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(54) **APPARATUS AND DEVICE FOR THE PRODUCTION OF NONWOVENS**

VORRICHTUNG UND GERÄT FÜR DIE HERSTELLUNG VON VLIESEN

APPAREIL ET DISPOSITIF DE PRODUCTION DE NON-TISSES

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- **PATENT ABSTRACTS OF JAPAN vol. 18, no. 490 (C-1249), 13 September 1994 & JP,A,06 158499 (CHISSO CORP), 7 June 1994,**
- **PATENT ABSTRACTS OF JAPAN vol. 18, no. 401 (C-1231), 27 July 1994 & JP,A,06 116853 (KURASHIKI SENI KAKO KK), 26 April 1994,**

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Description

[0001] The invention is directed to an apparatus according to the preamble of claim 1 for the production of nonwovens using at least one carding machine designed for high production speeds of the fiber webs, from which a nonwoven is mechanically transferred to a conveyor belt, and a method for the production of nonwovens according to the preamble of claim 10.

[0002] High speed cards of the above type are known from DE-A 43 44 226.

[0003] By means of carding machines, high production rates can be obtained. Particularly with light-weight nonwovens, however, production speeds above 150 to 200 m/min. entail the problem that, during transport, the structure of the sensitive unbonded nonwoven is affected, resulting in an irregular nonwoven or even destruction of the non-woven.

[0004] FR-A-2545507 and DE-A-3832858 relate to an apparatus for the production of nonwovens comprising a plurality of carding rollers from which the fibers are thrown into an air stream The dispersed fibers are carried by the air stream onto a condensing means which is built by an air-permeable belt which is subjected to suction from below. This apparatus produces an airlaid nonwoven web.

[0005] Thus, it is an object of the invention to provide an apparatus and a method for the production of nonwovens which allow for a considerable increase of the production speed.

[0006] The above object is solved by the features of claims 1 and 10. According to the invention, it is provided that the conveyor belts is air-permeable, and that, at the transition region between the carding machines and the conveyor belt, an underground suction force is applied using a suction means arranged at the conveyor belts. The suction is set to be just sufficient to remove the air film generated between the nonwoven and the conveyor belt at high transport speeds while, on the other hand, the nonwoven will not be sucked too firmly against the conveyor belt. Due to the removal of the air film, no disturbances of the appearance of the nonwoven will occur, not even at speeds of the nonwoven above 150 to 200 m/min. Finally, at the output side of the apparatus, the speed of the nonwoven can be as high as 400 m/min. or more.

[0007] The solution according to the invention offers the considerable advantage invention that the nonwoven is subjected to a relatively small draft. This is favorable especially in case of high speeds of the nonwoven because already a relatively small percentage draft can result in high absolute draft values, which can cause disturbances of the structure of the nonwoven.

[0008] Preferably, it is provided that, at the transition region, a take-off roller transfers a doubled non-woven onto the conveyor belt. A doubled nonwoven has better cohesion and thus is better suited for high speeds. Because a doubled nonwoven is transferred to the conveyor belt by a sole roller, the number of transition regions is reduced. Further, doubling the nonwoven within the carding machine provides the advantage that no further intermediate conveyor belts are required, so that the overall expenditure for machinery can be reduced.

[0009] The apparatus according to the invention is particularly useful for the processing of staple fibers, i. e. polyester, polyethylene or polypropylene fibers.

[0010] The suction means exerts the suction effect on the conveyor belt in sections. Thus, it is made possible that selected portions of the conveyor belt are sucked at different intensities, depending on their current position and their distance from the transition region between the carding machine and the conveyor belt. This is facilitated also because, after the generation of an air film at the transition region between the carding machines and the conveyor belt has been prevented, only a relatively small suction force is required from then on.

[0011] Preferably, suction boxes are arranged below the conveyor belt, extending, on the one hand, over the desired width of the nonwoven and, on the other hand, at least over part of the conveyor belt in the longitudinal direction. Limiting the suction to the desired width of the nonwoven offers the advantage that a sharp, linear end edge of the nonwoven will be generated, without any control or guide means being required on the upper side of the conveyor belt.

[0012] For improved adhesion, the conveyor belts can have a structured surface on the side facing towards the nonwoven.

[0013] The vacuum generated by the suction means can be controllable in a variable manner. Thus, it is possible to adapt the underground suction to the current production speed and/or the type of the fibers being processed, or to other process parameters.

[0014] Preferably, the carding machine used comprises a main cylinder, at least two web-forming rollers engaging the main cylinder and each taking off a respective fiber web from the main cylinder, a doffing means arranged downstream of the web-forming rollers, and a take-off means from which the nonwoven is transferred to the conveyor belt. By means of a common roller, arranged upstream of the take-off means, the at least two fiber webs taken off the main cylinder by the web-forming rollers, are doubled into a nonwoven which is laid as a formed web onto the conveyor belt.

