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

(11) Publication number: **0 084 032**
B1

(12) # EUROPEAN PATENT SPECIFICATION

(45) Date of publication of patent specification: **21.09.88**

(51) Int. Cl.[4]: **B 65 H 51/22,** D 03 D 47/36

(21) Application number: **82902075.9**

(22) Date of filing: **12.07.82**

(86) International application number:
PCT/GB82/00204

(87) International publication number:
WO 83/00137 20.01.83 Gazette 83/02

(54) **WEFT YARN METERING DEVICE.**

(30) Priority: **14.07.81 GB 8121646**

(43) Date of publication of application:
27.07.83 Bulletin 83/30

(45) Publication of the grant of the patent:
21.09.88 Bulletin 88/38

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

(56) References cited:
EP-A-0 024 561
FR-A-1 547 158
FR-A-2 431 559
FR-A-2 465 812
US-A-3 670 976
US-A-4 132 368

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EP 0 084 032 B1

Courier Press, Leamington Spa, England.

Description

The present invention relates to a metering device for use in a fluid jet loom for metering the amount of weft yarn supplied across the warp shed on each weaving cycle of the loom.

It is known from FR-A-2 465 812 to provide a weft metering device having a stationary spool onto which yarn is wound by a yarn supply arm. The spool contains a series of stop fingers located within the spool and which are arranged to move in succession to emerge at a first axial position, move axially along the spool and then retract at a second axial position. The stop fingers are arranged such that when a stop finger retracts at the second position to discharge yarn a succeeding finger has already emerged at the first axial position. A further separate stop is provided which is selectively operable to hold discharged windings to delay discharge of the yarn until a subsequent weaving cycle.

It is known from EP-A-0 024 561 to provide a weft metering device having a stationary spool divided into a storage region and a discharge region. A yarn supply arm is provided which winds yarn onto the storage region and simultaneously transfers windings of yarn from the storage region to the discharge region. Discharge of yarn from the discharge region of the spool is controlled by a pair of stop fingers. The pair of stop fingers are located within the spool and are spaced apart axially along the spool. The stop fingers are arranged to move radially between retracted and projected positions. Discharge of yarn is achieved by moving the fingers furthermost from the storage region to a retracted position.

According to the present invention there is provided a yarn metering device comprising a stationary spool, and having a storage region and a discharge region, a yarn supply arm arranged to wrap yarn onto the storage region of the spool, a yarn guide arm provided for simultaneously transferring yarn from the storage region to the discharge region, a stop means co-operable with the spool for permitting yarn wrapped on the spool to be pulled axially off the spool after a predetermined quantity of yarn has been wrapped onto the spool, the stop means comprising a single finger located outside the spool and being arranged to move both radially and axially relative to the spool, the finger for each discharge of yarn being arranged to move radially inwardly at a first axial position to engage yarn being discharged from the yarn guide arm to thereby simultaneously initiate wrapping of yarn onto the discharge region of the spool by the yarn guide arm and to also define the metered length of yarn discharged from the device, the finger being arranged to then move axially along the spool to a second axial position and at said second axial position moves radially outwardly to release the yarn wrapped on the discharged region and during release of the yarn the finger returns to the first axial position before moving radially inwardly again.

Reference is now made to the accompanying drawings in which:—

Figure 1 is a schematic perspective illustration of part of a device according to the present invention;

Figure 2 is a more detailed axial section through a device according to the present invention shown mounted on part of a loom; and

Figure 3 is a cross-sectional view taken along line III-III in Figure 2.

