METHOD AND MACHINE FOR PACKING A ROPE INTO A CONTAINER.

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Description

This invention relates to a method of packing a rope into a container in such a manner as to permit easy extraction of the rope therefrom, in which method the rope is withdrawn from a supply reel and led down into the container to be coiled therein with the coil centre situated between the centre line and periphery of the container, while the container is rotated and a simultaneous relative axial movement is effected between a winding head and the container and pressure is exerted on the rope placed in the container.

Survival equipments comprise a container with a rope which is intended for extraction by means of a rocket. For this reason it is of extreme importance that the rope runs out with the least possible resistance. This naturally places great demands on the packing of the rope, which at present is made entirely by hand and thus of course implies high packing costs. The reason why packing is carried out by hand simply is that hitherto no machine has been available, which is capable of performing this work with the desired reliability.

US—A—3,234,627 and US—A—3,316,609 disclose machines for packing yarn into containers for subsequent dyeing. Such packing differs materially from rope packing. In the first place, the products are entirely different and cannot be handled in the same way. In the citations, the yarn is supplied by means of compressed air and simply is “dropped” down into the container in the form of loops which are shaped by means of a supply tube having a curved discharge end. This known type of machine cannot quite easily be used for packing a thick, long rope into a container.

The object of the present invention is to pack such a rope in a novel manner so that all safety requirements are satisfied at the same time as the packing of the rope can be carried out mechanically. This object is attained by withdrawing the rope from the supply reel by introducing the rope between a fixed central piece in the winding head and a tubular pulling means rotating about said piece, such that the rope thus is caused to move at least part of a turn about the central piece before it exits as a coil from the lower end of the means and is discharged into the container, and rotating or twisting the rope about its longitudinal axis on its way down into the container.

For packing the rope into a container, use is made of a new winding head for withdrawing the rope from a rope reel, coiling the rope and discharging it into a container, characterised by a tubular means in the lower end portion of a sleeve which is mounted on a vertical fixed shaft and rigidly connected to a rotatable rope reel supporting device for rotation therewith, said tubular means defining a cylindrical space, and an approximately cylindrical abutment mounted on the fixed shaft in the cylindrical space and defining together with the inner wall surface of the tubular means an annular gap in which the rope is receivable while being slightly pinched upon rotation of the means and from which gap the rope after having described at least part of a turn about the abutment is dischargeable as a coil at the lower open end.

The invention also relates to a machine packing a rope of this kind, said machine comprising a frame with a shaft fixed at its upper end and extending a predetermined distance vertically downward, a supporting device rotatably mounted on the shaft and having a rope reel rotatably mounted thereon, a support means for the container for supporting it such that its centre line extends parallel to but laterally spaced from the fixed shaft, whereby said shaft projects into the container with its axis situated in the space between the centre line and periphery of the container, and means for positioning the rope placed in the container. Said machine is characterised by a rotary winding head on the free end of the fixed shaft projecting into the container, said winding head comprising a cylindrical sleeve which is mounted on the vertical fixed shaft and rigidly connected to the rope reel supporting device for rotation with it, a tubular means in the lower end portion of the sleeve facing away from the supporting means, said means defining a cylindrical space, and an approximately cylindrical abutment mounted on the fixed shaft in the cylindrical space and defining together with the inner wall surface of the tubular means an annular gap in which the rope is receivable while being slightly pinched upon rotation of the means and from which gap the rope after having described at least part of a turn about the abutment is dischargeable as a coil at the lower open end, the winding head being adapted, upon rotation, to withdraw the rope from the rope reel during the rotation of the reel supporting device and to coil the rope with the coil centre situated between the centre line and periphery of the container, and means for rotating the supporting device for the rope reel, the winding head and the support means with the container and simultaneously axially moving the support means vertically downward.

The invention will be more fully described below with reference to the accompanying drawings in which:

Fig. 1 in elevation shows an embodiment of the invention; and
Figs. 2 and 3 on a larger scale show a winding head in section and from below.

