EUROPEAN PATENT SPECIFICATION

Date of publication and mention of the grant of the patent: 04.09.1996 Bulletin 1996/36

Application number: 93110451.7

Date of filing: 30.06.1993

Papermaking machine with a press part paper threading system
Papiermaschine mit einem Einfädelystem in der Presspartie
Machine à papier avec un système d’enfilage dans la section de presse

Designated Contracting States: DE GB IT


Date of publication of application: 02.03.1994 Bulletin 1994/09

Proprietor: MITSUBISHI JUKOGYO KABUSHIKI KAISHA
Tokyo (JP)

Inventors:
- Bando, Takashi, Mihara Machinery Works
  Mihara-shi, Hiroshima-ken (JP)
- Iijima, Hidemasa, Mihara Machinery Works
  Mihara-shi, Hiroshima-ken (JP)
- Fujita, Norio, Mihara Machinery Works
  Mihara-shi, Hiroshima-ken (JP)

Representative: Henkel, Feiler, Hänzel & Partner
Möhlstrasse 37
81675 München (DE)

References cited:
DE-U-9011461
US-A-5037509

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).
Description

The present invention relates to a paper-making machine with a paper threading system applicable to a press part of the paper machine.

Description of the Prior Art:

One example of a press part paper threading system in a heretofore known paper machine is illustrated in Fig. 4. At the time of threading a wet paper web through a press part in a paper machine, as shown in Fig. 4 a net paper web transferred from a wire part to a press part with the aid of a suction pick-up roll 4, passes through a No. 1 press, a No. 2 press and a No. 3 press to be dewatered by the respective presses, and then it is scraped out by means of a center roll doctor 6 and falls in a broke pit for a press (not shown). In this instance, the wet paper web is slitted at the positions of a tail width by means of paper cutting nozzles 2 set at the positions for making a paper threading tail on the wire part, and it is threaded up to a center roll 5 as a sheet trimmed by trimming nozzles 1.

Under the above-mentioned condition, if the tail is blown by means of an air-jet nozzle (not shown) towards a nip portion where a transfer felt 16 engaged with a No. 1 suction transfer roll 7 and a 4P bottom felt 18 come into contact with each other to be transferred to the nip portion, then the tail advances into a nip portion of a No. 4 press, then it is scraped out by a doctor 10 for a 4P top roll and is taken out to the outside by means of a broke conveyor 11 for the 4P top roll.

Subsequently, the tail is threaded up to a No. 1 dryer by means of an air-jet nozzle (not shown), then it is transferred to a dryer part as caught in a carrier rope of a dryer not shown, and threading of the tail to the dryer is completed. Thereafter, spreading of a paper web is effected by traversing the paper cutting nozzle 2, and threading of a wet paper web over its entire width is completed. An outline of the condition of slitting by means of the paper cutting nozzle 2 and the condition of trimming by means of the trimming nozzles 1 in the above-described case is shown in Fig. 5.

However, in the heretofore known system, since threading of a paper web from the center roll 5 to the No. 4 press and the threading of a paper web from the No. 4 press to the dryer part are carried out respectively by means of air-jet nozzles, there was a problem that experience of threading was necessary for operation and automatic threading of a paper web was impossible.

Furthermore, because of the fact that at the time of threading a paper web, depending upon skill in the threading technique, wet paper may enter a press nip of the next stage in a coagulated form, there was a problem that a nip pressure would rise partly, resulting in damage of a felt, or rubber of a rubber-coated roll would be damaged due to an excessively large nip pressure on the roll surface.

In addition, the heretofore known press part paper threading system had shortcomings that since an open draw is formed between the center roll 5 and the No. 1 suction transfer roll 7 and between the 4P top roll 9 and the No. 2 suction transfer roll 8 during operation, a sheet tension (a draw value between the presses) for stretching the wet paper sheet is applied, a longitudinal-to-lateral ratio of a product paper strength becomes large, and the quality is degraded, and that for the purpose of broke processing at the time of paper threading, the 4P top roll 9 necessitated a paper scraping doctor and a broke processing apparatus.

