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(54) **Packaging method and device for the wrapping of a bundle of welding electrodes.**

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Description

The subject invention concerns a method and a device for packaging of a number of bundled welding electrodes of essentially equal lengths, preferably coated electrodes, with the aid of an elastic wrapping material.

In packaging welding electrodes in the form of bundles containing e.g from 10 to 100 electrodes, it is essential that the electrodes of each bundle, which electrodes generally have a circular cross-sectional shape, are maintained as far as possible in a mutually immobilized position in order to prevent relative movement of the electrodes with consequential damage thereto in the subsequent handling of the bundles, for instance during transportation and storage.

In accordance with a previously tested and known method one or several straps of an elastically shrinkable material, such as a plastics film, is applied around the ends of a bundle of electrodes, whereupon the film is shrunk in order to immobilize the electrodes.

During the shrinkage of the straps, the bundle is tightened and, depending on the number of electrodes in the bundle, the latter takes on a profile configuration that more or less resembles that of a polygon or a circle. Bundles having this profile configuration take up a great deal of room during transport and storage because of the considerable large dead inter-bundle space formed when the bundles are stacked.

Although this has a certain electrode immobilizing effect the remaining relative electrode movability is still sufficient to constitute a risk for damage to the electrodes during the handling thereof.

In accordance with another prior-art method, a bundle of electrodes is packaged in an individual box of paper-board or in a case of plastics material having a closable lid. Also in both these cases the electrodes are more or less free to move relatively one another and thus to cause damage to one another and even to the very package during handling.

The purpose of the subject invention is to avoid the disadvantage outlined in the aforegoing by providing a positively shape-permanent bundle of immobilized electrodes, and a bundle profile of optimum configuration to achieve space economy for transportation and storage of the packaged bundles.

This purpose is achieved by the method in accordance with the invention in that in order to form a bundle of electrodes, the latter are placed in a retainer with their external free ends projecting from the retainer in opposite directions and essentially in alignment, that the wrapping material is wound in one or several turns about the bundle in the longitudinal direction thereof and in abutment against the free ends of the electrodes for the purpose of mutually immobilizing the electrodes making up the bundle, and in that the bundle thus packaged is separated from the retainer.

The tightening fixes every single electrode in its position. Vibrations cannot either cause dislodging of the electrodes.

A device developped in accordance with the invention for the performance of this method is characterized by a retainer in which the electrodes, designed to form a bundle, are insertable in such a manner that the outer free bundle ends project from said retainer in opposite directions and essentially in alignment, by a device for winding wrapping material in one or several turns about the bundle in the longitudinal direction thereof above and in abutment against the free ends of the electrodes for the purpose of mutually immobilizing the electrodes making up the bundle, and by a device for separation of the bundle thus packaged from the retainer.

The invention will be described in closer detail in the following with reference to the accompanying drawings illustrating one presently preferred embodiment of a device in accordance with the invention for performance of the method. In the drawings,

Fig. 1 illustrates in a perspective view the main components of this device necessary to understand the functioning of said device, as well as some ancillary equipment, whereas

Figs. 2A-2C, 3A-3C and 4A-4C schematically show a sequence of different steps for wrapping a bundle of electrodes according to the method of the invention, to form a package.

Coated welding electrodes 1 of a conventional design which have been manufactured in a preceding station, not shown, are transported one by one on a belt conveyor 2 or similar forwarding device in the direction indicated by arrow A, up to a transfer device 3 formed with electrode collection pockets 4 arranged to transfer the electrodes 1 in the direction indicated by arrow B onto the packaging and wrapping device in accordance with the invention, generally designated by reference 5.

The wrapping device 5 in accordance with the embodiment described and illustrated herein comprises a belt 7 of rubber or other similar material which travels around pulleys 6 at least one of which is driven by a motor, not shown, and a transmission associated therewith. The upper part of the belt 7 travels in the direction of arrow C.

On its external face, the belt 7 supports a number of retainers 8 extending transversely across the belt as seen in the lengthwise direction thereof, said retainers being shorter than the electrodes 1.

The material of the retainers 8 is a matter of choice and could be for instance extruded or welded aluminium. The retainers are formed with a space 10 which opens upwards and at the retainer ends 9 for reception therein of electrodes 1 in a manner to be described in closer detail in the following.

The space 10 is laterally delimited by upwardly projecting guide walls 11, thus giving the space a configuration most closely resembling that of an upwardly open cradle.

At the end of the wrapping device 5 turned towards the transfer device 3 there is arranged a transfer station 12 for transfer of electrodes 1 from the transfer device 3 to a retainer 8 below. When the electrodes 1 are transferred to or are placed inside this retainer 8, they form a bundle 13, in accordance with the example shown comprising 16 electrodes, but obviously the number could be increased or decreased according to wish.

