(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 182 289 A2

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
27.02.2002 Bulletin 2002/09

(51) Int Cl.[7]: **D06B 3/18**, D06B 19/00

(21) Application number: **01116858.0**

(22) Date of filing: **10.07.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

(30) Priority: **18.08.2000 JP 2000248178**

(71) Applicant: **TSUDAKOMA KOGYO KABUSHIKI KAISHA**
Kanazawa-shi Ishikawa-Ken (JP)

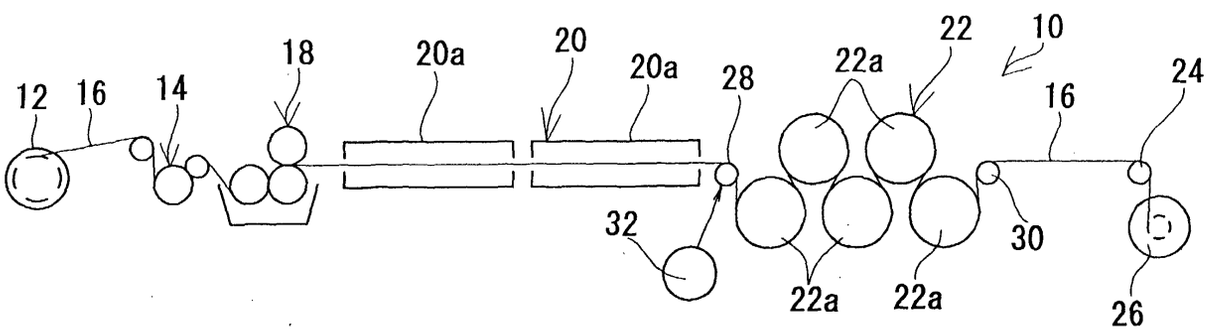
(72) Inventors:
- **Nakade, Kiyoshi**
  Komatsu-shi, Ishikawa-ken (JP)
- **Nomura, Eiichi**
  Kahoku-gun, Ishikawa-ken (JP)

(74) Representative:
von Samson-Himmelstjerna, Friedrich R., Dipl.-Phys. et al
SAMSON & PARTNER Widenmayerstrasse 5
80538 München (DE)

(54) Warp sizer

(57) This warp sizer comprises means (32) for heating a guide roller (28) for guiding a sized warp sheet (16) to a cylinder dryer (22). The non-dried warp sheet is heated by the guide roller (28), whereby the size adhered to the warp sheet is dried at least in the surface part of the warp sheet to be hardened to such an extent as not to adhere to the surface of the guide roller and adheres to the warp sheet

FIG. 1



EP 1 182 289 A2

Description

BACKGROUND OF THE INVENTION

1. Field of the invention

[0001] The present invention relates to a warp sizer for winding a sized warp sheet over a guide roller and then passing through a cylinder dryer.

2. Prior Art

[0002] One of warp sizers for sizing warps and heating the warps to dry is disclosed in Japanese Patent Publication No. 6-35705, in which a hot-air dryer and a cylinder dryer are disposed on the downstream side of a sizing apparatus for sizing the warps and in which a so-called warp sheet including a plurality of warps formed like a sheet and sized by the sizing apparatus is passed through both the dryers to be dried.

[0003] In this prior art, the sized warp sheet is passed through the hot-air dryer and dried to a certain extent in a non-contact state, and then the warp sheet in an imperfectly dried state is passed through the cylinder dryer to be almost dried up. Further, the conventional warp dryer has a guide roller disposed between the hot-air dryer and the cylinder dryer.

[0004] In the warp sizer such as above, however, a warp sheet passing through the guide roller is dried by the hot-air dryer but is in an imperfectly dried state. Consequently, it is unavoidable for the non-dried size to adhere to the surface of the guide roller.