[0015] A carding machine of the above type makes it possible to perform doubling and simultaneous crosslinking of the fiber webs already within the carding machine after the web-forming rollers and before the take-off means. A further advantage resides in that, behind the doffing roller, only a sole take-off means and a sole conveyor belt are required. Thus provides for a reduction of the constructional expenditure for the production of doubled fiber webs, while allowing a improved controlling of the production process, particularly in case of light-weight fiber webs and high production speeds.

[0016] According to an preferred embodiment of the

invention, it is provided that a sole doffing roller is arranged in engagement with two web-forming rollers, that the doffing roller takes over a respective fiber web from each of the two web-forming rollers and doubles the fiber webs. Doubling is carried out immediately behind the web-forming rollers so that only one doffing roller is required.

[0017] An embodiment of the invention will be explained in greater detail hereunder with reference to the Figures.

Fig. 1 is a side view of the apparatus for the production of nonwovens,

Fig. 2 is a plan view of the apparatus according to Fig. 1, and

Fig. 3 is a detailed side view of a preferred carding machine.

[0018] The apparatus for the production of nonwovens 1 according to the embodiments illustrated in Figs. 1 and 2, comprises two carding machines 2 with a respective feed means 3, the carding machines 2 laying the respective generated nonwoven 1 onto a common conveyor belt 4. The conveyor belt 4 is provided as an endless belt and is permeable to air to be subjected to a suction force from below. Behind the second carding machine 2, the repeatedly doubled nonwoven 1 is running into a following processing unit 14, e.g. a thermobonding means. By way of alternative to the arrangement of Figs. 1 and 2, the apparatus for the production of nonwovens 1 can be provided with one carding machine 2 only or with more than two carding machines 2.

[0019] The carding machines used can be high-speed carding machines with production speeds above 150 m/min., preferably above 200 m/min. The first carding machine 2 in the running direction of conveyor belt 4 will lay a first nonwoven 1 onto the conveyor belt 4, notably in the transition region 6 between the carding machine 2 and the conveyor belt 4. A suction means 8, consisting of a plurality of suction boxes 10 distributed along the length of conveyor belt 4, is provided to subject the transition region 6 to a suction force by means of a first suction box 10. This underground suction at the transition region 6 precludes the formation of any air film between the nonwoven 1 and the conveyor belt 4, which air film, in case of high production speeds, would at least disturbe the uniform appearance of nonwoven 1 or even cause complete destruction of nonwoven 1.

[0020] The suction box 10 located at transition region 6 can be provided with a partition wall 11 so that the suction force acting on conveyor belt 4 is increased in the transition region 6. This partition wall 11 can also be arranged to be pivoted and/or displaced in suction box 10, so that the vacuum force and the area exposed to suction can be variably controlled in an easy manner. Of course, the transition region 6 can be provided with a separate suction box 10. The position of partition wall 11 shown in Fig. 3 will automatically cause a weaker suction force acting on conveyor belt 4 behind transition region 6. Another possibility for adjustment in the transition region 6 resides in shifting a slider, extending in parallel to conveyor belt 4 and being adjustable in running direction, for variably setting the sucked area under the conveyor belt.

[0021] In the further course of conveyor belt 4, further suction boxes 10 are arranged in respective areas. As compared to the suction boxes 10 arranged in the transition regions 6, these further suction boxes 10 could be operated at a lower adjustable vacuum force. The width of the suction boxes 10 exactly corresponds to the set width of the nonwoven. In this regard, a further advantage resides in that the nonwoven 1 can be given absolutely linear, sharp lateral edges without additional measures.

[0022] Between the suction boxes 10, respective support rollers 16 are provided for supporting the conveyor belt 4:

[0023] The suction capacity of the suction boxes 10 can be variably controlled in dependence on the production speed and the type of fibers. Control can be carried out by a central processing unit. In each case, the suction is set such that the generation of an air film is prevented particularly in the transition regions 6, without sucking the nonwoven 1 onto the - if required, structured - surface of the conveyor belt 4 at an excessive force.

[0024] The second carding machine 2 in the running direction of conveyor belt 4 will produce a second nonwoven 1 which, at the second transition region 6 in the running direction of the belt, is laid onto the first nonwoven 1 produced by the first carding machine 2, thus doubling the nonwoven 1. As compared to the suction box 10 arranged at the first transition region 6, the suction box 10 arranged at this second transition region 6 can be operated at a higher vacuum for compensating the pressure loss due to the first nonwoven 1. Thus, formation of an air film between the first and the second nonwovens and a resultant possible disturbance are precluded.

