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(54) **Apparatus for controlling the production of paper rolls.**

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Description

The invention refers to rewinders for producing small rolls or logs of paper. More particularly the intention refers to a rewinder according to the preamble of claim 1 or claim 2.

In the preparation of logs or rolls of paper of relatively small diameter from large diameter rolls produced on a paper-making machine, the equipment and apparatus have been well developed to produce such logs or rolls automatically and at high speed.

Relevant patents relating to the background of this type of paper-converting machinery and process are the U.S. Patents 3,869,095, 4,327,877 and 4,422588.

In the preparation of these logs or rolls, the web of paper fed to the machine quite often varies in basis weight, caliper, surface characteristics and the like, and it is also important that the manufacturer provide the precise number of sheets or usable units in each of the finished rolls.

All of this has to be accomplished while keeping the outside diameter of the roll within predetermined limits, which are generally dictated by the wrapping and packaging equipment, as well as by the size of the holder or dispenser on which the finished roll is used by the consumer.

The core on which the paper is wound may also vary in diameter, and this creates a further problem for the manufacturer in keeping the outside diameter of the finished roll within pre-determined limits.

Under the circumstances, it is important for economic and commercial reasons that the length of the paper wound into the roll, the number of sheets or usable units provided in the roll, and the outside diameter of the roll, be controlled as accurately as possible. The apparatus of the present invention provides such equipment.

The invention relates to machines for paper manufacture and, in particular to the rewinders, i.e., machines which are fed with one or more large rolls or with a roll of two-ply paper, for the production of "logs" or rolls of paper having relatively smaller diameter. These "logs" are subsequently cut perpendicularly to their axes to provide small rolls of paper for use as toilet paper, kitchen towels, or for similar uses. In these machines, it is suitable and sometimes indispensable to provide an exact diameter of the roll so that the small rolls meet requirements of successive operations, such as cutting and packaging, as well as practical requirements, such as fitting into a toilet-roll dispenser.

It is also suitable (or even necessary) that the exact diameter be obtained with a precise and predetermined length of paper, or with a precise and pre-determined number of sheets (when the paper is perforated to be detached in sheets of equal length), again for commercial requirements and so as not to exceed desired paper length according to economical requirements.

A particular requirement is that of keeping the length (that is, the number of sheets of the paper) or the weight of the small roll, and the diameter of the small rolls uniform, even though the characteristics (such as basis weight or caliper or surface finish) may not be constant.

The apparatus in question ensures control and correction of the production in order to achieve uniformity of the above-mentioned characteristics.

Therefore, it is an object to provide an apparatus for controlling the production of rolls or "logs" of paper produced by a rewinder fed with large rolls or two-ply paper rolls, especially for ensuring an exact overall diameter and the paper length and/or paper weight within pre-set limits.

From JP-A-59143837 a rewinder is known, which includes: a pressing roller which exerts a pressure on the small roll being wound, said pressing roller being movable to allow the diameter of the small roll to increase; length detection means for detecting the length of web wound on said small roll; and diameter detecting sensors for detecting the diameter reached by the small roll. This known rewinder is suitable for the production of rather large rolls of paper web wherein the winding parameters, and in particular the tension in the web, can be changed during winding. Starting from an average thickness value of the web, a pre-set desired density of the roll and a pre-set diameter, this known rewinder detects the instant diameter and the instant length of paper during winding of each single roll. From the detected data a microcomputer calculates the actual instant winding density and automatically changes the tension in the web to modify the winding tension and thus the winding density.

This operation is not possible in rewinders wherein the winding time ranges between 2 or 3 seconds.

To reach the above mentioned objects, in a first embodiment the rewinder of the invention provides:

- means for setting the final web length on the roll to be formed;
- means for setting a desired final diameter of the small roll;
- a logic circuit for comparing the pre-set final diameter with the detected final diameter and the pre-set length with the length actually wound onto the small roll at the end of the winding of a small roll;
- and a correcting circuit for changing the value of the pressure exerted by said pressing

roller at the end of the winding of the small roll and before starting winding of a new small roll.

In this first embodiment the pressure of the pressing roller is changed, if necessary, to obtain logs with a predetermined diameter and a predetermined length of paper wound thereon.

In some instances it is required that the weight of the roll be maintained in a predetermined range. Based on the same inventive concept, a second embodiment of the rewinder of the invention provides:

- weight sensor means for detecting the final weight of the small roll;
- means for setting a desired final diameter of the small roll;
- means for setting a desired final weight of the small roll;
- a logic circuit for comparing the pre-set final diameter and final weight values with the detected diameter and weight of the finished small roll;
- a correcting circuit for changing the value of the pressure exerted by said pressing roller at the end of the winding of the small roll and before starting winding of a new small roll.

The diameter-sensing means may be associated with the small presser, and it is activated when the desired diameter is reached.

The apparatus may comprise at least two sensors and a cam member, or an encoder, for evaluating limit positions, and thresholds for controlling fine and coarse adjustments according to the sensed diameter of the roll, i.e., according to the position of the presser assembly. There can be provided two fixed sensors, which have adjustable position and interspace, and a screen member located on an arm for the angular displacement of the presser, in order to obtain the various adjustments through four practicable and subsequent pulses. Alternatively, the diameter sensor may be arranged as an encoder that measures the angular displacement of the presser arm.