Referring initially to Figure 1, the device 10 according to the present invention is a stationary or fixed spool 12 which is of generally cylindrical shape, and a yarn supply arm 14 which extends radially from the axis of the spool and which is rotatably mounted for rotation about said axis. The arm 14 is hollow and is cranked so as to be able to wrap yarn 16 about the spool as will be described in greater detail later. The device also includes a yarn guide arm 17 which is conveniently diametrically opposed to the arm 14 and is rotatable in unison therewith. The guide arm 17 picks up yarn deposited by arm 14 and re-wraps the yarn on the spool at a position further along the spool. The device also includes a yarn stop finger 20 which controls release of yarn from the spool 12 and initiates winding of yarn onto the spool by guide arm 17. As illustrated in Figure 1 the device 10 is arranged to supply yarn to an air jet nozzle 22 which drives the yarn across the warp shed of the loom (not shown). As indicated above, yarn 16 is wrapped onto the spool at two different locations on the spool 12. These locations 24, 25 respectively are separated by a ridge 26 so that the locations are physically separated. At location 24 before operation of the device 10 the yarn is wrapped about the spool 12 by a predetermined minimum number of turns to define a supply coil of yarn 28. The supply coil of yarn 28 has basically two main functions, viz to provide a supply of yarn for yarn guide arm 17 and to prevent slippage of yarn on the spool 12 as the arm 14 draws yarn from the yarn package (not shown). During each weaving cycle of the loom, arms 14 and 17 are continually rotating so that arm 14 winds onto the spool a supply of yarn which is picked up and rewound onto the spool by arm 17. Accordingly since the rate of winding of arm 14 is the same as the rate of unwinding of the guide arm 17 the size of the supply coil 28 remains constant. As guide arm 17 wraps yarn onto the spool 12 the stop finger 20 moves axially along the spool away from arms 14 and 17. At a predetermined time in the weaving cycle after shedding of the warp yarns the finger 20 is moved radially away from the spool to allow the yarn wound thereon by arm 17 to be pulled off by the jet nozzle 22. The finger 20 is simultaneously moved axially back toward the arms 14 and 17 and then moved radially inwardly to

enable arm 17 to initiate wrapping of yarn about the spool. The cycle is then repeated.

The constant length of yarn stored on the spool in the supply 28 is basically dependent on two variables, viz the number of revolutions made by arm 17 in each cycle and the diameter of the spool. The number of revolutions is controlled by a suitable choice of gearing ratios in drive from the main loom drive shaft and the spool is preferably constructed so that its diameter may be adjusted. Accordingly the amount of yarn stored on the spool may be accurately and easily adjusted.

The finger 20 is timed to move radially inwardly after all the yarn wrapped onto the spool by arm 17 has been pulled off the spool. Thus the yarn is initially stopped by arm 17. However the arm 17 is rotating to unwind yarn from the supply coil 28 and so this yarn is drawn from the arm 17 by the air jet nozzle 22 at a rate determined by the speed of movement of the arm 17 until the arm passes the stop finger 20 when the yarn will then be completely arrested by the stop and continued movement of the arm 17 causes the yarn to be wrapped about the spool. Thus inward movement of the stop finger 20 stops discharge of yarn from the device and simultaneously causes wrapping of yarn onto the spool. By suitably adjusting the rotary position of the arm 17 to the stop finger 20 and/or the timing of moving the finger 20 radially inwards it is possible to adjust the length of yarn metered out at a controlled rate by the arm 17 to a desired value.

By way of example a specific embodiment of the present invention is described below with reference to Figures 2 and 3. In these Figures parts corresponding to similar parts in Figure 1 have been designated by the same reference numerals. In Figure 2, the spool 12 is made up of individual segments 30 (only one of which is shown for the purposes of clarity). The segments 30 include an arcuate outer peripheral surface portion 31 which collectively make up the outer peripheral surface of the spool 12. Each segment has a web 32 depending from the surface portion 31 and the web 32 is secured to an annular boss 34. The web 32 is provided with a radially extending slot (not shown) through which passes a bolt 35 and a guide pin 36 so that each segment may be moved radially inwardly or outwardly so as to alter the effective diameter of the spool 12.

The annular boss 34 houses a bearing 37 which rotatably receives a shaft 40 from which arms 14 and 17 radially project. The annular boss 34 also includes a plurality of magnets 44 spaced about its circumference which co-operate with magnets 45 received in a fixed support 46 of the device 10. Magnets 44 and 45 attract one another so that annular boss 34 and accordingly spool 12 remain stationary despite rotation of shaft 40. The shaft 40 is also mounted in bearings 50 housed in support 46. The shaft 40 has a central bore 40a which communicates with the internal bore 14a of arm 14 to provide a passageway for yarn 16. Air ducts 53 are provided to enable pressurised air to be supplied to bore 40a to enable threading of yarn 16 through bores 40a and 14a. Shaft 40 is provided with a pinion gear 40b which meshes with gear 55 mounted on a drive shaft 56 of the loom.

