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(54) **APPARATUS FOR OPERATING AND PROGRAMMING A RING SPINNING FRAME**

VORRICHTUNG FÜR DEN BETRIEB UND DIE PROGRAMMIERUNG EINER RINGSPINNMASCHINE

APPAREIL POUR L'ACTIONNEMENT ET LA PROGRAMMATION D'UN CONTINU À FILER À ANNEAUX

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(56) References cited:
WO-A1-2008/068294 **CH-A5- 688 479**
DE-A1- 4 041 301

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Description

[0001] The present invention relates to an apparatus for operating and programming a ring spinning frame destined to process a roving so as to obtain a yarn made from a continuous sequence of portions, each portion having predetermined count and/or twist characteristics.

[0002] In the modern textile industry there is an increasing trend towards the production of high-value textiles, frequently characterised by unusual aesthetic qualities distinguishing them from ordinary products.

[0003] In particular it is known that the count or twist characteristics of a yarn can affect the aesthetic qualities of the textile made from the yarn, as known e.g. from CH 688479-A5, DE-A-40,41,301, or WO 2008/068294-A1.

[0004] The variation of the count of a yarn, in other words the variation in weight along its length, gives rise to a thickening or thinning of the textile made from the yarn, giving it pleasing aesthetic qualities.

[0005] In such case the yarn is called a slub yarn and the corresponding process is called slubbing.

[0006] Similarly, a variation in the twist of the yarn is related to its capacity to absorb colour. In this case too, if this characteristic is exploited skilfully, it is possible to produce textiles having unusual chromatic characteristics which increasingly often make the textile into a high-value product.

[0007] It is also possible to vary the count and twist simultaneously.

[0008] Generally, the yarn is processed in such a way that it acquires the desired count and/or twist characteristics in a ring spinning machine, by passing through specially designed drawing and twisting devices in which the count or the twist of the yarn is varied by suitably adjusting the speed of the drawing rollers.

[0009] An example of a textile machine based on the aforesaid principle is described in GB-A-2034764. There is also a known way of generating appropriate reference signals which, when suitably interpreted by dedicated devices of the textile machine, adjust the speed of the driving means in order to generate a yarn in which the variation of the count or of the twist corresponds to the values of a specified function. An example of an embodiment as above is described in EP669414.

[0010] A further embodiment example of a frame provided with an operating and control device is described in document EP1413655 in the name of the Applicant.

[0011] The variation of the count along a defined portion of length of the yarn makes a slub, which may have different profiles depending on the progress of the count in the portion considered.

[0012] In practice, a user of the frame who intends to produce a yarn with a desired sequence of slubs, must manually predispose a list of instructions to submit to the operating and control device, to control it adequately.

[0013] However, such procedure is open to numerous potential errors by the user with consequent results on the yarn produced. Moreover, such activity becomes considerably complex for a slub having an unusual profile or as soon as the sequence of the slub along the yarn becomes slightly more complex than a mere repetition of a slub with a constant count.

[0014] The problem tackled by the present invention is that of devising an apparatus for operating and programming a frame such that the aforesaid requirements are met while the drawbacks mentioned with reference to the known art are overcome.

[0015] Such purpose is achieved by an operating and programming apparatus according to claim 1 and a method as defined in claim 6.

[0016] The characteristics and advantages of the operating and programming apparatus according to the present invention will be evident from the following description, made by way of a non-limiting example, with reference to the attached drawings, wherein:

- Figure 1 is a schematic view of a spinning station of a ring spinning frame;
- Figure 2 is a diagram of an operating and programming apparatus according to the present invention;
- figure 3 shows an example of embodiment of a first interface of the apparatus in figure 2, in which the profile of a slub is designed;
- figure 4 shows an example of embodiment of a second interface of the apparatus in figure 2;
- figure 5 shows an example of production of a portion of yarn by means of the apparatus of the present invention; and
- figure 6 shows a further example of a profile of a slub which can be designed with the first interface of the apparatus according to the present invention.

[0017] With reference to the attached figures, reference numeral 1 indicates the whole of a spinning station of a ring spinning frame. The ring spinning frame comprises a plurality of spinning stations 1, arranged along a spinning front.

[0018] Each spinning station 1 has, in a feed section 2, means 4 for feeding a roving 6 wound on bobbins 8 formed by preceding processes, such as processes carried out on a fly frame.

[0019] The end product of the process at each spinning station is a yarn wound on a bobbin placed in an output section 12 of the spinning station 1 of the textile machine.

[0020] In a spinning station, therefore, it is possible to define a fibre processing flow which runs from the feed section 2, located up-line, to the output section 12, located down-line.

[0021] The spinning frame further comprises, for each spinning station, a drawing device 14, which the roving 6 is inserted in.

[0022] The drawing device 14 comprising a plurality of drawing rollers coupled to idle rollers located above them.

[0023] In a preferred embodiment, said drawing device 14 comprises, along the direction of the processing flow, a third drawing roller 16, a second drawing roller 18 and

a first drawing roller 20. Said drawing rollers are coupled respectively to idle rollers 16', 18' and 20'.

[0024] In other words, said first drawing roller 20 is located down-line of the second roller 18 and of the third roller 16, and therefore near the output section 12 of the spinning station 1.

[0025] The roving 6 leaves the drawing device 14 in the form of drawn yarn 22 and is inserted into a twisting and winding device 24, or, alternatively, into a condensation device located up-line of the twisting and winding device 24.

[0026] The twisting and winding device 24 comprises a fixed guide 26 and a slider 28 which is rotatable on a fixed ring 30, supported by a table 32. Furthermore, said drawing device 14 also comprises a spindle 34, which also rotates, and a containing ring 36.