[0005] The size adhered to the surface of the guide roller is in a half-dried state and highly sticky. For this reason, running warps adhere to the surface of the guide roller and comes off the guide roller when separated from the guide roller and become fluffy (in case of filament threads, broken filaments are caused). Sometimes a plurality of filaments are broken and coil round the guide roller, causing to cut thread. Broken filaments as well as fluffs prevent the warps from being divided in a subsequent process, further causing broken filaments or fluffs and a shedding insufficiency in weaving by a loom to prevent improvement in weaving performance.

[0006] In view of the above, a surface treatment hardly causing size to adhere such as Teflon coating used to be done to guide rollers. However, even such a treatment proved insufficient for preventing the size from adhering, and without undergoing a certain degree of drying by a hot-air dryer, the size adhesion increases in a short time. Therefore, it was necessary to restrict the running speed of warps irrespective of the drying ability of the cylinder dryer, and to lower the running speed of the warps so that drying by the hot-air dryer can be carried out to such an extent as no size will adhere to the guide roller.

[0007] In a warp sizer, therefore, it is important to prevent size from adhering to the surface of a guide roller disposed on the upstream side of a cylinder dryer.

SUMMARY OF THE INVENTION

[0008] The warp sizer according to the present invention comprises means for heating a guide roller which guides a sized warp sheet to a cylinder dryer.

[0009] A sized warp sheet of which the size is in a non-dried state comes in contact with the surface of the heated guide roller and is heated by the guide roller. By this, the size adhered to the warp sheet is dried at least in the surface part of the warp sheet by the time the warp sheet is separated from the guide roller, and is hardened so as not to adhere to the surface of the guide roller and adheres to the warp sheet, thereby preventing the size from adhering to the surface of the guide roller.

BREEF OF THE DRAWINGS

[0010] Fig. 1 is a view showing one embodiment of the warp sizer according to the present invention.

[0011] Fig. 2 is a view showing another embodiment of the warp sizer according to the present invention.

PREFEED EMBODIMENT OF THE INVENTION

[0012] Referring to Fig. 1, a sizer 10 draws out in a form of a warp sheet 16 a plurality of warps wound round a warp beam 12 by a feeder 14 and passes them through a sizing apparatus 18.

[0013] The feeder 14 is a known feed mechanism comprising a plurality of rollers such as a feed roller, a guide roller and a nip roller disposed on the upstream and downstream sides of the feed roller, respectively.

[0014] The sizing apparatus 18 is a known apparatus for adhering a predetermined amount of size to each warp of the warp sheet 16 by passing the warp sheet through a plurality of rollers into a sizing tank.

[0015] The sized warp sheet 16 is passed through a next hot-air dryer 20 to be heated and dried. The hot-air dryer 20 is a known apparatus for drying the non-dried warp sheet 16 to a certain extent in a state not in contact with composing members of the hot-air dryer 20 by exposing the warp sheet 16 to the hot air. The hot-air dryer 20 in the illustrated example is disposed between the sizing apparatus 18 and the cylinder dryer 22 and has a plurality of hot-air drying chambers 20a, 20a arranged in series to pass the warp sheet 16.

[0016] Though the warp sheet 16 is dried to a certain extent by passing through the hot-air dryer 20, the adhered size is still in an insufficiently dried state. The warp sheet 16 is passed through the next cylinder dryer 22 to be heated and dried.

[0017] The cylinder dryer 22 is a known apparatus, comprising a plurality of heating cylinders 22a to be heated by steam and to pass the non-dried warp sheet 16 by bringing it into contact with the surfaces of the heating cylinders 22a one after another. All the heating

cylinders 22a are rotated synchronously with the running speed of the warp sheet.

[0018] The warp sheet 16 is wound over the outer periphery of each heating cylinder 22a to be efficiently and perfectly dried by contact drying. The dried warp sheet 16 is taken up by a take-up beam 26 through a length-measuring roller 24. The warp sheet 16 is passed through a warp divider (not shown) for preventing adjoining warps from adhering to each other by the size in at least one position between the sizing apparatus 18 and the take-up beam 26.