The stop finger 20 is mounted on a support 60 which is pivotally mounted on a spindle 61. The spindle 61 is mounted in a support 62 which in turn is pivotally mounted on a spindle 63. Spindles 61 and 63 are perpendicular to one another so that the finger 20 may be moved axially along the spool and also moved radially inwardly or outwardly relative to the spool. Such movement of the finger 20 is achieved by a pair of cams 67 which co-operate with a pair of cam followers 68 mounted on support 60. The cam followers 68 are biased into contact with the cams 67 via a spring 67a. The cams 67 are shaped so that at two circumferential locations they have the same profile so as to move the finger radially inwardly or radially outwardly and at other times a different profile so as to cause the support to pivot about spindle 63 and so move the finger 20 axially along the spool whilst it is maintained in either a radially innermost or radially outermost position.

As seen in Figure 2 the ridge 26 has an inclined face 269 facing the terminal end of the spool 12. The purpose of the inclined face 269 is to encourage yarn wrapped about the spool 12 by the arm 17 to move axially along the spool to avoid overlapping of the yarn during winding. The rate of axial movement of finger 20 is arranged to be similar to the axial movement of yarn 16 along the spool. A similar inclined face 12a is provided at location 24 for co-operation with arm 14.

Claims

1. A yarn metering device comprising a stationary spool (12), and having a storage region (24) and a discharge region (25), a yarn supply arm (14) arranged to wrap yarn onto the storage region of the spool, a yarn guide arm (17) provided for simultaneously transferring yarn from the storage region to the discharge region, a stop means co-operable with the spool for permitting yarn wrapped on the spool to be pulled axially off the spool after a predetermined quantity of yarn has been wrapped onto the spool, the stop means comprising a single finger (20) located outside the spool and being arranged to move both radially and axially relative to the spool, the finger (20) for each discharge of yarn being arranged to move radially inwardly at a first axial position to engage yarn being discharged from the yarn guide arm (17) to thereby simultaneously initiate wrapping of yarn onto the discharge region of the spool by the yarn guide arm and to also define the metered length of yarn discharged from the device, the finger being arranged to then move axially along the spool to a second axial position and at said second axial position moves radially outwardly to release the yarn wrapped on the discharge region and during release of the yarn the finger returns

to the first axial position before moving radially inwardly again.

2. A yarn metering device according to Claim 1, wherein the finger (20) is mounted on a first support (60) which is pivotally mounted on a second support (62) for movement about a first pivot axis, the second support being pivotally mounted for movement about a second pivot axis, the first and second pivot axes being perpendicular to one another, the first support being acted upon by a pair of side by side cams (67) whose axis of rotation is parallel to the second pivot axis.

3. A yarn metering device according to any preceding claim wherein the storage (24) and discharge (25) regions are separated by an annular ridge (26).

4. A yarn metering device according to Claim 3 wherein the ridge has an inclined face (269) extending toward the discharge end of the spool so that yarn wrapped onto the inclined face is encouraged to move axially along the spool towards its discharge end.

5. A yarn metering device according to any preceding claim wherein the yarn supply arm (14) and the yarn guide arm (17) are diametrically opposed and mounted on a common shaft (40) for rotation in unison.

6. A yarn metering device according to Claim 5 wherein the shaft (40) is rotatably mounted in a housing (46) and the spool rotatably receives the shaft, the spool and housing having co-operable magnetic poles (44, 45) which restrain the spool from rotating.

7. A yarn metering device according to any preceding claim wherein the spool is composed of a plurality of segments (30) which are radially movable for adjusting the diameter of the spool.

