

Description

The present invention relates to an apparatus washing out foreign matter, such as oil, dust or odds and ends, on a continuous woven or knit tape.

Generally, in the manufacture of touch-and-close or so-called surface-type fasteners, a substantially endless-length fabric web or tape having a multiplicity of hook-shaped or loop-shaped (male or female) elements projecting from one surface is dyed at the finishing stage of production. A primary problem with the surface-type fastener production is that various foreign matter tends to be easily caught by the fastener elements during production, which necessitates washing and heat-setting of the tape to make it uniform in structure before dyeing. To this end, it is customary to wash the tape by drawing it through a series of hot-water baths one after another. However, this multi-bath washing is complete to remove foreign matter from the tape. Foreign matter on the tape can be removed by moving the tape in swinging motion during the washing; but this swinging would cause the tape to be twisted or entangled and hence to be fed in a disorderly fashion.

AT-B-344 120, on which the preamble of claim 1 is based, discloses (see Figure 1) a method of washing an elongated tape with hot water, comprising:

feeding the tape through a succession of hot-water baths one after another; bringing the tape out of and then into the hot water in each of the baths at least one time while the tape is fed in each of the baths and removing the hot water from the tape when the latter is transferred from one of the baths to the next bath.

AT-B-344 120 discloses also (see Figure 1) an apparatus for washing an elongated tape with hot water, comprising:

a succession of hot-water baths; at least two guide rollers per bath, on and about which the tape is to be fed, said guide rollers being mounted in each of the baths and a hot-water removing unit disposed between each adjacent pair of said baths for removing the hot water from the tape when the latter is transferred from one of said baths to the next bath.

DE-A-2 612 264 discloses (see figure) an apparatus for washing elongate tapes and having at least one drive roller, on and about which the tape is to be fed, per bath, said driven roller being disposed above each of the baths in vertical alignment with the centre between said guide rollers.

Shower nozzles are shown in DE-A-2 612 264 (see figure).

The present invention seeks to provide apparatus for washing an elongated tape such as of touch-and-close or surface-type fasteners with hot

water, which guarantees not only improved cleaning of the tape but also orderly feeding of the tape.

According to the present invention, there is provided an apparatus for washing an elongated tape with hot water, according to claim 1.

Other objects, features and advantages of the present invention will become manifest to those versed in the art upon making reference to the detailed description and the accompanying sheets of drawings in which a preferred embodiment incorporating the principle of the present invention is shown by way of illustrative example.

Figure 1 is a longitudinal cross-sectional view of a tape washing apparatus embodying the present invention; and

Figure 2 is a plan view of Figure 1.

Figures 1 and 2 show an apparatus for washing at least one elongated tape F, such as for touch-and-close or surface-type fasteners.

The apparatus generally comprises first, second third and fourth baths 1, 2, 3, 4 disposed in succession each for containing hot water 20, and a feed unit 5 disposed adjacent to the first bath for feeding the tape F through the successive baths 1, 2, 3, 4 where the tape F is washed in a manner described below. The completely washed tape F is discharged-out of the apparatus via the fourth bath 4 and is then supplied to a subsequent drying station (not shown).

The feed unit 5 includes a horizontal first support member 7 fixedly secured to a post 6, and a plurality of pin rollers 8 rotatably mounted on the first support member 7 and adapted to be driven by a first motor 9 for rotation in a direction opposite to the feeding direction of the tape F. Each of the pin rollers 8 is composed a plurality of pins mounted between a pair of circular disks at equal circumferential distances. Disposed under the feed unit 7 are a plurality of cans 10 each for containing the respective tape F. The tape F from each of the cans 10 is wound on the respective pin roller 8 and is fed to the first bath 1 via a plurality of first guide rollers 11, 12, 13, 14 arranged between the feed unit 5 and the first bath 1.

A twist detector 15 is disposed between two of the first guide rollers 12, 13 for producing a feed-termination signal when a twisted portion of the tape F arrives at the twist detector 15. A non-supply detector 16 also is disposed between the two first guide rollers 12, 13 immediately downstream of the twist detector 15 for producing a stop-demand signal when there is no supply of the tape F from the can 10; upon receipt of the stop-demand signal, the apparatus is rendered to be inoperative or stopped.