[0019] The warp sizer 10 is further provided with guide rollers 28 and 30 for enlarging the winding length (i.e., winding angle) of the warp sheet 16 over the heating cylinders 22a on the most upstream and downstream sides arranged respectively on the upstream and downstream sides of the cylinder dryer 22 and a heating fluid feeder 32 for feeding high-temperature hot fluid such as steam, water, fire-resistant fluid to the guide roller 28.

[0020] The warp sheet 16, being enlarged in the winding length over the heating cylinders 22a in the most upstream and downstream sides by the guide rollers 28, 30, is more efficiently and perfectly heated and dried. Further, since the guide roller 28 is heated by the heating fluid from the hot-fluid feeder 32, the warp sheet 16 is heated more and dried by coming into contact with the guide roller 28.

[0021] In the illustrated embodiment, the guide roller 28 is a so-called passive driving (driven rotation) roller to be rotated, following a movement of the warp sheet 16. The guide roller 28 may be, however, a so-called active driving (driving rotation) roller to be actively rotated synchronously with the running speed of the warp sheet 16. The guide roller 28 has a diameter smaller than the heating cylinder 22a, so that it can be manufactured at a lower cost than the heating cylinder.

[0022] The warp sheet 16 which is passed through the hot-air dryer 20 and dried to a certain extent is wound over the outer periphery of the guide roller 28 and passes it, thereby being heated and dried by the guide roller 28. By this, the size adhered to the warp sheet 16 is dried in at least the surface part by the time the warp sheet 16 is separated from the guide roller 28, hardened to such an extent as not to adhere to the surface of the guide roller 28, adhered to and maintained by the warps of the warp sheet 16 and prevented from adhering to the surface of the guide roller 28.

[0023] If the size does not adhere to the guide roller 28 such as above, the warp sheet 16 after passing through the hot-air dryer 20 may be less dried than in the conventional sizer, so the running speed of the warp sheet 16 can be higher than in the conventional sizer for increasing the efficiency in production, while in case the running speed of the warp sheet 16 is not increased, the temperature of the hot-air dryer 20 can be more lowered than in the conventional sizer.

[0024] In the above-mentioned warp sizer 10, if the drying ability by the hot-air dryer 20 is lowered, incidental effects such as follows can be obtained.

(1) Even warps too much affected to be dried at a high temperature can be dealt with, not by lowering the running speed of the warps but by lowering a little the temperature of hot-air drying, so that it is not necessary to take measures of fully drying as conventionally by lowering the temperature as well as the running speed of the warps.

(2) It is necessary to raise the drying temperature by the cylinder dryer by the extent that the temperature of the hot-air dryer is lowered. However, since the heating cylinder 22a is made of a metal having good heat conduction, the warp sheet 16 is brought into contact with the excellent heat-conductive metal in the cylinder dryer 22 to be efficiently dried. Therefore, the cylinder dryer 22 is of a higher thermal efficiency than the hot-air dryer. Both dryers 20, 22 as a whole results in saving energy by lowering the drying ability of the hot-air dryer 20 of a low thermal efficiency and enhancing the drying ability of the cylinder dryer 22 of a high thermal efficiency.

[0025] Fig. 2 shows a warp sizer 40 specifically used for span threads. Since occurrence of fluff does not matter in span threads, the warp sizer 40 does not comprise any hot-air dryer of a low thermal efficiency, and the cylinder dryer 22 is provided above the sizing apparatus 18 in order to shorten the machine length.

[0026] In this warp sizer 40, too, the guide roller 28 for enlarging the winding length of the warp sheet 16 over the heating cylinder 22a, where the warps are first wound, is heated by a heating fluid from the heating fluid feeder 32 to heat and dry the warp sheet 16 passing therethrough. In this embodiment, too, the guide roller 28 has a diameter smaller than the heating cylinder 22a.

[0027] In any one of the above-mentioned embodiments, the guide roller 28 may be constantly heated. However, if the guide roller 28 is heated only during an operation of the sizer, it will not only save energy but also prevent the size from drying excessively when the sizer is stopped.

[0028] The surface of the guide roller 28 may be metal, but it is preferably made of a face of a low friction factor such as a coating face coated by polytetrafluoroethyrene such as Teflon. By doing so, it will become harder for the size to adhere to the guide roller 28.