An apparatus for transferring a threading tail of a web from a press section to a dryer section of a paper making machine is disclosed in US-A 5 037 509. This known device comprises a cutting device which cuts the paper web in a longitudinal direction on or upstream of the press roll in order to form a longitudinal strip having a smaller width than the paper web. The tail cutting means can move in a cross-machine direction for initially cutting the threading tail to be a narrow wedge. The tail of the paper web is used to facilitate pickup of the paper web from the press roll by means of a suction transfer roll having a divided interior vacuum space including a tail zone at an axial end of the suction transfer roll. As soon as the tail is threaded into the machine, the width of the tail is gradually increased to the total width of the paper web by gradually moving the longitudinal cutting device in the cross-machine direction.

SUMMARY OF THE INVENTION:

It is one object of the present invention to provide a paper-making machine with a press part paper threading system, wherein a paper threading operation can be carried out automatically in a simple manner without necessitating experience nor skill of an operator.

Another aspect of the present invention is to provide a paper-making machine with a press part paper threading system, wherein at the time of paper threading, wet paper would not enter a press nip in a coagulated form, and so, damage of a felt or damage of a roll coating caused by an excessively large nip pressure would not occur.

According to the present invention there is provided a paper-making machine with a threading system for threading a paper web from a press roll of a press part of the machine, said threading system comprising: cutting nozzle means for cutting a longitudinally-extending slit in the paper web as a side thereof to form a tail in the paper web located between the slit and one lateral side edge of the paper web, the tail being narrower than the portion of the paper web between said slit and the other lateral side edge of the paper web, a blanket loop running over the press roll, a suction transfer roll cooperating with the blanket loop so as to transfer the paper web from the blanket, said suction transfer roll being supported in the press part so as to be capable of moving toward
the blanket and lightly pressing against the blanket to achieve a partial overlap of the blanket on the suction transfer roll in order to elongate a nip formed therebetween and of releasing the pressing, and said suction transfer roll having a divided interior vacuum space including a tail zone at an axial end of the suction transfer roll such that said suction transfer roll can selectively exert vacuum first only on said tail zone to cause only the tail of the paper web travelling over the press roll to be transferred from the press roll and then on its entire width to secure the paper web to be transferred with no open draw during continuous operation, a tail cutting means for cutting the paper web transversely between a location on the paper web at which the slit is formed by said cutting nozzle means and a location corresponding to the lateral side edge of the paper web to thereby create a cut in the paper web which forms a leading edge of the tail of the paper web so as to facilitate transfer from said blanket by vacuum exerted on said tail zone of said suction transfer roll when the leading edge of the tail passes through the nip between said blanket and said suction transfer roll, said tail cutting means and said cutting nozzle means being disposed upstream of the nip between said blanket and said suction transfer roll.

Preferred embodiments of the paper-making machine of the present invention are defined in the subclaims.

In operation (see Figure 1 for reference of the No. 1 to 4 press), a wet paper web transferred to a press part by a suction pick-up roll is scraped out over its entire width by means of a doctor for a center roll. Subsequently, while the respective No. 1 and No. 2 suction transfer rolls are lightly pressed against the center roll and the top roll, vacuum is exerted upon the vacuum zone corresponding to a tail width. At the same time, cutting of a tail is effected by actuating a tail cutting nozzle in a wire part. When the tip end of the tail is thereby cut off, the tip cut off by the tail cutting nozzle passes through a nip portion of the No. 1 suction transfer roll, and the tail would be transferred to the side of a transfer felt by its vacuum force and would enter a nip portion of the No. 4 press. At this moment, an airjet could be blown towards the tip end of the tail cut in the widthwise direction to assist the transfer to the side of the transfer felt.

The tip end of the tail having passed the nip portion of the No. 4 press, can be smoothly transferred to the side of a dryer canvas by a vacuum force when it passes the nip of the No. 2 suction transfer roll similarly to the No. 1 suction transfer roll. In this case also, like the paper threading between the center roll and the top roll, it is possible to assist the transfer of the tail by means of an air-jet nozzle.

