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(54) **ROLL OF LOW-WEIGHT CONSTRUCTION AND METHOD FOR MANUFACTURE OF THE ROLL**

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ROULEAU DE CONSTRUCTION LEGERE ET PROCEDE DE FABRICATION DUDIT ROULEAU

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Description

[0001] The invention concerns a roll of low-weight construction for a paper or board machine or for a paper or board finishing device the roll frame of which roll comprises a cylindrical mantle with thin walls and a core part, which fills said cylindrical mantle fully or at least partly and which has been made of a filler material that has a low weight but that endures loading in the press direction well.

[0002] The invention also concerns a method for manufacture of a roll of low-weight construction for a paper or board machine or for a paper or board finishing device, in which method the roll frame of the roll is formed so that a cylindrical mantle with thin walls is manufactured and that the cylindrical mantle is filled fully or at least partly with a filler material that has a low weight but that endures loading in the press direction well and that constitutes the core part of the roll.

[0003] In paper machines and paper finishing devices, there is a need to provide a roll of low-weight construction that endures loads. Such a need is manifested with emphasis, for example, in modernization of supercalenders, because, in connection with modernization, it is desirable to replace the fibre rolls that were used earlier in such supercalenders by modern polymer-coated rolls. When a new supercalender is being constructed, such a problem does not occur, because the rolls and the frame construction can be designed so that they are well compatible with each other right from the beginning. A modern supercalender includes a large number of polymer-coated rolls, in which the roll frame is most commonly made of a relatively thick steel mantle. It is, however, not possible to fit such a roll in place of an earlier fibre roll in all old supercalenders, because the set of rolls would be excessively heavy for the existing frames and other equipment. Such rolls with low-weight construction substituted for fibre rolls have been described earlier, e.g., in the *DE publications 19 511 595 and 19 533* 823 and in the *EP publication 735,287*, which publications deal with polymer-faced calender rolls that have been formed so that the axle of the old fibre roll is utilized in the roll so that, onto the roll axle, in place of the fibre disks, disks made of aluminum material by casting and turning are fitted, which disks, in view of achieving a sufficiently low weight, consist of cellular material with thin walls, in which at least some of the walls that form the cells extend in the radial direction of the roll. Then, onto these disks, an elastic polymer coating has been fitted. The roll thus formed has quite good properties, above all because the weight of the roll has been made so low that it can be used readily in renewals of supercalenders, because the difference in weight of the roll as compared with a fibre roll is very little. However, a significant drawback of these rolls is very high cost. The high cost again results from the technique of manufacture that is used, which requires casting and machining of the disks. As one alternative solution, these publications suggest manufacture of the disks out of a material that contains reinforcement fibres, such as epoxy reinforced with fibreglass, carbon fibres, aramide fibres, or equivalent. Such solutions are, of course, usable in themselves, and with them a roll with a construction of quite low weight is obtained, but a problem is an even higher cost.

[0004] According to the document US-A-5324248 there is known a roll of low-weight construction according to the preamble of claim 1. Such a roll has a roll frame comprising a cylindrical mantle with thin walls and a core part which fills the cylindrical mantle partly and which has been made of a filler material. The roll is further provided with a continuous axle bore, into which a continuous axle is embedded. The ends of the axle form journals by means of which the roll is to be mounted on a support construction.

[0005] In nip rolls, a further problem is generally the load bearing capacity in the direction of the nip plane. For example, in supercalenders, the intermediate rolls form two nips in the nip plane, i.e. they are "pressed" from opposite directions. It is a result of such loading that the roll mantle becomes flat, i.e. the shape of the roll becomes oval. However, since, in polymer rolls, the roll ends have been attached fixedly to the roll mantle, the roll cannot be flattened over its entire axial length in the same way, but the roll is circular in its end areas. From the point of view of the calendering profile, this is quite troublesome. In nip rolls, it should be a definite aim that flattening of the roll is excluded completely, which is in many cases quite difficult to achieve, or that the flattening is uniform over the entire axial length, in which case the profile of linear load in the nip can be made uniform. In rolls that form a nip, in particular in modem centre rolls of the press sections in paper machines, which rolls have been made commonly out of a tubular roll mantle and of a suitable coating fitted onto the roll mantle, it is a problem that shell oscillation occurs in the roll. This shell oscillation may cause barring in the felts, which is again copied along with the paper to the calender rolls. In massive rock rolls, which were used earlier, shell oscillation did not occur to a corresponding extent. Thus, it ought to be possible to construct a roll so that shell oscillation of said sort can be prevented. Moreover, rolls of low-weight construction are needed in paper machines and in paper finishing devices in a number of different applications, e.g., as paper alignment and guide rolls and equivalent.

[0006] The object of the present invention is to eliminate the above problems and drawbacks related to the prior art and, further, to provide a novel roll and a method for manufacture of a roll of low-weight construction.

[0007] The object of the invention is achieved by the combination of the features set forth in each of the independent claims 1 and 22.

[0008] The method in accordance with the invention is mainly characterized by machining locations or spaces into the core part of the roll frame, into each end of

the roll, fixing axle journals or seats which are separate from the roll itself directly into the core into said locations or spaces, by means of which axle journals or seats the roll is bearing-mounted on the support constructions, or installing roll bearings into said spaces, through which roll bearings the roll is mounted on the support constructions by means of non-rotating axle journals.

[0009] By means of the invention, a number of significant advantages are obtained as compared with the prior art, and, of these advantages, for example, the following can be stated. The method in accordance with the invention is very simple and easy to carry out, and, among other things, out of this reason a roll manufactured in accordance with the method is of very low cost, as compared with the rolls currently in use. A roll manufactured in accordance with the invention endures bending in compliance with the application of use that it has been intended for, and further, the roll receives loads in the press direction very well. If necessary, the roll can be constructed as of very low weight, in which case it can be used in a number of different applications in paper machines.

[0010] Of the advantages that can be obtained with different embodiments of the invention, in the form of a catalogue, further, the following can be stated. As was already stated above, depending on the filler material used in the roll, a construction of very low weight is obtained. These materials of particularly low weight can be employed in particular in rolls with multi-layer plate construction. It is a highly significant further advantage that the construction of the frame of the roll can be made fully homogeneous across the entire length of the roll. In particular, in a construction with no end flanges, as the starting point of the dimensioning of the roll can be adopted the strength of the coating of the roll, in stead of the requirement of an equally little flattening of the tubular roll mantle as a result of the non-existent flattening of the massive end flanges. This again provides the advantage that the tubular roll mantle can be made even thinner, which reduces the weight of the roll further. For the roll frame, a more extensive flattening of the roll frame can be permitted than in the prior art, which results, in the case of a nip roll, in a more extended nip, in longer nip times, in a lower maximal pressure with a certain load or, inversely, in a higher linear load with a certain level of maximal pressure. In a roll solution with no end flanges, a construction is achieved which has no weld joints, bolt joints or tight fittings. Attenuation of vibrations in a roll with multi-layer plate construction can be accomplished readily, and the roll does not involve detrimental shell oscillation. From the point of view of the process of manufacture, the roll in accordance with the invention is simple, among other things, because, when a wound composite tube is employed at least as the outer tube, steps of manufacture of the roll frame can be combined with steps of coating. The bending arising from the own weight of the roll can be regulated readily by means of dimensioning of the surface plates and the filler material in a roll with multi-layer plate construction, by means of choice of materials, and, when composite materials are used, by means of choice of the fibre orientations. The roll in accordance with the invention is very well suited for use in connection with modernization of equipments and devices.

[0011] Owing to the low-weight construction, balancing of the roll is also easy. Of possible applications of use of the rolls can be stated, among other things, intermediate rolls in supercalenders, various rolls that require heating, centre rolls in press sections, various guide and alignment rolls, and equivalent. The further advantages and characteristic features of the invention will come out from the following detailed description of the invention.

[0012] In the following, the invention will be described by way of example with reference to the figures in the accompanying drawing.

[0013] Figure 1 is a fully schematic illustration of a reference roll manufactured by means of the method in accordance with the invention.

[0014] Figures 2A and 2B are schematic illustrations as a sectional view and as a side view in part of a reference roll.

[0015] Figures 3-5 show embodiments of the roll in accordance with the invention.