The first, second, third and fourth baths 1, 2, 3, 4 are formed by dividing a single large tank by a plurality of partitions 17, 18, 19 and each of the

baths 1, 2, 3, 4 is filled with hot water 20. Each of the partitions 17, 18, 19 has a through opening 21, 22, 23; the through opening 23 of the partition 19 is disposed at a highest position above the bottom of the tank, and the through opening 21 of the partition 17 is disposed at a lowest position. The hot water 20 in the fourth bath 4 overflows into the third bath 3 via the through opening 23, while the hot water 20 in the third bath 3 overflows into the second bath 2 via the through opening 22. Likewise, the hot water 20 in the second bath 2 overflows into the first bath 1 via the through opening 21.

A pair of shower nozzles 24, 24 is disposed in each of the baths 1, 2, 3, 4 at a position slightly higher than the level of the hot water 20 in the respective bath 1, 2, 3, 4. In order to keep the level of the hot water 20 constant, the tank has a draining pipe 25 for discharging the overflowed hot water, and a discharge pipe 26 for discharging all of the hot water 20 in the four baths 1, 2, 3, 4. Each of the baths 1, 2, 3, 4 is also provided with a steam pipe 27 for circulation therethrough of steam or vapor via a steam inlet 28 and a steam outlet 29. The temperature of the hot water 20 in each bath 1, 2, 3, 4 is kept constant by a temperature sensor 30 disposed in the respective bath 1, 2, 3, 4.

A pair of second guide rollers 31, 32 is mounted on the bottom of each bath 1, 2, 3, 4, and a driven roller 34 supported by a horizontal second support member 33 above the respective bath 1, 2, 3, 4 in vertical alignment with the center between the pair of the second guide rollers 31, 32. The driven roller 34 is operatively connected to a second motor 35 via an endless chain 36 for rotation in the direction of feeding the tape F. Thus the tape F from the first guide roller 14 extends about one of the second guide rollers 31 on the bottom of the first bath 1, then about the driven roller 34 on the second support member 33 above the first bath 1, and thereafter about the other second guide roller 32 on the bottom of the first bath 1. Similarly, the tape F from the first bath 1 extends about one of the second guide rollers 31 on the bottom of the second bath 2, then about the driven roller 34 on the second support member 33, and thereafter about the other guide roller 32 on the second bath 2. The tape F from the second bath 2 further extends through the third bath 3 and then through the fourth bath 4 in the like manner and finally to a subsequent processing station such as for drying. If the tape f is a touch-and-close or surface-type fastener tape, the tape F is wound on the driven roller 34 with only the element-free tape surface in contact with the periphery of the driven roller 34, thus preventing the fastener elements from any abrasive wear.

In each of the baths 1, 2, 3, 4, the tape F runs

upwardly and downwardly in a meandering fashion as guided by a plurality of guide pins 37 which are mounted in each bath and assist to prevent the tape F from being contacted by itself.

When the tape F is transferred from one bath to the next bath, hot water contained in the tape f is removed by a hot-water removing unit. This removing unit includes a V-shaped arm 38 mounted on the top of the respective partition 17, 18, 19, a pair of third guide rollers 39, 40 rotatably supported on opposite distal ends of the V-shaped arm 38, and a centrally slitted suction nozzle 41 supported on the arm 38 between the two third guide rollers 39, 40. The suction nozzle 41 is operatively connected to a ring-shaped blower 42 for sucking hot water on and in the tape F while the latter runs over the top surface of the suction nozzle 41 as guided by the third guide rollers 39, 40.

A discharge roller 43 is mounted on the top of the final or fourth bath 4 for assisting in discharging the washed tape F out of the washing apparatus to the next processing station. In the path of the tape F from the washing apparatus to the next processing station, a plurality of additional suction nozzles 41 of the above described construction are disposed for assisting in removing hot water left in the tape F.

Supported on and over the second support member 33 are a pair of covers 44, 44 each carrying a fan 45 for discharging vapor rising from the baths 1, 2, 3, 4.