The retainer 8 is arranged to be affected by a vibrating mechanism 29, the latter becoming active when a predetermined number of electrodes 1, to be bundled together, have been transferred to the retainer 8. As a result of the vibrations, the electrodes 1 will assume mutual positions displaying a high fill factor.

As a rule, the number of electrodes used to form the bundle does not make it possible to assemble the electrodes into a bundle having an essentially rectangular cross-sectional configuration; on the contrary, the top layer in the bundle will be only partly filled with electrodes.

When the electrodes are placed inside the retainer 8, the outer free ends of the electrodes 1 of the bundle 13 will project in opposite directions from the ends 9 of the retainer 8. Owing to the shape of the space 10 in the retainer 8, as described previously, the bundle 13 will essentially assume the configuration of a square block, which is the optimum configuration for wrapping, transporting and storing the bundles.

In accordance with the preferred embodiment, the vibrating mechanism 29 is in the form of a vibrator 30 which is fixedly mounted below the upper part of the belt 7 and in abutment against the lower face of that belt part. Via the upper belt part, the vibrator 30 imparts a vibratory motion to the retainer 8 above, which is filled with the bundle 13 of electrodes 1, whereby the electrodes 1 are "compacted" and takes on the above described configuration of a square block inside the space 10.

In order to ensure that the outer free ends 14 of the electrodes 1 are in alignment, i.e. that they project by the same amount from the respective adjacent end 9 of the retainer 8, a centering station 15 is provided after the transfer station 12 as seen in the direction of arrow C, said centering station including centering means 16 which are arranged to move to and fro in the direction indicated by arrow D by means of drive means, not shown, and which means are arranged to be moved into abutment against the free ends 14 of the electrodes to position the electrode ends in alignment with one another in the way indicated in the aforegoing.

After the centering station 15 as seen in the direction of arrow C a winding-on station 17 is provided, comprising a winding device 18 arranged to wrap the bundle 13 of electrodes 1 with the aid of an elastic wrapping material 19.

The winding device in accordance with the embodiment shown comprises a stand 20 in the form of an arm one end of which is fixedly attached to a hollow shaft 21, the latter being rotated in the direction of arrow E by a drive means, not shown. At the opposite end, the stand 20 supports a supply 22 of wrapping material 19, in the embodiment shown in the form of a roller.

The winding device 18 performs its wrapping action by orbiting the supply 22 of wrapping material 19 around the bundle 13 in one or several turns, usually 3-5 turns, in the longitudinal direction of the bundle 13, as most - clearly apparent from particularly Fig. 1, over and in abutment against the free ends 14 of the electrodes 1, in order to immobilize the electrodes 1 making up the bundle 13 in their relative positions.

In this operation, wrapping material 19 is applied also around the retainer 8, more precisely on the retainer guide walls 11, see Figs. 3A-3C.

In order to prevent the electrodes 1 of the bundle 13 from moving inside the space 10 of the retainer 8 during the winding-on of the wrapping material 19 about the bundle 13 and the retainer 8, a holding device 31 is provided. The holding device 31 comprises a plate 31 which is coupled to a drive means, not shown, by means of a rod 33 extending through the hollow shaft 21. Prior to the winding-on operation, the drive means is arranged to be activated for the purpose of displacing the plate 32 in a downwards direction by means of the rod 33, into abutment against the upper face of the bundle 13 of electrodes 1, thus holding the electrodes 1 in position during the winding-on operation. When the winding-on is completed, the plate 32 is moved in the opposite direction upwards, away from the upper face of the bundle 13, in order to release the bundle.

After the winding-on station 17 as seen in the direction of arrow C, a separation station 23 is provided, including a separator mechanism 24 which is arranged to separate the bundle 13 of electrodes 1, now wrapped and forming a package, from the retainer 8 and transfer the package to a belt conveyor 25 or similar transporting device to be discharged.

In accordance with the embodiment shown the separator mechanism 24 comprises pusher means 26 which are arranged to move up and down in the direction indicated by arrow F so as to lift the bundle 13 out of the retainer 8 and lift it to the level of the belt conveyor 25. In the lifting movement, the wrapping material is removed or separated from the retainer and as consequence of the elasticity of the material it clings to the electrodes 1.

At the belt level a transfer device 27 including a transfer means 28 is provided, said means arranged to be displaced to and fro in the direction of arrow G by drive means, not shown, to transfer the bundle 13 of electrodes 1 from the pusher means 16 onto the belt conveyor 25.