[0027] To carry out a drawing operation, the drawing rollers are moved at different peripheral speeds, increasing in the direction of the processing flow.

[0028] In other words, the peripheral speed of the third drawing roller 16 is less than, or at most equal to, the peripheral speed of the second drawing roller 18 which, in turn, is less than, or at most equal to, the peripheral speed of the first drawing roller 20.

[0029] Since the corresponding idle rollers coupled to the drawing rollers press the roving 6 against said drawing rollers, said roving does not slide on the surfaces of the drawing rollers, but is drawn out.

[0030] The drawing results in an elongation of the roving and a decrease of its nominal diameter, in other words a proportional decrease in the count.

[0031] The drawn yarn 22 is wound on the spindle 34, causing the slider 28 to rotate around said spindle and slide over the fixed ring 30. The sliding of the drawn yarn 22 over the fixed ring 30 generates the twist of the yarn which is thus wound on the spindle in the form of twisted yarn

[0032] At the same time, the table 32 is made to move with a vertical reciprocating motion, by which the twisted yarn is wound on the spindle to form the bobbin.

[0033] The drawing frame further comprises driving means operatively connected to the drawing cylinders, spindles and table.

[0034] In a preferred embodiment, the driving means comprise a first motor 42 which activates in rotation the third 16 and the second 18 drawing cylinder, by means of suitable transmission means and a second motor 44 which activates in rotation the first drawing cylinder 20.

[0035] In addition, preferably, the driving means comprise a third motor 46 which activates the spindle 34 and a fourth motor 48, which activates the table 32 in translation.

[0036] An apparatus for operating and programming the ring spinning frame described above comprises an actuation device 50, operatively connected to the driving means to activate them depending on the speed instructions, imposing a desired speed on the drawing cylinders or spindles.

[0037] Furthermore, the operating and programming apparatus comprises an electronic programming device 60, operatively connected to the actuation device 50, programmable by a user to program the progress of the count and/or twist along the length of the yarn.

[0038] In particular the electronic programming device 60 comprises a first interface 62 suitable to design the profile of a slub (figure 3).

[0039] The term slub is used to mean a portion of yarn in which the count varies in a predetermined manner, changing from the nominal count value.

[0040] The first interface 62, for example, shows a slub region 64, which reproduces the reference portion on the x-axis and the slub count on the y-axis for example showing the increase or decrease of the count compared to the nominal count.

[0041] In the example shown, the y-axis shows the references "0x", "1x", "2x", "3x", "4x" indicating that the count at a certain point of the reference portion is 0, 1, 2, 3 or 4 times the nominal count of the yarn.

[0042] The slub may be designed in the slub region 64 in a continuous manner, for example using an optical pen or simply by touching a monitor (touch screen), or discretely identifying several dots of the region, subsequently automatically joined by straight lines.

[0043] In other words, the first interface 62 is suitable to receive the slub profile by entering an out and out design. Or again, the first interface 62 is suitable to receive the discreet dots indicating a slub profile by means of an out and out design.

[0044] In other words, in the first interface 62 a slub region 64 is present in which dots of the slub profile are traced on the graphic visualisation in an x-axis/y-axis system. For example the slub can be designed as a continuous line or as dots which when joined show the shape of the slub.

[0045] In one embodiment, the slub is designed manually in the slub region 64 by the operator using hardware accessories such as a mouse, optical pen etc. Among the various embodiments it is also possible to design the slub in the slub region 64 by means of a touch screen.

[0046] In addition, the first interface 62, comprises an identification field 66, in which an ID of the slub designed is entered, for example an identification number of the slub.

[0047] The software controlling the first interface also makes it possible to save the profile of the slub designed, assigning such profile the chosen ID, memorising the profile parameters defining the slub profile in first memorisation means 62' of the first interface 62.

[0048] In addition, the electronic programming device 60 comprises a second interface 80 suitable for programming the repetition along the yarn of the slubs designed with the first interface (figure 4).

[0049] Preferably, the second interface 80 is in table form. On each line, the ID assigned to one of the slubs designed using the first interface, the length L of the reference portion which the slub identified must be repro-

duced in and the length of a pause P value of a pause section in which the count is equal to the nominal count, must be entered before moving on to the next line.

[0050] According to the example shown, in the first line, a slub identified as "5" designed using the first interface (figure 3) is recalled, a length L=400 millimetres is set for the reference portion in which the slub must be reproduced, and a pause P=100 millimetres for the pause section with nominal count is set, before moving on to the next line.

[0051] In the second line of the example shown, the slub identified as "5" is recalled again, a length L=100 millimetres is set for the reference portion in which the slub must be reproduced, and a pause P=150 millimetres for the pause section with nominal count.

[0052] According to the example shown, the yarn would have a sequence of slubs as illustrated in figure 5.

[0053] The software controlling the first interface also permits the memorisation of the repetition parameters which define the repetition of the slubs in second memorisation means 80' of the second interface 80.

[0054] Furthermore, the programming device 60 comprises conversion means 90, in particular computerised conversion means, which acquire the profile parameters memorised in the first memorisation means 62' and the repetition parameters memorised in the second memorisation means 80' and convert them into speed instructions for the operating device 50, to which the conversion means are connected, to set the speed of the drawing cylinders accordingly.

[0055] According to the invention, the apparatus according to the present invention makes it possible to overcome the drawbacks of the prior art, in that it is possible to design slubs having a complex profile and set the repetition of the same along the yarn as desired.

[0056] Advantageously, in addition, it is possible to set the variation of the count along a reference portion in a continuous manner.