[0025] Preferably, the carding machine used is of the type described in DE 43 44 226 A. The carding machine schematically shown in Fig. 1 comprises a main cylinder 20 arranged in engagement with two randomizing rollers 22 which in tum engage a doffing roller 24 and will double respectively two fiber webs 50,52 on doffing roller 24. The doubled fiber web will then be transferred from doffing roller 24 to two condensing rollers 26 and, from these, to two successive take-off rollers 28. From the last take-off roller 28, the nonwoven 1 is laid onto conveyor belt 4 at transition region 6. In this regard, it is essential that the doubled nonwoven 1 is transferred onto conveyor belt 4 by a sole take-off roller 29.

[0026] Fig. 3 shows a preferred embodiment of a nonwoven carding machine provided with an intake means 30 consisting of an intake trough 32 and an intake roller 34.

[0027] The subsequent licker-in device 36 comprises

a licker-in roller 38 and a licker-in tambour 40. The licker-in tambour 40 is provided with two worker and stripper pairs 42.

[0028] This arrangement is followed by a transfer roller 44 for transferring the supplied fiber web 46 to main cylinder 20.

[0029] Main cylinder 20 is provided with six worker and stripper pairs 48. Behind the worker and stripper pairs when viewed in the direction of rotation, two web-forming randomizing rollers 22,23 engage main cylinder 20 successively in the direction of rotation, each of them taking off one fiber web 50,52 from main cylinder 20. A sole doffing roller 24 takes over both fiber webs 50,52 from the randomizing rollers 22,23 and doubles the webs so that a doubled fiber web 54 is transferred to the subsequent condensing means 26,27 and the take-off means 28,29 arranged behind condensing means 26,27. From take-off means 28,29, the doubled fiber web 54 reaches conveyor belt 4 in the form of a nonwoven 1.

[0030] In the above embodiment, wherein two randomizing rollers 22,23 are combined with only one doffing roller 24, the randomizing rollers can be arranged in close proximity to each other, thus leaving enough space on the periphery of main cylinder 20 for an additional worker and stripper pair 48. Such an additional worker and stripper pair 48 increases the carding performance.

[0031] The web-forming rollers 22,23, preferably provided as randomizing rollers, can have different rotational speeds or different diameters whereby the properties of the to-be-doubled fiber webs 50,52 can be influenced. The main cylinder 20 is preferably larger than the web-forming rollers 22,23.

[0032] Preferably, also the doffing roller 24 has a larger diameter than the web-forming rollers 22,23.

Claims

1. An apparatus for the production of nonwovens (1) comprising at least one carding machine (2) and at least one conveyor belt (4) for conveying the nonwoven (1), transferred to the conveyor belt (4) by a take-off roller (29) of said carding machine (2) **characterized in that** the conveyor belt (4) is air-permeable, and that the transition regions (6) between the take-off roller (29) and the conveyor belt (4) are subjected to suction from below, generated by a suction means (8) with at least one suction box (10) arranged at the conveyor belt (4) and being set to remove an air film generated between the nonwovens (1) and the conveyor belt (4) at transport speeds above 150 to 200 m/min, and in that the suction force of the suction means (8) acting on the conveyor belt (4) is applied in sections over the complete length of the conveyor belt (4).

2. The apparatus according to claim 1, **characterized in that**, at the transition region (6), said take-off roller (29) transfers a doubled non-woven (1) onto the conveyor belt (4).

3. The apparatus according to any one of claims 1 to 2, **characterized in that** a plurality of suction boxes (10) are arranged below the conveyor belt (4), said suction boxes (10) extending over the desired width of the nonwoven (1) and at least over part of the conveyor belt (4) in the longitudinal direction.

4. The apparatus according to one of the claims 1 to 3, **characterized in that** the conveyor belt (4) leads to a thermobonding means (14) and that the complete conveyor belt (4) between the transition region (6) and the thermobonding means (14) is subjected to suction.

5. The apparatus according to any one of claims 1 to 4, **characterized in that**, for improved adhesion, the conveyor belt (4) has a structured surface on the side facing towards the nonwoven (1).

6. The apparatus according to any one of claims 1 to 5, **characterized in that** the vacuum generated by the suction means (8) can be variably controlled for different sections.

7. The apparatus according to any one of claims 1 to 6, **characterized in that** the carding machine (2) comprises a main cylinder (20), at least two web-forming rollers (22,23) engaging the main cylinder (20) and each taking off one fiber web (50,52) from the main cylinder (20), a doffing means (24) arranged downstream of the web-forming rollers (22,23), and a take-off means (28), and that, using a common roller (24), the at least two fiber webs (50,52) taken off the main cylinder (20) by the web-forming rollers (22, 23), are doubled into a nonwoven (1) upstream of the take-off means (28).

8. The apparatus according to claim 7, **characterized in that** two mutually independent web-forming rollers (22,23), engaging the main cylinder (20) and rotating in the same sense as the main cylinder (20), each take off one fiber web (50,52) from the main cylinder (20), and that a sole doffing roller (24) of the doffing means, being in engagement with both web-forming rollers (22,23), takes over a respective fiber web (50, 52) from each of the two web-forming rollers (22,23) and doubles the fiber webs (50,52) into a nonwoven (1).