The wrapping material 19 proper is in the form of a film possessing shrinkage and/or tensile properties and consisting of a material adequate for the purpose.

When a film possessing shrinking properties is used, it is shrunk into enclosing engagement with the free ends 14 of the electrodes 1 so as to ensure immobilization of the electrodes 1 in an absolute shape-permanent relationship once the packaged bundle 13 has been separated from the retainer 8 in the separating station 23. When this kind of film is used, a source of heat, for example an IR heater or an oven, may be provided in the area of the belt conveyor 25 in order to heat the film to effect shrinkage thereof.

On the other hand, when a film possessing tensile properties is used, the film is stretched into enclosing engagement with the free ends 14 of the electrodes 1 in order to provide the immobilization of the electrodes in the absolute, shape-permanent relationship thereof, when the film is wound about the bundle 13 inside the winding-on station 17.

Following transfer of the bundle 13 onto the belt conveyor 25 the shape-permanent bundle 13 of electrodes 1 preferably is packaged in an hermetically enclosed and moisture sealed manner in a wrapping that is impervious to air and moisture.

The invention must not be regarded as limited to the features shown and described herein but a number of modifications are possible within the scope of the claimed protection as defined in the appended claims.

Claims

1. A method of packaging a number of bundled welding electrodes (1) of essentially equal lengths, preferably coated electrodes, with the aid of an elastic wrapping material (19), **characterized** in that in order to form a bundle (13) of electrodes, the latter are placed in a retainer (8) with their external free ends projecting from the retainer in opposite directions and essentially in alignment, that the wrapping material (19) is wound in one or several turns about the bundle in the longitudinal direction thereof and in abutment against the free ends (14) of the electrodes for the purpose of mutually immobilizing the electrodes making up the bundle, and in that the bundle thus packaged is separated from the retainer.

2. A method as claimed in claim 1, **characterized** in that the electrodes are vibrated inside the retainer, either before their ends have been brought into alignment or during such alignment operation.

3. A method as claimed in claim 1 or 2, **characterized** in that the wrapping material is wound also about at least part of the retainer or guide means covering the latter, and that it is removed from the retainer or the guide means, when the wrapped bundle is separated from the retainer.

4. A method as claimed in claim 1 or 3, **characterized** in that the wrapping material is formed by a film possessing shrinking properties, and in that it is shrunk into enclosing engagement with the free ends of the electrodes to ensure the immobilized shape-permanent relative positions of the electrodes after the packaged bundle has been separated from the retainer.

5. A method as claimed in claim 1 or 3, **characterized** in that the wrapping material is formed by a film possessing tensile properties, and in that it is stretched into enclosing engagement with the free ends of the electrodes to ensure the immobilized shape-permanent relative positions of the electrodes when the film is wound about the bundle.

6. A method as claimed in any one of the preceding claims, **characterized** in that the bundle is given substantially the shape of a square block.

7. A device for packaging of a number of bundled (13) welding electrodes (1) of essentially equal lengths, preferably coated electrodes, with the aid of an elastic wrapping material (19), **characterized** by a retainer (8) in which the electrodes (1), designed to form the bundle (13), are insertable in such a manner that the outer free bundle ends project from said retainer (8) in opposite directions and essentially in alignment, by a device (18) for winding the wrapping material (19) in one or several turns about

the bundle (13) in the longitudinal direction thereof above and in abutment against the free ends (14) of the electrodes (1) for the purpose of mutually immobilizing the electrodes (1) making up the bundle (13), and by a device (24) for separation of the bundle (13) thus packaged from the retainer (8).

8. A device as claimed in claim 7, **characterized** by a vibrating mechanism (29) subjecting the retainer (8) and the bundle (13) of electrodes (1) supported therein to vibration in order to make the electrodes assume mutual positions giving a high fill factor, and by centering means (16) which are arranged to be moved into abutment against the outer free ends (14) of the electrodes (1) in order to bring said ends essentially into alignment.

9. A device as claimed in claim 7 or 8, **characterized** in that the retainer (8) is shorter than the electrodes (1) and in that it comprises a space (10) which is open at least at the ends (9) for application of the electrodes (1), said space giving the bundle (13) of electrodes essentially the shape of a square block.

10. A device as claimed in claim 9, **characterized** in that the space (10) is limited sidewise by walls (11) around which the wrapping material (19) may also be wound concurrently with the winding of said material about the bundle (13) in the longitudinal direction thereof, and from which walls the wrapping material may be removed, when the packaged and wrapped bundle is removed from the retainer (8).