[0057] For example, according to the example in figure 6, a slub is designed in such a way as to present a constant variation of the count along the reference portion. By setting P=0 (pause length nil) in the second interface and a length of reference portion equal to the length of a very long portion of yarn, a yarn is produced in which the count varies constantly from start to finish. Such a result is, for example, impossible to achieve with the device of the prior art.

Claims

1. Apparatus for operating and programming a ring spinning frame,
wherein said spinning frame comprises a drawing device (14) comprising a plurality of pairs of drawing rollers (16,16';18,18';20,20') and driving means (42,44) connected to said drawing device (14) to impose on the drawing rollers (16,16';18,18';20,20') a desired rotation,
said apparatus comprising:

- an actuation device (50), operatively connected to the driving means (42,44) to activate them depending on the speed instructions;
- an electronic programming device (60), operatively connected to the actuation device (50), programmable by a user to program the progress of the count and/or twist along the length of the yarn;

wherein the electronic programming device (60) comprises a first interface (62) suitable for showing a slub region (64) which reproduces the reference portion and the slub count, and for designing in the slub region (64) the profile of the slub in a continuous manner, and conversion means (90) suitable for converting the parameters of the profile of the designed slub into speed instructions for the actuation device;
characterized by the fact that the electronic programming device (60) comprises an optical pen or a touch screen suitable for tracing in the slub region (64) the profile of the slub in a continuous manner.

2. Apparatus according to claim 1, wherein the first interface (60) comprises first means of memorisation (62') to memorise the profile parameters relative to the slub designed.

3. Apparatus according to claim 1 or 2, wherein the electronic programming device (60) comprises a second interface (80) suitable for programming the repetition along the yarn of the slubs designed by the first interface (62).

4. Apparatus according to claim 3, wherein the second interface (80) comprises second means of memorisation (80') for the memorisation of the repetition parameters which define the repetition of the slubs along the yarn.

5. Apparatus according to claim 3 or 4, wherein the conversion means (90) are also suitable for acquiring the repetition parameters and converting them, together with the profile parameters, into the speed instructions for the actuation device (50).

6. Method of controlling a ring spinning frame for the realisation of a yarn having a count variation along its length,
wherein said spinning frame comprises
a drawing device (14) comprising a plurality of pairs of drawing rollers (16,16';18,18';20,20'), and driving means (42,44) connected to said drawing device to impose on the drawing rollers a desired rotation speed,
and a first interlace (62) suitable for showing a slub

region (64) which reproduces the reference portion and the slub count, and for designing in the slub region (64) the profile of the slub in a continuous manner,
said method comprising the steps of:

- designing in the slub region (64), using an optical pen or a touch screen, the profile of the slub in a continuous manner;
- converting the profile parameters of the slub into speed instructions for the driving means (42,44) of the spinning frame.

7. Method of controlling a ring spinning frame for the realisation of a yarn having a count variation along its length, according to claim 6, comprising the steps of:

- previewing the graphic visualisation in an x-axis/y-axis system in the slub region (64) included in the first interface (62) of the slub profile;;
- manually tracing, in said slub region (64) on the x-axis/y-axis, dots of the slub profile.

Patentansprüche

1. Vorrichtung zum Betreiben und Programmieren einer Ringspinnmaschine,
wobei die Spinnmaschine eine Streckvorrichtung (14) aufweist, die mehrere Paare von Streckwalzen (16, 16'; 18, 18'; 20, 20') sowie mit der Streckvorrichtung (14) verbundene Antriebsmittel (42, 44) aufweist, um den Zugwalzen (16, 16', 18, 18'; 20, 20') eine gewünschte Drehung zu verleihen;
wobei die Vorrichtung aufweist:

- eine Aktivierungsvorrichtung (50), die mit den Antriebsmitteln (42, 44) betriebsmäßig verbunden ist, um diese in Abhängigkeit von Geschwindigkeitsanweisungen zu aktivieren;
- eine elektronische Programmiervorrichtung (60), die mit der Aktivierungsvorrichtung (50) betriebsmäßig verbunden ist, vom Benutzer programmierbar ist, um den Fortschritt des Zählers und/oder Twists entlang der Länge des Garns zu programmieren;

wobei die elektronische Programmiervorrichtung (60) aufweist:

eine erste Schnittstelle (62), die dazu geeignet ist,
einen Verdickungsbereich (64), der den Referenzabschnitt wiedergibt, sowie den Verdickungszähler zu zeigen, und das Profil der Verdickung in dem Verdickungsbereich (64) kontinuierlich zu gestalten, und
Umwandlungsmittel (90), die dazu geeignet sind, die Parameter des Profils der gestalteten Verdickung in Geschwindigkeitsanweisungen für die Aktivierungsvorrichtung umzuwandeln;
gekennzeichnet durch die Tatsache, dass die elektronische Programmiervorrichtung (60) einen optischen Griffel oder einen berührungsempfindlichen Bildschirm aufweist, der dazu geeignet ist, in dem Verdickungsbereich (64) das Profil der Verdickung kontinuierlich zu verfolgen.

2. Vorrichtung nach Anspruch 1, wobei die erste Schnittstelle (60) erste Speichermittel (62') zum Speichern der Profilparameter in Bezug auf die gestaltete Verdickung aufweist.

3. Vorrichtung nach Anspruch 1 oder 2, wobei die elektronische Programmiervorrichtung (60) eine zweite Schnittstelle (80) aufweist, geeignet zum Programmieren der Wiederholung der mit der ersten Schnittstelle (62) gestalteten Verdickungen entlang dem Garn.

4. Vorrichtung nach Anspruch 3, wobei die zweite Schnittstelle (80) zweite Speichermittel (80') zum Speichern der Wiederholparameter aufweist, die die Wiederholung der Verdickungen entlang dem Garn definieren.