After the threading of the tail of a wet paper web into a dryer has been completed, a tail width is broadened by moving the paper cutting nozzle on the wire part, and a wet paper web having a total width is threaded. At the same time, the vacuum zones of the respective suction transfer rolls are switched to a total-width zone, and automatic paper threading through a press part is completed. However, since the nip widths formed by the No. 1 and No. 2 suction transfer rolls, the center roll and the top roll are short, the case where transfer to the transfer rolls is difficult, is expected. Thus, if blankets are arranged around the center roll and around the top roll and the blankets are somewhat overlapped with the suction transfer rolls, then nip widths where vacuum acts would be elongated, and it becomes possible to reliably carry out sheet transfer. In this case, the doctor for the center roll is not used, but the total-width sheet is made to fall in a broke pit for a press. Likewise, the top roll also reliably transfers the tail by means of the blanket.

According to the present invention, owing to the above-described structural and operational features, a paper threading operation is carried out automatically in a simple manner, and hence, even an operator having a little experience and skill in the technique can easily achieve the paper threading operation.

Also, according to the present invention, since coagulated paper would not enter a press nip, damage of a felt or damage of a roll coating caused by an excessively large nip pressure would not occur, and so, a running cost of a paper machine can be reduced.

In addition, according to the present invention, owing to the fact that an open draw is not present between the respective presses, a longitudinal-to-lateral ratio of a paper strength becomes small, paper quality is improved, breaking of a paper web in the press part is minimized, hence a stable operation at a high speed is possible, and therefore, a productivity can be raised by improving an operation efficiency of a paper machine.

The above-described and other objects, features and advantages of the present invention will become more apparent by reference to the following description of preferred embodiments of the present invention taken in conjunction with the accompanying drawings.

**BRIEF DESCRIPTION OF THE DRAWINGS:**

In the accompanying drawings:

Fig. 1 is a schematic view showing a layout of an entire press part disclosing certain features of the present invention;

Fig. 2 is a schematic view as viewed in the direction of an arrow A in Fig. 1;

Fig. 3 is a schematic view showing a layout of a press part according to a preferred embodiment of the present invention;

Fig. 4 is a schematic view showing a layout of an entire press part in the prior art; and

Fig. 5 is a schematic view as viewed in the direction of an arrow B in Fig. 4.
DESCRIPTION OF THE PREFERRED EMBODIMENTS:

In the following, the present invention will be described in greater detail in connection with the preferred embodiments illustrated in the accompanying drawings. Figs. 1 to 3 show the preferred embodiments of the present invention. At first, referring to Fig. 1, on a wire part are disposed trimming nozzles 1 for determining a paper web width, a paper cutting nozzle 2 for making a tail at the time of threading a paper web, and a tail cutting nozzle 3 having a swing arm 3a for cutting a tail in the widthwise direction in the press part.

A wet paper web on the wire part is transferred to a total-width press part by means of a suction pick-up roll 4, a wet paper web dewatered respectively through a No. 1 press, a No. 2 press and a No. 3 press is scrapped out over its entire width by means of a center roll doctor 6 provided on a center roll (press roll) 5, and is led into a broke pulper (not shown) by means of a broke shoot 17. In this instance, the wet paper web is carried up to the center roll in the form of a sheet having slitted at the positions of a tail width by means of paper cutting nozzles 2 and trimmed by means of trimming nozzles 1 as shown in Fig. 2.

Subsequently, while a No. 1 suction transfer roll 7' having an inner space divided into a tail zone and a total-width zone is lightly pressed against the center roll, vacuum is acted upon the tail zone. At the same time, a No. 2 suction transfer roll 8' having an inner space divided into a tail zone and a total-width zone is also lightly pressed against a 4P top roll 9, and vacuum is acted upon the tail zone. In succession, the tail portion is cut in the widthwise direction from the slit formed by the trimming nozzle 1 up to the slit formed by the paper cutting nozzle 2 as shown by a tail cut line in Fig. 2 by actuating the tail cutting nozzle 3 on the wire part. When the cut portion has passed a No. 3 press and has passed a nip between a center roll 5 and a No. 1 suction transfer roll 7', due to a vacuum force acted upon a tail portion of this tail, the tail is transferred from the nip end portion of the tail cut in the widthwise direction to the No. 1 suction transfer roll 7'. At this moment, an air-jet nozzle 14 could be used for assisting the transfer of the tail to the No. 1 suction transfer roll 7'.