11. A device as claimed in claim 7, **characterized** in that the winding device (18) comprises at least one supply (22) of wrapping material (19) which is mounted in a stand (20) and which supply (22) is arranged to orbit about the retainer (8) with a bundle (13) therein in the longitudinal direction of the latter in order to wind the wrapping material (19) around the bundle.

12. A device as claimed in claim 7, **characterized** in that the winding device comprises at least one supply of wrapping material which is mounted in a stand, and in that the retainer (8) with the bundle (13) of electrodes (1) therein is arranged to be rotated past the supply in order to wind on the wrapping material (19) about the bundle in the longitudinal direction thereof.

13. A device as claimed in claim 7, **characterized** in that the separating means (24) comprises pusher means (26) arranged to be moved into abutment against the bundle (13) of electrodes (1), said pusher means preferably being positioned on either side of the retainer (8).

Patentansprüche

1. Verfahren zum Verpacken einer Anzahl von gebündelten Schweißelektroden (1) von im wesentlichen gleicher Länge, insbesondere ummantelten Elektroden, mittels eines elastischen Verpackungsmaterials (19), dadurch gekennzeichnet, daß zur Bildung eines Bündels (13) von Elektroden letztere in einem Halter (8) plaziert werden, wobei ihre äußeren freien Enden den Halter in entgegengesetzten Richtungen und im wesentlichen unter sich bündig überragen, daß das Verpackungsmaterial (19) einmal oder mehrmals in Längsrichtung des Bündels um dieses und in Anlage an die freien Enden (14) der Elektroden gewickelt wird, um die das Bündel bildenden Elektroden gegenseitig festzusetzen, und daß das so verpackte Bündel dem Halter entnommen wird.

2. Verfahren nach Anspruch 1, dadurch gekennzeichnet, daß die Elektroden vor oder während des bündigen Ausrichtens ihrer Enden innerhalb des Halters in Schwingung versetzt werden.

3. Verfahren nach Anspruch 1 oder 2, dadurch gekennzeichnet, daß das Verpackungsmaterial zumindest auch teilweise um den Halter oder letzteren abdeckende Führungsmitteln gewikkelt und von dem Halter oder den Führungsmittel abgenommen wird, wenn das verpackte Bündel dem Halter entnommen wird.

4. Verfahren nach einem der Ansprüche 1 oder 3, dadurch gekennzeichnet, daß das Verpakkungsmaterial aus einer Folie mit Schrumpfeigenschaften gebildet ist und durch Schrumpfen zur engen Anlage an die freien Enden der Elektroden kommt, um die Elektroden nach Entnahme des verpackten Bündels aus dem Halter in ihrer formstabilen Relativlage zueinander zu halten.

5. Verfahren nach einem der Ansprüche 1 oder 3, dadurch gekennzeichnet, daß das Verpakkungsmaterial aus einer zugelastischen Folie gebildet ist und an den freien Enden der Stäbe durch Dehnen fest zur Anlage kommt, um die Stäbe nach dem Umwickeln des Bündels mit der Folie in ihrer formstabilen Realativlage zueinander zu halten.

6. Verfahren nach einem der vorangehenden Ansprüche, dadurch gekennzeichnet, daß das Bündel im wesentlichen die Form eines Rechtecks aufweist.

7. Vorrichtung zum Verpacken einer Anzahl von gebündelten (13) Schweißelektroden (1) von im wesentlichen gleicher Länge, insbesonders ummantelten Elektroden, mittels eines elastischen Verpackungsmaterials (19), gekennzeichnet durch einen Halter (8), in den die Elektroden (1) zur Ausbildung des Bündels (13) derart einsetzbar sind, daß die freien äußeren Bündelenden den Halter (8) in entgegengesetzten Richtungen und im wesentlichen unter sich bündig ausgerichtet überragen, durch eine Einrichtung (18) zum einfachen oder mehrfachen Umwickeln des Bündels (13) in dessen Längsrichtung und in Anlage gegen die freien Enden (14) der Elektroden (1) mit dem Verpackungsmaterial (19), um die das Bündel (13) bildenden Elektroden (1) gegenseitig festzusetzen, und durch eine Einrichtung (24) zum Trennen des solchermaßen verpackten Bündels (13) aus dem Halter (8).

8. Vorrichtung nach Anspruch 7, gekennzeichnet durch einen Schwingungsmechanismus (29), welcher den Halter (8) und das darin enthaltene Bündel (13) aus Elektroden (1) in Schwingung versetzt, um die Elektroden in eine Lage zueinander mit hohem Füllungsgrad auszurichten, und durch Zentriermittel (16), welche derart angeordnet sind, daß sie zur Anlage gegen die freien äußeren Enden (14) der Elektroden (1) bewegt werden, um die Enden im wesentlichen bündig auszurichten.