5. Vorrichtung nach Anspruch 3 oder 4, wobei die Umwandlungsmittel (90) auch dazu geeignet sind, die Wiederholparameter zu erfassen und diese, zusammen mit den Profilparametern in Geschwindigkeitsanweisungen für die Aktiverungsvorrichtung (50) umzuwandeln.

6. Verfahren zum Steuern einer Ringspinnmaschine für die Realisierung eines Garns mit einer Zähleränderung entlang seiner Länge,
wobei die Spinnmaschine aufweist:

eine Streckvorrichtung (14), die mehrere Paare von Streckwalzen (16, 16'; 18, 18'; 20, 20') aufweist, sowie Antriebsmittel (42, 44), die mit der Streckvorrichtung verbunden sind, um den Zugwalzen eine gewünschte Drehzahl zu verleihen, und
eine erste Schnittstelle (62), die dazu geeignet ist, einen Verdickungsbereich (64), der den Referenzabschnitt wiedergibt, sowie den Verdickungszähler zu zeigen, und das Profil der Verdickung in dem Verdickungsbereich (64) kontinuierlich zu gestalten,
wobei das Verfahren die Schritte aufweist:

- in dem Verdickungsbereich (64), kontinuierliches Gestalten des Profils der Verdi-

ckung mittels eines optischen Griffels oder eines berührungsempfindlichen Bildschirms,
- Umwandeln der Profilparameter der Verdickung der Geschwindigkeitsanweisungen für die Antriebsmittel (42, 44) der Spinnmaschine.

7. Verfahren zum Steuern der Ringspinnmaschine zum Realisieren eines Garns mit einer Zähleränderung entlang seiner Länge gemäß Anspruch 6, welches die Schritte aufweist:

- Vorbetrachten der grafischen Visualisierung, in einem X-Achsen/Y-Achsen-System, in dem Verdickungsbereich (64), der in der ersten Schnittstelle (62) des Verdickungsprofils enthalten ist;
- manuelles Verfolgen, in dem Verdickungsbereich (64) auf der X-Achse/Y-Achse, von Punkten des Verdickungsprofils.

Revendications

1. Appareil pour faire fonctionner et programmer un métier à filer à anneaux,
dans lequel ledit métier à filer comprend un dispositif d'étirage (14) comprenant une pluralité de paires de rouleaux d'étirage (16, 16' ; 18, 18' ; 20, 20') et des moyens d'entraînement (42, 44) raccordés audit dispositif d'étirage (14) pour imposer, sur les rouleaux d'étirage (16, 16' ; 18, 18' ; 20, 20'), une rotation souhaitée, ledit appareil comprenant :

- un dispositif d'actionnement (50), raccordé fonctionnellement aux moyens d'entraînement (42, 44) pour les activer suivant les instructions de vitesse ;
- un dispositif de programmation électronique (60), connecté fonctionnellement au dispositif d'actionnement (50), programmable par un utilisateur pour programmer le progrès du numéro et/ou de la torsion sur la longueur du fil ;

dans lequel le dispositif de programmation électronique (60) comprend une première interface (62) appropriée pour présenter une région de mèche (64) qui reproduit la portion de référence et le numéro de mèche, et pour concevoir, dans la région de mèche (64), le profil de la mèche de manière continue, et des moyens de conversion (90) appropriés pour convertir les paramètres du profil de la mèche conçue en instructions de vitesse pour le dispositif d'actionnement;
caractérisé en ce que le dispositif de programmation électronique (60) comprend un stylo optique ou un écran tactile approprié pour tracer, dans la région de mèche (64), le profil de la mèche de manière continue.

2. Appareil selon la revendication 1, dans lequel la première interface (60) comprend des premiers moyens de mémorisation (62') pour mémoriser les paramètres de profil par rapport à la mèche conçue.

3. Appareil selon la revendication 1 ou 2, dans lequel le dispositif de programmation électronique (60) comprend une seconde interface (80) appropriée pour programmer la répétition, le long du fil, des mèches conçues par la première interface (62).

4. Appareil selon la revendication 3, dans lequel la seconde interface (80) comprend des seconds moyens de mémorisation (80') pour la mémorisation des paramètres de répétition qui définissent la répétition des mèches le long du fil.

5. Appareil selon la revendication 3 ou 4, dans lequel les moyens de conversion (90) sont également appropriés pour acquérir les paramètres de répétition et les convertir, conjointement avec les paramètres de profil, en instructions de vitesse pour le dispositif d'actionnement (50).

6. Méthode de commande d'un métier à filer à anneaux pour la réalisation d'un fil possédant une variation de numéro sur sa longueur,
dans laquelle ledit métier à filer comprend un dispositif d'étirage (14) comprenant une pluralité de paires de rouleaux d'étirage (16, 16' ; 18, 18' ; 20, 20'), et des moyens d'entraînement (42, 44) raccordés audit dispositif d'étirage pour imposer, sur les rouleaux d'étirage, une vitesse de rotation souhaitée,
et une première interface (62) appropriée pour présenter une région de mèche (64) qui reproduit la portion de référence et le numéro de mèche, et pour concevoir, dans la région de mèche (64), le profil de la mèche de manière continue,
ladite méthode comprenant les étapes de :

- la conception, dans la région de mèche (64), en utilisant un stylo optique ou un écran tactile, du profil de la mèche de manière continue ;
- la conversion des paramètres de profil de la mèche en instructions de vitesse pour les moyens d'entraînement (42, 44) du métier à filer.

7. Méthode de commande d'un métier à filer à anneaux pour la réalisation d'un fil possédant une variation de numéro sur sa longueur, selon la revendication 6, comprenant les étapes de :

- la prévisualisation de la visualisation graphique, dans un système d'axe x/d'axe y, dans la région de mèche (64) incluse dans la première

interface (62) du profil de mèche ;
- le traçage manuel, dans ladite région de mèche (64), sur l'axe x/l'axe y, de points du profil de mèche.

