



NEW EUROPEAN PATENT SPECIFICATION

Date of publication of the new patent specification : **19.11.92 Bulletin 92/47**

Int. Cl.⁵ : **D06C 11/00**

Application number : **83102269.4**

Date of filing : **08.03.83**

Process and means to optimize utilisation of drums of raising machines and the like.

Priority : **09.03.82 IT 8360882**

Date of publication of application :
14.09.83 Bulletin 83/37

Publication of the grant of the patent :
25.11.87 Bulletin 87/48

Mention of the opposition decision :
19.11.92 Bulletin 92/47

Designated Contracting States :
AT BE CH DE FR GB LI LU NL SE

References cited :
DE-B- 1 137 713
DE-C- 91 375
DE-C- 116 706
DE-C- 385 719
FR-A- 1 163 662

References cited :
FR-E- 89 593
GB-A- 1 078 203
GB-A- 2 036 116
US-A- 3 822 447
W. Bernard "Appretur der Textilien", 2nd. Edition, 1967, Springer-Verlag, Berlin, pages 142 - 161

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EP 0 088 431 B2

Description

The invention relates to a raising machine, of the type comprising a raising roller, carrier drum, an intake roller for the input of a piece of fabric to be raised against the drum and a takeoff roller for the output of a piece out of the drum.

This invention concerns a process and means to optimize the utilization of the operative surface of raising roller carrier drums of raising machines and the like.

In the known art raising machines and the like comprise at least one drum including a number of raising rollers each one driven to rotate each around its axis and altogether around the axis of the drum as parts carried by the same. In satellitic position, attending upon such raising roller carrier drum a fabric intake roller and a fabric takeoff roller are provided with their axes parallel to the raising roller carrier drum axis so as to include a convex angle with vertex at the axis of raising roller carrier drum of about 290 degrees. FR-A-89593 discloses a raising machine of this type. Since the fabric length runs around intake roller, raising roller carrier drum and takeoff roller, the fabric length engages the raising roller carrier drum along a 290 degrees arc which corresponds to the surface of the raising roller carrier drum, which raising rollers, comprised in such arc, keep into raising working engagement with the fabric loop being fed thereupon. Working effectiveness depends, among other factors, upon pressure urging the fabric upon the raising rollers and the pressure, at its turn, is a direct function of fabric feeding stretch and an inverse function of raising roller carrier drum diameter. Moreover such a pressure is not constant all over the raising rollers engaged by the fabric. In fact, the raising working pressure is relatively low at the first raising roller, i.e. the one being closest to the intake roller and thereafter increases up to a constant value which is maintained along an angle of about 120 degrees. Whereupon the pressure rapidly increases along the top central part of the fabric loop and then, symmetrically to the increasing trend, decreases along next 120 degrees and at takeoff roller it assumes the same value than at the intake roller. Due to this unsteadiness of radial centripetal raising working pressure the diameter of the raising roller carrier drum can not be designed smaller, while a true effectiveness of raising working takes place only when the pressure is comprised in a very strict optimal field. In fact, when lower pressures, as at fabric intake, and too much higher pressures, as in correspondance of the top of the fabric loop occur, the result is substantially null. Moreover, once the fabric was subjected to an excessive raising working pressure, e.g. at the top of the fabric loop or raising roller carrier drum, even with a following optimization of the pressure, optimal efficiency is not restored. This proceeding was generally ignored as the raising working result was accepted as a whole, without having care to analyze it where in fact, really occurred. Once the inventor's spirit of observation carried him, firstly to conceive and then to constate practically the steps of proceeding, he realized two very important consequences: firstly the fabric-raising drum contact in those sections of poor effectiveness is useless; secondly, from the same sections an optimal effectiveness may be obtained. Corollary to this perception there are the following ideas: a) to recover the effectiveness lost in the second half of the drum by decreasing fabric feeding speed; b) fabrics to be raised on both sides may be alternatively worked on both sides by optimal balancing pile raising. After having checked also these hypotheses, he designed fabric takeoff from raising roller carrier drum where effectiveness become poor whereupon turning the fabric upside-down and then reapproaching the same fabric by an additional intake roller to another section position of same raising roller carrier drum. Particular and whole checking of these hypotheses carried the inventor to conceive new and novel raising machines and process by which with a single raising machine according to an embodiment of the present invention the same results obtainable from two known coupled raising machines may be obtained. Moreover with the embodiments of the invention many results may be obtained which are not obtainable from known raising machine or are obtainable only from complicated special raising machines or plants. Moreover the results are even more interesting when more than one embodiment of the present invention is included in one raising line.