Patentansprüche

1. Einrichtung zum Abmessen von Schussgarn mit einer ortsfesten Trommel (12), welche einen Bereich zum Speichern (24) und Entspeichern (25) aufweist, mit einem Wickelarm (14) zum Aufwikkeln von Garn in der Speicherzone der Trommel, mit einem Garnführungsarm (17) zum Ueberführen des Garns von der Speicherzone in die Entspeicherungszone, mit Haltemitteln, die der Trommel zugeordnet sind, und die es ermöglichen, dass auf der Trommel aufgewickeltes Garn axial von der Trommel abgezogen wird, nachdem eine vorbestimmte Länge des Garns auf der Trommel aufgewickelt wurde, wobei die einzelnen Haltemittel einen einzigen Finger (20) ausserhalb der Trommel aufweisen und dieser so angeordnet ist, dass er radial und axial zur Trommel bewegbar ist in der Weise, dass der Finger (20) für jede Schussabgabe zunächst radial nach innen gegen die Trommel bewegbar ist, um Garn festzuhalten, das durch den Garnführungsarm (17) geliefert wird, und um damit gleichzeitig das Aufwickeln von Garn auf die Abwickelzone der Trommel mittels des Garnführungsarms einzuleiten und um die von der Einrichtung zu liefernde Garnlänge festzulegen, und dass der Finger weiterhin axial entlang der Trommel in eine zweite Position bewegbar ist, in der er radial von der Trommel wegbewegbar ist, um das in der Entspeicherungszone der Trommel aufgewickelte Garn freizugeben, und dass schliesslich der Finger während des Abziehens von Garn in die erste axiale Position bewegbar ist, bevor die erneute Radialbewegung folgt.

2. Einrichtung zur Abmessung von Schussgarn nach Anspruch 1. wobei der Finger (20) auf einem ersten Halter (60) sitzt, der drehbar auf einem zweiten Halter (62) zur Ermöglichung einer Bewegung um eine erste Schwenkachse montiert ist, und wobei der zweite Halter schwenkbar auf einer zweiten Drehachse gelagert ist, die senkrecht zur ersten Schwenkachse steht, und wobei der erste Halter von einem Paar nebeneinanderliegender Kurvenscheiben antreibbar ist, deren Drehachse parallel zur zweiten Schwenkachse liegt.

3. Einrichtung zur Abmessung von Schussgarn nach einem der vorhergehenden Ansprüche, worin die Speicherzone (24) und die Abwickelzone (25) durch einen ringförmigen Vorsprung getrennt sind.

4. Einrichtung zum Abmessen von Schussgarn nach Anspruch 3, wobei der Vorsprung eine zur Entspeicherungszone der Trommel sich erstrekkende geneigte Fläche (269) aufweist, so dass auf der geneigten Fläche aufgewickeltes Garn sich axial entlang der Trommel in Richtung auf das Abwickelende bewegen kann.

5. Einrichtung zum Abmessen von Schussgarn nach einem der vorhergehenden Ansprüche, worin der Garnwickelarm (14) und der Garnführungsarm (17) bezüglich der Trommelachse diametral angeordnet sind und auf einer gemeinsamen Welle (40) montiert sind, um im Gleichlauf zu rotieren.

6. Einrichtung zum Abmessen von Schussgarn nach Anspruch 5, wobei die Welle (40) in einem Gehäuse (46) drehbar gelagert ist und diese Welle drehbar in der Trommel liegt, und wobei die Trommel und das Gehäuse einander zugeordnete Magneten (44, 45) enthalten, welche das Mitdrehen der Trommel verhindern.

7. Einrichtung zum Abmessen von Schussgarn nach einem der vorhergehenden Ansprüche. worin die Trommel aus einer Mehrzahl von Segmenten (30) zusammengesetzt ist, welche radial einstellbar sind, um eine Veränderung des Trommeldurchmessers zu ermöglichen.

Revendications

1. Dispositif de mesure de fil comprenant un tambour fixe (12) et ayant une zone (24) d'emmagasinage et une zone (25) de décharge, un bras (14) d'alimentation en fil conçu pour enrouler le fil sur la zone d'emmagasinage du tambour, un bras (17) de guidage du fil prévu pour simultanément transférer le fil de la zone d'emmagasinage vers la zone de décharge, des moyens d'arrêt pouvant coopérer avec le tambour pour permettre au fil enroulé sur le tambour d'être tiré axialement hors

du tambour après qu'une quantité prédéterminée de fil a été enroulée sur le tambour, les moyens d'arrêt comprenant un doigt unique (20) disposé à l'extérieur du tambour et conçu pour se déplacer à la fois radialement et axialement par rapport au tambour, le doigt (20), pour chaque décharge de fil, étant conçu pour se déplacer radialement vers l'intérieur en une première position axiale afin de porter contre le fil pendant qu'il est déchargé du bras (17) de guidage de fil pour, ainsi, simultanément déclencher le bobinage du fil sur la zone de décharge du tambour par le bras de guidage du fil et définir aussi la longueur mesurée de fil déchargée du dispositif, le doigt étant conçu pour se déplacer ensuite axialement le long du tambour vers une seconde position axiale et, dans ladite position axiale, il se déplace radialement vers l'extérieur pour libérer le fil enroulé sur la zone de décharge et, pendant la libération du fil, le doigt revient vers la première position axiale avant de se déplacer de nouveau radialement vers l'intérieur.