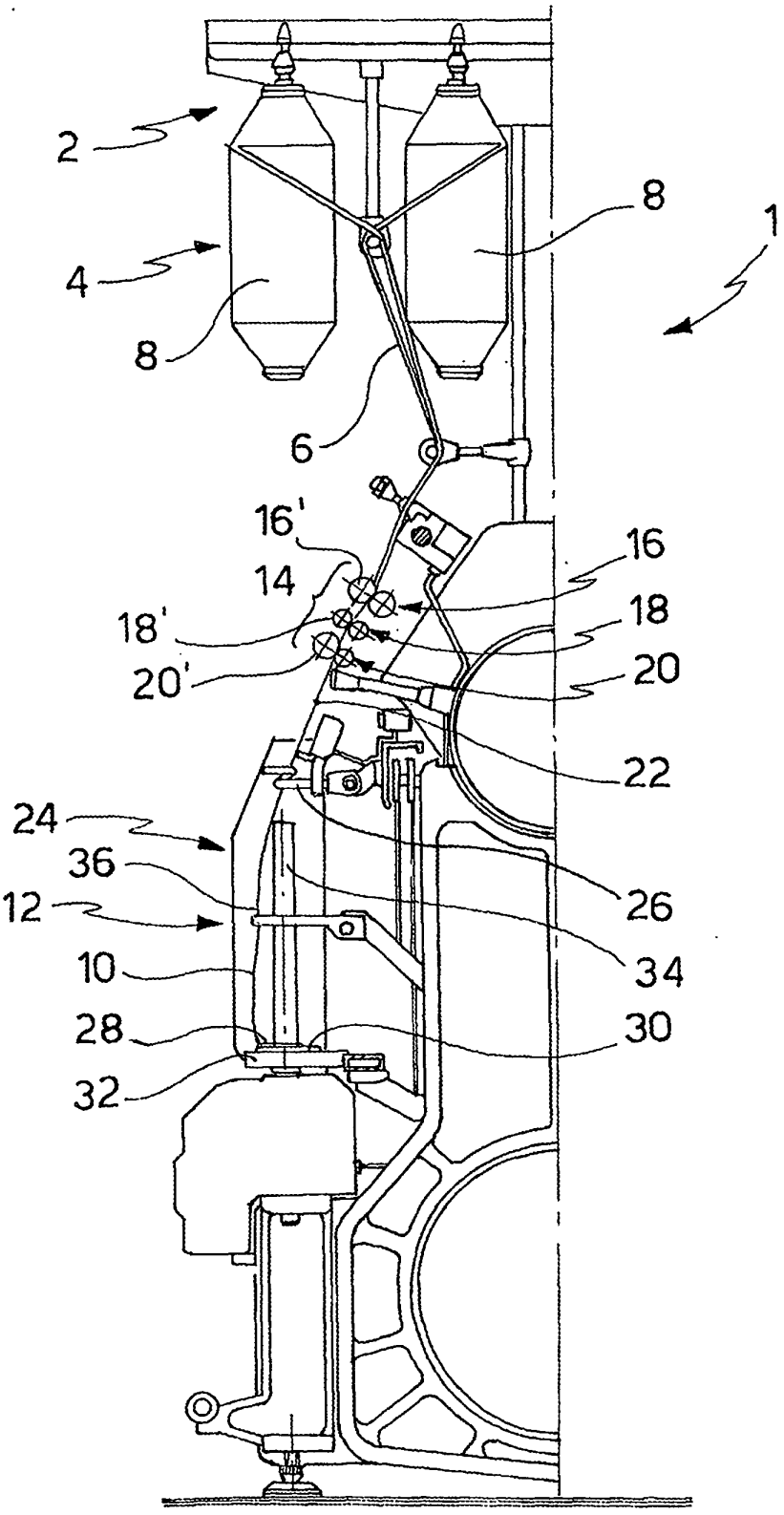


Fig. 1

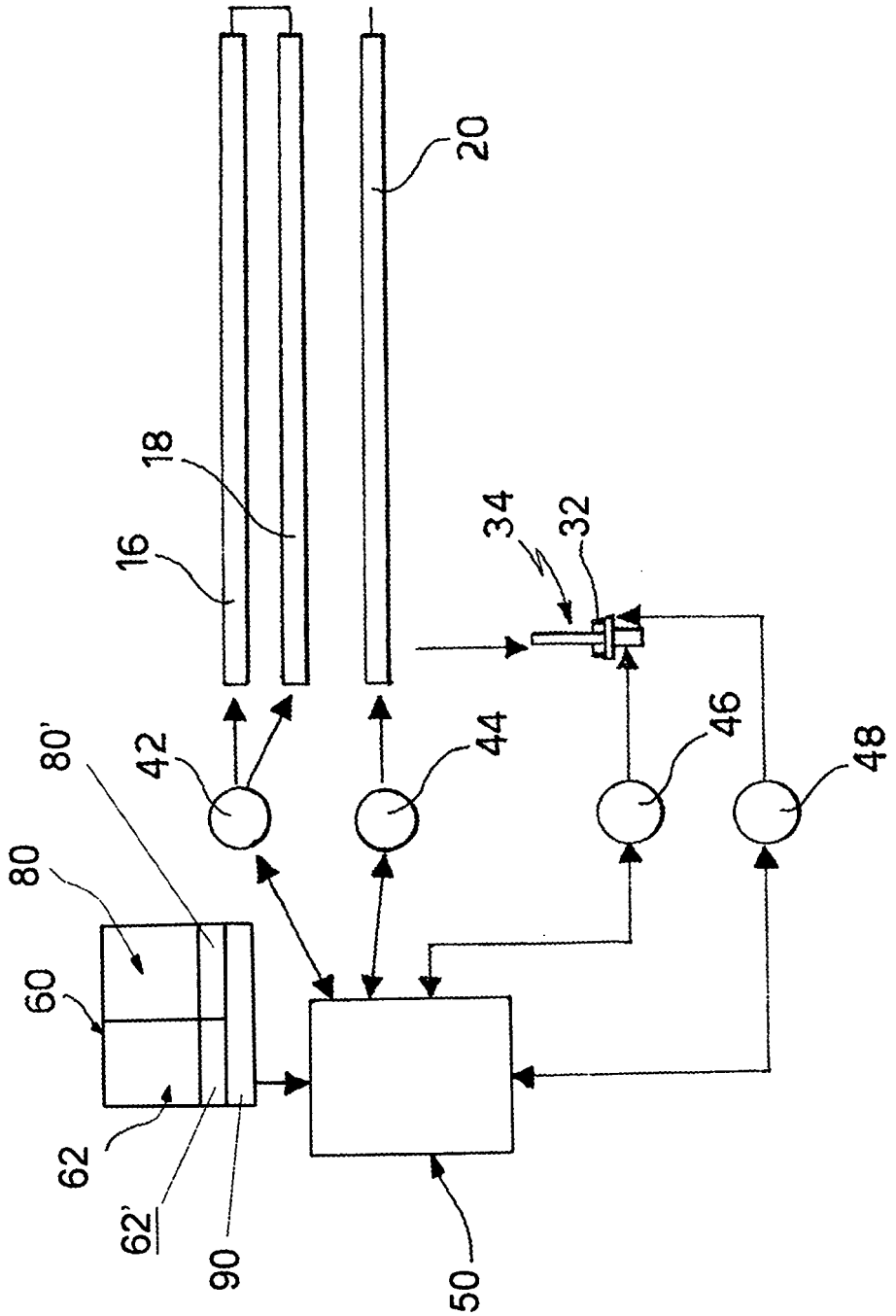


Fig. 2