The solution is characterised by the fact of comprising at least two pairs of intake and takeoff rollers (4,5';4',5), in which the intake and takeoff rollers (4',5') of each pair are placed so that the planes passing through the drum axis and the respective intake and takeoff roller axes of each pair define an angle, so that the arc of the piece of fabric extending between the intake roller and the takeoff roller is pressed against the drum (1) with a pressure sufficient for the raising, and by the fact that the leading speed of each intake and takeoff rollers (4,4',5,5') of each roller pair is independently adjustable.

For a better understanding of the present invention reference may now be made to the accompanying drawings which show a possible embodiment thereof in a diagrammatic and merely illustrative way.

Figure 1 is a schematic side view of a raising plant according to the present invention showing row, by an optimal utilization of effective section of a single raising roller carrier drum, a fabric lump of definite length arranged as a loop, is raised on both sides thereof.

Figure 2 is a schematic side view of a three raising machines raising plant according to the present invention showing how, by providing an optimal utilization of the effective surface of raising roller carrier drums, a fabric

lump of indefinite length, is raised on both sides thereof.

Figure 3 is a schematic side view of a raising machine, according to the present invention, showing the driving transmission to drive, at variable speed, the additional intake and takeoff rollers.

Figure 4 is a particular perspective view showing a section of transmission shown at Figure 3.

Figure 5 is a diagram showing in abscissa the flat developed circumference "L" of raising roller carrier drum or correspondingly the fabric length supposed to provide a loop about the whole raising roller carrier drum and in ordinate "P", representing the radial centripetal component power "P", urging the fabric against each raising roller or carrier drum, in fact representing raising working pressure. Diagram in the form of ordinate parallel arrows; thin arrow "C" representing conditions of known raising machines and thicker arrows "I" representing the corresponding conditions resulting from a raising machine according to the present invention. The diagram was determined analytically.

Figure 6 is a diagram showing in abscissa time "T" and in ordinate the corresponding raising effectiveness "E". Area "V" marked with thicker lines or hatchings relating to known raising machines and area "I" marked with thinner lines or hatchings relating to raising machines according to the present invention, with a fabric feeding speed reduced by about 30% of speed of known raising machines. The diagram was determined with an experimental raising machine embodying the present invention wherein the takeoff roller was slowly rotated about the raising roller carrier drum axis from a position suitable for known raising machines to the intake roller, checking the effectiveness obtained at each rotating step. Approximately such experimental raising machine corresponds to the raising machine shown at Figure 7 but including only two roller carrier arms: the first one (intake) and the last one (takeoff).

Figure 7 is a sketch of an improved raising machine according to the present invention, wherein four raising working sectors are provided which size or angle may be adjusted according to the need and including three fabric turnover devices meaning that about a single raising roller carrier drum for raising operations dependent or independent of any kind may be provided.

Referring now to Figures 1, 2 and 7 of the drawings, a known raising machine comprises substantially a raising roller carrier drum 1 which is rotatable about a drum shaft 10 and carrying on its substantially cylindrical periphery a number of raising rollers 11 and 11'. Raising rollers 11 and 11' rotate in the same direction, each about its axis but each is provided with raising fillets which teeth points are pointing in opposite direction referred to the raising fillet teeth point applied to the previous and next raising roller. The fabric lump to be worked, e.g. fed off from a beam (not shown) or from a chute 3, is run on a number of conveying rollers and finally wound about a portion of intake roller 4 placed almost tangent to the raising rollers 11, 11' of raising roller carrier drum 1 at a distance from its vertical axis substantially corresponding to about one half of the distance of its axis from drum axis 10. In the known machines the fabric lump 2 runs upon the raising roller carrier drum 1 along an arc of about 290 degrees of its periphery and is taken off tangentially to the same raising roller carrier drum 1 and takeoff roller 5 to be received by output rollers 6. Then the fabric lump 2, partially worked on its side 2', could be worked on the same side by intaking the fabric lump in another machine (Figure 2) as the one described of the same line comprising two (M2, M3) or more machines or the leading end of fabric lump 2 could be attached to the rear end of same to provide a loop to be run indefinitely completing the raising operation. This arrangement is shown in Figure 1 and is such that the fabric lump 2 is carried again on the chute 3. Since operations to be executed on each side 2', 2'' of the fabric lump are of at least two kinds, each including more runnings, one of which comprising the step, so said "pile" according to which the fabric lump 2, the raising roller carrier drum 1, the raising rollers 11, 11' and the points are rotated or are pointed in one direction and the step, so said "counterpile", according to which at least one of the directions now described is inverted to be opposite to pile raising operation and vice versa. In known machines when both sides 2', 2'' of fabric lump 2 had to be worked a four step operation was necessary which in case of on line plants could operate only with a number of machines resulting from the following relation:

$$N \text{ of machines} = \frac{N \text{ of sides or surfaces (pile runnings + counterpile runnings)}}{N \text{ of leading ends changes}}$$

The same inventor and applicant with a previous application in Italy numbered 83639A/81 solved the problem of the number of leading end changes reducing them to one, i.e. the fabric lump are intaken row into the first machine M1 and outlet from the last plant machine. However this result was obtained increasing correspondingly the number N of machines; since two steps are usually needed, the number of machines is to be duplicated.