9. The apparatus according to any one of claims 1 to 8, **characterized in that** a plurality of carding machines (2) each lay one nonwoven (1) onto the common conveyor belt (4).

10. A method for the production of nonwovens (1) at high operating speeds, using at least one carding machine (2) and at least one conveyor belt (4), the nonwoven (1) being transferred onto the conveyor belt (4) by a take-off roller (29),
characterized in
that an air-permeable conveyor belt (4) is used, and that, in the transition regions (6) between the take-off roller (29) and the conveyor belt (4) an underground vacuum is applied to the conveyor belt (4) to remove an air film generated between the non-woven (1) and the conveyor belt (4) at high transport speeds above 150 to 200 m/min, wherein the suction force of the suction means (8) acting on the conveyor belt (4) is applied in sections over the complete length of the conveyor belt (4).

11. The method according to claim 10, **characterized in that** a doubled non-woven (1) is transferred onto the conveyor belt (4) by a sole roller (29).

12. The method according to claim 10 or 11, **characterized in that** the vacuum is variable with increasing distance from the transition region (6).

13. The method according to any one of claims 10 to 12, **characterized by** use of a carding machine (2) wherein, in a web-forming stage, two fiber webs (50,52) are taken off the main cylinder (20) of the carding machine (2) by two mutually independent web-forming rollers (22,23) and on a common roller (24) in or immediately after a doffing stage are combined into a doubled non-woven (1).

14. The method according to claim 13, **characterized in that** the fiber webs (50,52) transferred from the web-forming rollers (22,23) are doubled on a doffing roller (24) provided in common for both rollers (22,23).

15. The method according to any one of claims 10 to 14, **characterized in that** a plurality of nonwovens (1) are doubled onto the common conveyor belt (4) by a plurality of carding machines (2).

16. The method according to anyone of claims 10 to 15, **characterized in that** the nonwoven (1) is transported to a thermobonding means (14) onto said conveyor belt (4) and that the nonwoven (1) is subjected to suction on its complete way on said conveyor belt (4) to the thermobonding means.

Patentansprüche

1. Anlage zur Herstellung von Vliesbahnen (1) mit mindestens einer Kardiermaschine (2) und mit mindestens einem Transportband (4) für den Transport der Vliesbahn (1), die mittels einer Abnahmewalze (29) der Kardiermaschine (2) zu dem Transportband (4) bewegt wird,
dadurch gekennzeichnet,
dass das Transportband (4) luftdurchlässig ist, und dass die Übergangsstellen (6) zwischen der Abnahmewalze (29) und dem Transportband (4) einer Unterflurabsaugung ausgesetzt werden, die mittels einer Absaugeinrichtung (8) mit mindestens einem Absaugkasten (10) erzeugt wird, der an dem Transportband (4) angeordnet ist und derart eingestellt ist, dass er einen Luftfilm entfernt, welcher zwischen den Vliesbahnen (1) und dem Transportband (4) mit Transportgeschwindigkeiten über 150 bis 200 m/min, erzeugt wird, und dadurch, dass die auf das Transportband (4) einwirkende Saugkraft der Absaugeinrichtung (8) über die gesamte Länge des Transportbandes (4) abschnittsweise aufgebracht wird.

2. Anlage nach Anspruch 1, **dadurch gekennzeichnet, dass** an der Übergangsstelle (6) die Abnahmewalze (29) eine dublierte Vliesbahn (1) auf das Transportband (4) überträgt.

3. Anlage nach einem der Ansprüche 1 bis 2, **dadurch gekennzeichnet, dass** unter dem Transportband (4) mehrere Absaugkästen (10) angeordnet sind, die sich über die gewünschte Breite der Vliesbahn (1) und zumindest über einen Teil des Transportbandes (4) in Längsrichtung erstrecken.

4. Anlage nach einem der Ansprüche 1 bis 3, **dadurch gekennzeichnet, dass** das Transportband (4) zu einer Thermobonding-Vorrichtung (14) führt und dass das gesamte Transportband (4) zwischen der Übergangsstelle (6) und der Thermobonding-Vorrichtung (14) einer Saugkraft ausgesetzt wird.

5. Anlage nach einem der Ansprüche 1 bis 4, **dadurch gekennzeichnet, dass** das Transportband (4) zur Haftungserhöhung auf der der Vliesbahn (1) zugewandten Seite eine strukturierte Fläche aufweist.

6. Anlage nach einem der Ansprüche 1 bis 5, **dadurch gekennzeichnet, dass** der durch die Absaugeinrichtung (8) erzeugte Unterdruck abschnittsweise variabel steuerbar ist.