9. Vorrichtung nach einem der Ansprüche 7 oder 8, dadurch gekennzeichnet, daß der Halter (8) kürzer als die Elektroden (1) ausgebildet ist und daß er einen Raum (10) aufweist, welcher zumindest an den Enden (9) zur Einwirkung auf die Elektroden (1) offen ist, wobei der Raum dem Bündel (13) aus Elektroden im wesentlichen die Form eines Rechtecks verleiht.

10. Vorrichtung nach nach Anspruch 9, dadurch gekennzeichnet, daß der Raum (10) seitlich durch Wände (11) begrenzt ist, um die das Verpackungsmaterial (19) beim Umwickeln des Bündels (13) in dessen Längsrichtung gleichzeitig gewickelt werden kann, und von denen das Verpackungsmaterial abgenommen wird, wenn das verpackte und umwickelte Bündel dem Halter (8) entnommen wird.

11. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Wickeleinrichtung (18) zumindest einen Vorrat (22) an Verpackungsmaterial (19) aufweist, der an einem Ständer (20) angebracht und derart angeordnet ist, daß er den Halter (8) mit einem darin enthaltenen Bündel (13) in Längsrichtung desselben umläuft, um das Verpackungsmaterial (19) um das Bündel zu wickeln.

12. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Wickeleinrichtung zumindest einen Vorrat an Verpackungsmaterial aufweist, der an einem Ständer angebracht ist, und daß der Halter (8) mit dem darin enthaltenen Bündel (13) aus Elektroden (1) so angeordnet ist, daß er an dem Vorrat vorbeigedreht wird, um das Verpackungsmaterial (19) um das Bündel in dessen Längsrichtung zu wickeln.

13. Vorrichtung nach Anspruch 7, dadurch gekennzeichnet, daß die Trenneinrichtung (24) Ausstoßer (26) aufweist, welche zur Anlage gegen das Bündel (13) aus Elektroden (1) bewegt werden, wobei die Ausstoßer bevorzugt auf beiden Seiten des Halters (8) angeordnet sind.

Revendications

1. Procédé d'emballage d'une pluralité d'électrodes de soudage en faisceaux (1) ayant des longueurs pratiquement égales, de préférence des électrodes revêtues, à l'aide d'un matériau d'emballage élastique (19), caractérisé en ce que, en vue de former un faisceau (13) d'électrodes, ces dernières sont placées dans un organe de maintien (8) avec leurs extrémités libres extérieures saillant de l'organe de maintien, dans des directions opposées et essentiellement en alignement, en ce que le matériau d'emballage (19) est enroulé en formant un ou plusieurs tours autour du faisceau, dans sa direction longitudinale et en butée contre les extrémités libres (14) des électrodes, en vue d'immobiliser mutuellement les électrodes constituant le faisceau, et en ce que le faisceau ainsi emballé est séparé de l'organe de maintien.

2. Procédé selon la revendication 1, caractérisé en ce que les électrodes sont mises en vibration dans l'organe de maintien, avant que leurs extrémités libres aient été alignées ou bien durant une telle opération d'alignement.

3. Procédé selon la revendication 1 ou 2, caractérisé en ce que le matériau d'emballage est également enroulé autour d'au moins une par-

tie de l'organe de maintien ou du moyen de guidage recouvrant ce dernier, lorsque le faisceau emballé est séparé de l'organe de maintien.

4. Procédé selon la revendication 1 ou 3, caractérisé en ce que le matériau d'emballage est formé par un film ayant des propriétés de rétrécissement, et en ce qu'il est rétréci afin de venir en contact de fermeture avec les extrémités libres des électrodes, afin d'assurer les positions relatives permanentes à forme immobilisée des électrodes, après que le faisceau emballé ait été séparé de l'organe de maintien.

5. Procédé selon la revendication 1 ou 3, caractérisé en ce que le matériau d'emballage est formé par un film ayant des propriétés de traction, et en ce qu'il est étiré afin de venir en contact de fermeture avec les extrémités libres des électrodes, en vue d'assurer les positions relatives permanentes à forme immobilisée des électrodes lorsque le film est enroulé autour du faisceau.

6. Procédé selon l'une quelconque des revendications précédentes, caractérisé en ce que l'on donne au faisceau sensiblement la forme d'un bloc carré.

