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(11) Publication number:

0 414 650 A1

(12)

EUROPEAN PATENT APPLICATION

(21) Application number: 90830368.8

(51) Int. Cl.⁵: **D06C 17/00**

(22) Date of filing: 07.08.90

(30) Priority: 22.08.89 IT 1167789

I-50047 Prato Firenze(IT)

(43) Date of publication of application:
27.02.91 Bulletin 91/09

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(84) Designated Contracting States:
BE CH DE DK ES FR GB LI NL

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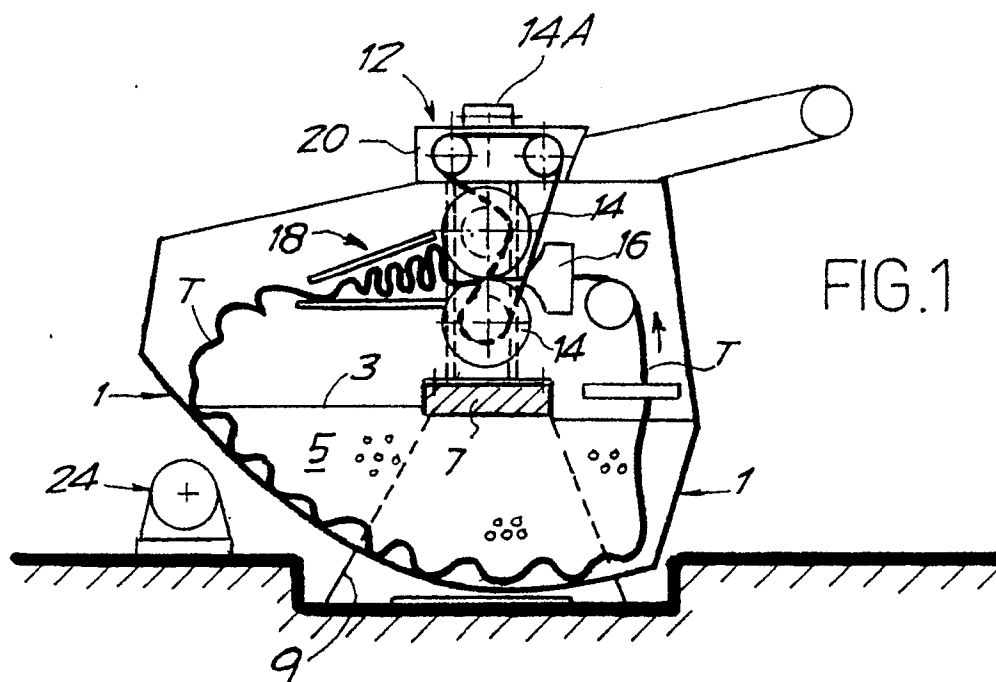
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(54) **A multiple, selfoperating fulling machine.**

(57) A multiple scouring-fulling machine, comprising a single common tank (1) with perforated dividing partitions (3) allowing the intercommunication be-

tween the tank sections (5) formed by said partitions, and independently operating heads (12) overhanging each tank section (5).



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The invention refers to a fulling machine or better, a scouring-fulling machine for fabrics, which has special advantages and performances that will be evident by the reading of the following description.

A scouring-fulling machine provides, during the operation, the steps of:

- 1) pre-washing;
- 2) percentage reduction of water in the fabric;
- 3) introduction of fulling agents (soaps, etc.);
- 4) fulling;
- 5) washing.

The fulling machine must be set according to the operations that are required thereto by the action of the input sides or pads (which is a function of the weft shrinkage percentage), of the transfer cylinders pressure and of the casing (which is a function of the warp shrinkage percentage), all to cause the fulling of the wool or mixed wool fabric.