7. Anlage nach einem der Ansprüche 1 bis 6, **dadurch gekennzeichnet, dass** die Kardiermaschine (2) einen Hauptzylinder (20), mindestens zwei mit dem Hauptzylinder (20) im Eingriff befindliche florbildende Walzen (22,23), die je einen Faserflor (50,52) von dem Hauptzylinder (20) abnehmen, eine den florbildenden Walzen (22,23) nachgeschaltete Doffereinrichtung (24) und eine Abnahmeeinrichtung (28) aufweist, und dass mittels einer gemeinsamen Walze

(24) vor der Abnahmeeinrichtung (28) die mindestens zwei mittels der florbildenden Walzen (22,23) von dem Hauptzylinder (20) übernommenen Faserflore (50,52) zu einer Vliesbahn (1) dubliert werden.

8. Anlage nach Anspruch 7, **dadurch gekennzeichnet, dass** zwei mit dem Hauptzylinder (20) im Eingriff befindliche und mit diesem gleichsinnig rotierende, voneinander unabhängige florbildende Walzen (22,23) je einen Faserflor (50,52) von dem Hauptzylinder (20) abnehmen, und dass eine einzige Dofferwalze (24) der Doffereinrichtung, die mit beiden florbildenden Walzen (22,23) im Eingriff ist, von jeder der beiden florbildenden Walzen (22,23) je einen Faserflor (50,52) übernimmt und die Faserflore (50,52) zu einer Vliesbahn (1) dubliert.

9. Anlage nach einem der Ansprüche 1 bis 8, **dadurch gekennzeichnet, dass** mehrere Kardiermaschinen (2) jeweils eine Vliesbahn (1) auf dem gemeinsamen Transportband (4) ablegen.

10. Verfahren zur Herstellung von Vliesbahnen (1) bei hohen Arbeitsgeschwindigkeiten unter Verwendung von mindestens einer Kardiermaschine (2) sowie mindestens eines Transportbands (4), wobei die Vliesbahn (1) mittels einer Abnahmewalze (28) auf das Transportband (4) übertragen wird,
dadurch gekennzeichnet,
dass ein luftdurchlässiges Transportband (4) verwendet wird, und dass an den Übergangsstellen (6) zwischen der Abnahmewalze (28) und dem Transportband (4) zur Entfernung eines sich bei hohen Transportgeschwindigkeiten über 150 bis 200 m/min, zwischen Vliesbahn (1) und Transportband (4) bildenden Luftfilms ein Unterdruck an der Unterseite des Transportbandes (4) angelegt wird, wobei die auf das Transportband (4) einwirkende Saugkraft der Absaugeinrichtung (8) über die gesamte Länge des Transportbandes (4) abschnittsweise aufgebracht wird.

11. Verfahren nach Anspruch 10, **dadurch gekennzeichnet, dass** eine dublierte Vliesbahn (1) von einer einzigen Walze (29) auf das Transportband (4) übertragen wird.

12. Verfahren nach Anspruch 10 oder 11, **dadurch gekennzeichnet, dass** der Unterdruck mit zunehmendem Abstand von der Übergangsstelle (6) unterschiedlich einstellbar ist.

13. Verfahren nach einem der Ansprüche 10 bis 12, **gekennzeichnet durch** die Verwendung einer Kardiermaschine (2), bei der in einer Florbildungsstufe zwei Faserflore (50,52) mit zwei voneinander unabhängigen florbildenden Walzen (22,23) von dem Hauptzylinder (20) der Kardiermaschine (2) abgenommen werden und auf einer gemeinsamen Walze (24) in oder unmittelbar nach einer Dofferstufe zu einer dublierten Vliesbahn (1) zusammengeführt werden.

14. Verfahren nach Anspruch 13, **dadurch gekennzeichnet, dass** die von den florbildenden Walzen (22,23) übergebenen Faserflore (50,52) auf einer für beide Walzen (22,23) gemeinsamen Dofferwalze (24) dubliert werden.

15. Verfahren nach einem der Ansprüche 10 bis 14, **dadurch gekennzeichnet, dass** mehrere Vliesbahnen (1) von mehreren Kardiermaschinen (2) auf dem gemeinsamen Transportband (4) dubliert werden.

16. Verfahren nach einem der Ansprüche 10 bis 15, **dadurch gekennzeichnet, dass** die Vliesbahn (1) auf dem Transportband (4) zu einer Thermobonding-Vorrichtung (14) transportiert wird und dass die Vliesbahn (1) auf ihrem gesamten Weg auf dem Transportband (4) zu der Thermobonding-Vorrichtung einer Saugkraft ausgesetzt wird.