[0016] In Fig. 1, the roll is denoted generally with the reference numeral 10. The frame of the roll 10 consists of a cylinder 11 with thin walls or of a corresponding cylindrical mantle and of a filler material 12 that fills said cylinder 11. According to a preferred embodiment, the cylindrical mantle 11 is made of a metal material, in particular steel. For the manufacture of the cylindrical mantle, it is also possible to use some other material, in stead of a metal material, and as one. alternative solution is suggested manufacture of the mantle out of a composite material, in particular when the roll frame is used, for example, as the frame of rolls with soft coatings in a multi-roll calender. To the roll frame, which consists of the cylindrical mantle 11 and of the filler material 12, rolls ends 14 and axle journals 15 have been attached in a suitable way. Further, the roll may be provided with a coating 13, which can be constructed in the desired way in respect of the material and other properties. The manufacture of the roll frame is carried out in two stages, so that first a cylindrical mantle 11 with thin walls is manufactured out of the desired material suitable for the application of use. In the second stage, this cylindrical mantle 11 is filled completely or at least partly with a material that has a low weight but that endures loading in the press direction very well. The filling of the cylindrical mantle 11 is carried out by casting, and the filler material is advantageously concrete.

[0017] The cylindrical mantle 11 is measured exclusively in accordance with the requirement of bending of the roll 10, in which case a very thin cylindrical mantle 11 of low weight is obtained. The load applied to the roll 10 in the press direction is taken care of by means of

the filler material 12, so that flattening of the roll mantle 11 is prevented, for example, by passing a nip load directly through the roll 10 from one side to the other when the roll 10 is used, for example, as an intermediate roll in a supercalender. This passing of the load through the roll 10 is carried out by means of the filler material 12. The filler material 12 can be optimized in respect of the cost and the weight, in which case concrete is a very good and usable alternative. The concrete can also be internally reinforced concrete, in particular fibre-reinforced concrete, in order that it should also tolerate a certain extent of bending. The whole of the roll frame consisting of a cylindrical mantle 11 and of filler material 12 can be manufactured without roll ends 14, in which case, as required, in the manufacture a pre-stressed tube can be formed whose deflection is little. The roll ends 14 are added to the roll frame in a later stage.

[0018] As is shown in Fig. 1 further, the roll 10 may be provided with a coating 13. When the roll 10 is used, for example, as an intermediate roll in a supercalender, the coating 13 is made of a polymer material. When the roll 10 is used, for example, as the centre roll in a press section, the coating must be suitable for this purpose, in which case, as the material of the coating 13, it is possible to use a ceramic material, metal-ceramic, or equivalent.

[0019] The method of manufacture can be modified very easily for manufacture of rolls of different types, and one such usable solution is illustrated in Figs. 2A and 2B. In Fig. 2A, the roll is denoted generally with the reference numeral 20, and, similarly to Fig. 1, the roll frame of the roll comprises a cylindrical mantle 21, which is preferably fully, or at least partly, filled with a filler material 22, advantageously concrete. The roll 20 as shown in Fig. 2A is meant to be used as a heatable roll, in which case the material of the cylindrical mantle 21 is preferably steel, and it is, for example, either shell hardened or provided with a suitable hard coating, for example ceramic or metal-ceramic coating. Further, into the interior of the cylindrical mantle 21, pipes 26 extending substantially in the axial direction of the roll have been fitted, which pipes have been fitted in the interior of the cylindrical mantle 21 preferably in connection with the casting of the filler material 22 and fixed to the inner face of the cylindrical mantle 21. The roll 20 is supposed to be heated by means of a heat transfer medium, such as water or steam, and said heat transfer medium is meant to flow in the pipes 26. When the roll 20 is supposed to operate as a metal-mantle heatable roll, between the filler material 22 of concrete and the metallic cylindrical mantle 21, an insulation layer which tolerates high temperatures and pressures well, for example a ceramic insulation layer (not shown), can be fitted before casting of the concrete.

[0020] In Fig. 2B, it is illustrated further how the heat transfer medium is introduced into the finished roll. For the introduction of the heat transfer medium, a duct or bore has been formed into the axle 25, and similarly, into the roll end 24, a necessary system of ducts 27 has been formed, which communicates with the bore formed into the axle 25, on one hand, and with the pipes 26 fixed to the inner face of the cylindrical mantle 21, on the other hand. Further, to the end of the axle 25, a water or steam coupling 28 or equivalent has been connected, by whose means the heat transfer medium is passed to the roll. It can also be considered that the heating of the roll 20 is carried out in some other way, in stead of a heat transfer medium. It is one solution, for example, that electric resistors are fitted in the pipes 26, in which case the roll 20 is heated by means of electricity. Induction can also be used as the mode of heating.

[0021] Embodiments of a roll according to the invention are illustrated, for example, in Figs. 3 and 5, in which the roll is denoted generally with the reference numeral 40. In such an embodiment, first the outer tube 41 that forms the cylindrical mantle of the roll is manufactured, and said tube is then filled with the filler material 42 by casting. The manufacture can also be carried out so that a separate outside mould is used, which is filled with the filler material 42 by casting. After this, said outside mould is removed, and the cylindrical mantle 41 of the roll is formed onto the filler material 42, for example, by winding. Further, after this, the roll can be coated with a purposeful coating material. Into the roll frame thus manufactured, the seats for the axle journals 45 (Fig. 3) or for the bearings 49 (Fig. 5) are machined, and said axle journals 45 / bearings 49 can be fixed to the fastening points formed into the filler material 42, e.g., by gluing.

[0022] By means of a roll construction as shown in Figs. 3 and 5, a construction of very low weight is achieved, which is fully homogeneous from end to end in the roll. The end flanges of the roll are entirely unnecessary, for the journalling of the roll can be carried out by means of separate seats. In such a construction with no inner tube, the axle journals or bearings are fixed directly to the filler material. In calender operation or from the point of view of the calendering process, the end flanges of the roll would be exclusively detrimental because of lateral compression, crown formation as a result of heat, etc. detrimental effects. As the starting point of the dimensioning of a roll manufactured without end flanges in the way described above, it is possible to adopt the strength of the roll coating, in stead of a requirement of an equally little flattening of the roll mantle as a result of the non-existent flattening of the end flanges of solid material.

[0023] Fig. 4 still shows a further alternative solution of the roll in accordance with the invention. In Fig. 4, the roll is denoted generally with the reference numeral 50. In the solution of this embodiment, the cylindrical mantle of the roll is formed first out of a tube 51 with thin walls, whose material can be a metal, plastic, fibreglass or carbon fibre, or equivalent. Then, the cylindrical tube 51 of the roll is filled with tubes 52a of thin walls and of very small diameters, as compared with the diameter of the

cylindrical tube 51, which tubes 52a are fitted substantially in the axial direction of the roll. The material of these small-diameter tubes 52a is, for example, metal, plastic, carbon fibre, or equivalent. Said tubes 52a are cast together with each other with a suitable medium, for example glue, metal, concrete, resin, micro-globules, or an equivalent material. In such a case, said tubes 52a together with the medium that binds them together form the filler material 52 in the roll frame.

[0024] Thus, by means of the solution as shown in Fig. 4, a low-weight construction is achieved, which is very rigid and which endures loading very well, as compared with the weight of the roll 50, in which construction, moreover, the channels formed by the longitudinal tubes 52a can be used, for example, for passing a heat transfer medium. Thus, the roll 50 as shown in Fig. 4 can be used, e.g., as a heatable roll in a calender. On the other hand, the medium circulating in the tubes 52a can be used for cooling of the roll 50 or for equalizing the temperature, which can be the case in calenders in the case of polymer rolls. So, the roll 50 can be provided with a coating in a way similar to what has been described in relation to earlier embodiments. By means of choice of materials and dimensioning of the cylindrical mantle tube 51 and of the small-diameter tubes 52a included in the filler material 52, it is possible to affect the rigidity and the weight of the roll 50, i.e. the bending of the roll by the effect of its own weight, efficiently. By affecting the bending, it is possible to manufacture, for example, such rolls with uniform bending as are used in modern calenders of certain types.

[0025] The fixing and journalling of a roll as shown in Fig. 4 on the frame constructions can be accomplished, for example, in a way similar to those described in relation to earlier embodiments.