Instead in case of provision of a fabric closed loop multiple revolution may be made so that the factor between brackets of the previous relation is reduced to unity so that the relation may be reduced to:

$$N \text{ of machines} = \frac{N \text{ of sides or surfaces}}{N \text{ of leading end changes}}$$

From this relation results that for raising working a fabric lump on both sides without end changes step and

with loop provision at least two machines are needed. Again in known machines the intake roller 4 and the take-off roller 5 both drive the fabric lump 2 and their speed may be adjusted by a variator 40'', 50'' for each roller. Correspondingly adjusting the speed of rollers 4 and 5 a suitable stretch is provided on the fabric lump which provide a centripetal radial pressure of fabric 2 against raising rollers 11, 11' representing the raising working pressure. From this pressure depends the working effectiveness. Pressure P for known machines is shown at Figure 5 by thin arrows C each of which represents a raising roller engaging the fabric 2 while effectiveness is represented by area C' marked with thick lines ascending from left hand to right hand of diagram of Figure 6.

According to the present invention, at least one additional takeoff roller 5' and preferably at least one additional intake roller 4' are provided. Thus the same raising roller carrier drum may engage two or more surfaces of the same fabric lump or of more separate fabric lumps: as many as the pairs of intake-takeoff rollers.

As shown in Figure 1, the raising machine, according to the invention, comprises two pairs of intake and takeoff rollers.

Particularly, the machine comprises a first pair having an intake roller 4 and a takeoff roller 5', and a second pair having an intake roller 4' and a takeoff roller 5.

It is to be pointed out that the intake roller 4(4') and the takeoff roller 5(5') of each pair are placed so that the planes passing through the drum axis and the respective intake and takeoff roller axes define an angle, so that the arc of the piece of fabric extending between the intake roller and the takeoff roller is pressed against the drum with a pressure sufficient for the raising.

As shown in Figure 1, the raising machine, according to the invention, advantageously comprises a fabric turnover device which acts on the fabric between the takeoff roller 5' of one of said pairs of roller and the intake roller 4' of the other one of said pairs.

The same piece of fabric is passed simultaneously between both pairs of intake and takeoff rollers in order to be raised on both its sides.

It will be appreciated that according to the present invention the previous relations are to be completed including at their denominator the number of roller pairs whose minimum value is of course 2 (Figures 1, 2, 3, 5 and 6) thus the number of machines requested to make a given raising work is reduced at least to half. In fact, (Figure 7) according to the present invention bigger raising roller carrier drums may be provided including four or more pairs of intake-takeoff rollers 4-5', 4'-5'', 4''-5''' and 4'''-5. The raising working pressure P available at raising rollers 11 and 11' according to the present invention is shown in the diagram of Figure 5 by thickened arrows which were determined analytically. Whereas the diagram of Figure 6 showing surface C' relative to known machines which is marked with thick lines or hatchings drafted empirically, regarding the effect of the present invention using a machine with a satellite takeoff roller 5' which may be placed in any position about the periphery of raising roller carrier drum by adjusting at each experiment the angle formed with respect to intake roller 4 and raising roller carrier drum center. Diagram of Figure 6 clearly shows that according to the present invention a substantially double effectiveness is obtained simply by reducing fabric feeding speed by 30% as it is evident from a comparison of areas I' and C'. In fact it will be appreciated that area I' is twice as large as area C'. Thus at parity of time and number of machines, an increase of production by 65% is obtained. As shown in Figures 1 and 3 of drawings, when more than one surface of one or more fabric lump are to be worked, it is advisable to include between a pair of rollers and the next one, e.g. between takeoff roller 5' of the first pair and intake roller 4' of second pair, i.e. between rollers 5'' and 4'' and between rollers 5''' and 4''', a fabric turnover device R or R'' or R'''.