Revendications

1. Appareil de production de non-tissés (1) comprenant au moins une carde (2) et au moins une bande transporteuse (4) pour transporter le non-tissé (1), transféré sur la bande transporteuse (4) par un rouleau détacheur (29) de ladite carde (2),
caractérisé en ce que la bande transporteuse (4) est perméable à l'air, et **en ce que** les zones de transition (6) entre le rouleau détacheur (29) et la bande transporteuse (4) sont soumises à une aspiration par en dessous, engendrée par un moyen d'aspiration (8) comportant au moins une caisse aspirante (10) aménagée au niveau de la bande transporteuse (4) et réglée pour supprimer un film d'air engendré entre les non-tissés (1) et la bande transporteuse (4) à des vitesses de transport au-dessus de 150 à 200 m/min, et **en ce que** la force d'aspiration du moyen d'aspiration (8) agissant sur la bande transporteuse (4) est appliquée par sections sur toute la longueur de la bande transporteuse (4).

2. Appareil selon la revendication 1, **caractérisé en ce que**, au niveau de la zone de transition (6), ledit rouleau détacheur (29) transfère un non-tissé doublé (1) sur la bande transporteuse (4).

3. Appareil selon l'une quelconque des revendications 1 à 2, **caractérisé en ce qu'**une pluralité de caisses aspirantes (10) sont aménagées en dessous de la bande transporteuse (4), lesdites caisses aspirantes (10) s'étendant sur la largeur désirée du non-tissé (1) et au moins sur une partie de la bande transpor-

teuse (4) dans la direction longitudinale.

4. Appareil selon l'une des revendications 1 à 3, **caractérisé en ce que** la bande transporteuse (4) conduit à un moyen de liage thermique (14) et **en ce que** toute la bande transporteuse (4) entre la zone de transition (6) et le moyen de liage thermique (14) est soumise à une aspiration.

5. Appareil selon l'une quelconque des revendications 1 à 4, **caractérisé en ce que**, pour améliorer l'adhérence, la bande transporteuse (4) a une surface nervurée du côté dirigé vers le non-tissé (1).

6. Appareil selon l'une quelconque des revendications 1 à 5, **caractérisé en ce que** la dépression engendrée par le moyen d'aspiration (8) peut être commandée de façon variable pour différentes sections.

7. Appareil selon l'une quelconque des revendications 1 à 6, **caractérisé en ce que** la carde (2) comprend un cylindre principal (20), au moins deux rouleaux de formage de voile (22,23) venant en prise avec le cylindre principal (20), chacun d'eux détachant un voile de carde (50, 52) du cylindre principal (20), un moyen de décharge (24) aménagé en aval des rouleaux de formage de voile (22,23), et un moyen détacheur (28), et **en ce que**, par utilisation d'un rouleau commun (24), les voiles de carde (50,52) au nombre d'au moins deux, détachés du cylindre principal (20) par les rouleaux de formage de voile (22,23), sont doublés pour donner un non-tissé (1) en amont du moyen détacheur (28).

8. Appareil selon la revendication 7, **caractérisé en ce que** deux rouleaux de formage de voile (22,23) indépendants l'un de l'autre, venant en prise avec le cylindre principal (20) et tournant dans le même sens que le cylindre principal (20), détachent chacun un voile de carde (50,52) du cylindre principal (20), et **en ce qu'**un rouleau de décharge unique (24) du moyen de décharge, en prise avec les deux rouleaux de formage de voile (22,23), détache un voile de carde respectif (50,52) de chacun des deux rouleaux de formage de voile (22,23) et double les voiles de carde (50,52) en un non-tissé (1).

9. Appareil selon l'une quelconque des revendications 1 à 8, **caractérisé en ce que** chaque carde d'une pluralité de cardes (2) dépose un non-tissé (1) sur la bande transporteuse commune (4).

10. Procédé de production de non-tissés (1) à de grandes vitesses de fonctionnement, utilisant au moins une carde (2) et au moins une bande transporteuse (4), le non-tissé (1) étant transféré sur la bande transporteuse (4) par un rouleau détacheur (29), **caractérisé en ce qu'**une bande transporteuse perméable à l'air (4) est utilisée, et **en ce que**, dans les zones de transition (6) entre le rouleau détacheur (29) et la bande transporteuse (4), une dépression sous-jacente est appliquée à la bande transporteuse (4) pour supprimer un film d'air engendré entre le non-tissé (1) et la bande transporteuse (4) à de grandes vitesses de transport au-dessus de 150 à 200 m/min, et **en ce que** la force d'aspiration du moyen d'aspiration (8) agissant sur la bande transporteuse (4) est appliquée par sections sur toute la longueur de la bande transporteuse (4).

11. Procédé selon la revendication 10, **caractérisé en ce qu'**un non-tissé doublé (1) est transféré sur la bande transporteuse (4) par un rouleau unique (29).

12. Procédé selon la revendication 10 ou 11, **caractérisé en ce que** la dépression est variable avec l'augmentation de la distance à la zone de transition (6).