[0026] Finally, to summarize the above disclosed invention, the invention is relating to a roll of low-weight construction for a paper or board machine or for a paper or board finishing device. The roll frame of the roll comprises a cylindrical mantle with thin walls and a core part, which fills said cylindrical mantle fully or at least partly and which has been made of a filler material that has a low weight but that endures loading in the press direction well.

[0027] End flanges provided with axle journals can be fixed to the ends of the rotl frame, in view of journalling of the roll.

[0028] For the purpose of journalling of the roll, axle journals may have been fixed directly into the core part of the roll frame, into each end of the roll, into locations that have been machined into the core part.

[0029] Into each end of the roll, for the purpose of journalling of the roll, spaces may have been machined into which the roll bearings have been installed.

[0030] The thickness of the cylindrical mantle has preferably been dimensioned in compli ance with the requirements of bending of the roll, and the filler material that forms the core part of the roll and the filling ratio of the cylindrical mantle have preferably been dimensioned in compliance with the load applied to the roll in the press direction.

[0031] The cylindrical mantle may have been made of a metal material, in particular steel. In that case the outer face of the cylindrical mantle has preferably been shell hardened.

[0032] On the other hand the cylindrical mantle may have been made of a composite material, such as fibreglass, carbon fibre, or equivalent.

[0033] The filler material that forms the core part of the roll frame may be made of concrete, preferably internally reinforced concrete, in particular fibre-reinforced concrete.

[0034] The other alternative materials for the the filler material that forms the core part of the roll frame are e. g. syntactic foam, PVC foam, aluminum foam, etc. The filler material may also consist of a cellular material.

[0035] In connection with the casting of the filler material, inside the cylindrical mantle of the roll frame, pipes may have been fitted, which extend substantially in the axial direction of the roll frame from end to end in the roll frame and which have been attached to the inner face of the cylindrical mantle. A heat transfer medium, such as hot water or steam, may have been arranged to circulate in the pipes in order to heat the roll, or electric resistors or equivalent heating elements may have been fitted in the pipes.

[0036] In an alternative embodiment the core part of the roll frame consists of tubes of small diameter, as compared with the diameter of the cylindrical mantle tube, and thin walls and fitted as parallel to the axis of the cylindrical mantle tube, with which tubes the cylindrical mantle tube of the roll has been filled substantially completely. In this embodiment the small-diameter tubes with thin walls which constitute the core part of the roll frame have been fixed to each other by casting by means of a medium, such as glue, plastic, metal, concrete, resin and micro-globules, or a material of equivalent type. Heat transfer medium may have been arranged to flow in the tubes that constitute the core part of the roll frame.

[0037] The cylindrical mantle of the roll may be provided with a hard coating, in particular a ceramic coating, a metal-ceramic coating, or equivalent.

[0038] An insulation layer that tolerates high temperatures and pressure may have been fitted between the cylindrical mantle of the roll and the filler material. The insulation layer is preferably made of a ceramic material.

[0039] Alternatively the cylindrical mantle of the roll may be provided with a polymer coating.

[0040] In the method for manufacture of a roll of low-weight construction for a paper or board machine or for a paper or board finishing device the roll frame of the roll is formed so that a cylindrical mantle with thin walls is manufactured and the cylindrical mantle is filled fully or at least partly with a filler material that has a low weight but that endures loading in the press direction

well and that constitutes the core part of the roll.

[0041] According to the method the cylindrical mantle of the roll is dimensioned in compliance with the requirements of bending of the roll, and the filler material in the roll is dimensioned in compliance with the press load applied to the roll.

[0042] The filling of the cylindrical mantle with the filler material is carried out by casting and the casting is preferably carried out when the cylindrical mantle is in the vertical position.

[0043] The roll ends, if needed, and axle journals are attached to the roll frame that has been formed.

[0044] According to one alternative of the method the cylindrical mantle is made of a metal material, in particular steel. The outer face of the cylindrical mantle of the roll frame is preferably shell hardened.

[0045] Alternatively the cylindrical mantle may be made of a composite material by winding.

[0046] In the method concrete is preferably used as the filler material. The concrete may be internally reinforced concrete, in particular fibre-reinforced concrete.

[0047] Other possibilities for the filler material are e. g. syntactic foam, PVC foam, alumi num foam, etc., or the filler material may be composed of a cellular material.

[0048] In a further embodiment of the method,in connection with the casting of the filler material, into the interior of the cylindrical mantle of the roll frame, pipes are fitted, which extend substantially in the axial direction of the roll frame from end to end in the roll frame and which are attached to the inner face of the cylindrical mantle.

[0049] In the method the core part of the roll frame is composed of tubes of small diameter, as compared with the diameter of the cylindrical mantle tube, and thin walls and fitted as parallel to the axis of the cylindrical mantle tube, with which tubes the cylindrical mantle tube of the roll is filled substantially completely. Said small-diameter tubes may be fixed to each other by casting by means of a medium, such as glue, plastic, metal, concrete, resin and micro-globules, or a material of equivalent type.

[0050] The method may comprise a step of providing the roll frame with a coating, fixed onto the cylindrical mantle.

[0051] The coating may be a polymer coating or alternatively a ceramic coating, a metal-ceramic coating, or equivalent.

[0052] When the roll to be manufactured is supposed to operate as a heatable metal-mantle roll, in connection with the manufacture, between the filler material in the roll and the metallic cylindrical mantle, an insulation layer that tolerates high temperatures and pressure well is fitted before the filler material is cast. The insulation layer is preferably made of a ceramic material.

Claims

1. A roll of low-weight construction for a paper or board machine or for a paper or board finishing device the roll frame of which roll (10; 20; 40; 50) comprises a cylindrical mantle (11; 21; 41; 51) with thin walls and a core part (12; 22; 42; 52), which fills said cylindrical mantle fully or at least partly and which has been made of a filler material that has a low weight but that endures loading in the press direction well, **characterized in that**, into the core part (42) of the roll frame, into each end of the roll, locations or spaces have been machined, into which separate axle journals (45) or seats have been fixed directly into the core, by means of which axle journals (45) or seats the roll is bearing-mounted on the support constructions, or into which spaces roll bearings (49) have been installed, through which the roll is mounted on the support constructions by means of non-rotating separate axle journals (45a).

2. A roll as claimed in claim 1, **characterized in that** the thickness of die cylindrical mantle (11; 21; 41; 51) has been dimensioned in compliance with the requirements of bending of the roll, and that the filler material that forms the core part (12; 22; 42; 52) of the roll and the filling ratio of the cylindrical mantle (11; 21; 41; 51) have been dimensioned in compliance with the load applied to the roll in the press direction.

3. A roll as claimed in claim 1 or 2, **characterized in that** the cylindrical mantle (11; 21; 41; 51) has been made of a metal material, in particular steel.

4. A roll as claimed in claim 3, **characterized in that** the outer face of the cylindrical mantle (11; 21; 41; 51) has been shell hardened.

5. A roll as claimed in claim 1 or 2, **characterized in that** the cylindrical mantle (11; 21; 41; 51) has been made of a composite material, such as fibreglass, carbon fibre, or equivalent.

6. A roll as claimed in any of the preceding claims, **characterized in that** the filler material that forms the core part (12; 22; 42) of the roll frame is concrete.

7. A roll as claimed in any of the preceding claims, **characterized in that** the filler material that forms the core part (12; 22; 42) of the roll frame is internally reinforced concrete, in particular fibre-reinforced concrete.

8. A roll as claimed in any of the claims 1 to 5, **characterized in that** the filler material that forms the core part (12; 22; 42) of the roll frame is syntactic foam.

9. A roll as claimed in any of the claims 1 to 5, **char-**

acterized in that the filler material that forms the core part (12; 22; 42) of the roll frame is PVC foam.

10. A roll as claimed in any of the claims 1 to 5, **characterized in that** the filler material that forms the core part (12; 22; 42) of the roll frame is aluminum foam.

11. A roll as claimed in any of the preceding claims, **characterized in that**, in connection with the casting of the filler material (12; 22; 42), inside die cylindrical mantle (11; 21; 41) of the roll frame, pipes (26) have been fitted, which extend substantially in the axial direction of the roll frame from end to end in the roll frame and which have been attached to the inner face of the cylindrical mantle (11; 21).

