collected in any suitable manner, as desired. Thus, just as was the case with the cover member 11 of the embodiment of FIG. 1, here also

threads are prevented from becoming caught at the free end of the gap 15 and from penetrating into such gap or from contacting other rotary parts of the machine. Moreover, it is not absolutely necessary that the cover member 21 completely surrounds the circumference of the outer wall 6 of the draw roll 1, as for instance was the case with the arrangement of FIG. 1, but such may also only partially surround or enclose the outer wall of the draw roll.

FIG. 3 once again illustrates a fragmentary sectional view of a still further embodiment of draw roll and temperature gauge arrangement, wherein for convenience in illustration only a portion of the wall 23 is shown, this draw roll wall likewise being provided with a retaining rim member 24. The face 25 of the retaining rim member 24 confronting the machine frame is here also provided with an annular recess 26. Just as was the case with the arrangement of FIG. 1, a cover member 28 protrudes into this recess 26, but without contacting the boundary walls thereof, so as to provide a small clearance or gap 27, wherein the face 25 of the retaining rim member 24 overlaps, as shown, the confronting end of the cover member 28 from both above and below. The portion 28a of the cover member 28 situated behind the end face 29 of the draw roll will be seen to extend radially inwardly. Furthermore, cover member 28 is provided with an opening 31, the axis of which is located at substantially a right angle to the outer roll surface 30. Once again, a suitable temperature gauge or feeler 32 is inserted through this opening 31 so as to protrude vertically from above into the confines of the compartment or chamber 33 formed between the cover member 28 and the outer roll surface 30, as already explained. A connecting element 34 serves to fixedly connect the temperature gauge 32 with the machine frame. Gauge 32 may be connected via the connector 35 with a suitable measuring instrument (not shown) and/or via a control device with a heating element, such as heating element 19 illustrated in FIG. 1 and omitted in this figure for the sake of preserving clarity in illustration. In fact, in none of the illustrations of the various embodiments of inventive draw roll and temperature gauge arrangement is an understanding of the manner of connection of the temperature feeler with the measuring instrument and/or heating element via the control device, necessary for understanding the underlying concepts of the invention, and therefore has been justifiably omitted from the illustrations. Cover member 28, in this embodiment, is also designed to possess a conical configuration at its outside surface 36. If desired, a recess of the type corresponding to recess 20 shown in FIG. 1, could be similarly provided at the outside surface 36 of the cover member 28 of FIG. 3.

Turning now to the final embodiment of draw roll and temperature feeler or gauge arrangement as designed according to the teachings of the present invention, once again the draw roll 39 will be seen to be provided with a retaining rim member 40 at the outer surface 37 thereof, this retaining rim member 40 concentrically surrounding the circumference of the draw roll wall 38. Here also, there is provided the cover member 41 which surrounds the outer surface 37 of the draw roll 39 at the side thereof which faces the machine frame, cooperating with the outer surface 37 in the manner previously explained in conjunction with the prior embodiments to provide the annular compartment or space 42 which, as shown, is located between the inside surface of the cover member 41 and the outer surface 37 of the draw roll 39. Just as was the case with the prior embodiments, cover member 41 is again rigidly connected with the nonillustrated machine frame. Also, similar to the prior embodiments, the cover member 41 protrudes, in spaced relationship and over the outer surface 37 of the draw roll, into a recess 44 provided at the retaining rim member 40, yet without contacting the boundary walls of such recess. As a result, the cover member 41 is again overlapped at both its inside surface as well as its outer surface by the end face 45 of retaining rim member 40. In this arrangement, a temperature gauge 46 extends tangentially with respect to the outer surface 37 of the draw roll and

protrudes into the temperature gauge-receiving compartment 42, as shown. This temperature gauge 46 is supported, most preferably at the machine frame as previously described, by the connecting element 47. Furthermore, the connector 48 serves to connect the temperature gauge 46 with a suitable measuring instrument and/or via a suitable control device with a draw roll-heating mechanism which may be of any construction desired. Similar to the arrangements of FIGS. 2 and 3, here also the outside surface 49 of the cover member 41 conically tapers in a direction away from the end face 45 of the retaining rim member 40. If desired, this outside surface 49 can also be provided with the previously discussed circumferential recess. The mode of operation of this embodiment of the draw roll and temperature gauge arrangement is similar to that described and discussed above in conjunction with the embodiments of FIG. 1 to 3 inclusive.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

What is claimed is:

1. A draw roll and temperature gauge arrangement comprising a draw roll member having an outer circumferentially extending wall, a retaining rim member integral with and extending circumferentially about said wall, said wall including a circumferential wall portion extending to one side of a face of said retaining rim member intended to confront the machine frame, a stationary outer cover member situated opposite said extended circumferential wall portion of said draw roll, said outer cover member extending towards and in close proximity to said face of said retaining rim member, said retaining rim member overlapping said cover member without contact therewith, said cover member extending towards said retaining rim member in spaced relationship from said extended wall portion of said draw roll member to define therebetween a compartment for receiving a temperature gauge, and a temperature gauge disposed at the region of said extended wall portion and protruding into said compartment formed between said cover member and said extended wall portion of said draw roll member.
2. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said temperature gauge extends into said compartment in a direction approximately parallel to said outer circumferentially extending wall.
3. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said temperature gauge extends into said compartment substantially tangentially with respect to said outer circumferentially extending wall.
4. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said temperature gauge extends into said compartment at an angle with respect to said outer circumferentially extending wall.
5. A draw roll and temperature gauge arrangement as defined in claim 4, wherein said temperature gauge extends into said compartment substantially perpendicular to said outer circumferentially extending wall.
6. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said face of said retaining rim member is provided with a recess into which extends said outer cover member.
7. A draw roll and temperature gauge arrangement as defined in claim 6, wherein said recess is defined by boundary walls which overlap both the inside and outside surfaces of said outer cover member.
8. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said outer cover member is concentrically arranged about the circumference of said wall of said draw roll member.
9. A draw roll and temperature gauge arrangement as defined in claim 8, wherein said outer cover member concentrically extends about the entire circumference of said wall of said draw roll member.

10. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said outer cover member possesses an external surface provided with circumferentially extending recess means.

11. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said cover member possesses an outer surface which conically tapers in a direction away from said face of said retaining rim member.

12. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said cover member contains heat insulating material.

13. A draw roll and temperature gauge arrangement as defined in claim 1, wherein said cover member includes a portion intended to confront the machine frame which overlaps in radial direction an end face of said draw roll member intended to confront the machine frame.

14. A draw roll and temperature gauge arrangement comprising a draw roll member having an outer wall, a retaining rim member integral with and extending circumferentially

about said outer wall, said outer wall including an extended circumferential wall portion to one side of a face of said retaining rim member intended to confront the machine frame, a cover member intended to be fixed to a machine frame and situated opposite said extended circumferential wall portion of said draw roll, said cover member having a cover portion extending towards and in spaced relationship from said face of said retaining rim member, said retaining rim member overlapping without contact said extended cover portion of said cover member, said cover portion being directed towards said retaining rim member in spaced relationship from said circumferential wall portion of said draw roll member to define therebetween a compartment for receiving a temperature gauge, and a stationary temperature gauge protruding into said compartment formed between said cover portion and said extended circumferential wall portion of said draw roll member.

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