13. Procédé selon l'une quelconque des revendications 10 a 12, **caractérisé par** l'utilisation d'une carde (2) dans laquelle, à une étape de formage de voile, deux voiles de carde (50,52) sont détachés du cylindre principal (20) de la carde (2) par les deux rouleaux de formage de voile (22,23) indépendants l'un de l'autre et sont combinés sur un rouleau commun (24) lors d'une étape de décharge ou immédiatement après une étape de décharge pour donner un non-tissé doublé (1).

14. Procédé selon la revendication 13, **caractérisé en ce que** les voiles de carde (50,52) transférés des rouleaux de formage de voile (22,23) sont doublés sur un rouleau de décharge (24) prévu en commun pour les deux rouleaux (22,23).

15. Procédé selon l'une quelconque des revendications 10 à 14, **caractérisé en ce qu'**une pluralité de non-tissés (1) sont doublés sur la bande transporteuse commune (4) par une pluralité de cardes (2).

16. Procédé selon l'une quelconque des revendications 10 à 15, **caractérisé en ce que** le non-tissé (1) est transporté vers un moyen de liage thermique (14) sur ladite bande transporteuse (4) et **en ce que** le non-tissé (1) est soumis à une aspiration sur tout son trajet sur la bande transporteuse (4) jusqu'au moyen de liage thermique.