12. A roll as claimed in claim 11, **characterized in that** a heat transfer medium, such as hot water or steam, has been arranged to circulate in the pipes (26) in order to heat the roll.

13. A roll as claimed in claim 11, **characterized in that**, in the pipes (26), electric resistors or equivalent heating elements have been fitted in order to heat the roll.

14. A roll as claimed in any of the claims 1 to 5, **characterized in that** the filler material that forms the core part (12; 22; 42) of the roll frame consists of a cellular material.

15. A roll as claimed in any of the claims 1 to 5, **characterized in that** the core part (52) of the roll frame consists of tubes (52a) of small diameter, as compared with the diameter of the cylindrical mantle tube (51), and thin walls and fitted as parallel to the axis of the cylindrical mantle tube (51), with which tubes (52a) the cylindrical mantle tube (51) of the roll has been filled substantially completely.

16. A roll as claimed in claim 15, **characterized in that** the small-diameter tubes (52a) with thin walls which constitute the core part (52) of the roll frame have been fixed to each other by casting by means of a medium, such as glue, plastic, metal, concrete, resin and micro-globules, or a material of equivalent type.

17. A roll as claimed in claim 15 or 16, **characterized in that** a heat transfer medium has been made to flow in the tubes (52a) that constitute the core part (52) of the roll frame.

18. A roll as claimed in any of the preceding claims, **characterized in that** the cylindrical mantle (11; 21; 41; 51) is provided with a hard coating, in particular a ceramic coating, a metal-ceramic coating, or equivalent.

19. A roll as claimed in any of the preceding claims 8 to 18, **characterized in that**, between the cylindrical mantle (11; 21) of the roll and the filler material (12; 22), an insulation layer that tolerates high temperatures and pressure has been fitted.

20. A roll as claimed in claim 19, **characterized in that** the insulation layer is made of a ceramic material.

21. A roll as claimed in any of the claims 8 to 14, **characterized in that** the cylindrical mantle (11; 21) of the roll is provided with a polymer coating.

22. A method for manufacture of a roll of low-weight construction for a paper or board machine or for a paper or board finishing device, in which method the roll frame of the roll (10; 20; 40; 50) is formed so that a cylindrical mantle (11; 21; 41; 51) with thin walls is manufactured and that the cylindrical mantle (11; 21; 41; 51) is filled fully or at least partly with a filler material (12; 22; 42; 52) that has a low weight but that endures loading in the press direction well and that constitutes the core part of the roll, **characterized by** machining locations or spaces into the core part (42) of the roll frame, into each end of the roll, fixing separate axle journals (45) or seats directly into the core into said locations or spaces, by means of which axle journals (45) or seats the roll is bearing-mounted on the support constructions, or installing roll bearings (49) into said spaces, through which roll bearings the roll is mounted on the support constructions by means of non-rotating separate axle journals (45a).

23. A method as claimed in claim 22, **characterized by** dimensioning the cylindrical mantle (11; 21; 41; 51) of the roll (10; 20; 40; 50) in compliance with the requirements of bending of the roll, and dimensioning the filler material (12; 22; 42; 52) in the roll in compliance with the press load applied to the roll.

24. A method as claimed in claim 22 or 23, **characterized by** filling the cylindrical mantle (11; 21; 41; 51) with the filler material by casting.

25. A method as claimed in claim 24, **characterized in that** the casting is carried out when the cylindrical mantle (11; 21; 41; 51) is in the vertical position.

26. A method as claimed in any of the claims 22 to 25, **characterized by** making the cylindrical mantle (11; 21; 41; 51) of a metal material, in particular steel.

27. A method as claimed in claim 26, **characterized by** shell hardening the outer face of the cylindrical mantle (11; 21; 41; 51) of the roll frame.

28. A method as claimed in any of the claims 22 to 27, **characterized by** manufacturing the cylindrical mantle (11; 21; 41; 51) of a composite material by winding.

29. A method as claimed in any of the claims 22 to 28, **characterized by** using concrete as the filler material (12; 22; 42).

30. A method as claimed in any of the claims 22 to 29, **characterized by** using internally reinforced concrete, in particular fibre-reinforced concrete, as the filler material (11; 21; 42).

31. A method as claimed in any of the claims 22 to 28, **characterized in that** the filler material (12; 22; 42) is syntactic foam.

32. A method as claimed in any of the claims 22 to 28, **characterized in that** the filler material (12; 22; 42) is PVC foam.

33. A method as claimed in any of the claims 22 to 28, **characterized in that** the filler material (12; 22; 42) is aluminum foam.

34. A method as claimed in any of the claims 23 to 33, **characterized in that**, in connection with the casting of the filler material (22), into the interior of the cylindrical mantle (21) of the roll frame, pipes (26) are fitted, which extend substantially in the axial direction of the roll frame from end to end in the roll frame and which are attached to the inner face of the cylindrical mantle (21).

35. A method as claimed in any of the claims 22 to 28, **characterized in that** the filler material (12; 22; 42) is composed of a cellular material.

36. A method as claimed in any of the claims 22 to 28, **characterized in that** the core part (52) of the roll frame is composed of tubes (52a) of small diameter, as compared with the diameter of the cylindrical mantle tube (51), and thin walls and fitted as parallel to the axis of the cylindrical mantle tube (51), with which tubes (52a) the cylindrical mantle tube (51) of the roll is filled substantially completely.

37. A method as claimed in claim 36, **characterized in that** the small-diameter tubes (52a) with thin walls which constitute the core part (52) of the roll frame are fixed to each other by casting by means of a medium, such as glue, plastic, metal, concrete, resin and micro-globules, or a material of equivalent type.

38. A method as claimed in any of the claims 22 to 37, **characterized by** providing the roll frame with a coating (13; 33) fixed onto the cylindrical mantle (11; 21; 41; 51).

39. A method as claimed in claim 38, **characterized in that** the coating (13) is a polymer coating.

40. A method as claimed in claim 38, **characterized in that** the coating (13) is a ceramic coating, a metal-ceramic coating, or equivalent.

41. A method as claimed in any of the claims 22 to 40, **characterized in that**, when the roll to be manufactured is supposed to operate as a heatable metal-mantle roll, in connection with the manufacture, between the filler material in the roll and the metallic cylindrical mantle, an insulation layer that tolerates high temperatures and pressure well is fitted before the filler material is cast.

42. A method as claimed in claim 41, **characterized in that** the insulation layer is made of a ceramic material.

Patentansprüche

1. Walze mit einem Aufbau mit einem geringen Gewicht für eine Papiermaschine oder Kartonmaschine oder für eine Papierfinishingvorrichtung oder Kartonfinishingvorrichtung, wobei der Walzenrahmen von dieser Walze (10; 20; 40; 50) einen zylindrischen Mantel (11; 21; 41; 51) mit dünnen Wänden und einen Kernteil (12; 22; 42; 52) aufweist, der den zylindrischen Mantel gänzlich oder zumindest teilweise füllt und der aus einem Füllstoffmaterial hergestellt ist, das ein geringes Gewicht hat aber eine Belastung in der Pressrichtung gut aushält,
dadurch gekennzeichnet, dass
in den Kernteil (42) des Walzenrahmens in jedes Ende der Walze Orte oder Räume bearbeitet sind, in die separate Achszapfen (45) oder -sitze direkt in den Kern hinein fixiert sind, wobei durch die Achszapfen (45) oder -sitze die Walze an dem Stützaufbau per Lager montiert ist, oder wobei in diese Räume Kugellager (49) eingebaut sind, durch die die Walze an dem Stützaufbau mittels nicht-drehender separater Achszapfen (45a) montiert ist.

2. Walze gemäß Anspruch 1,
dadurch gekennzeichnet, dass
die Dicke des zylindrischen Mantels (11; 21; 41; 51) in Übereinstimmung mit den Biegeanforderungen der Walze dimensioniert ist und
das Füllstoffmaterial, das den Kernteil (12; 22; 42; 52) der Walze ausbildet, und das Füllverhältnis des zylindrischen Mantels (11; 21; 41; 51) in Übereinstimmung mit der auf die Walze in der Pressrichtung aufgebrachten Belastung dimensioniert sind.