According to the present invention, partly because the elongated tape is fed through a succession of hot-water baths, and partly because the tape is brought upwardly out of the hot water and then downwardly into the hot water in each bath, the tape can be washed without being twisted or entangled and hence can be fed in an orderly fashion through the successive baths. Another advantage of the present invention is that since the tape is raised from the level of the hot water in the individual bath and is then returned into the hot water, a certain amount of frictional resistance is created between the tape and the hot water, and hot water on and in the raised tape flows downwardly into the bath along the tape, thus guaranteeing improved cleaning of the tape.

Claims

1. Apparatus for washing an elongated tape (F) with hot water (20), comprising: a succession of hot-water baths (1, 2, 3, 4); at least two guide rollers (31, 32), on and about which the tape (F) is to be fed, per bath, said guide rollers (31, 32) being mounted in each of the baths (1, 2, 3, 4); at least one driven roller (34), on and about which the tape (F) is to be fed,



baths 1, 2, 3, 4 is filled with hot water 20. Each of the partitions 17, 18, 19 has a through opening 21, 22, 23; the through opening 23 of the partition 19 is disposed at a highest position above the bottom of the tank, and the through opening 21 of the partition 17 is disposed at a lowest position. The hot water 20 in the fourth bath 4 overflows into the third bath 3 via the through opening 23, while the hot water 20 in the third bath 3 overflows into the second bath 2 via the through opening 22. Likewise, the hot water 20 in the second bath 2 overflows into the first bath 1 via the through opening 21.

A pair of shower nozzles 24, 24 is disposed in each of the baths 1, 2, 3, 4 at a position slightly higher than the level of the hot water 20 in the respective bath 1, 2, 3, 4. In order to keep the level of the hot water 20 constant, the tank has a draining pipe 25 for discharging the overflowed hot water, and a discharge pipe 26 for discharging all of the hot water 20 in the four baths 1, 2, 3, 4. Each of the baths 1, 2, 3, 4 is also provided with a steam pipe 27 for circulation therethrough of steam or vapor via a steam inlet 28 and a steam outlet 29. The temperature of the hot water 20 in each bath 1, 2, 3, 4 is kept constant by a temperature sensor 30 disposed in the respective bath 1, 2, 3, 4.

A pair of second guide rollers 31, 32 is mounted on the bottom of each bath 1, 2, 3, 4, and a driven roller 34 supported by a horizontal second support member 33 above the respective bath 1, 2, 3, 4 in vertical alignment with the center between the pair of the second guide rollers 31, 32. The driven roller 34 is operatively connected to a second motor 35 via an endless chain 36 for rotation in the direction of feeding the tape F. Thus the tape F from the first guide roller 14 extends about one of the second guide rollers 31 on the bottom of the first bath 1, then about the driven roller 34 on the second support member 33 above the first bath 1, and thereafter about the other second guide roller 32 on the bottom of the first bath 1. Similarly, the tape F from the first bath 1 extends about one of the second guide rollers 31 on the bottom of the second bath 2, then about the driven roller 34 on the second support member 33, and thereafter about the other guide roller 32 on the second bath 2. The tape F from the second bath 2 further extends through the third bath 3 and then through the fourth bath 4 in the like manner and finally to a subsequent processing station such as for drying. If the tape f is a touch-and-close or surface-type fastener tape, the tape F is wound on the driven roller 34 with only the element-free tape surface in contact with the periphery of the driven roller 34, thus preventing the fastener elements from any abrasive wear.

In each of the baths 1, 2, 3, 4, the tape F runs

upwardly and downwardly in a meandering fashion as guided by a plurality of guide pins 37 which are mounted in each bath and assist to prevent the tape F from being contacted by itself.

When the tape F is transferred from one bath to the next bath, hot water contained in the tape f is removed by a hot-water removing unit. This removing unit includes a V-shaped arm 38 mounted on the top of the respective partition 17, 18, 19, a pair of third guide rollers 39, 40 rotatably supported on opposite distal ends of the V-shaped arm 38, and a centrally slitted suction nozzle 41 supported on the arm 38 between the two third guide rollers 39, 40. The suction nozzle 41 is operatively connected to a ring-shaped blower 42 for sucking hot water on and in the tape F while the latter runs over the top surface of the suction nozzle 41 as guided by the third guide rollers 39, 40.