According to Fig. 1 according to the invention has a frame 10 which is fixed to a bottom plate 11. At the top the frame has a transverse beam 12 in the centre of which a vertical shaft 13 is secured by means of a fastening device 14. The shaft 13 extends vertically downward and a supporting device generally designated 15 is rotatably mounted at a distance from the transverse beam 12. The supporting device 15 has a drive pulley 16 which is coaxial with the shaft 13 and about which a V-belt 17 is passed. The V-belt 17 is driven by a drive pulley 18. Secured to the
supporting device 15 is a holder 19 for rotary accommodation of a rope supply reel 20 onto which is wound a rope 21. The supporting device 15 at the underside of the V-belt pulley 16 has a fastening 22 with which a tubular sleeve 23 is rigidly connected via flange means. The sleeve 23 extends about the shaft 13 coaxially therewith down to the lower end of the shaft 13. Further, a tube 24 is connected to the underside of the supporting device 15 and the upper end of the tube opens opposite the longitudinal centre of the reel 20 mounted on the supporting device 15 while the lower end of the tube 24 opens adjacent the outer periphery of the sleeve 23. The rope 21 is intended to be pulled via a bushing in the supporting device 15 down through the tube to the point adjacent the periphery of the sleeve 23 and farther axially downward to a winding head 25 in the lower end of the shaft 13 and the sleeve 23.

As shown in Fig. 2, the winding head 25 consists of a cylindrical portion 26 which is fixed by means of a neck portion 52 and a stop screw 58 in the lower end of the sleeve 23. The cylindrical portion 26 extends downward past the lower end of the fixed shaft 13 projecting from the sleeve 23 and has below said lower end a cylindrical space. The portion 26 which defines the cylindrical space, and the neck portion 52 have a lining 27 of plastics, preferably Nylon®. The lining has a smooth inner side. A recess 28 extends from the outer side of the portion 26 and opens at the inner side of the lining 27. A cylindrical means 29 is fixed with the aid of a screw 55 to the lower end of the shaft 13. The means 29 has axial grooves 56, as shown in Fig. 3, and is received in the lined cylindrical space of the portion 26 with easy running fit to the wall of the space. At the lower end the lining 27 has an enlarged cylindrical portion so that a gap 57 is formed between the lining and the periphery of the means 29, in which gap the rope 21 is receivable, while being slightly pinched between the lands of the means 29 and the lining 27. The rope running along the sleeve 23 is drawn in from the outer side of the sleeve to the gap 57 via the recess 28. Part of the periphery of the rope within the gap 57 will touch the means 29 at the lower end of the shaft 13 and upon rotation of the cylindrical portion 26 the rope will be drawn towards the downwardly facing outlet opening of the gap 57 and discharged from the winding head 25 in the form of a coil having a diameter that normally slightly exceeds that of the winding head.

Fig. 1 shows a container 31 into which the rope 21 is to be packed. The container 31 is cylindrical and has a likewise cylindrical tube 32 upstanding from the bottom, whereby an annular space is defined in the container 31. The radial extension of said annular space slightly exceeds the diameter of the winding head 25. The rope 21 is intended to be placed in said coils in said annular space by rotation of the winding head 25. To achieve this the container 31 must, however, be rotated about its axis, as will appear from Fig. 1, and at the same time be displaced vertically downwards.

To have the container 31 effect said movements a support means 30 is provided, which on its upper side has support and holder means 33 for retaining the container 31. A threaded shaft 34 is connected to the underside of the support means and extends coaxially with the container 31. The shaft 34 is rotatable with the aid of a pulley 35 via a central fastening 36 wherein. The pulley 35 is rotated by means of a V-belt 37 and a drive pulley 38 engaging said V-belt. The pulley 35 with the fastening 36 is mounted in a holder means 39 which is connected to the frame 10 and at its underside has a bushing 41 with a hollow cross-piece provided with a threaded portion 42 engaging the threads of the shaft 34, which by means of a handle 43 can be moved into and out of engagement with the threads of the shaft 34. Upon rotation of the shaft 34 by means of the pulley 35 the shaft will also move axially because of its engagement with the threaded portion 42. The engagement between the shaft 34 and the central fastening 36 of the pulley 35 is a frictional engagement which does not prevent the shaft 34 from moving axially.