When the tail has passed a nip portion of a No. 4 press, it is caught by the 4P top roll 9 and passes the nip between the roll 9 and the No. 2 suction transfer roll 8'. At this moment, similarly to the No. 1 suction transfer roll 7', the tip end of the tail is transferred to a No. 2 suction transfer roll 8' by a vacuum action upon the tail portion, and is threaded through a dryer part. At this time, an air-jet nozzle 15 could be used for assisting the transfer of the tail to the No. 2 suction transfer roll 8'. A 4P top roll doctor 10 is used with a relatively low nip pressure for removing paper dregs or the like adhered to the 4P top roll.

When threading of a tail of a wet paper web through a dryer has been completed in the above-described manner, the paper cutting nozzle 2 in the wire part is moved to broaden a tail width of the wet paper web up to the total width. At the same time, the vacuum zones in the above-described suction transfer rolls 7' and 8' are switched to a total-width zone. Thereby, threading of a wet paper web having a total width is automatically completed.

Fig. 3 shows another preferred embodiment, in which transfer of a tail in the transfer roll portion can be achieved more reliably. In Fig. 3, a center roll blanket 12 and a 4P top roll blanket 13 are wound respectively around the center roll 5 and around the 4P top roll 9, and by making these blanket somewhat overlap respectively with the No. 1 suction transfer roll 7' and the No. 2 suction transfer roll 8', the sheet transfer at these portions is made to be reliable. In this modified case, the respective transfer suction rolls 7' and 8' are not pressed lightly against the center roll 5 nor against the 4P top roll 9, and so, a wet paper web can be transferred from the blankets 12 and 13 without forming an open draw.

While the method of paper threading operation for a tail is similar to the embodiment shown in Figs. 1 and 2, the center roll doctor 6 is not provided, but a wet paper web before threading would travel jointly with the center roll blanket 12, and it could be made to fall into a broke pulper or paper threading for a tail portion could be effected in a similar manner to the above-described preferred embodiment. It is to be noted that the tail cutting device could be disposed either in a wire part or in a press part, and the cutting means could not be a water jet but could be any other means.

Claims

1. A paper-making machine with a threading system for threading a paper web from a press roll (5, 9) of a press part of the machine, said threading system comprising:

cutting nozzle means (2) for cutting a longitudinally-extending slit in the paper web at a side thereof to form a tail in the paper web located between the slit and one lateral side edge of the paper web, the tail being narrower than the portion of the paper web between said slit and the other lateral side edge of the paper web, a blanket loop (12, 13) running over the press roll (5, 9), a suction transfer roll (7', 8') cooperating with the blanket loop (12, 13) so as to transfer the paper web from the blanket, said suction transfer roll (7', 8') being supported in the press part so as to be capable of moving toward the blanket and lightly pressing against the blanket to achieve a partial overlap of the blanket on the suction transfer roll (7', 8') in order to elongate a nip formed therebetween and
of releasing the pressing, and
said suction transfer roll (7', 8') having a divided interior vacuum space including a tail zone at
an axial end of the suction transfer roll (7', 8')
such that said suction transfer roll (7', 8') can
selectively exert vacuum first only on said tail
zone to cause only the tail of the paper web
travelling over the press roll (5, 9) to be trans-
ferred from the press roll (5, 9) and then on its
entire width to secure the paper web to be
transferred with no open draw during continu-
ous operation,
a tail cutting means (3) for cutting the paper web
transversely between a location on the paper
web at which the slit is formed by said cutting
nozzle means (2) and a location corresponding
to the lateral side edge of the paper web to
thereby create a cut in the paper web which
forms a leading edge of the tail of the paper web
so as to facilitate transfer from said blanket by
vacuum exerted on said tail zone of said suction
transfer roll (7', 8') when the leading edge of
the tail passes through the nip between said blank-
et and said suction transfer roll (7', 8'), said tail
cutting means (3) and said cutting nozzle means (2) being disposed upstream of the nip
between said blanket (12, 13) and said suction
transfer roll (7', 8').

2. The paper-making machine with a threading system
as claimed in claim 1, wherein an air-jet nozzle (14,
15) is disposed after the nip between said press roll
(5, 9) and said suction transfer roll (7', 8') and ori-
ented to direct a stream of air in a direction tending
to blow the paper web from said press roll (5, 9) to
said suction transfer roll (7', 8').