In the second embodiment,a weighing means may be provided, such as a load cell, able to evaluate the weight of the log or roll as data to be used for corrections.

Therefore, the apparatus provides for carrying out the simultaneous control of the diameter and length of the paper or of the weight of the log up to the pre-determined limit. Moreover, the apparatus provides for keeping said diameter exact when the characteristics of paper are changing, either by imposing a change of length of the paper supplied for each roll, or by keeping the length and the diameter steady through a variation of the thrust operated by the small presser.

In one embodiment, the presser thrust is reduced, thus increasing the roll diameter with the same length of wound paper. Vice-versa, paper may be added to the roll, in order to reach the desired length, by causing a greater thrusting action of the presser on the roll, to reach the pre-set diameter with a greater quantity of rolled-up paper.

In a further embodiment, the apparatus allows the paper weight to be kept steady through a variation of the length, and by maintaining the diameter steady through a variation of the presser thrust on the roll being formed.

Further embodiments are set forth in the appended claims.

All the operations can be carried out with the machine in operation, without interrupting the production process, and providing for successive corrections up to the restoration of the pre-set and desired limits.

With the above and other objects in view, more information and a better understanding of the present invention may be achieved by reference to the following detailed description, while advantageous features of the invention are set out in the claims.

For the purpose of illustrating the invention, there is shown in the accompanying drawings a form thereof which is at present preferred, although it is to be understood that the several instrumentalities of which the invention consists can be variously arranged and organized and that the invention is not limited to the precise arrangements and organizations of the instrumentalities as herein shown and described.

In the drawings, wherein like reference characters indicate like parts:

FIG. 1 shows a schematic representation of a rewinder, limited to the main members for the winding of the paper web into a roll.

FIG. 2 shows a block diagram of the electronic parts relvant to the connection system.

FIG. 3 shows another embodiment similar to FIG. 1.

FIG. 4 shows an explanatory switching diagram.

Referring to the attached drawings, and particularly FIGS. 1 and 3, the continuously fed paper web N is transversally perforated at equal distances (to provide sheets) by a device 1 and is turned by a cylinder 2 in order to be fed to the main cylinder 3. Cylinder 3 determines the total length of web to be wound and includes a cutting device, including a cylinder 5, which carries out the cutting of said web N.

Number 7 indicates a cylinder which cooperates with cylinder 3 and defines an interspace with it, wherein a tubular core, preferably made of cardboard, is inserted--in a known manner--in the direction of arrow fA. The paper web is wound on

the core to form the roll or log BS, which is then suitably moved away in the direction of arrow fB. Such cutting and winding arrangements are well-known, as shown in U.S. Patent 4,327,877. They may include also a so-called presser, i.e., a further pressing roller indicated by 9, which is movably mounted, for example, on a pair of arms 12 pivoted at 14. Presser 9 is able to produce a suitable pressure, that is, a thrust on the roll BS being formed and thus to completely define the diameter of the roll.

Presser 9 is capable of varying the pressure exerted on the roll BS being formed and thereby compact the paper in the roll to a more or less degree. The presser 9 assembly, with its supporting arms 12, allows also to sense the diameter of the roll being formed and, therefore, the presser itself may cooperate with a diameter evaluating sensor. For example, the regulation of the pressure exerted by the presser on the roll may be obtained by an adjustable weight slidable along arm 12, by a screw-control or other device (not shown).

As shown in FIG. 1, a sensor is provided for evaluating said diameter, which sensor comprises a screen 16 located on the arms 12, and a sight 18 of optical type such as an "electric eye", for example, at a fixed position. A more simple arrangement includes a suitably positioned microswitch which establishes the diameter that the roll BS must reach to meet the above-mentioned requirements. Two optical sensors may be provided that can regulate the coarse and fine corrections of the presser thrust on the paper.

On the assembly of arms 12 of presser 9, means is provided for adjusting the pressure to be exerted by presser 9 on the roll BS being formed. The regulator may consist of a cylinder piston system 20 supplied by pressure adjustable through a control system, generally indicated by 22, which is dependent on control means electronically operated according to a suitable program. The regulator may operate by increase of the pressure inside the system 20 and thus reduce the presser thrust on the roll, and vice versa.

Fig.2 shows an electronic block diagram including an input 31 for the data concerning the desired diameter, which data are obtained by a sensor like that indicated by 16,18 in Fig. 1. Numerals 33 and 35 in Fig.2 indicate two timers which are set for a longer and shorter time, respectively, to obtain coarse and fine corrections, respectively. Numerals 36 and 37 indicate the date input for setting the lengths (i.e., the meters) of paper representing the limits of the allowable range of paper, while numeral 38 indicates the input of the actual value of the length of the fed paper, such input being supplied through a counter 24 associated with cylinder 3. Numeral 39 indicates an electronic logic which can receive a card (which can be easily changed) containing the program. Numerals 41, 43, and 45 indicate three gates associated with the three outputs of electronic logic 39 and which receive also the data relevant to the reached diameter from input 31. Gates 41 and 43 are intended for the coarse correction and gate 45 for the fine correction.