7. Dispositif d'emballage d'une pluralité d'électrodes de soudage (1) en faisceau (13), ayant des longueurs pratiquement égales, de préférence des électrodes revêtues, à l'aide d'un matériau d'emballage (19) élastique, caractérisé par un organe de maintien (8) dans lequel les électrodes (1), conçues de façon à former le faisceau (13), peuvent être insérées de manière que les extrémités libres extérieures de faisceau fassent saillie dudit organe de maintien (8), dans des directions opposées et essentiellement en alignement, par un dispositif (18) servant à enrouler le matériau d'emballage (19) de façon à former un ou plusieurs tours autour du faisceau (13), dans sa direction longitudinale, au-dessus de et en butée contre les extrémités libres (14) des électrodes (1), en vue d'immobiliser mutuellement les électrodes (1) constituant le faisceau (13), et par un dispositif (24) servant à séparer le faisceau (13) ainsi emballé par rapport à l'organe de maintien (8).

8. Dispositif selon la revendication 7, caractérisé par un mécanisme vibrant (29) exposant l'organe de maintien (8) et le faisceau (13) d'électrodes (1) y étant supporté à des vibrations, de manière que les électrodes occupent des positions mutuelles fournissant un facteur de remplissage élevé, et par des moyens de centrage (16) agencés de façon à se déplacer en butée contre les extrémités libres extérieures (14) des électrodes (1), en vue d'amener lesdites extrémités essentiellement en alignement.

9. Dispositif selon la revendication 7 ou 8, caractérisé en ce que l'organe de maintien (8) est plus court que les électrodes (1) et en ce qu'il comprend un espace (10) ouvert au moins aux extrémités (9), afin d'appliquer les électrodes (1), ledit espace conférant au faisceau d'électrodes (13) essentiellement la forme d'un bloc carré.

10. Dispositif selon la revendication 9, caractérisé en ce que l'espace (10) est limité latéralement par des parois (11) autour desquelles le matériau d'emballage (19) peut également être enroulé simultanément avec l'enroulement dudit matériau autour dudit faisceau (13), dans sa direction longitudinale, et parois à partir desquelles le matériau d'emballage peut être retiré, lorsque le faisceau emballé et enveloppé est retiré de l'organe de maintien (8).

11. Dispositif selon la revendication 7, caractérisé en ce que le dispositif d'enroulement (18) comprend au moins une source (22) de matériau d'emballage (19), montée dans un support (20), cette source (22) étant agencée de façon à tourner de manière orbitale autour de l'organe de maintien (8) conjointement avec le faisceau (13), dans la direction longitudinale de ce dernier, en vue d'enrouler le matériau d'emballage (19) autour du faisceau.

12. Dispositif selon la revendication 7, caractérisé en ce que le dispositif d'enroulement comprend au moins une source de matériau d'emballage montée dans un support, et en ce que l'organe de maintien (8) conjointement avec le faisceau (13) d'électrodes (1) en son sein, est agencé de façon à être tourné au-delà de la source en vue d'enrouler le matériau d'emballage (19) autour du faisceau, dans sa direction longitudinale.

13. Dispositif selon la revendication 7, caractérisé en ce que le moyen de séparation (24) comprend un moyen poussoir (26) agencé de façon à être déplacé pour venir en butée avec le faisceau (13) d'électrodes (1), ledit moyen poussoir étant de préférence disposé de chaque côté de l'organe de maintien (8).