[0029] As heating means for the guide roller 28, other heating means such as not only a high-temperature heating fluid but also an electric heater may be used.

[0030] In heating means using an electric heater, the electric heater is disposed in the guide roller 28, and the heating power is controlled by an external guide roller controller, thereby controlling the temperature of the electric heater and operating time. When an electric heater is used as heating means, the heating fluid feeder 32 is replaced by a heating power supplier such as a heating source and a controller.

[0031] The guide roller 28 has a smaller diameter and a higher rotation speed than a heating cylinder 22a, so that when a heating fluid is used as heating means, a sealing technique at a joint portion of the guide roller 28 and a heating fluid circulation pipe is more difficult than a sealing technique at the heating cylinder 22a, which causes a fear for the heating fluid to leak outside. On the other hand, when an electric heater is used as heating means, there is caused no such a fear, and heating of the guide roller 28 can be carried out more safely.

[0032] The present invention is not limited to the above-mentioned embodiments. The present invention can be changed variously without departing from its spirit.

Claims

1. A warp sizer which sizes a sized warp sheet (16) by guiding the same to a cylinder dryer (22) through a guide roller (28), comprising means (32) for heating said guide roller (28).

2. A warp sizer according to claim 1, wherein said heating means (32) include means for supplying hot air or steam to said guide roller.

3. A warp sizer according to claim 1, wherein said heating means (32) are disposed within said guide roller (28) and include an electric heater.

4. A warp sizer according to claim 1, 2 or 3, further comprising a hot-air dryer (18) disposed on farther upstream side in the moving direction of said warp sheet (16) than said guide roller (28) and for drying said warp sheet by heating.

FIG. 1

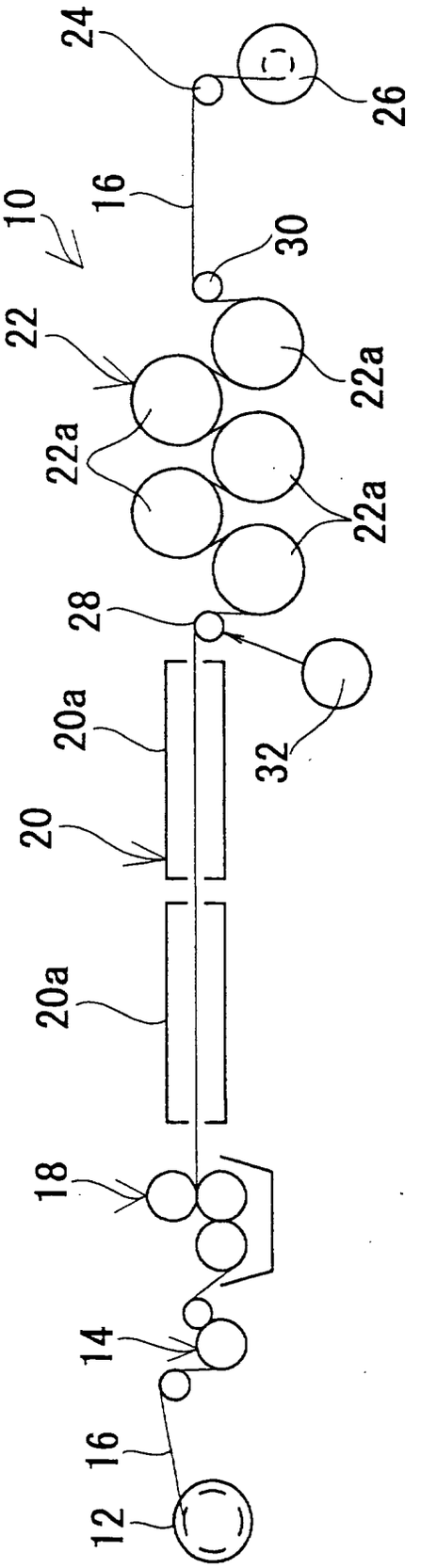


FIG. 2