From gates 41 and 43 data are fed through lines 47 and 49 to two switches 51 and 53, respectively, for increasing or decreasing coarse correction represented by blocks 55 and 57 respectively. Switches 51 and 53 receive the correction time from timer 33 which is set for a longer duration. The two corrections 55 and 57 may also be activated by switches 59 and 61, provided for the fine adjustment, which are connected to timer 35, set for the shorter duration, and by gates 67 and 69. The correcting signals arrive at switches 59 and 61 via two lines 63 and 65, respectively, coming from two gates 67 and 69 fed with data obtained via line 71 from the gate 45 of the electronic logic. Data for the delivery of the type of fine correction to be made are obtained from lines 73 and 75 which are connected to the counter 24 for detecting the length of passed paper, said counter being connected, for example, to cylinder 3 and to the diameter sensor such as that indicated by 16 and 18.

The operation of the apparatus is as follows.

As the optical sensor (or microswitch) 16, 18 - either single or dual- is activated because the roll diameter has reached the desired preset value, and the counter 24, which provides the information relative to the length of wound paper, has not arrived at any of the two selections preset by 36 and 37 in the electronic logic, it is necessary to increase the length of paper and thus the pressure of presser 9 must be increased so that greater compaction of the rolls of paper will allow an accumulation of a larger amount of paper while maintaining the roll diameter at the desired value.

If the microswitch 16, 18 is actuated and the counter 24 has already reached the upper selection limit for the allowable paper length, this means that there is sufficient paper in the roll, and as a consequence the pressure of presser 9 must be lowered so that the desired diameter is reached with a smaller amount of paper.

The two above-mentioned corrections are achieved through timer 33 and the enabling controls on switches 51 and 53 coming from gates 41 and 43 respectively.

Figs. 3 and 4 show a modified embodiment, in which two proximity or optical sensors 118 and 120 can cooperate with a screening body 116 carried by arm 12. Sensors 118 and 120 may be carried by a support 122 pivotable at 114. Likewise arm 12 is pivotable at 114. Support 122 is adjustable, for

example, by a screw 126 to set the position of the two sensors 118 and 120 and thus the desired diameter for roll BS. The distance between the two sensors 118 and 120 can also be adjusted for establishing the tolerance of the diameter of roll BS.

In this embodiment, the regulation system is driven by a series of pulses. With reference to the diagram of Fig. 4, lines 201, 202, 203 and 204 may be considered as the thresholds delimited by pulses obtained from the pair of sensors 118 and 120 influenced by screen 116, wherein:

- 201 corresponds to the screening (actuating) pulse of the first sensor;
- 202 corresponds to the releasing (abandoning) pulse of the first sensor;
- 203 corresponds to the screening (actuating) pulse of the second sensor; and
- 203 corresponds to the releasing (abandoning) pulse of the second sensor.

The regulation may be carried out by comparing the output of counter 24 driven by the main cylinder 3 (proportional to the length of wound paper) with pulses 201, 202, 203 and 204 through the following logical consequences:

(1) If the preset counting goes off and pulse 201 has not yet arrived, it is necessary to provide a coarse regulation to lower the presser thrust and slacken the winding in order quickly to increase the diameter of roll BS;

(2) If the preset counting goes off and pulse 201 has already arrived, it is necessary to provide a fine regulation to lower the presser thrust;

(3) If the preset counting goes off when pulse 201 has already been delivered and pulse 202 has not, it is necessary to provide a fine regulation in order to increase the presser thrust;

(4) The moment pulse 202 goes off and up to the moment the pulse 203 goes off, the diameter is within the tolerance range;

(5) If the preset counting goes off and pulse 203 has already arrived, it is necessary to provide a fine regulation in order to increase the presser thrust;

(6) In the interval between pulses 203 and 204, the fine regulation is maintained;

(7) If the preset counting goes off and pulse 204 has already arrived, it is necessary to provide a coarse regulation in order to increase the presser thrust and reduce the diameter.

All this is accomplished by utilizing the two proximity sensors 118 and 120 whose distance of application determines the tolerance field TL accepted for the roll diameter, in relation to the thickness of the screening body 116 carried by the presser 9, 12.

Another solution can be that of mounting a pulse genertor on the fulcrum 14 of arm 12 of presser 9 and comparing the pulses thereof with those emitted by the counter 24 on cylinder 3 with the same criteria as those of the preceding solution.

What has been described above relates to a kind of operation in which a certain length of paper is set beforehand, and diameter adjustments are imposed through variations of the thrust operated by presser 9 on the roll being formed in order to assure that the final diameter of the rolls is at the desired value.

As soon as the screening body 116 obscures the first sensor 118, a pulse takes place and the programmer compares the length of paper passed through - evaluated by pulses produced by the counter 24 on cylinder 3 - with the preset length (which takes into account a constant which is necessary to carry out the whole exchange cycle) and, if the two values are substantially equal, the change of rolls (an operation which always takes place in any case) is actually carried out without making a change in the presser thrust. If, instead, the two values are different (being either greater or smaller) the system will initiate a change by decreasing or increasing the thrust of the presser in order to correct the amount of paper in the roll. The greater the difference between the two countings (paper length and diameter of roll BS), the greater will be this correction.

Alternatively, the diameter and weight of the roll may be preset and the corrections performed by imposing variations in the length of paper. In this case, the diameter of the roll is ensured but not the length of the wound paper, which length may vary by an amount of even one revolution of cylinder 3.