2. Dispositif de mesure de fil selon la revendication 1, dans lequel le doigt (20) est monté sur un premier support (60) qui pivote sur un second support (62) pour se déplacer autour d'un premier axe de pivotement, le second support pivotant de façon à se déplacer autour d'un second axe de pivotement, les premier et second axes de pivotement étant perpendiculaires entre eux, le premier support étant soumis a l'action de deux cames (67) disposées côte à côte et dont l'axe de rotation est parallèle au second axe de pivotement.

3. Dispositif de mesure de fil selon l'une quelconque des revendications précédentes, dans lequel les zones d'emmagasinage (24) et de décharge (25) sont séparées par une nervure annulaire (26).

4. Dispositif de mesure de fil selon la revendication 3, dans lequel la nervure présente une face inclinée (269) s'étendant vers l'extrémité de décharge du tambour afin de favoriser un déplacement axial le long du tambour, vers son extrémité de décharge, d'un fil enroulé sur la face inclinée.

5. Dispositif de mesure de fil selon l'une quelconque des revendications précédentes, dans lequel le bras (14) d'alimentation en fil et le bras (17) de guidage du fil sont diamétralement opposés et montés sur un arbre commun (40) afin de tourner ensemble.

6. Dispositif de mesure de fil selon la revendication 5, dans lequel l'arbre (40) est monté de façon à tourner dans un bâti (46) et le tambour reçoit l'arbre en rotation, le tambour et le bâti possédant des pôles magnétiques coopérants (44, 45) qui empêchent le tambour de tourner.

7. Dispositif de mesure de fil selon l'une quelconque des revendications précédentes, dans lequel le tambour est composé de plusieurs segments (30) qui peuvent être déplacés radialement pour régler le diamètre du tambour.