A disk 44 having a central opening of slightly greater diameter than that of the tube 32 and an opening for the winding head 25 is carried by arms 45, 46 of which the latter is pivotally connected to the frame 10 and rockable by means of an eccentric 54. The purpose of the disk 44 will appear from the following.

For rotation of the drive pulleys 18, 38 gearings 47, 48 are provided, which are driven by means of a shaft 49 in turn driven by a V-belt pulley 51 via a worm gearing 50. Instead of the gearings 47, 48 and 50 many other possibilities to drive the pulleys are conceivable.

The described machine is used in the following manner to pack a rope 21 into the container 31. First, the rope 21 is drawn via the tube 24, the outer side of the sleeve 23 and the recess 28 to the gap 57 in the winding head 25. Preferably, a sufficiently long rope length is withdrawn from the winding head 25 to permit being placed along the inner surface of the container up to the upper edge and folded about said edge, such that the lowermost end of the rope is accessible. Then a container 31 is placed on the support means 30 and fixed in correct position. By detaching the threaded piece 42 by means on the handle 43 the shaft 34 can be urged axially upward until the winding head 25 is adjacent the bottom of the container 31. Then the threaded piece 42 is again engaged with the threads of the shaft 34 by winding of the handle 43. The machine is now ready for start.

When the machine is started the supporting device 15 is caused to rotate whereby the reel 20 is rotated about the shaft 13 as indicated at 20°. By this rotation the rope 21 drawn down to the winding head will be twisted or turn about its own axis, which generally is a prerequisite for its being discharged in a correct manner from the winding head. The portion 26 rotates because of its connection with the supporting device 15 via the sleeve 23 and the connecting means 22 at the same speed of rotation as the reel 20 and the rope is discharged.
via the gap 57 in the portion 26 in coils from the winding head 25, as indicated to the left in Fig. 1. At the same time the container 31 is rotated very slowly via the support means 30 and the shaft 34 so that the coils are arranged in a uniform layer in the container 31 about the central tube 32 thereof. When the container 31 has rotated a full revolution it has simultaneously moved a distance downwardly approximately corresponding to the rope thickness owing to the engagement of the threaded shaft 34 with the threaded piece 42, and a new layer of rope coils is placed on the layer already laid. The rope coils are placed below the disk 44 which has the task of pressing the laid layers together from above. If necessary, the disk 44 can be adapted to oscillate axially in that the eccentric 54 actuates the arm system 45, 46. When the winding head approaches the upper end of the container 31 the packing is interrupted and the container 31 is lowered, in such a manner that the rope theretofore being released, if any, of the support means 31 by release of the threaded piece 42 and cutting the rope 21.

With the aid of the machine according to the invention it is possible to pack a rope in the above-described manner in a fraction of the time required for manual packing of the rope. Besides, packing takes place in an extremely advantageous, safe manner and it has proved that the rope length which can be packed is considerably longer than that which can be packed in the same container by hand. The drawing shows a special container with a central tube, but it is obvious that applying the invention one can pack the rope also into other containers and for other purposes than that mentioned in the introduction.

Claims

1. A method of packing a rope (21) into a container (31) in such a manner as to permit easy extraction of the rope therefrom, in which the rope (21) is withdrawn from a supply reel (20) and led down into the container (31) to be coiled therein with the coil centre situated between the centre line and periphery of the container (31) while the container (31) is rotated and a simultaneous relative axial movement is effected between a winding head (25) and the container (31) and pressure is exerted on the rope placed in the container, characterised by withdrawing the rope from the supply reel (20) by introducing the rope between a fixed central piece (29) in the winding head (25) and a tubular pulling means (26) rotating about said piece, such that the rope thereto is caused to move at least part of a turn about the central piece (29) before it exits as a coil from the lower end of the means (26) and is discharged into the container (31), and rotating or twisting the rope about its longitudinal axis on its way down into the container.

2. Winding head for withdrawing a rope (21) from a rope reel (20), coiling the rope and discharging it into a container, characterised by a tubular means (26) in the lower end portion of a sleeve which is mounted on a vertical fixed shaft (13) and rigidly connected to a rotatable rope reel supporting device for rotation therewith, said tubular means (26) defining a cylindrical space, and an approximately cylindrical abutment (29) mounted on the fixed shaft (13) in the cylindrical space and defining together with the inner wall surface of the tubular means (26) an annular gap (57) in which the rope (21) is receivable while being slightly pinched upon rotation of the means (26) and from which gap the rope after having described at least part of a turn about the abutment is dischargeable as a coil at the lower open end.