Weighing systems may be included, such as load cells like those shown in dotted lines at C in Fig. 3 for weighing the roll which has left the position BS (where it was formed) and has moved along chute S in the direction of arrow fB. By the weight date it is possible to affect the corrections of the presser thrust and/or of the length of the paper which has been fed to each roll.

It is furthermore to be understood that the present invention may be embodied in other specific forms without departing from the spirit or special attributes, and it is, therefore, desired that the present embodiments be considered in all respects as illustrative and, therefore, not restrictive, reference being made to the appended claims rather than to the foregoing description to indicate the scope of the invention.

Claims

1. A rewinder for producing small rolls (BS) of paper web from larger rolls, including: a press-

ing roller (9) which exerts a pressure on the small roll being wound, said pressing roller (9) being movable to allow the diameter of the small roll (BS) to increase; length detection means (24) for detecting the length of web wound on said small roll (BS); and diameter detecting sensors (16, 18; 116, 118, 120) for detecting the diameter reached by the small roll (BS); characterized by

- means (36, 38) for setting the final web length on the roll to be formed;
- means (39) for setting a desired final diameter of the small roll (BS);
- a logic circuit (39, 41, 43, 45) for comparing the pre-set final diameter with the detected final diameter and the pre-set length with the length actually wound onto the small roll at the end of the winding of a small roll;
- and a correcting circuit (33, 35, 51, 53, 59, 61, 55, 57, 67, 69) for changing the value of the pressure exerted by said pressing roller (9) at the end of the winding of the small roll and before starting winding of a new small roll (BS).

2. A rewinder for producing small rolls (BS) of paper web from larger rolls, including: a pressing roller (9) which exerts a pressure on the small roll being wound, said pressing roller being movable to allow the diameter of the small roll to increase; length detection means (24) for detecting the length of web wound on said small roll (BS); and diameter detection sensors (16, 18; 116, 118, 120) for detecting the diameter reached by the small roll (BS); characterized by

- weight sensor means (C) for detecting the final weight of the small roll (BS);
- means (39) for setting a desired final diameter of the small roll (BS);
- means (39) for setting a desired final weight of the small roll (BS);
- a logic circuit (39, 41, 43, 45) for comparing the pre-set final diameter and final weight values with the detected diameter and weight of the finished small roll (BS);
- a correcting circuit (33, 35, 51, 53, 61, 59, 57, 67, 69) for changing the value of the pressure exerted by said pressing roller (9) at the end of the winding of the small roll and before starting winding of a new small roll (BS).

3. The rewinder of claim 1, wherein the correcting circuit (33, 35, 51, 53, 59, 61, 55, 57, 67, 69) provides a change of the length of web wound on each small roll (BS), said length being comprised within a range of allowable lengths defined by two pre-set values.

4. The rewinder of claim 2, wherein the correcting circuit (33, 35, 51, 53, 59, 61, 55, 57, 67, 69) provides a change of the length of web wound on each small roll (BS).

5. The rewinder of any of claims 1 to 4, wherein the diameter detecting sensors are operatively connected to the pressing roller (9).

6. The rewinder of claim 5, including two diameter detecting sensors (118, 120) which evaluate the limit positions and control thresholds for fine and coarse regulations of the diameter of the small roll (BS) as detected by the pressing roller (9) during formation of the small roll.

7. The rewinder of claim 6, wherein the distance between the two diameter detecting sensors (118, 120) is adjustable, a screen (116) being provided for cooperating with said sensors, the position of the screen with respect to the sensors being a function of the diameter of the small roll (BS).

8. The rewinder of claim 6 or 7, wherein the pressing roller (9) is supported on an angularly displaceable arm (12) and the screen (116) is mounted on the arm, while the sensors (118, 120) are fixed.

9. The rewinder of claim 8, wherein the sensors are adjustable in position with respect to the position of the arm supporting the pressing roller (9).

10. The rewinder of any of claims 1 to 6, wherein the pressing roller (9) is supported on an angularly displaceable arm (12), and the diameter detecting sensor is an encoder which measures the angular displacement of the arm.

Patentansprüche

1. Eine Aufwickelvorrichtung zur Herstellung kleiner Rollen (BS) aus einer Papierbahn aus größeren Rollen mit einer Andruckrolle (9) die einen Druck auf die kleine im Aufwickeln begriffene Rolle ausübt und derart beweglich ist, daß der Durchmesser der kleinen Rolle (BS) ansteigen kann; mit Längenfühlermitteln (24) zum Feststellen der Länge der auf die kleine Rolle (BS) aufgewickelten Bahn; und mit Durchmesserfühlern (16, 18; 116, 118, 120) zum Erfassen des Durchmessers, der von der kleinen Rolle (BS) erreicht worden ist, gekenn-

zeichnet durch

- Mittel (36, 38) zum Einstellen der endgültigen Bahnlänge auf der zu bildenden Rolle;
- Mittel (39) zum Einstellen des endgültigen Durchmessers der kleinen Rolle;
- eine Logikschaltung (39, 41, 43, 45) zum Vergleichen des voreingestellten endgültigen Durchmessers mit dem festgestellten endgültigen Durchmesser und der voreingestellten Länge mit der tatsächlich am Ende des Aufwickelns der kleinen Rolle festgestellten Länge;
- und eine Korrekturschaltung (33, 35, 51, 53, 59, 61, 55, 57, 67, 69) zum Verändern des Wertes des von der Andruckrolle (9) ausgeübten Drucks am Endes des Aufwickelns der kleinen Rolle und vor dem Beginn des Aufwickelns einer neuen kleinen Rolle (BS).