3. Walze gemäß Anspruch 1 oder 2,
dadurch gekennzeichnet, dass
der zylindrische Mantel (11; 21; 41; 51) aus einem metallischen Material, insbesondere Stahl, hergestellt ist.

4. Walze gemäß Anspruch 3,
dadurch gekennzeichnet, dass
die Außenfläche des zylindrischen Mantels (11; 21; 41; 51) mantelgehärtet ist.

5. Walze gemäß Anspruch 1 oder 2,
dadurch gekennzeichnet, dass
der zylindrische Mantel (11; 21; 41; 51) aus einem Verbundmaterial, wie beispielsweise Glasfaser, Kohlenstofffaser oder dergleichen, hergestellt ist.

6. Walze gemäß einem der vorherigen Ansprüche,
dadurch gekennzeichnet, dass
das Füllstoffmaterial, das den Kernteil (12; 22; 42) des Walzenrahmens bildet, Beton ist.

7. Walze gemäß einem der vorherigen Ansprüche,
dadurch gekennzeichnet, dass
das Füllstoffmaterial, das den Kernteil (12; 22; 42) des Walzenrahmens bildet, innen verstärkter Beton, insbesondere faserverstärkter Beton, ist.

8. Walze gemäß einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet, dass
das Füllstoffmaterial, das den Kernteil (12; 22; 42) des Walzenrahmens bildet, syntaktischer Schaum ist.

9. Walze gemäß einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet, dass
das Füllstoffmaterial, das den Kernteil (12; 22; 42) des Walzenrahmens bildet, PVC-Schaum ist.

10. Walze gemäß einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet, dass
das Füllstoffmaterial, das den Kernteil (12; 22; 42) des Walzenrahmens bildet, Aluminiumschaum ist.

11. Walze gemäß einem der vorherigen Ansprüche,
dadurch gekennzeichnet, dass
die Verbindung mit dem Gießen des Füllstoffmaterials (12; 22; 42) innerhalb des zylindrischen Mantels (11; 21; 41) des Walzenrahmens Rohre (26) eingesetzt sind, die sich im Wesentlichen in der axialen Richtung des Walzenrahmens von Ende zu Ende in dem Walzenrahmen erstrecken und die an der Innenfläche des zylindrischen Mantels (11; 21) angebracht sind.

12. Walze gemäß Anspruch 11,
dadurch gekennzeichnet, dass
ein Wärmeübertragungsmedium, wie beispielsweise heißes Wasser oder Dampf, so eingerichtet ist, dass es in den Rohren (26) zirkuliert, um die Walze zu erwärmen.

13. Walze gemäß Anspruch 11,
dadurch gekennzeichnet, dass
in den Rohren (26) elektrische Widerstände oder gleichwertige Erwärmungselemente sitzen, um die Walze zu erwärmen.

14. Walze gemäß einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet, dass
das Füllstoffmaterial, das den Kernteil (12; 22; 42) des Walzenrahmens bildet, aus einem Zellularmaterial besteht.

15. Walze gemäß einem der Ansprüche 1 bis 5,
dadurch gekennzeichnet, dass
der Kernteil (52) des Walzenrahmens aus Röhren (52a) besteht die einen kleinen Durchmesser im Vergleich zu dem Durchmesser der zylindrischen Mantelröhre (51) und dünne Wände haben und parallel zu der Achse der zylindrischen Mantelröhre (51) sitzen, wobei mit den Röhren (52a) die zylindrische Mantelröhre (51) der Walze im wesentlich vollständig gefüllt ist.

16. Walze gemäß Anspruch 15,
dadurch gekennzeichnet, dass
die mit dem kleinen Durchmesser versehenen Röhren (52a) mit den dünnen Wänden, die den Kernteil (52) des Walzenrahmens bilden, aneinander durch Gießen mittels eines Mediums fixiert sind, wie beispielsweise Klebstoff, Kunststoff, Metall, Beton, Harz und Mikrokugeln oder einem Material einer gleichwertigen Art.

17. Walze gemäß Anspruch 15 oder 16,
dadurch gekennzeichnet, dass
ein Wärmeübertragungsmedium dazu gebracht wird, dass es in den Röhren (52a) strömt, die den Kernteil (52) des Walzenrahmens bilden.

18. Walze gemäß einem der vorherigen Ansprüche,
dadurch gekennzeichnet, dass
der zylindrische Mantel (11; 21; 41; 51) mit einer harten Beschichtung versehen ist, insbesondere eine keramische Beschichtung, eine metall-keramische Beschichtung oder dergleichen.

19. Walze gemäß einem der vorherigen Ansprüche 8 bis 18,
dadurch gekennzeichnet, dass
zwischen dem zylindrischen Mantel (11; 21) der Walze und dem Füllstoffmaterial (12; 22) eine Isolationslage sitzt, die hohe Temperaturen und

Druck toleriert.

20. Walze gemäß Anspruch 19,
dadurch gekennzeichnet, dass
die Isolationslage aus einem keramischen Material hergestellt ist.

21. Walze gemäß einem der Ansprüche 8 bis 14,
dadurch gekennzeichnet, dass
der zylindrische Mantel (11; 21) der Walze mit einer Polymerbeschichtung versehen ist.

22. Verfahren für die Herstellung einer Walze mit einem Aufbau mit einem geringen Gewicht für eine Papiermaschine oder Kartonmaschine oder für eine Papierfinishingvorrichtung oder Kartonfinishingvorrichtung, wobei bei diesem Verfahren der Walzenrahmen der Walze (10; 20; 40; 50) so ausgebildet wird, dass ein zylindrischer Mantel (11; 21; 41; 51) mit dünnen Wänden hergestellt wird und dass der zylindrische Mantel (11; 21; 41; 51) gänzlich oder zumindest teilweise mit einem Füllstoffmaterial (12; 22; 42; 52) gefüllt wird, das ein geringes Gewicht hat aber eine Belastung in der Pressenrichtung gut aushält und das den Kernteil der Walze bildet,
gekennzeichnet durch
Bearbeiten von Orten oder Räumen in den Kernteil (42) des Walzenrahmens in jedes Ende der Walze, Fixieren von separaten Achszapfen (45) oder -sitzen direkt in den Kern in die Orte oder Räume, wobei mittels der Achszapfen (45) oder -sitze die Walze an den Stützkonstruktionen per Lager montiert wird, oder Einbauen von Kugellagern (49) in die Räume, wobei **durch** die Kugellager die Walze an den Stützkonstruktionen mittels sich nichtdrehender separater Achszapfen (45a) montiert wird.

23. Verfahren gemäß Anspruch 22,
gekennzeichnet durch
Dimensionieren des zylindrischen Mantels (11; 21; 41; 51) der Walze (10; 20; 40; 50) in Übereinstimmung mit den Biegeanforderungen der Walze und Dimensionieren des Füllstoffmaterials (12; 22; 42; 52) in der Walze in Übereinstimmung mit der auf die Walze aufgebrachten Pressbelastung.

24. Verfahren gemäß Anspruch 22 oder 23,
gekennzeichnet durch
Füllen des zylindrischen Mantels (11; 21; 41; 51) mit dem Füllstoffmaterial **durch** Gießen.

25. Verfahren gemäß Anspruch 24,
dadurch gekennzeichnet, dass
das Gießen ausgeführt wird, wenn der zylindrische Mantel (11; 21; 41; 51) bei der vertikalen Position ist.

26. Verfahren gemäß einem der Ansprüche 22 bis 25,
gekennzeichnet durch
Gestalten des zylindrischen Mantels (11; 21; 41; 51) aus einem Metallmaterial, insbesondere Stahl.

27. Verfahren gemäß Anspruch 26,
gekennzeichnet durch
Mantelhärten der Außenfläche des zylindrischen Mantels (11; 21; 41; 51) des Walzenrahmens.

28. Verfahren gemäß einem der Ansprüche 22 bis 27,
gekennzeichnet durch
Herstellen des zylindrischen Mantels (11; 21; 41; 51) aus einem Verbundmaterial **durch** Wickeln.

29. Verfahren gemäß einem der Ansprüche 22 bis 28,
gekennzeichnet durch
Verwenden von Beton als das Füllstoffmaterial (12; 22; 42).