Thus is self explaining as (Figure 7) again referring to previous relations or formulas that the number N of machines necessary to work a fabric 2 on both sides if the fabric lump is arranged as a loop and the machine takes advantage of invention described in Italian patent application 83639A/81 is reduced to:

$$N \text{ of machines} = \frac{N \text{ sides or surfaces}}{N \text{ of leading end changes} \cdot N \text{ pairs of rollers}} = \frac{2}{1.2} = 1$$

According to a preferred embodiment of the present invention each intake roller 4' and each takeoff roller 5' is driven by the same variator 40'' and 50'' driving the partner roller of the pair. Since, as known, between each variator 50'' and 40'' and the driven roller respectively 5, 4, a reduction gear 50, 40, are provided also between variators 50'', 40'' and rollers 4', 5' respectively, pendular reducing gears 40', 50' are provided. Pendular position of each reducing gear is adjustable by a device 7, 7', e.g. comprising a toothed segment 70, 70' a driving worm 71, 71', a driving rod 72, 72' and a knob 73, 73'. According to the same embodiment of the invention each pulley 74, 74' of pendular reducing gear and/or the one driving it through belt 58, 58' may be of the expandible kind so that the feeding speed of rollers 4', 5' may be changed about the speed rate of rollers 4 and 5 of the same pair.

Claims

1. Raising machines, of the type comprising a raising roller carrier drum (1) an intake roller (4) for the input of a piece of fabric (2) to be raised against the drum (1) and a takeoff roller (5) for the output of the piece (2) out of the drum (1),
 characterised by the fact of comprising at least two pairs of intake and takeoff rollers (4,5';4',5), in which the intake and takeoff rollers (4',5') of each pair are places so that the planes passing through the drum axis and the respective intake and takeoff roller axes of each pair define an angle, so that the arc of the piece of fabric extending between the intake roller and the takeoff roller is pressed against the drum (1) with a pressure sufficient for the raising,
 and by the fact that the leading speed of each intake and take off roller (4,4',5,5') of each roller pair is independently adjustable.
2. Raising machine according to Claim 1, characterised in that the same piece of fabric is passed simultaneously between both pairs of intake and takeoff roller and in that a fabric turnover device is provided, which acts on the fabric between the takeoff roller of one of the said pairs of rollers and the intake roller of the other one of said pairs.

Patentansprüche

1. Rauhaschine mit einer Rauhzyylinder-Tragtrommel (1), einer Einlaufwalze (4) für die Eingabe eines Stoffstücks (2), das an der Trommel (1) aufgerauht werden soll, und einer Abzugswalze (5) zur Ausgabe des Stücks (2) aus der Trommel (1),
 dadurch gekennzeichnet, daß sie zumindest zwei Paare von Einlauf- und Abzugswalzen (4,5';4',5) umfaßt, bei denen die Einlauf- und Abzugswalzen (4',5') jedes Paares so angeordnet sind, daß die durch die Trommelachse verlaufenden Ebenen und die jeweiligen Einlauf- und Abzugswalzenachsen jeden Paares einen Winkel bilden, so daß der Bogen des Stoffstücks, das sich zwischen der Einlaufwalze und der Abzugswalze erstreckt, mit einem für das Aufrauen ausreichenden Druck gegen die Trommel (1) gedrückt wird,
 und durch die Tatsache, daß die Zuführgeschwindigkeit jeder der Einlauf- und Abzugswalzen (4,4',5,5') jedes Walzenpaares einzeln einstellbar ist.
2. Rauhaschine nach Anspruch 1, dadurch gekennzeichnet, daß das gleiche Stoffstück gleichzeitig zwischen zwei Paaren von Einlauf- und Abzugswalzen durchläuft, und daß eine Stoffwendeeinrichtung vorgesehen ist, die auf den Stoff zwischen der Abzugswalze des einen der Walzenpaare und der Einlaufwalze des anderen dieser Paare einwirkt.

Revendications

1. Laineuse, du type comportant un tambour de support de rouleau gratteur (1), un rouleau d'entrée (4) d'une pièce de tissu (2) à gratter contre le tambour (1) et un rouleau de sortie (5) de la pièce (2) hors du tambour, caractérisée par le fait qu'elle comporte au moins deux paires de rouleaux d'entrée et de sortie (4,5';4',5), dans lesquelles les rouleaux d'entrée et de sortie (4',5') de chaque paire sont placés de façon que les plans passant par l'axe du tambour et les axes respectifs de chaque paire de rouleaux d'entrée et de sortie définissent un angle, de sorte que l'arc de la pièce de tissu s'étendant entre le rouleau d'entrée et le rouleau de sortie soit comprimé contre le tambour (1) avec une pression suffisante pour le grattage et par le fait que la vitesse d'alimentation de chaque rouleau d'entrée et de sortie (4,4',5,5') de chaque paire de rouleaux est réglable indépendamment.
2. Laineuse suivant la revendication 1, caractérisée en ce que la même pièce de tissu passe simultanément entre deux paires de rouleaux d'entrée et de sortie et en ce qu'un dispositif de retournement du tissu est prévu, agissant sur le tissu entre le rouleau de sortie de l'une desdites paires de rouleaux et le rouleau d'entrée de l'autre paire de rouleaux.