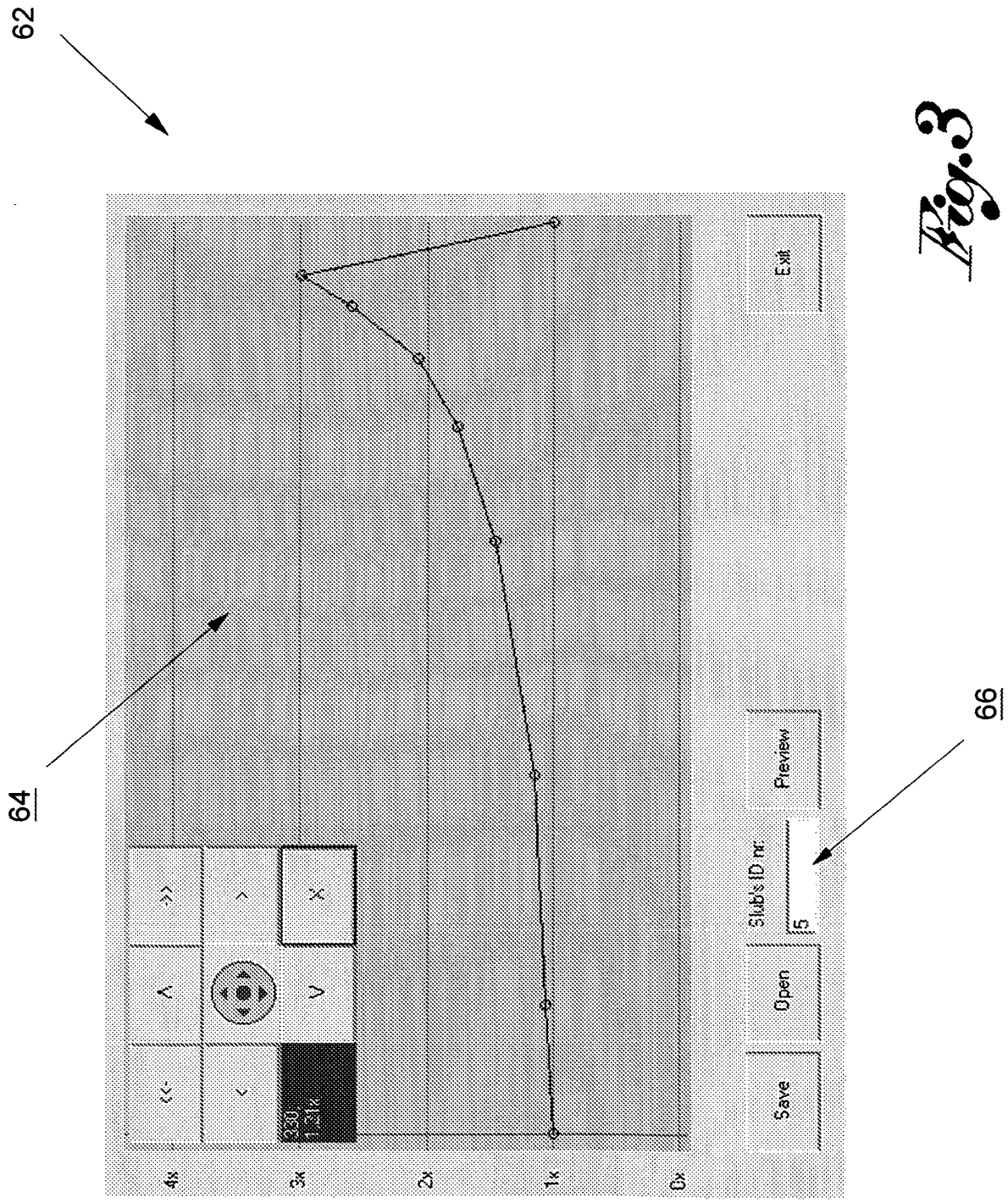


Fig.3

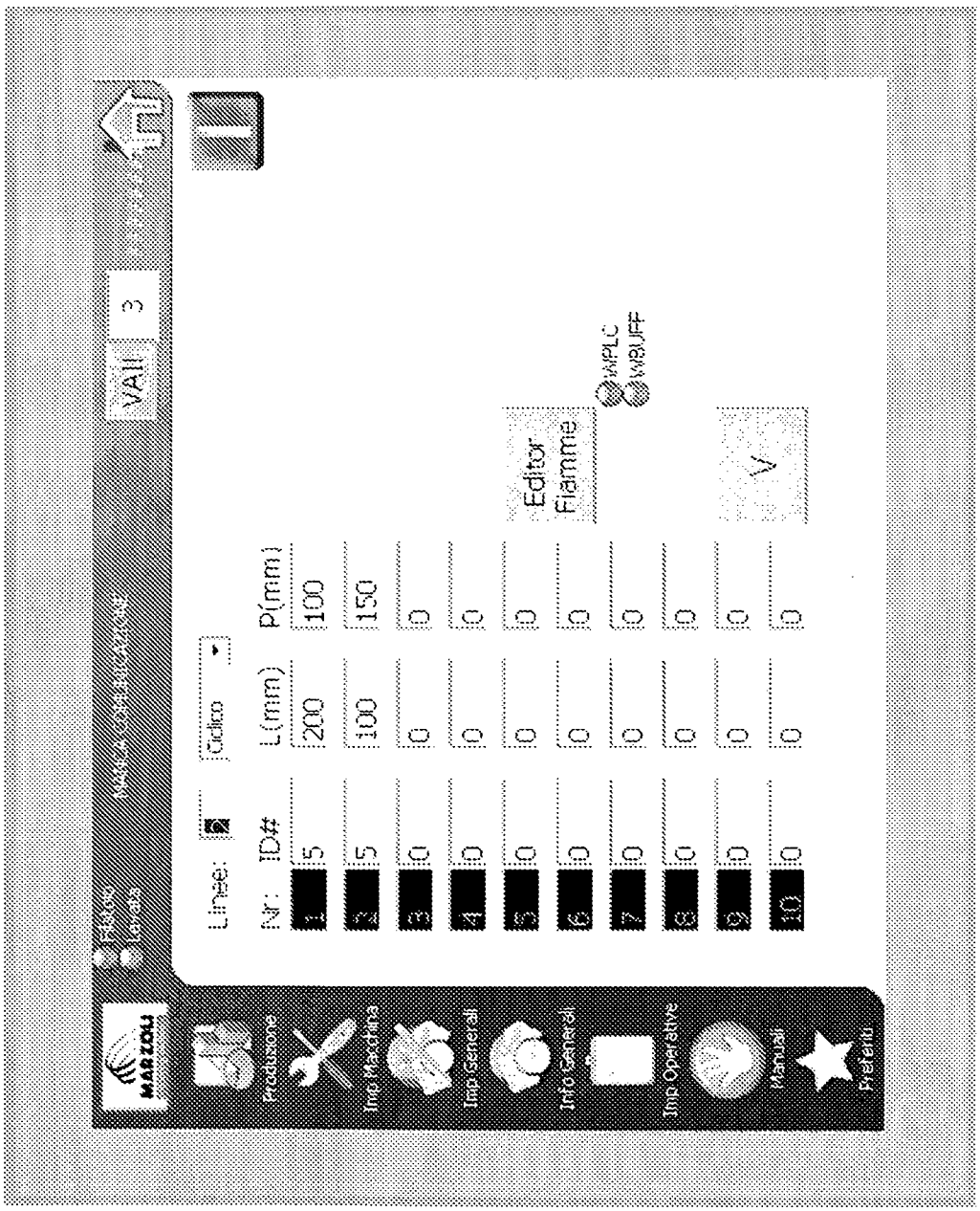

80
Linea:
Ciclico
Nr:
ID#
L(mm)
P(mm)
Editor Fiamme
WPLC
WBUFF
VAI!
3
Produzione
Imp.Macchina
Imp.General
Info General
Imp.Operative
Manual
Preferiti