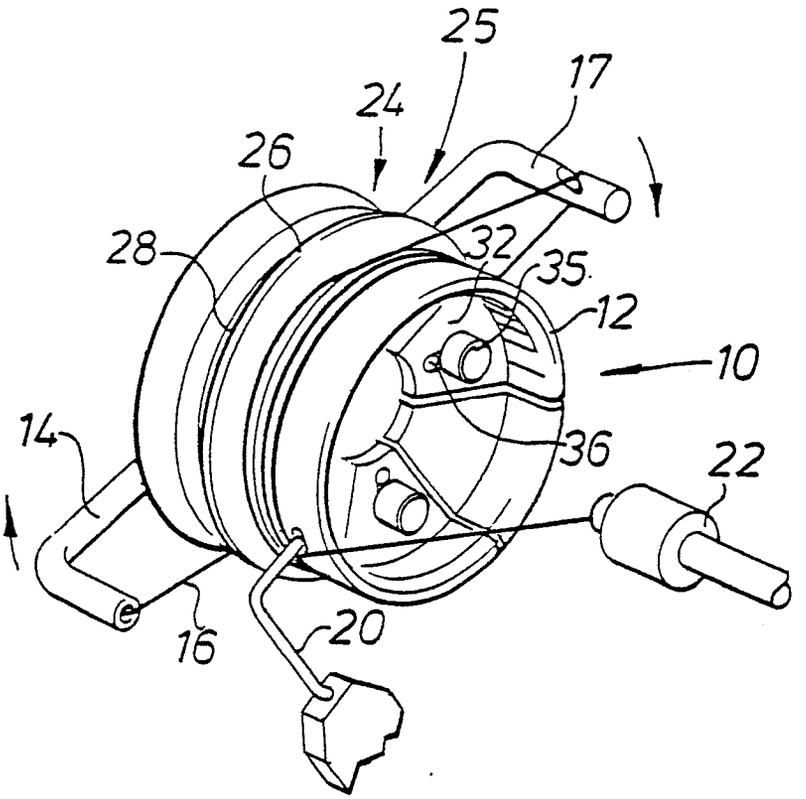

FIG.1

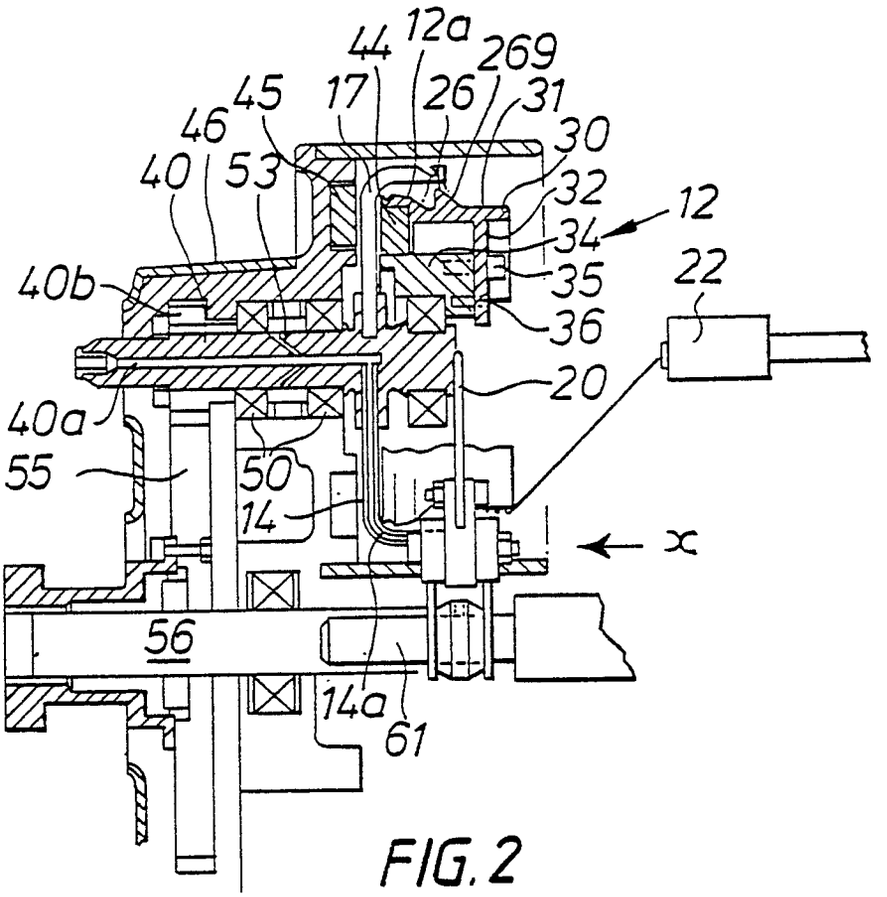
44
12a
269
45
17
26
31
46
30
40
53
32
12
34
40b
35
22
36
20
40a
55
50
14
x
56
14a
61

FIG. 2

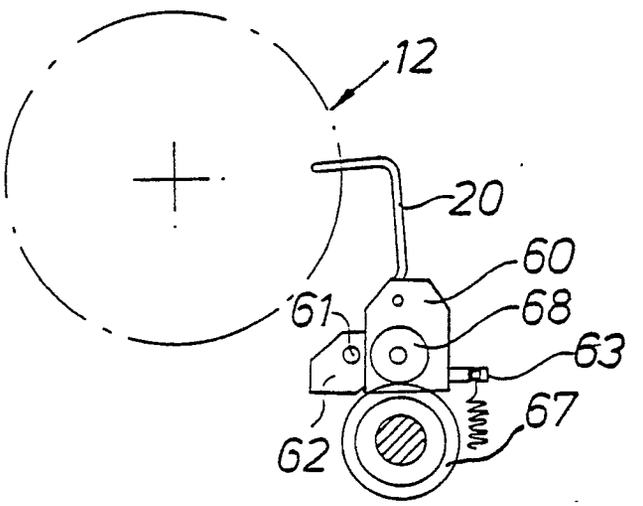
12
20
60
61
68
63
67
62

FIG. 3