2. Eine Aufwickelvorrichtung zur Herstellung kleiner Rollen (BS) aus einer Papierbahn von größeren Rollen mit einer Andruckrolle (9), die einen Anpreßdruck auf die kleine im Aufwikkeln begriffene Rolle ausübt und derart beweglich ist, daß der Durchmesser der kleinen Rolle zunehmen kann, mit Längenfühlermitteln (24) zur Feststellung der Länge der auf die kleine Rolle (BS) aufgewickelten Bahn, und mit Durchmesserfühlern (16, 18; 116, 118, 120) zur Feststellung des von der kleinen Rolle (BS) erreichten Durchmessers, gekennzeichnet durch

- Gewichtsfühlermittel (C) zum Feststellen des Endgewichts der kleine Rolle;
- Mittel (39) zum Einstellen eines gewünschten Enddurchmessers der kleinen Rolle (BS);
- Mittel (39) zum Einstellen eines gewünschten Endgewichts der kleinen Rolle (BS);
- eine Logikschaltung (39, 41, 43, 45) zum Vergleichen des voreingestellten Enddurchmessers und Endgewichts mit dem festgestellten Durchmesser und Gewicht der fertigen kleinen Rolle (BS);
- eine Korrekturschaltung (33, 35, 51, 53, 61, 59, 57, 67, 69) zum Verändern des Druckes, der durch die Andruckrolle (9) am Ende des Aufwickelns der kleinen Rolle und vor dem Beginn des Aufwikkelns einer neuen kleinen Rolle (BS) ausgeübt wird.

3. Die Aufwickelvorrichtung nach Anspruch 1, wobei die Korrekturschaltung (33, 35, 51, 53, 59, 61, 55, 57, 67, 69) eine Längenänderung der auf jede kleine Rolle (BS) aufgewundenen Bahn ermöglicht, wobei die Länge innerhalb eines Bereichs zulässiger Längen liegt, die durch zwei voreingestellte Werte bestimmt ist.

4. Die Aufwickelvorrichtung nach Anspruch 2, wobei die Korrekturschaltung (33, 35, 51, 53, 59, 61, 55, 57, 67, 69) eine Längenveränderung der auf jede kleine Rolle (BS) aufgewickelten Bahn ermöglicht.

5. Die Aufwickelvorrichtung nach einem der Ansprüche 1 bis 4, in der die Durchmesserfühler mit der Andruckrolle (9) wirkungsmäßig verbunden sind.

6. Die Aufwickelvorrichtung nach Anspruch 5 mit zwei Durchmesserfühlern (118, 120), die die Grenzpositionen evaluieren und Schwellen für Fein- und Grobregulierungen des Durchmessers der kleinen Rolle (BS) gemäß Feststellung durch die Andruckrolle (9) während der Bildung der kleinen Rolle steuern.

7. Die Aufwickelvorrichtung nach Anspruch 6, in der der Abstand zwischen den beiden Durchmesserfühlern (118, 120) einstellbar ist, wobei ein Raster oder Finger (116) zum Zusammenwirken mit den Fühlern vorgesehen ist und die Position des Rasters oder Fingers bezüglich der Fühler eine Funktion des Durchmessers der kleinen Rolle (BS) ist.

8. Die Aufwickelvorrichtung nach Anspruch 6 oder 7, in welcher die Andruckrolle (9) von einem winkelmäßig deplazierbaren Arm (12) getragen ist und das Raster oder die Finger (116) auf dem Arm befestigt ist, während die Fühler (118, 120) fest sind.

9. Die Aufwickelvorrichtung nach Anspruch 8, in welcher die Fühler in ihrer Position bezüglich der Position des die Andruckrolle (9) tragenden Armes einstellbar sind.

10. Die Aufwickelvorrichtung nach einem der Ansprüche 1 bis 6, wobei die Andruckrolle (9) auf einem winkelmäßig deplazierbaren Arm (12) getragen ist und der Durchmesserfühler ein Kodierer ist, der die winkelmäßige Deplazierung des Armes mißt.

Revendications

1. Rebobineuse pour produire des petits rouleaux (BS) de bande de papier à partir de rouleaux plus grands comprenant : un rouleau de pressage (9) qui exerce une pression sur le petit

rouleau se rebobinant, le rouleau de pressage (9) étant mobile pour permettre l'augmentation du diamètre du petit rouleau (BS) ; des moyens de détection de longueur (24) pour détection la longueur de la bande enroulée sur le petit rouleau (BS) ; des capteurs de diamètre (16,18,116,118,120) pour détecter le diamètre atteint par le petit rouleau (BS), caractérisée par :

- des moyens (36,38) pour fixer la longueur finale de la bande sur le rouleau à former ;
- des moyens (39) pour fixer un diamètre final désiré du petit rouleau (BS);
- un circuit logique (39,41,43,45) pour comparer le diamètre final présélectionné avec le diamètre final détecté et la longueur présélectionnée avec la longueur réellement enroulée sur le petit rouleau à la fin de l'embobinage sur le petit rouleau ;
- et un circuit de correction (33,35,51,53,59,61, 55,57,67,69) pour changer la valeur de la pression exercée par le rouleau de pressage (9) à la fin de l'embobinage du petit rouleau et avant de commencer l'embobinage sur un nouveau petit rouleau (BS).