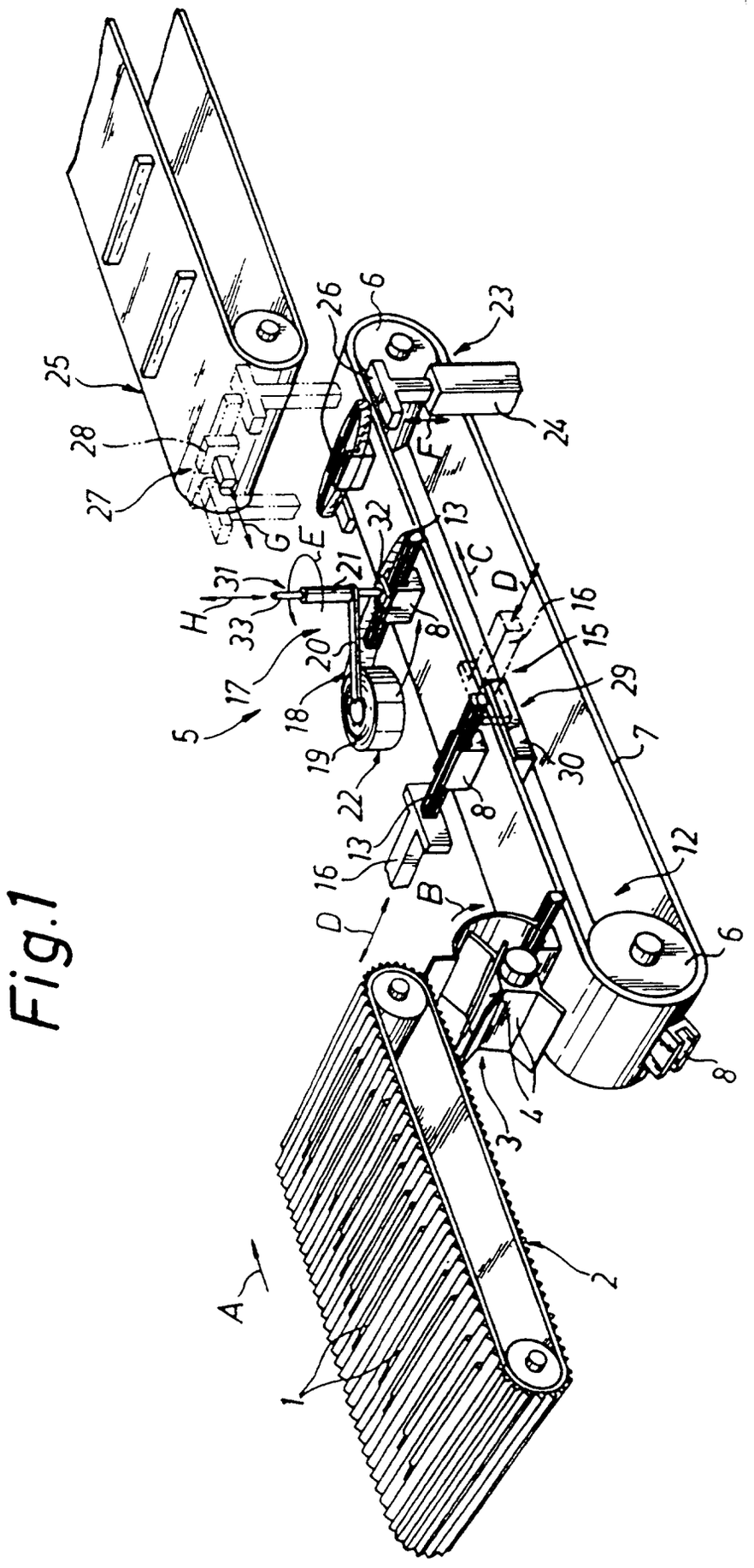
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Fig.1

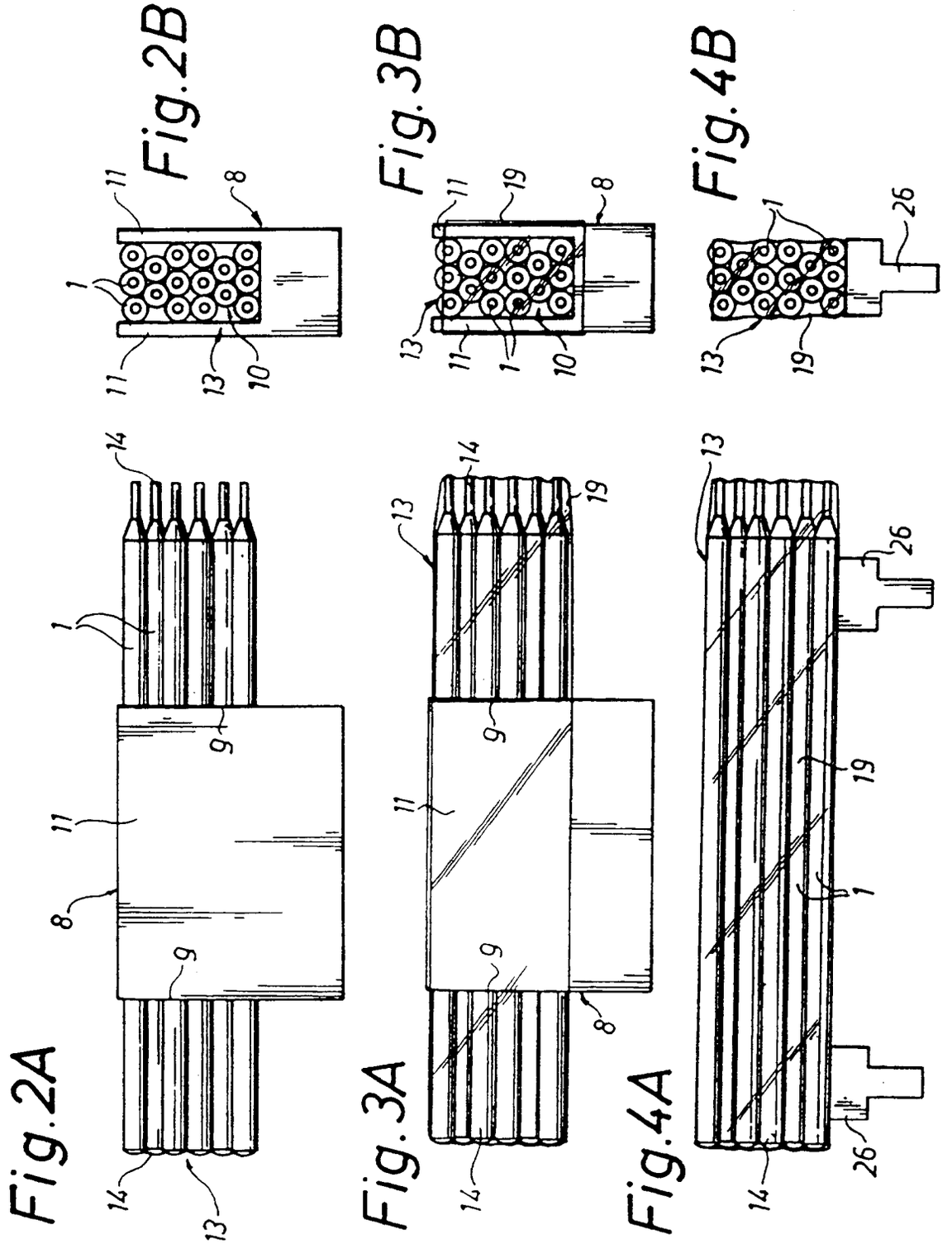
Fig.2B
Fig.3B
Fig.4B
Fig.2A
Fig.3A
Fig.4A