30. Verfahren gemäß einem der Ansprüche 22 bis 29,
gekennzeichnet durch
Anwenden von innen verstärktem Beton, insbesondere faserverstärktem Beton, als das Füllstoffmaterial (11; 21; 42).

31. Verfahren gemäß einem der Ansprüche 22 bis 28,
dadurch gekennzeichnet, dass
das Füllstoffmaterial (12; 22; 42) syntaktischer Schaum ist.

32. Verfahren gemäß einem der Ansprüche 22 bis 28,
dadurch gekennzeichnet, dass
das Füllstoffmaterial (12; 22; 42) PVC-Schaum ist.

33. Verfahren gemäß einem der Ansprüche 22 bis 28,
dadurch gekennzeichnet, dass
das Füllstoffmaterial (12; 22; 42) Aluminiumschaum ist.

34. Verfahren gemäß einem der Ansprüche 23 bis 33,
dadurch gekennzeichnet, dass
in Verbindung mit dem Gießen des Füllstoffmaterials (22) in das Innere des zylindrischen Mantels (21) des Walzenrahmens Rohre (26) eingepasst sind, die sich im Wesentlichen in der axialen Richtung des Walzenrahmens von Ende zu Ende in den Walzenrahmen erstrecken und die an der Innenfläche des zylindrischen Mantels (21) angebracht sind.

35. Verfahren gemäß einem der Ansprüche 22 bis 28,
dadurch gekennzeichnet, dass
das Füllstoffmaterial (12; 22; 42) aus einem Zellularmaterial besteht.

36. Verfahren gemäß einem der Ansprüche 22 bis 28,
dadurch gekennzeichnet, dass
der Kernteil (52) des Walzenrahmens aus Röhren (52a) besteht, die einen kleinen Durchmesser im Vergleich zu dem Durchmesser der zylindrischen Mantelröhre (51) und dünne Wände haben und parallel zu der Achse der zylindrischen Mantelröhre (51) sitzen, wobei mit den Röhren (52a) die zylindrische Mantelröhre (51) der Walze im Wesentlichen vollständig gefüllt sind.

37. Verfahren gemäß Anspruch 36,
dadurch gekennzeichnet, dass
die mit dem kleinen Durchmesser versehenen Röhren (52a) mit den dünnen Wänden, die den Kernteil (52) des Walzenrahmens bilden, aneinander durch Gießen mittels eines Mediums fixiert werden, wie beispielsweise Klebstoff, Kunststoff, Metall, Beton, Harz und Mikrokugeln, oder einem Material einer gleichwertigen Art.

38. Verfahren gemäß einem der Ansprüche 22 bis 37,
gekennzeichnet durch
Versehen des Walzenrahmens mit einer Beschichtung (13; 33), die an dem zylindrischen Mantel (11; 21; 41; 51) fixiert ist.

39. Verfahren gemäß Anspruch 38,
dadurch gekennzeichnet, dass
die Beschichtung (13) eine Polymerbeschichtung ist.

40. Verfahren gemäß Anspruch 38,
dadurch gekennzeichnet, dass
die Beschichtung (13) eine Keramikbeschichtung, eine Metall-Keramik-Beschichtung oder dergleichen ist.

41. Verfahren gemäß einem der Ansprüche 22 bis 40,
dadurch gekennzeichnet, dass
wenn die Walze, die hergestellt wird, als eine erwärmbare Metallmantelwalze arbeiten soll, in Verbindung mit der Herstellung zwischen dem Füllstoffmaterial in der Walze und dem metallischen zylindrischen Mantel eine Isolationslage, die hohe Temperaturen und Druck gut toleriert, eingepasst wird, bevor das Füllstoffmaterial gegossen wird.

42. Verfahren gemäß Anspruch 41,
dadurch gekennzeichnet, dass
die Isolationslage aus einem keramischen Material hergestellt wird.

Revendications

1. Un rouleau de construction à faible poids pour une machine à papier ou à fabriquer le carton ou pour un dispositif de finissage du papier ou du carton, le bâti de rouleau dudit rouleau (10; 20; 40; 50) comprenant une enveloppe cylindrique (11; 21; 41; 51) à parois minces et une partie centrale (12; 22; 42; 52) remplissant ladite enveloppe cylindrique pleinement, ou au moins partiellement, et fabriquée dans une matière de remplissage possédant un faible poids mais supportant bien une mise en charge en direction de la presse, **caractérisé en ce que**, dans la partie centrale (42) du bâti de rouleau, à l'intérieur de chaque extrémité du rouleau, des emplacements ou des espaces sont usinés, dans lesquels des fusées d'axe (45) ou sièges séparés sont directement fixés à la partie centrale, au moyen desquels fusées d'axe (45) ou sièges, le rouleau est monté sur palier sur les constructions d'appui, ou dans lesquels espaces des paliers à roulement (49) sont installés, à travers lesquels le rouleau est monté sur les constructions d'appui au moyen de fusées d'axe séparées non rotatives (45a).

2. Un rouleau selon la revendication 1, **caractérisé en ce que** l'épaisseur de l'enveloppe cylindrique (11; 21; 41; 51) est dimensionnée conformément aux prescriptions de cintrage du rouleau, et **en ce que** la matière de remplissage formant la partie centrale (12; 22; 42; 52) du rouleau et le taux de remplissage de l'enveloppe cylindrique (11; 21; 41; 51) sont dimensionnés en conformité avec la charge appliquée au rouleau en direction de la presse.

3. Un rouleau selon les revendications 1 ou 2, **caractérisé en ce que** l'enveloppe cylindrique (11; 21; 41; 51) est fabriquée dans une matière métallique, en particulier l'acier.

4. Un rouleau selon la revendication 3, **caractérisé en ce que** la face externe de l'enveloppe cylindrique (11; 21; 41; 51) a été durcie dans le moule.

5. Un rouleau selon les revendications 1 ou 2, **caractérisé en ce que** l'enveloppe cylindrique (11; 21; 41; 51) est fabriquée dans un matériau composite tel que la fibre de verre, la fibre de carbone, ou l'équivalent.

6. Un rouleau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la matière de remplissage qui forme la partie centrale (12; 22; 42; 52) du bâti de rouleau est du béton.

7. Un rouleau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** la matière de remplissage formant la partie centrale (12; 22; 42; 52) du bâti de rouleau est du béton intérieurement armé, en particulier du béton armé aux fibres.

8. Un rouleau selon l'une quelconque des revendica-

tions 1 à 5, **caractérisé en ce que** la matière de remplissage formant la partie centrale (12; 22; 42; 52) du bâti de rouleau est de la mousse synthétique.

9. Un rouleau selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** la matière de remplissage formant la partie centrale (12; 22; 42; 52) du bâti de rouleau est de la mousse PVC.

10. Un rouleau selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** la matière de remplissage formant la partie centrale (12; 22; 42; 52) du bâti de rouleau est de la mousse d'aluminium.

11. Un rouleau selon l'une des revendications précédentes, **caractérisé en ce que**, concernant le moulage de la matière de remplissage (12; 22; 42) à l'intérieur de l'enveloppe cylindrique (11; 21; 41) du bâti de rouleau, des tuyaux (26) sont installés, en s'étendant sensiblement dans la direction axiale du bâti de rouleau, d'une extrémité à l'autre dans le bâti de rouleau et étant fixés à la face interne de l'enveloppe cylindrique (11; 21).

12. Un rouleau selon la revendication 11, **caractérisé en ce qu'**un caloporteur tel que l'eau chaude ou la vapeur sont agencés pour circuler dans les tuyaux (26), de manière à chauffer le rouleau.

13. Un rouleau selon la revendication 11, **caractérisé en ce que**, dans les tuyaux (26), des résistances électriques ou des éléments de chauffage équivalents sont installés de manière à chauffer le rouleau.

14. Un rouleau selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** la matière de remplissage formant la partie centrale (12; 22; 42) du rouleau est constituée d'un produit alvéolaire.

15. Un rouleau selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que**, la partie centrale (52) du bâti de rouleau est constituée de tubes (52a) de petit diamètre, comparativement au diamètre du tube de l'enveloppe cylindrique (51), et de parois minces et installés en parallèle à l'axe du tube de l'enveloppe cylindrique (51), le tube de l'enveloppe cylindrique (51) du rouleau étant sensiblement rempli en entier avec ces tubes (52a).