3. The paper-making machine with a threading system
as claimed in claim 1 or 2,
wherein the press roll is a center roll (5) of the press
part of the paper-making machine.

4. The paper-making machine with a threading system
as claimed in claim 1 or 2,
wherein the press roll is a top roll (9) of the press
part of the paper-making machine.

Patentansprüche

1. Papiermaschine mit einem Einfädel- bzw. Einführ-
system zum Einführen einer Papierbahn von einer
Preßwalze (5, 9) einer Preßpartie der Maschine,
welches Einführungssystem umfaßt:
ein Schneidlüsennittel (2) zum Schneiden ei-
nes längsverlaufenden Schlitzes in der Papier-
bahn an einer Seite derselben zwecks Bildung
eines zwischen dem Schlitze und einer Quersei-
tenkante der Papierbahn gelegenen
Schlußstücks in der Papierbahn, welches
Schlußstück schmäler ist als der zwischen dem
Schlitze und der anderen Querseitenkante der
Papierbahn gelegene Abschnitt der Papier-
bahn,
eine Tuch- oder Deckenschleife (12, 13), die
über die Preßwalze (5, 9) verläuft, wobei eine
Saugübertragungswalze (7', 8') mit der Dek-
venschleife (12, 13) für die Überführung der Pa-
pierbahn von der Decke zusammenwirkt, wel-
che Saugübertragungswalze (7', 8') in der
Preßpartie so getragen oder gelagert ist, daß
sie sich zur Decke bewegen und leicht an die
Decke anpressen, um eine teilweise Überlap-
pung der Decke an der Saugübertragungswal-
ze (7', 8') zu erreichen zwecks Verlängerung ei-
nes dazwischen geformten (Quetsch-)Spalts, und
den Andruck aufheben kann, und
(wobei) die Saugübertragungswalze (7', 8') ei-
en untertellten inneren Vakuum- bzw. Unter-
druckraum mit einer Schlußstückzone an ei-
nem axialen Ende der Saugübertragungswal-
ze (7', 8') aufweist, derart, daß letztere selektiv ei-
nen Unterdruck zuerst nur auf die Schlußstück-
zone, um nur das Schlußstück der über die
Preßwalze (5, 9) laufenden Papierbahn von der
Preßwalze (5, 9) zu überführen, und dann auf
ihre gesamte Breite auszuüben vermag, um die
to überführende oder zu übertragende Papier-
bahn im fortlaufenden Betrieb ohne offenen
Zug (open draw) zu sichern,
ein Schlußstückschneidmittel (3) zum Schnei-
den der Papierbahn in Querrichtung zwischen
einer Stelle an der Papierbahn, an welcher der
Schlitze durch das Schneidlüsennittel (2) ge-
formt ist, und einer Stelle entsprechend der
Querseitenkante der Papierbahn, um damit in
der Papierbahn einen Schnitt zu erzeugen, der
eine vorlaufende Kante des Schlußstücks der
Papierbahn bildet, um damit die Überführung
oder Übertragung von der Decke durch den an
der Schlußstückzone der Saugübertragungs-
walze (7', 8') einwirkenden Unterdruck zu be-
günstigen, wenn die vorlaufende Kante des
Schlußstücks den Spalt zwischen der Decke
der Saugübertragungswalze (7', 8') durch-
läßt, wobei das Schlußstückschneidmittel (3) und
das Schneidlüsennittel (2) stromauf des
Spalts zwischen der Decke (12, 13) und der
Saugübertragungswalze (7', 8') angeordnet sind.

2. Papiermaschine mit einem Einführsystem nach An-
spruch 1, wobei eine Luftstrahldüse (14, 15) dem
Spalt zwischen der Preßwalze (5, 9) und der Saug-
übertragungswalze (7', 8') nachgeschaltet und ori-
entiert ist, um einen Luftstrom in einer Richtung zu richten, in welcher eine Tendenz zum Abblasen der Papierbahn von der Preßwalze (5, 9) zur Saugübertragungswalze (7°, 8°) besteht.