A discharge roller 43 is mounted on the top of the final or fourth bath 4 for assisting in discharging the washed tape F out of the washing apparatus to the next processing station. In the path of the tape F from the washing apparatus to the next processing station, a plurality of additional suction nozzles 41 of the above described construction are disposed for assisting in removing hot water left in the tape F.

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Claims

1. Apparatus for washing an elongated tape (F) with hot water (20), comprising: a succession of hot-water baths (1, 2, 3, 4); at least two guide rollers (31, 32), on and about which the tape (F) is to be fed, per bath, said guide rollers (31, 32) being mounted in each of the baths (1, 2, 3, 4); at least one driven roller (34), on and about which the tape (F) is to be fed,



per bath, said driven roller (34) being disposed above each of the baths (1, 2, 3, 4) in vertical alignment with the center between said guide rollers (31, 32); and a hot-water removing unit disposed between each adjacent pair of said baths (1, 2; 2, 3; 3, 4) for removing the hot-water (20) from the tape (F) when the latter is transferred from one of said baths (1, 2, 3) to the next bath (2, 3, 4), characterised in that said hot-water removing unit includes a V-shaped arm (38) disposed above and between each adjacent pair of said baths (1, 2; 2, 3; 3, 4), a pair of guide rollers (39, 40) rotatably supported on opposite distal ends of said V-shaped arm (38), and a suction nozzle (41) supported on said arm (38) between said guide rollers (39, 40) for sucking the hot water (20) from the tape (F) while the latter is passing over a top surface of said suction nozzle (41).

2. A washing apparatus according to claim 1, further including at least one shower nozzle (24) disposed in each of said baths (1, 2, 3, 4) at a position slightly higher than the level of the hot water (20) in the respective bath (1, 2, 3, 4) for spraying the hot water (20) over the tape (F).

3. A washing apparatus according to claim 1 or 2, further including a plurality of guide pins (37) mounted in each of said baths (1, 2, 3, 4) for guiding the tape (F) upwardly and downwardly in a meandering fashion.

4. A washing apparatus according to claim 1, 2 or 3, in which said successive baths (1, 2, 3, 4) are separated one from the next by a plurality of partitions (17, 18, 19) each having in its upper portion a through opening (21, 22, 23), the height of said through opening (21, 22, 23) of each said bath (1, 2, 3, 4) gradually increasing from an upstream end one of said successive baths toward a downstream end one of said baths.

Revendications

1. Appareil pour laver un long ruban (F) avec de l'eau chaude (20), comprenant : une succession de bains (1, 2, 3, 4) d'eau chaude; à chaque bain, au moins deux rouleaux de guidage (31, 32) sur et autour desquels le ruban (F) doit être avancé, les rouleaux de guidage (31, 32) étant montés dans chacun des bains (1, 2, 4); à chaque bain, au moins un rouleau entraîné (34) sur et autour duquel le ruban (F) doit être avancé, le rouleau entraîné (34) étant disposé au-dessus de chacun des bains (1, 2,

3, 4) en alignement vertical avec le centre de la distance entre les rouleaux de guidage (31, 32); et un dispositif d'évacuation d'eau chaude disposé entre chaque paire adjacente des bains (1, 2; 2, 3; 3, 4) pour évacuer l'eau chaude (20) du ruban (F) lorsque ce dernier est transféré d'un des bains (1, 2, 3) jusqu'au bain suivant (2, 3, 4) caractérisé en ce que le dispositif d'évacuation d'eau chaude comprend un bras (38) en forme de V disposé au-dessus et entre chaque paire adjacente des bains (1, 2; 2, 3; 3, 4), une paire de rouleaux de guidage (39, 40) supportés de façon tournante sur les extrémités libres opposées du bras (38) en forme de V, et une buse d'aspiration (41) supportée par le bras (38) entre les rouleaux de guidage (39, 40) pour aspirer l'eau chaude (20) du ruban (F) pendant que ce dernier passe sur la surface supérieure de la buse d'aspiration (41).