16. Un rouleau selon la revendication 15, **caractérisé en ce que** les tubes de petit diamètre (52a) à parois minces qui constituent la partie centrale (52) du bâti de rouleau ont été fixés l'un à l'autre par moulage au moyen d'un medium tel que de la colle, du plastique, du métal, du béton, de la résine et des microglobules, ou d'une matière de type équivalent.

17. Un rouleau selon les revendications 15 ou 16, **caractérisé en ce qu'**un caloporteur a été mis en circulation dans les tubes (52a) constituant la partie centrale (52) du bâti de rouleau.

18. Un rouleau selon l'une quelconque des revendications précédentes, **caractérisé en ce que** l'enveloppe cylindrique (11; 21; 41; 51) est prévue avec un revêtement dur, en particulier un revêtement céramique, un revêtement métal-céramique, ou l'équivalent.

19. Un rouleau selon l'une quelconque des revendications précédentes 8 à 18, **caractérisé en ce qu'**entre l'enveloppe cylindrique (11; 21) du rouleau et la matière de remplissage (12; 22), une couche isolante qui supporte des températures et des pressions élevées, est installée.

20. Un rouleau selon la revendication 19, **caractérisé en ce que** la couche isolante est faite d'une matière céramique.

21. Un rouleau selon l'une quelconque des revendications 8 à 14, **caractérisé en ce que** l'enveloppe cylindrique (11; 21) du rouleau est prévue avec un revêtement polymère.

22. Un procédé pour la fabrication d'un rouleau de construction de faible poids pour une machine à papier ou à fabriquer le carton ou pour un dispositif de finissage du papier ou du carton, dans lequel procédé, le bâti de rouleau du rouleau (10; 20; 40; 50) est formé de telle sorte qu'une enveloppe cylindrique (11; 21; 41; 51) est remplie en entier ou au moins partiellement d'une matière de remplissage (12; 22; 42; 52) possédant un faible poids mais supportant bien une mise en charge en direction de la presse et qui constitue la partie centrale du rouleau, **caractérisé par** l'usinage d'emplacements ou d'espaces dans la partie centrale (42) du bâti de rouleau, à l'intérieur de chaque extrémité du rouleau, la fixation de fusées d'axe (45) ou sièges séparés directement dans la partie centrale desdits emplacements ou espaces, au moyen desquels fusées d'axe (45) ou sièges, le rouleau est monté sur palier sur les constructions d'appui, ou l'installation de paliers à roulement (49) dans lesdits espaces, le rouleau étant monté grâce à ces paliers à roulement, sur les constructions d'appui, au moyen de fusées d'axe séparées non rotatives (45a).

23. Un procédé selon la revendication 22, **caractérisé par** le dimensionnement de l'enveloppe cylindrique (11; 21; 41; 51) du rouleau (10; 20; 40; 50) conformément aux prescriptions de cintrage du rouleau, et en ce que la matière de remplissage (12; 22; 42; 52) du rouleau est dimensionnée en conformité

avec la charge appliquée au rouleau.

24. Un procédé selon les revendications 22 ou 23, **caractérisé par** le remplissage de J'enveloppe cylindrique (11; 21; 41; 51) est remplie, par moulage, de la matière de remplissage.

25. Un procédé selon la revendication 24, **caractérisé en ce que** le moulage est effectué lorsque l'enveloppe cylindrique (11; 21; 41; 51) se trouve en position verticale.

26. Un procédé selon l'une quelconque des revendications 22 à 25, **caractérisé par** la formation de l'enveloppe cylindrique (11; 21; 41; 51) en une matière métallique, en particulier l'acier.

27. Un procédé selon la revendication 26, **caractérisé par** le durcissement de la face externe de l'enveloppe cylindrique (11; 21; 41; 51) dans le moule.

28. Un procédé selon l'une quelconque des revendications 22 à 27, **caractérisé par** la fabrication de l'enveloppe cylindrique (11; 21; 41; 51) en un matériau composite par bobinage.

29. Un procédé selon l'une quelconque des revendications 22 à 28, **caractérisé** l'utilisation du béton comme matière de remplissage (12; 22; 42).

30. Un procédé selon l'une quelconque des revendications 22 à 29, **caractérisé en ce que** la matière de remplissage (12; 22; 42) utilisée est du béton intérieurement armé, en particulier du béton armé aux fibres.

31. Un procédé selon l'une quelconque des revendications 22 à 28, **caractérisé en ce que** la matière de remplissage (12; 22; 42) est de la mousse synthétique.

32. Un procédé selon l'une quelconque des revendications 22 à 28, **caractérisé en ce que** la matière de remplissage (12; 22; 42) est de la mousse PVC.

33. Un procédé selon l'une quelconque des revendications 22 à 28, **caractérisé en ce que** la matière de remplissage (12; 22; 42) est de la mousse d'aluminium.

34. Un procédé selon l'une quelconque des revendications 22 à 33, **caractérisé en ce que**, concernant le moulage de la matière de remplissage (22), dans l'intérieur de l'enveloppe cylindrique (21) du bâti de rouleau, des tuyaux (26) sont installés, en s'étendant sensiblement dans la direction axiale du bâti de rouleau d'une extrémité à l'autre dans le bâti de rouleau et sont fixés à la face interne de l'enveloppe cylindrique (21).

35. Un procédé selon l'une quelconque des revendications 22 à 28, **caractérisé en ce que** la matière de remplissage (12; 22; 42) est composée d'une matière cellulaire.

36. Un procédé selon l'une quelconque des revendications 22 à 28, **caractérisé en ce que** la partie centrale (52) du bâti de rouleau est composée de tubes (52a) de petit diamètre comparativement au diamètre du tube de l'enveloppe cylindrique (51), et de parois minces et installés en parallèle à l'axe du tube de l'enveloppe cylindrique (51), le tube de l'enveloppe cylindrique (51) du rouleau étant sensiblement rempli en entier avec ces tubes (52a).

37. Un procédé selon la revendication 36, **caractérisé en ce que** les tubes (52a) de petit diamètre, avec des parois minces qui constituent la partie centrale (52) du bâti de rouleau, ont été fixés les uns aux autres par moulage au moyen d'un medium tel que de la colle, du plastique, du métal, du béton, de la résine et des micro-globules, ou un matériau de type équivalent.

38. Un procédé selon l'une quelconque des revendications 22 à 37, **caractérisé par** la fourniture au bâti de rouleau d'un revêtement (13; 33) fixé sur l'enveloppe cylindrique (11; 21; 41; 51).

39. Un procédé selon la revendication 38, **caractérisé en ce que** le revêtement (13) est un revêtement polymère.

40. Un procédé selon la revendication 38, **caractérisé en ce que** le revêtement (13) est un revêtement céramique, un revêtement métal-céramique, ou l'équivalent.

41. Un procédé selon l'une quelconque des revendications 22 à 40, **caractérisé en ce que**, concernant la fabrication, lorsque le rouleau devant être fabriqué est prévu pour fonctionner comme rouleau à enveloppe métallique chauffable, une couche isolante qui supporte bien les températures et pressions élevées est installée entre la matière de remplissage du rouleau et l'enveloppe cylindrique métallique, avant que la matière de remplissage ne soit moulée.

42. Un procédé selon la revendication 41, **caractérisé en ce que** la couche isolante est faite d'une matière céramique.