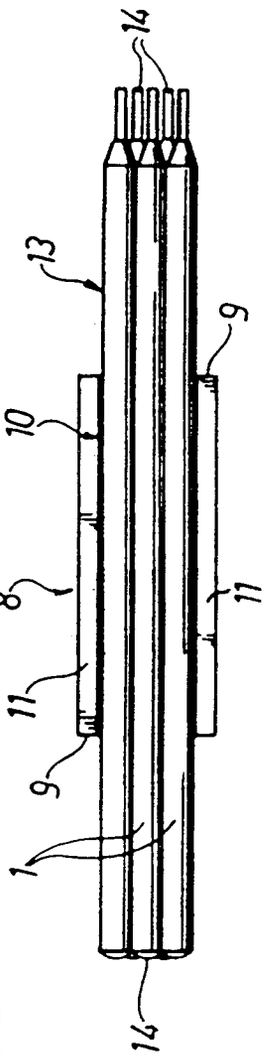

Fig.2C

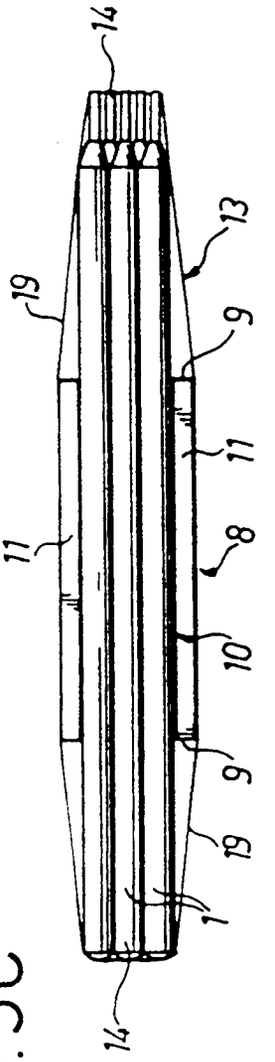

Fig.3C

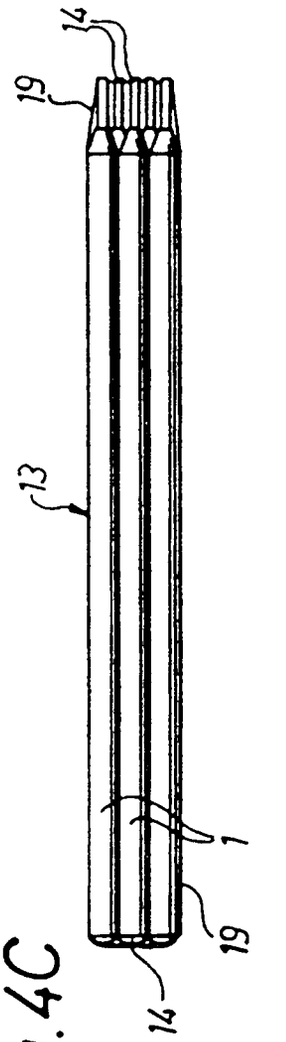

Fig.4C