2. Rebobineuse pour produire des petits rouleaux (BS) de bande de papier à partir de rouleaux plus grands comprenant : un rouleau de pressage (9) qui exerce une pression sur le petit rouleau se rebobinant, le rouleau de pressage étant mobile pour permettre l'augmentation du diamètre du petit rouleau (BS), des moyens de détection de longueur (24) pour détection la longueur de la bande enroulée sur le petit rouleau (BS) ; des capteurs de diamètre (16,18,116,118,120) pour détecter le diamètre atteint par le petit rouleau (BS), caractérisée par :

- des capteurs de poids (C) pour détecter le poids final du petit rouleau (BS) ;
- des moyens (39) pour fixer un diamètre final désiré du petit rouleau (BS) ;
- des moyens (39) pour fixer un poids final désiré du petit rouleau (BS) ;
- un circuit logique (39,41,43,45) pour comparer les valeurs de diamètre final et de poids final présélectionnées avec les diamètre et poids détectés du petit rouleau terminé (BS) ;
- un circuit de correction (33,35,51,53,61, 59,57,67,69) pour changer la valeur de la pression exercée par le rouleau de pressage (9) à la fin de l'embobinage du petit rouleau et avant de démarrer l'embobinage d'un nouveau petit rouleau (BS).

3. Rebobineuse selon la revendication 1, dans laquelle le circuit de correction (33,35,51,53,59,61, 55,57,67,69) provoque un changement de longueur de la bande enroulée sur chacun des petits rouleaux (BS), cette longueur étant comprise à l'intérieur d'une fourchette de longueurs acceptables définie par deux valeurs présélectionnées.

4. Rebobineuse selon la revendication 2, dans laquelle le dispositif de correction (33,35,51,53,59,61, 55,57,67,69) provoque le changement de longueur de la bande enroulée sur chacun des petits rouleaux (BS).

5. Rebobineuse selon l'une des revendications 1 à 4, dans laquelle les capteurs de diamètre sont fonctionnellement reliés au rouleau de pressage (9).

6. Rebobineuse selon la revendication 5, comprenant deux capteurs de diamètre (118,120) qui évaluent les positions limites et les seuils de contrôle pour des réglages fins et grossiers du diamètre du petit rouleau (BS) tel que détecté par le rouleau de pressage (9) durant la formation du petit rouleau.

7. Rebobineuse selon la revendication 6, dans laquelle la distance entre les deux capteurs de diamètre (118,120) est ajustable, un screen (116) étant prévu pour coopérer avec les capteurs, la position du screen par rapport aux capteurs étant en fonction du diamètre du petit rouleau (BS).

8. Rebobineuse selon la revendication 6 ou 7, dans laquelle le rouleau de pressage (9) est supporté par un bras angulaire déplaçable (12) et le screen (116) est monté sur le bras, tandis que les capteurs (118,120) sont fixés.

9. Rebobineuse selon la revendication 8, dans laquelle les capteurs sont ajustables en position par rapport à la position du bras supportant le rouleau de pressage (9).

10. Rebobineuse selon l'une des revendications 1 à 6, dans laquelle le rouleau de pressage (9) est supporté par un bras angulaire déplaçable (12), et en ce que le capteur de diamètre est un encodeur qui mesure le déplacement angulaire du bras.