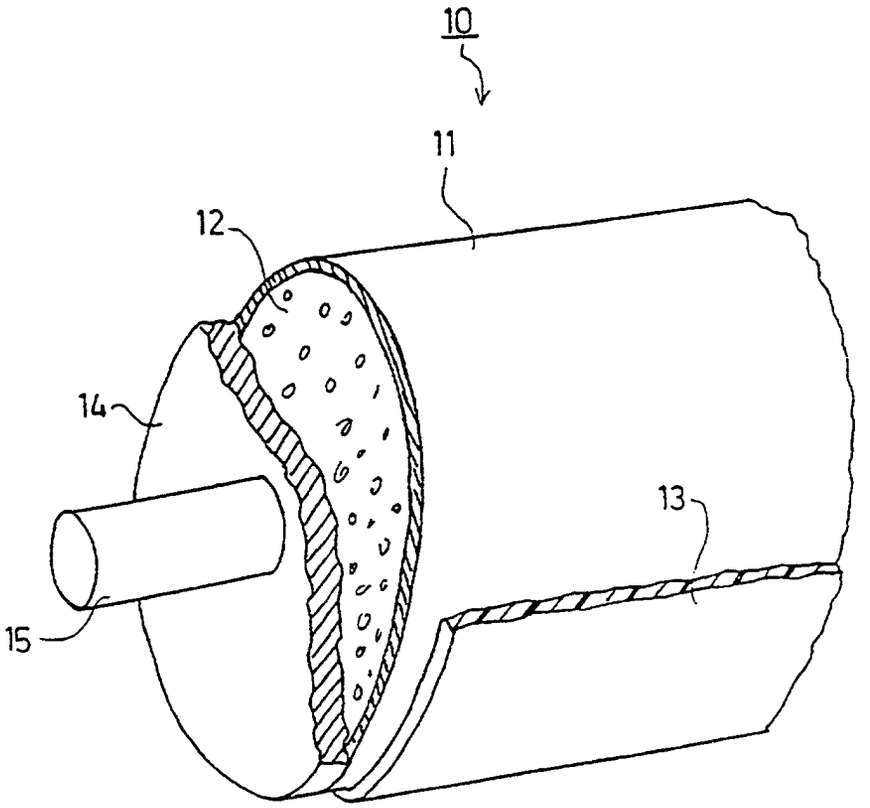

FIG. 1

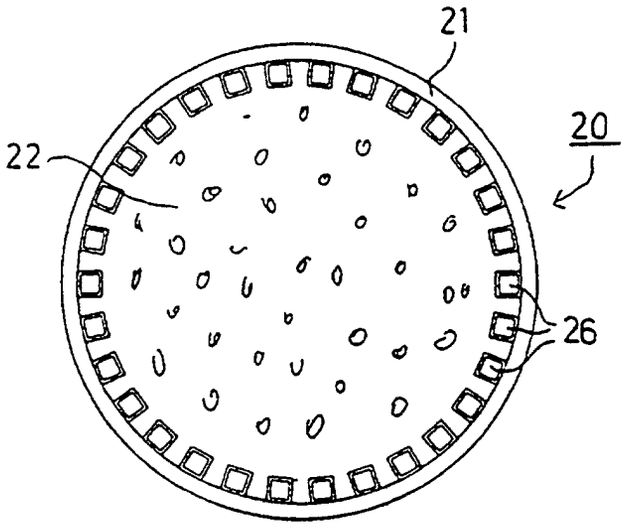

FIG. 2A

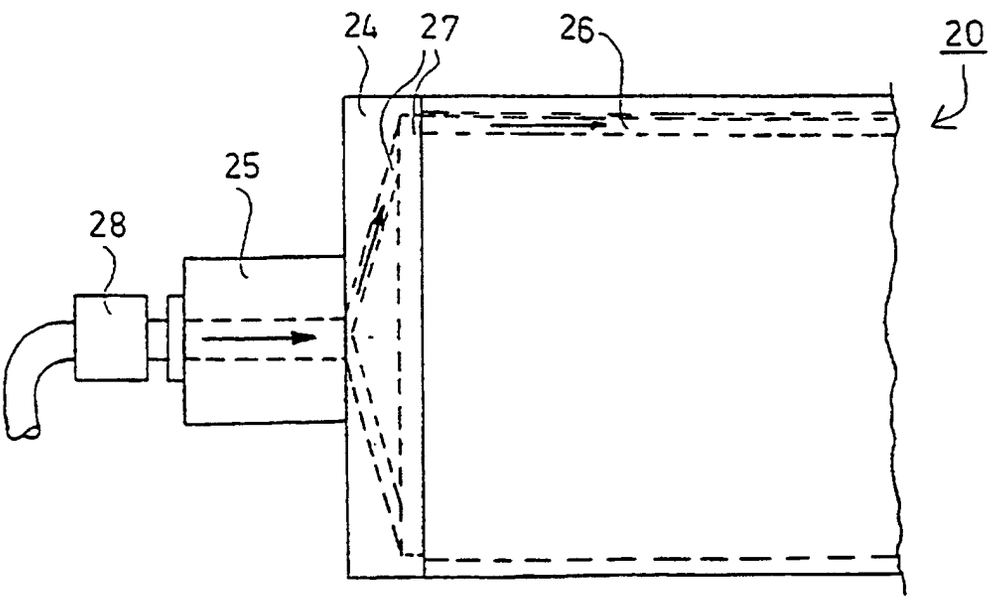

FIG. 2B

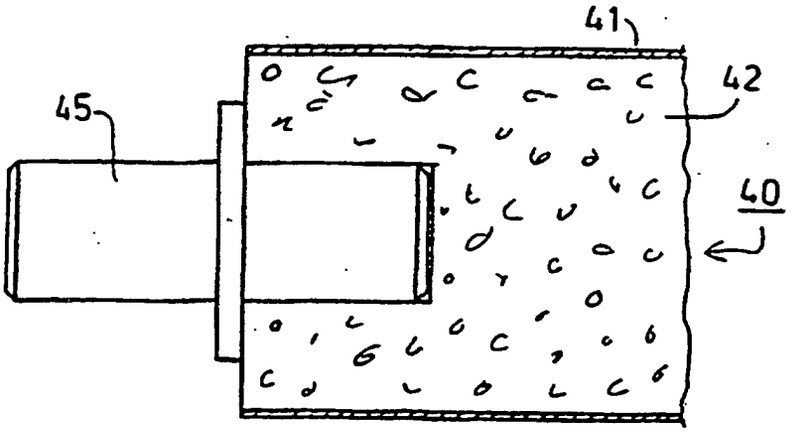

FIG. 3

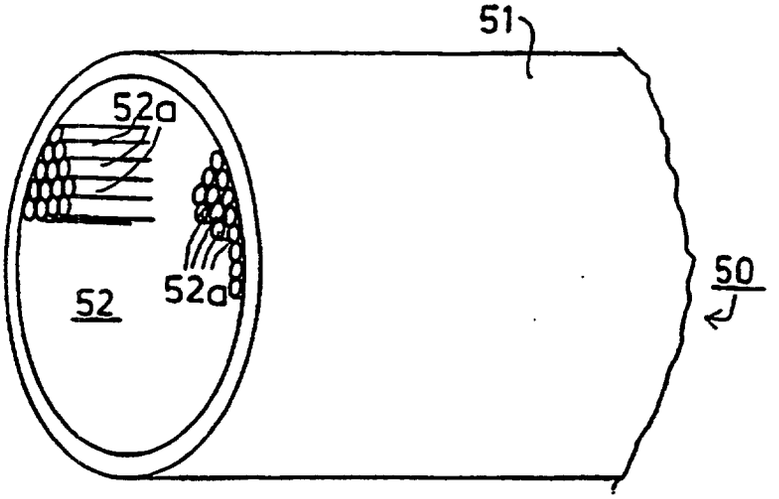

FIG. 4

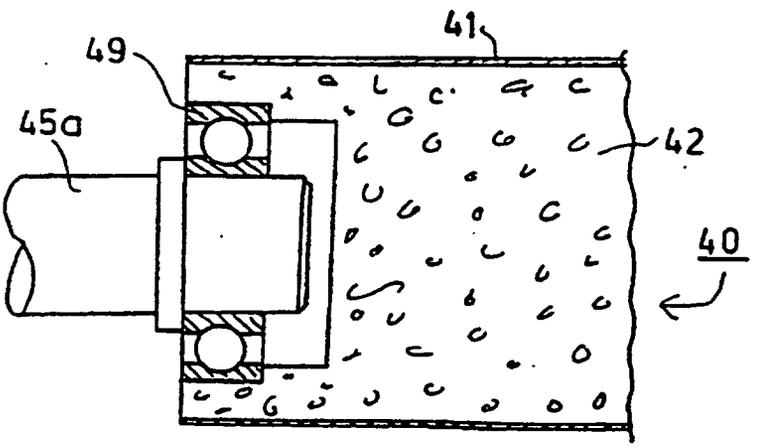

FIG. 5