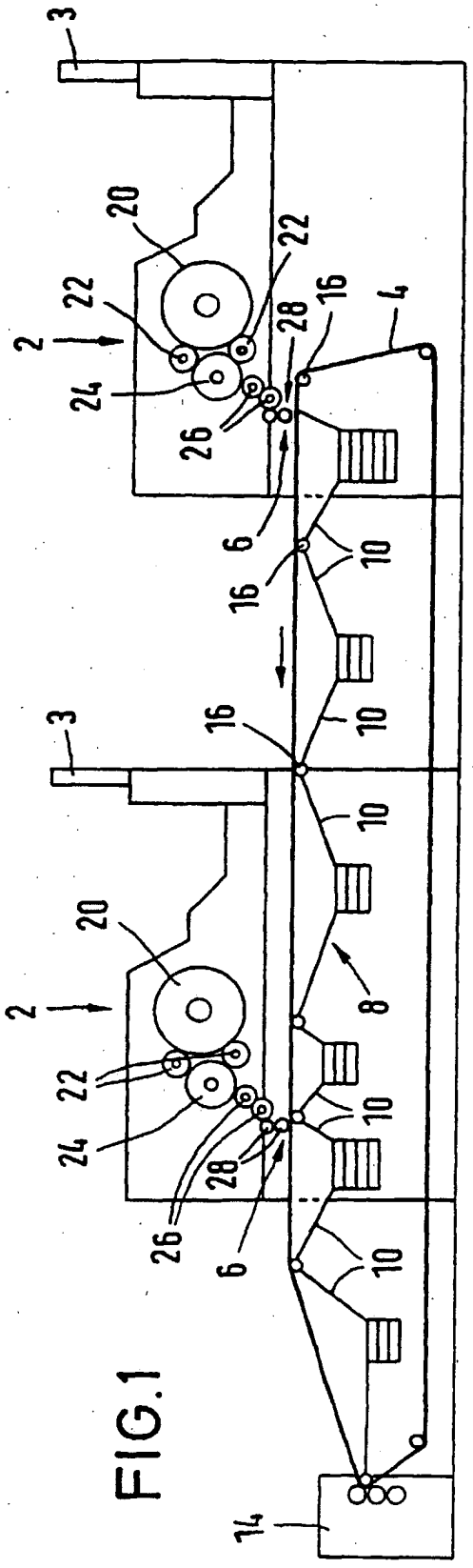

FIG.1

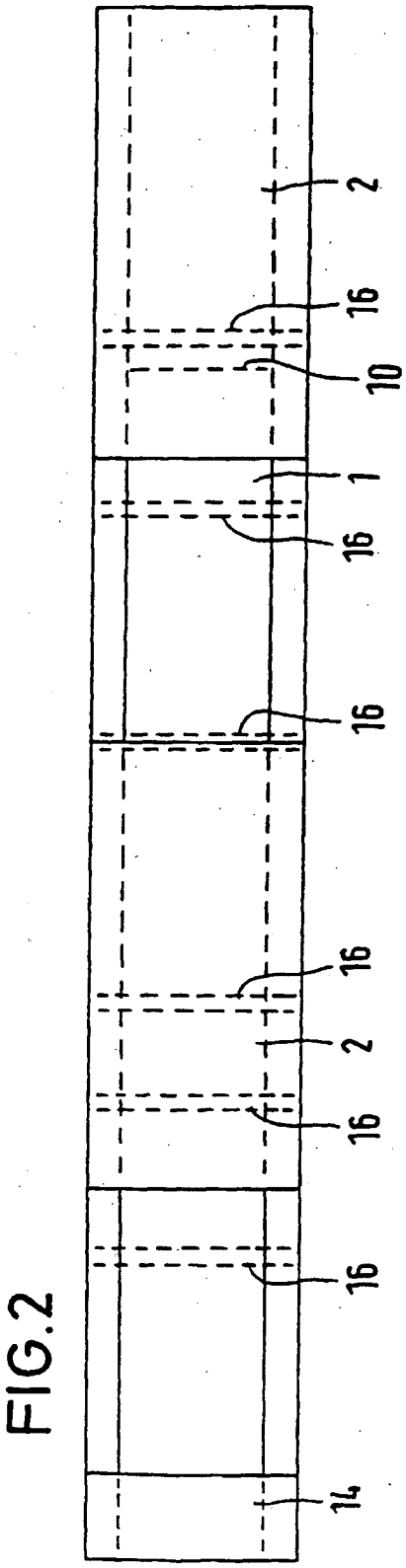

FIG.2

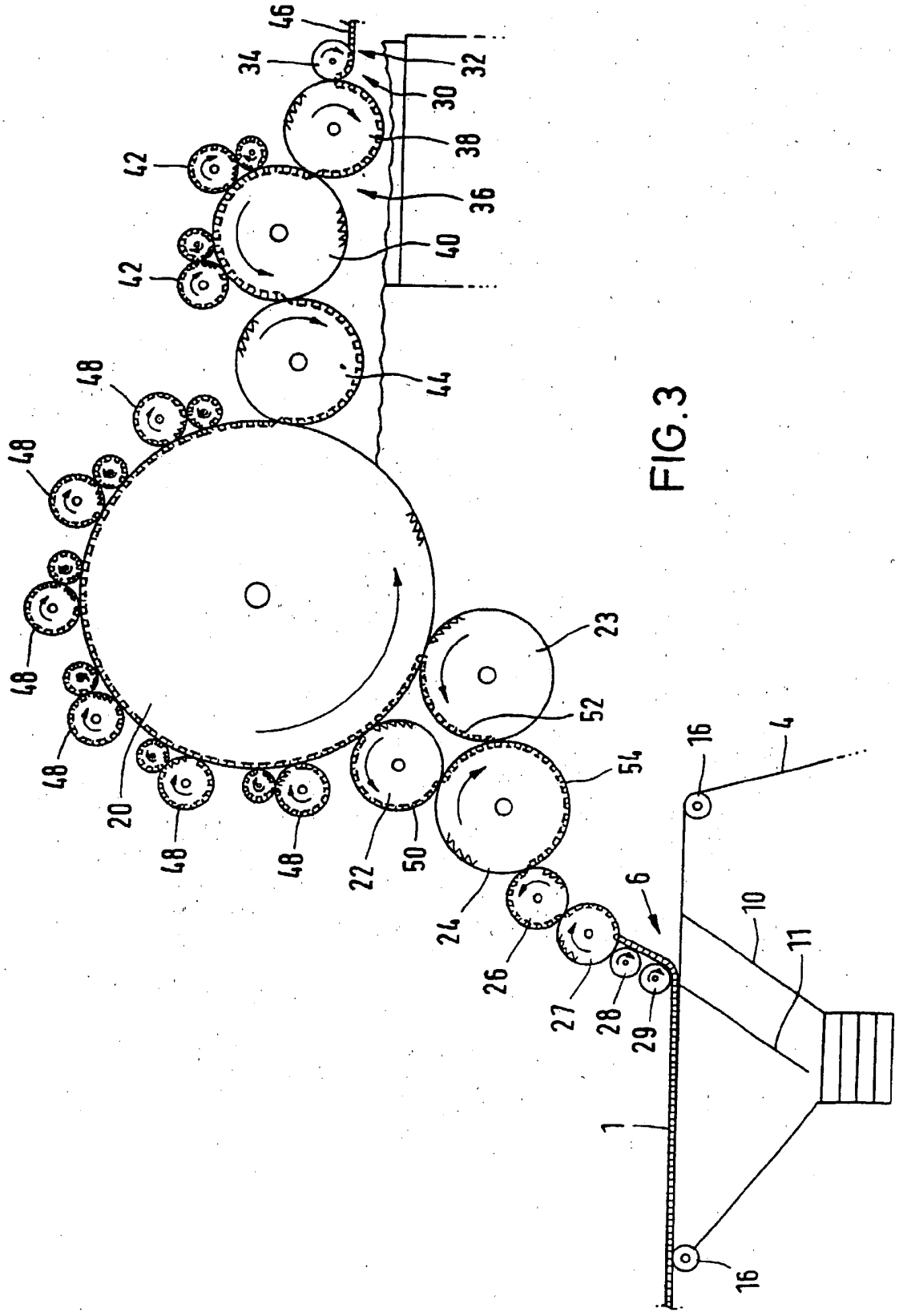
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FIG.3