Fig.1

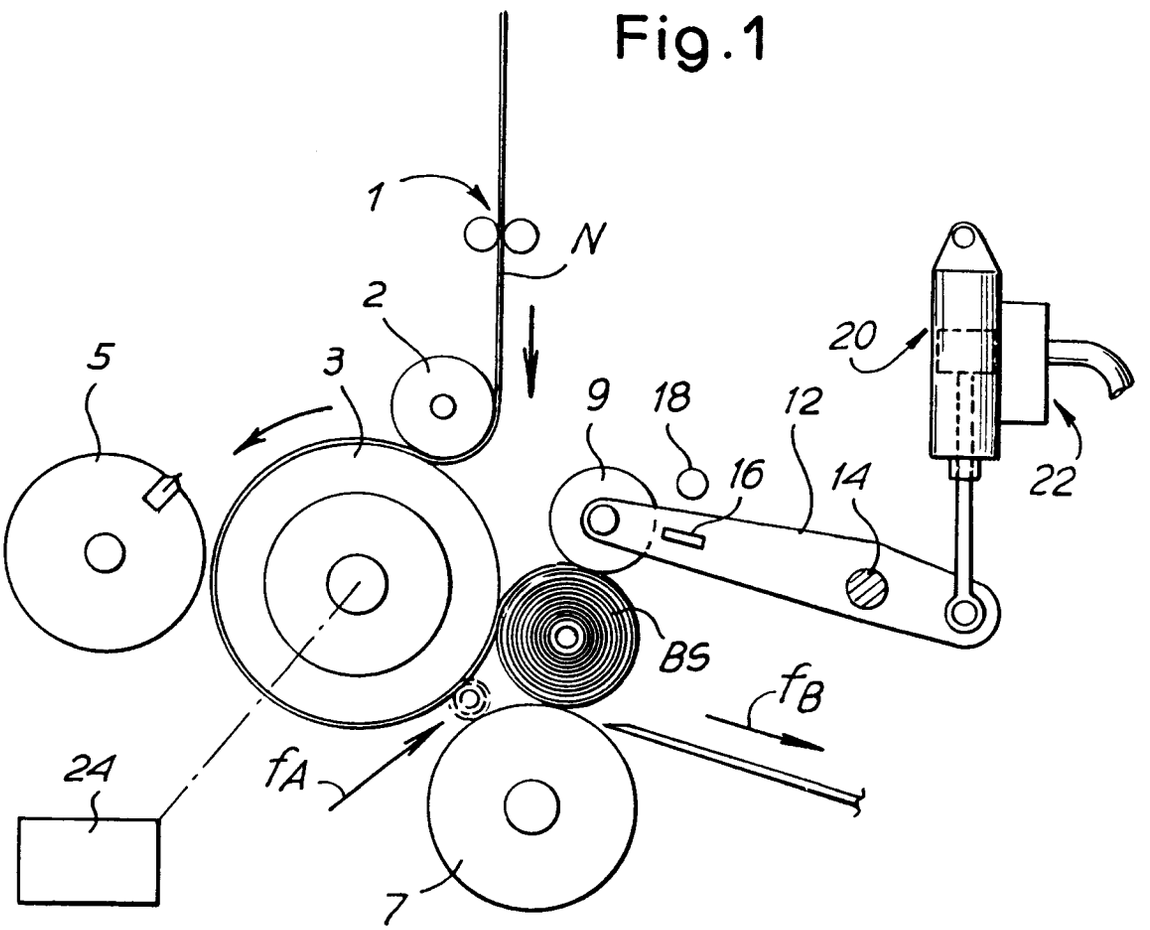


Fig. 2

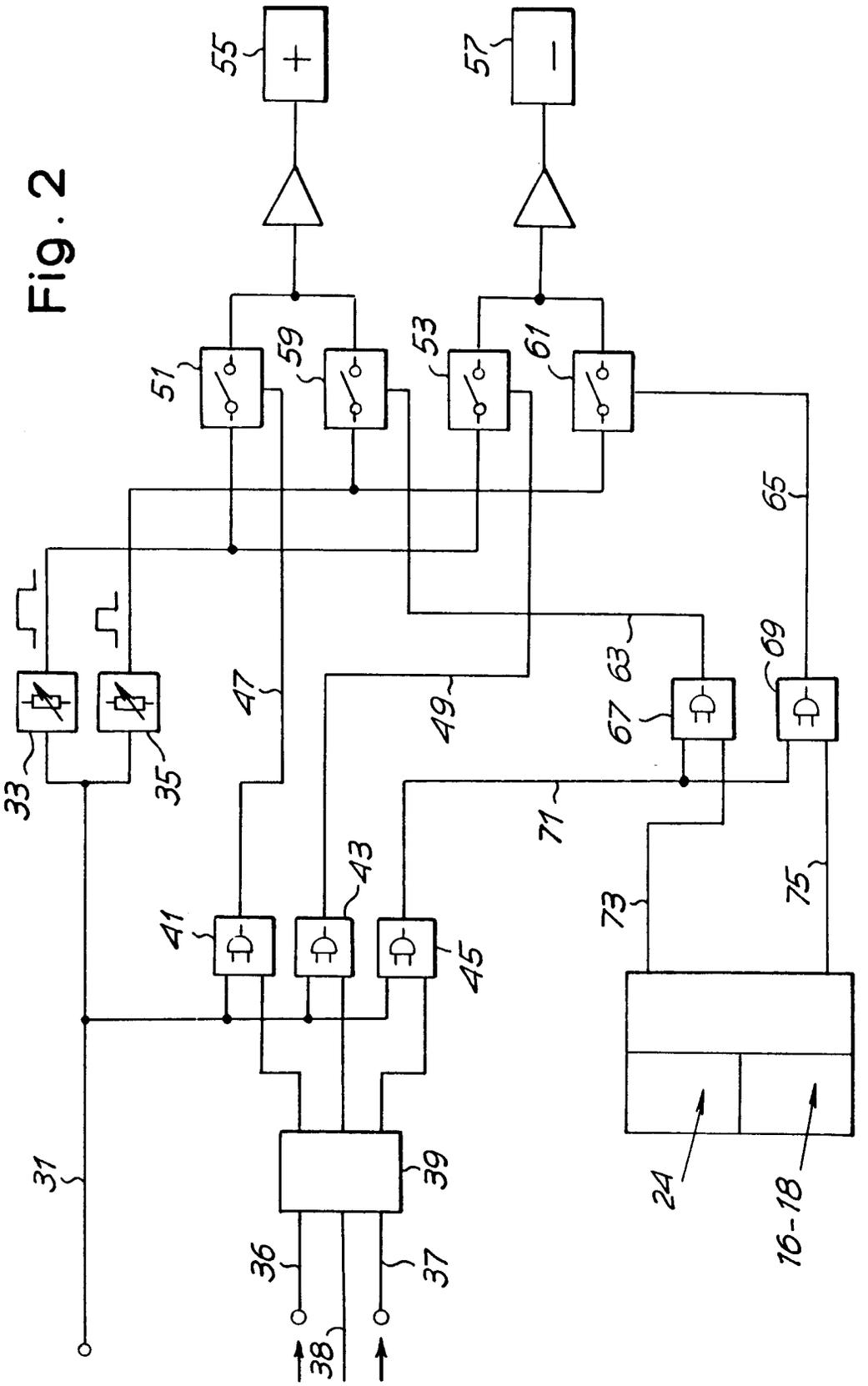

55
+
57
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51
59
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61
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33
35
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16-18