Fig. 4

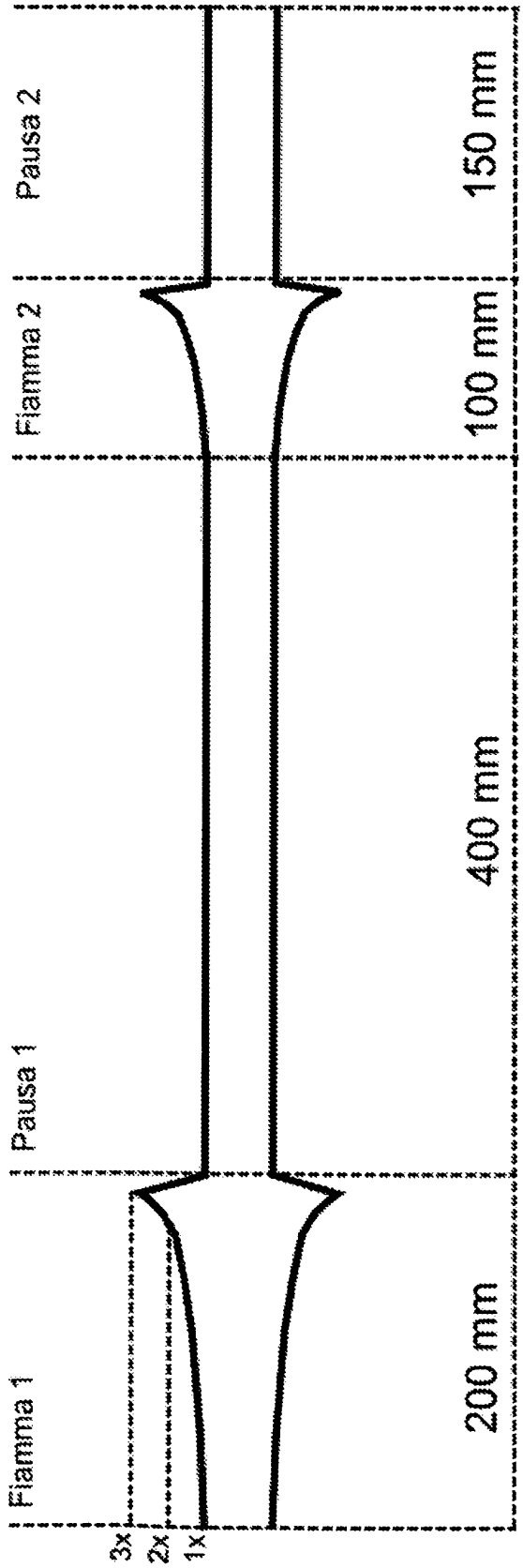
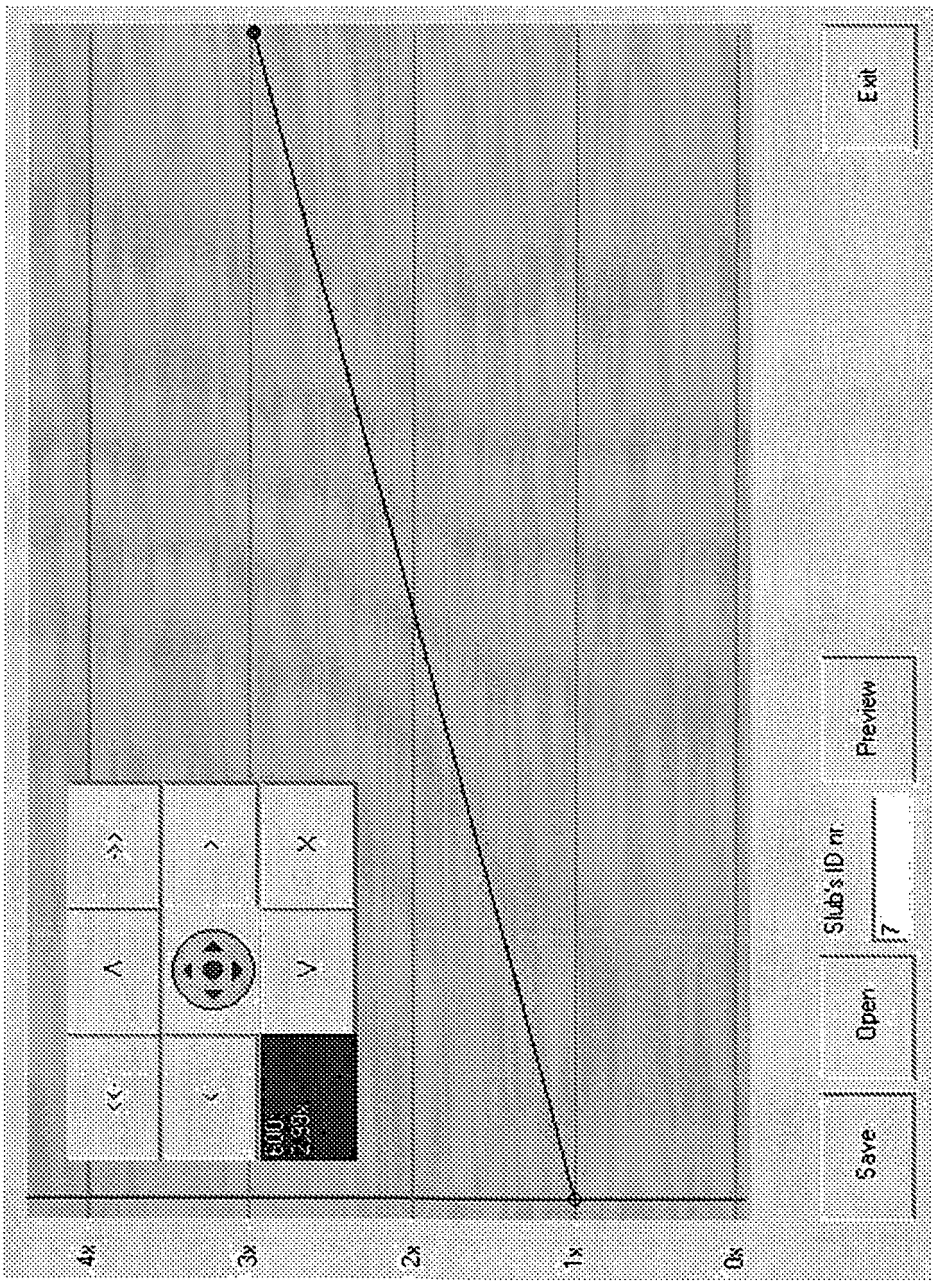

Pausa 2
150 mm
Fiamma 2
100 mm
Pausa 1
400 mm
Fiamma 1
200 mm
3x
2x
1x

Fig.5

Fig 9



REFERENCES CITED IN THE DESCRIPTION

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