There are known:

- single fulling machines (with a single tank and only one "rope", that is to say a single fabric passed through the head with one or more turns);
- fulling machines with washing (also with a single tank and only one passage);
- two-rope fulling machines with washing (with a single tank, two ropes, and a single drive for the two pairs of pressure cylinders);
- four-rope fulling machines, with two coaxial shafts having respective drives (with a single tank and four individual ropes);
- four or six-rope fulling machines (with a single tank, four or six individual ropes and only one drive with rigid shaft).

In some cases, the multiple washing-fulling machines includes means for controlling the individual "ropes" through the adjustment of the pads or cases.

In the case of multiple machines, when the fabric of one rope reaches earlier than the other fabrics the predetermined work percentage in length and/or width, owing to the different characteristics of the yarn or to the rope length, the fabric must be removed and washed on a second step. Otherwise, keeping the cylinders work pressure stable, even by spreading the cases apart and opening the pads, it would be a problem to properly control the shrinkage percentages. In conclusion, it is difficult to achieve uniform results in the various, simultaneously treated fabrics.

Achieving a more uniform final standard weight is possible only by really controlling each individual rope, thereby ensuring also the regularity of raising and other finishing operations after the fulling.

Some types of fabrics require power which is higher than that individually applied to multiple machines, and provision is to be made for powers higher than those actually required. These extra

powers are also required because of the possible occurrence of simultaneous absorption peaks during the passage of seams or other.

The length of the cylinder shafts causes structural and duration-related problems, which some times are difficult to solve.

Too long shafts having no intermediate bearings must be oversized.

In the multiple machines it is practically impossible to use systems for controlling the working percentage in the longitudinal direction, as the sensors, mounted to sense the seam passage, will create practically unremovable interferences.

On multiple machines, it is practically impossible to work fabrics with substantial differences in the weights in grams, because of the differences in thickness that these fabrics have when passing through the cylinders.

The invention overcomes the above drawbacks although providing a machine which is able to work in a way similar to the above mentioned multiple machines.

Substantially, a multiple scouring-fulling machine according to the model comprises a common single tank, with perforated dividing partitions allowing the intercommunication between the tank sections formed by said partitions, and further comprising independent operative heads, each overhanging a respective tank section.

In practice, a platform overhanging the tank sections may be provided, which supports said heads.

Advantageously, each head is operated by a hydraulic motor. A common hydraulic system supplying the hydraulic motors of the various heads may also be provided.

The invention will be better understood by following the description and the attached drawing, which shows a practical, non limitative exemplification of the same invention. In the drawing:

Fig. 1 shows a schematic side view in intermediate section of the multiple machine according to the invention; and

Fig. 2 shows a schematic side view in partial longitudinal section.

According to what is illustrated in the attached drawing, numeral 1 indicates a common tank of the multiple machine, which is subdivided by the partitions 3 into a plurality of separate tank sections 5. The partitions 3 are perforated or even grid-like and in any case cribose, i.e. they leave a substantial communication capability between the various tank sections 5, the tank remaining, however, a common and single tank. Developed above the tank 1 is a platform 7 which may be made of any suitable material and extends along the whole front of the tank, being supported at the ends by support means 9. Placed on the platform 7 there are sub-

stantially illustrated individual heads 12, each of which is provided with the typical members of the fulling machines, that is to say in particular with pressure cylinders 14, with so-called pads or sides 16 to transversely compact the fabric T on the input thereof between the two pressure cylinders 14, and with the so-called case 18 which compacts the fabric on the output thereof from the cylinders 14. The fabric T is made to pass several times, in order to form the so-called rope, by passing through the assembly of head 12 and to dip into the tank again in particular, according to the invention, into the section 5 of the multiple tank which is associated to each of said heads. Numeral 14A indicates the means for controlling the pressure of the pressure cylinders 14, while the means for regulating the pads 16, the case 18 and the cylinder pressure are omitted for the sake of clarity. All the regulation means of each head 12 are individual and independent one from the other. Each head 12 is typically driven by a hydraulic motor, diagrammatically indicated at 20 in the drawing, which may be installed in overhanging position, two-sided belt drives being possibly provided for the pressure cylinders 14. The hydraulic motors 20 of each head 12 may be all supplied by a single central unit 24 consisting at least of a hydraulic pump having sufficient capacity to ensure the operation of all the motors installed on the individual heads 12.