Fig.3

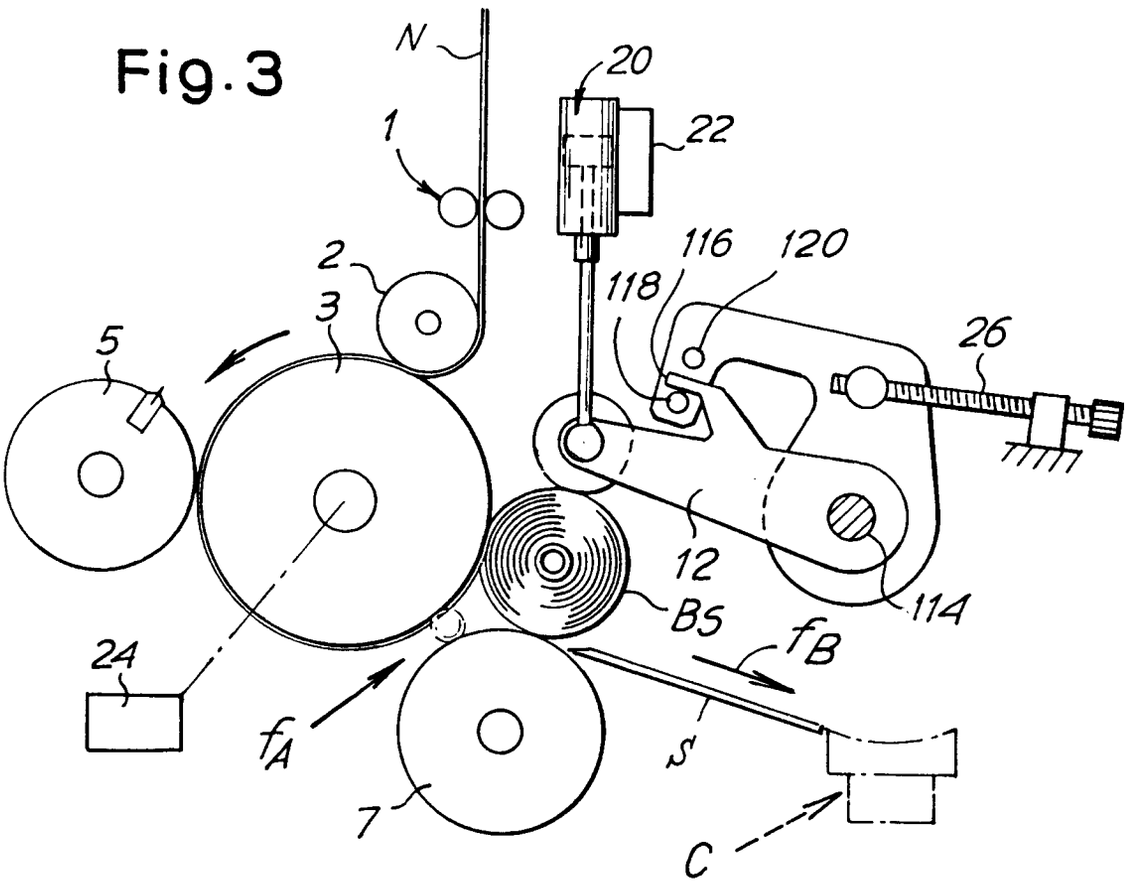
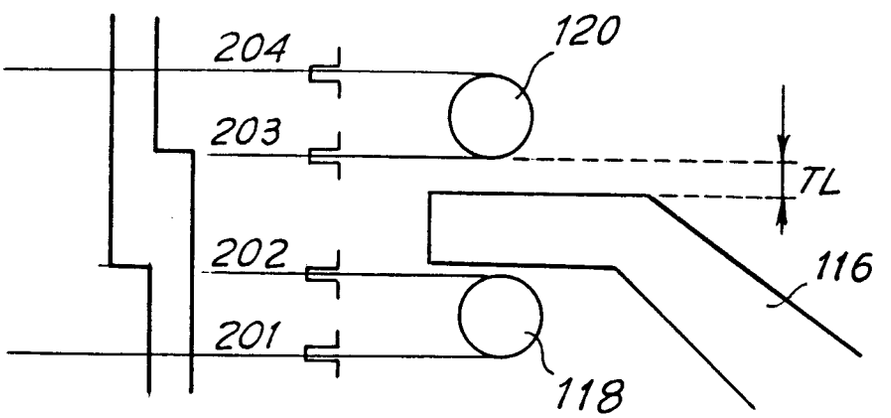

N
20
22
1
2
3
116
120
118
5
26
12
BS
114
24
f_B
f_A
S
7
C

Fig. 4


204
120
203
TL
202
116
201
118