2. Appareil de lavage selon la revendication 1, comprenant en outre au moins une buse d'aspersion (24) disposée dans chacun des bains (1, 2, 3, 4) à un endroit légèrement plus élevé que le niveau de l'eau chaude (20) présente dans le bain correspondant (1, 2, 3, 4) pour pulvériser l'eau chaude (20) sur le ruban (F).

3. Appareil de lavage selon la revendication 1 ou 2, comprenant, en outre, une pluralité d'axes de guidage (37) montés dans chacun des bains (1, 2, 3, 4) pour guider le ruban (F) vers le haut et vers le bas d'une façon sinueuse.

4. Appareil de lavage selon la revendication 1, 2 ou 3, dans lequel les bains successifs (1, 2, 3, 4) sont séparés chacun du bain suivant par une pluralité de cloisons (17, 18, 19) comportant chacune dans sa partie supérieure une ouverture traversante (21, 22, 23), la hauteur de l'ouverture traversante (21, 22, 23) de chacun des bains (1, 2, 3, 4) augmentant progressivement depuis l'extrémité d'amont des bains successifs en direction de l'extrémité d'aval desdits bains.

Patentansprüche

1. Vorrichtung zum Waschen eines langgestreckten Bandes (F) mit heißem Wasser (20), mit einer Folge von Heißwasserbädern (1,2,3,4); pro Bad wenigstens zwei Führungsrollen (31,32), auf und um die das Band (F) geführt wird, wobei die Führungsrollen (31,32) in jedem der Bäder (1,2,3,4) gelagert sind; pro Bad wenigstens einer angetriebenen Rolle (34), auf und um die das Band (F) geführt wird, wobei



- die angetriebene Rolle (34) über jedem der Bäder (1,2,3,4) in vertikaler Ausrichtung in Bezug auf die Mitte zwischen den Führungsrollen (31,32) angeordnet ist; und einer Heißwasserentfernungseinheit, die zwischen jedem benachbarten Paar von Bädern (1,2;2,3;3,4) zur Entfernung des heißen Wassers (20) vom Band (F) angeordnet ist, wenn letzteres von einem der Bäder (1,2,3) zum nächsten Bad (2,3,4) überführt wird, dadurch gekennzeichnet, daß die Heißwasserentfernungseinheit einen V-förmigen Arm (38) umfaßt, der über und zwischen jedem benachbarten Paar von Bädern (1,2;2,3;3,4) angeordnet ist, ein Paar Führungsrollen (39,40), die auf gegenüberliegenden entfernten Enden des V-förmigen Arms (38) drehbar gelagert sind, und eine Saugdüse (41), die vom Arm (38) zwischen den Führungsrollen (39,40) abgestützt ist, um das heiße Wasser (20) von dem Band (F) abzusaugen, während letzteres eine obere Oberfläche der Saugdüse (41) passiert.
2. Waschvorrichtung nach Anspruch 1, die weiterhin wenigstens eine Sprühdüse (24) umfaßt, die in jedem der Bäder (1,2,3,4) an einer Stelle angeordnet ist, welche geringfügig höher als der Pegel des heißen Wassers (20) im jeweiligen Bad (1,2,3,4) liegt, um das heiße Wasser (20) auf das Band (F) zu sprühen.
3. Waschvorrichtung nach den Ansprüchen 1 oder 2, die weiterhin eine Mehrzahl von Führungsstiften (37) umfaßt, welche in jedem der Bäder (1,2,3,4) festgelegt sind, um das Band (F) nach aufwärts und nach abwärts in mäanderförmiger Weise zu führen.
4. Waschvorrichtung nach den Ansprüchen 1, 2 oder 3, in der die aufeinanderfolgenden Bäder (1,2,3,4) jeweils von dem nächstfolgenden durch eine Mehrzahl von Trennwänden (17,18,19) abgetrennt sind, von denen jede in ihrem oberen Bereich eine Durchgangsöffnung (21,22,23) aufweist, deren Höhe allmählich von einem stromaufwärts gelegenen Ende zu einem der darauffolgenden Bäder auf ein stromabwärts gelegenes Ende eines dieser Bäder zu zunimmt.

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