The heads 12 are not provided with connections, especially rigid connections with each other, but are merely placed on the platform 7, which is relatively very rigid, but whose possible deflections do not affect the individual and adjacent heads 12.

With the separate tank represented by each section 5 for each individual head 12, the latter is able to operate independently of the others without the mass of the fabric rope T inside a tank section affecting the operation of heads 12 inside the adjacent sections 5, while there is the possibility of a safe exchange of liquid between one section and the other of the tank 1 in common to all the heads.

The main differences of the machine according to the invention, when compared with the known machines mentioned above, are the following: the common storing tank, with perforated partitions allows the common inflow of water during the washing and prevents the formation of stringings, knottings and superimpositions between adjacent ropes in the event of a rope stop during the fulling; the individual drive for each pair of cylinders (or so-called channels), obtained by a self-contained hydraulic or even electrical motor for each individual and complete fulling group.

There is thus obtained, among other things:

A) a perfect, absolutely individual control of the technological cycle of the individual "ropes",

that is to say fabrics, which may also be of different materials;

B) the possibility of reaching uniform weight standards;

C) the possibility of installing and exploiting powers sufficient for each absorption peak of each head, without resorting to too high installed powers;

D) the elimination of any structural problem related to the shafts;

E) no difference between the pressures actually applied on the ropes;

F) the possibility of actually applying an automatic control of the warp shrinkage of each fabric.

A fulling unit or a fulling head is intended to be a constructional assembly including those groups indispensable for achieving the fulling effect, that is: adjustable pads; cylinders for the transfer and compression of the fabric with relevant drive; adjustable fulling case.

While in the single fulling machines of known type, the three cited groups are anchored to or solid with the external structure of the machine, never before have they been provided in a single assembly.

This has been achieved by the fulling machine according to the invention which, in conclusion:

1) is a machine made up of two or more complete and self-contained fulling heads inserted into a storing tank having one or more perforated partitions;

2) is a machine made up of two or more complete fulling heads, which may be programmed - manually or automatically - with identical or different work parameters (speed, pressure, etc.);

3) is a machine made up of two or more fulling heads in each of which the work parameters may be changed or reset - either manually or automatically - during the work;

4) is a machine, with a common storing tank and with one or more perforated partitions, which allows a working with no interferences between close ropes in case of stopping thereof, and intercommunicating in the presence of water during the washing phase;

5) is a machine which - being made up of two or more independent heads - allows the application of an automatic control of the percentage shrinkage in length of the fabric;

6) is a machine that may be provided with a centralized system for filtering, recycling and mixing of the washing water.

The motorization of the individual heads may be of electrical instead of hydraulic type.

Claims

- 1) A multiple scouring-filling machine, comprising a single common tank with perforated dividing partitions allowing the intercommunication between the tank sections formed by said partitions, and independently operating heads overhanging each tank section. 5
- 2) A scouring-filling machine according to the preceding claim, comprising a platform disposed above the tank sections and supporting the said heads. 10
- 3) A scouring-filling machine according to the preceding claims, wherein each head is actuated by a hydraulic motor.
- 4) A scouring-filling machine according to claim 3, comprising a common hydraulic system which supplies the hydraulic motors of the various heads. 15