3. Papiermaschine mit einem Einführsystem nach Anspruch 1 oder 2, wobei die Preßwalze eine Zentralwalze (5) der Preßpartie der Papiermaschine ist.

4. Papiermaschine mit einem Einführsystem nach Anspruch 1 oder 2, wobei die Preßwalze eine Oberwalze (9) der Preßpartie der Papiermaschine ist.

Revendications

1. Une machine à papier avec un système d'enfilage pour enfiler une bande de papier à partir d'un rouleau de presse (5, 9) d'une section de presse de la machine, ledit système d'enfilage comportant : des moyens (2) à buse de découpe pour découper une fente s'étendant longitudinalement dans la bande de papier, sur un côté de celle-ci, pour former une queue dans la bande de papier située entre la fente et un bord latéral de la bande de papier, la queue étant plus étroite que la partie de la bande de papier entre ladite fente et l'autre bord latéral de la bande de papier,

une boucle de couverture (12, 13) circulant sur le rouleau de presse (5, 9), un rouleau (7°, 8°) de transfert par aspiration, coopérant avec la boucle de couverture (12, 13) de manière à transférer la bande de papier depuis la couverture, ledit rouleau de transfert par aspiration (7°, 8°) étant supporté dans la section de presse de manière à être capable de se déplacer vers la couverture et de presser légèrement contre la couverture pour effectuer un chevauchement partiel de la couverture sur le rouleau de transfert par aspiration (7°, 8°), de façon à allonger la zone de pincement formée entre eux, et de libérer la pression, et

ledit rouleau de transfert par aspiration (7°, 8°) présentant un espace d'aspiration intérieur divisé comportant une zone de queue à une extrémité axiale du rouleau de transfert par aspiration (7°, 8°), de telle manière que ledit rouleau de transfert par aspiration (7°, 8°) puisse sélectivement exercer une aspiration d'abord seulement sur ladite zone de queue pour amener seulement la queue de la bande de papier circulant sur le rouleau de presse (5, 9) à être transférée depuis le rouleau de presse (5, 9), puis sur toute sa largeur pour assujettir la bande de papier qui doit être transférée sans traction interrompue lors du fonctionnement en continu,

des moyens (3) de découpe de queue pour découper la bande de papier transversalement entre un emplacement sur la bande de papier auquel la fente est formée par lesdits moyens (2) à buse de découpe, et un emplacement correspondant au bord latéral de la bande de papier pour créer ainsi une découpe dans la bande de papier qui forme un bord avant de la queue de la bande de papier de manière à faciliter le transfert depuis ladite couverture par l'aspiration exercée sur ladite zone de queue dudit rouleau (7°, 8°) de transfert par aspiration lorsque le bord avant de la queue traverse la zone de pincement entre ladite couverture et ledit rouleau (7°, 8°) de transfert par aspiration, lesdits moyens (3) de découpe de queue et lesdits moyens (2) à buse de découpe étant disposés en amont de la zone de pincement entre ladite couverture (12, 13) et ledit rouleau (7°, 8°) de transfert par aspiration.

2. La machine à papier avec un système d'enfilage tel que revendiquée dans la revendication 1, dans laquelle une buse à jet d'air (14, 15) est disposée après la zone de pincement entre ledit rouleau de presse (5, 9) et ledit rouleau (7°, 8°) de transfert par aspiration, et orientée pour diriger un courant d'air dans une direction tendant à séparer par soufflage la bande de papier dudit rouleau de presse (5, 9) et la diriger vers ledit rouleau (7°, 8°) de transfert par aspiration.

3. La machine à papier avec un système d'enfilage tel que revendiquée dans la revendication 1 ou 2, dans laquelle le rouleau de presse est un rouleau central (5) de la section de presse de la machine à papier.

4. La machine à papier avec un système d'enfilage tel que revendiquée dans la revendication 1 ou 2, dans laquelle le rouleau de presse est un rouleau supérieur (9) de la section de presse de la machine à papier.
Fig. 5

Paper Width Transferred to Press Part at Normal Time

Center of Machine Traverse (Paper Spreading)

Tail Width for Paper Threading

Couch Trim Width

Wire Edge

Paper Edge on Wire