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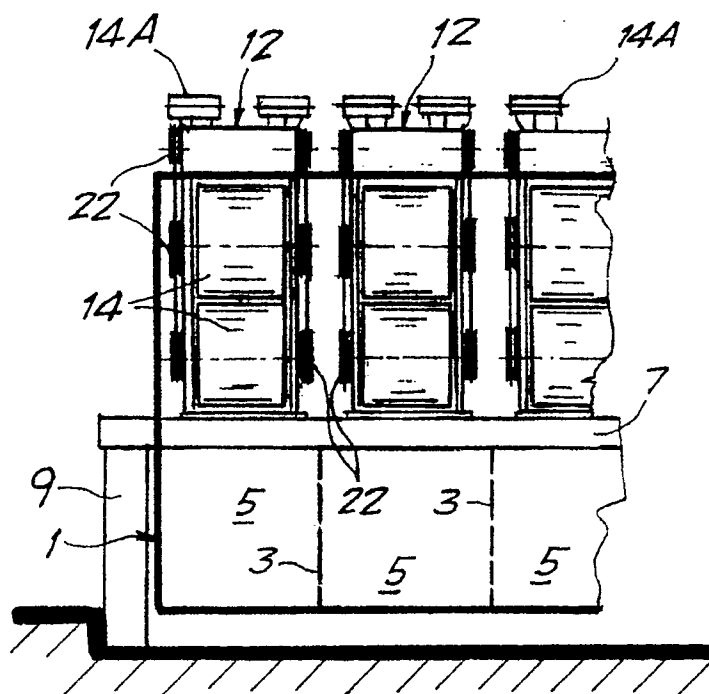
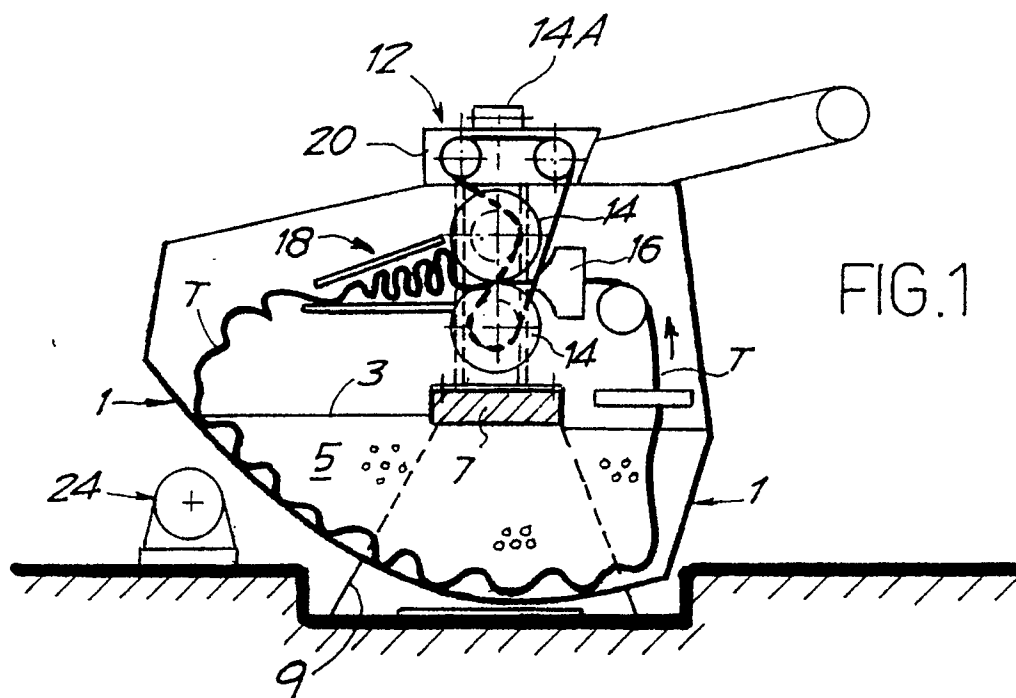
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EUROPEAN SEARCH REPORT

Application Number

EP 90 83 0368

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X	GB-A-1 273 489 (BERTOLDI) * the whole document * - - - -	1-4	D 06 C 17/00
X	DE-A-2 306 885 (ZONCO FEDERICO E FIGLIO DI FEDERICO ZONCO) * the whole document * - - - - -	1-4	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D 06 C
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of search 04 December 90	Examiner PETIT J.P.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			