3. A machine for packing a rope (21) into a container (31) in such a manner as to permit easy extraction of the rope therefrom, comprising a frame (10) with a shaft (13) fixed at its upper end and extending a predetermined distance vertically downward, a supporting device (15) rotatably mounted on the shaft (13) and having a rope reel (20) rotatably mounted thereon, a support means (30) for the container (31) for supporting it such that its centre line extends parallel to but laterally spaced from the fixed shaft (13), whereby said fixed shaft projects into the container (31) with its axis situated in the space between the centre line and periphery of the container, and means for compacting the rope placed in the container, characterised by a rotary winding head (25) on the free end of the fixed shaft (13) projecting into the container (31), said winding head (25) comprising a cylindrical sleeve (23) which is mounted on the vertical fixed shaft (13) and rigidly connected to the rope reel supporting device (15) for rotation with it, a tubular means (26) in the lower end portion of the sleeve (23) facing away from the supporting means (15), said means (26) defining a cylindrical space, and an approximately cylindrical abutment (29) mounted on the fixed shaft (13) in the cylindrical space and defining together with the inner wall surface of the tubular means (26) an annular gap (57) in which the rope (21) is receivable while being slightly pinched upon rotation of the means (26) and from which gap the rope after having described at least part of a turn about the abutment is dischargeable as a coil at the lower open end, the winding head being adapted, upon rotation, to withdraw the rope (21) from the rope reel (20) during the rotation of the reel supporting device (15) and to coil the rope with the coil centre situated between the centre line and periphery of the container, and means (34—42) for rotating the supporting device (15) for the rope reel (20), the winding head (25) and the support means (30) with the container (31) and simultaneously axially moving the support means (30) vertically downward.

4. A machine as claimed in claim 3, characterised in that the rope reel supporting device (15) has a tube (24) to guide the rope (21) from the reel (20) to the outer surface of the shaft sleeve (23), from which outer surface the rope is introducible into the gap (57) via a recess (28) in the wall of the tubular means (26).
5. A machine as claimed in claim 3 or 4, characterised in that the tubular means (26) has a lining (27) of plastics and that the approximately cylindrical abutment (29) has axial grooves (56) in its peripheral surface.

6. A machine as claimed in any one of claims 3—5, characterised in that the support means (30) of the container (31) is fixed on a vertical threaded shaft (34) rotatable by means of a driven wheel fixed to said shaft which is in threaded engagement with a threaded portion (42) connected to the frame (10) so that the shaft (34) and thus the support means (30) and the container (31), when being rotated by means of said wheel, also move vertically downward, the threaded portion (42) being manually swingable out of engagement with the shaft (34) when the latter is returned to its initial position.

7. A machine as claimed in any one of claims 3—6, characterised in that a disk (44) preferably oscillatable (54) in the longitudinal direction of the container (31) is provided in said container (31), said disk being supported by the frame (10) and having an opening through which the winding head (25) extends, said disk being further adapted to abut against and pack, respectively, the rope (21) coiled in the container (31).

8. A machine as claimed in any one of claims 3—7, characterised in that the container (31) round its axis has a central axial sleeve (32) which defines an annular space in the container (31) in which the rope coils are placed.

Patentansprüche


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5. Maschine nach Anspruch 3 oder 4, dadurch gekennzeichnet, dass das rohrförmige Glied (26) ein Futter (27) aus Kunststoff besitzt, und dass der annähernd zylindrische Anschlag (29) in seiner Umfangsfläche axiale Rillen (56) aufweist.

6. Maschine nach einem der Ansprüche 3—5, dadurch gekennzeichnet, dass das Tragglied (30) des Behälters (31) auf einer senkrecht, mit Gewinde versehenen und mittels eines darauf befestigten, angetriebenen Rades drehbaren Achse (34) befestigt ist, die mit einem mit dem Rahmen (10) verbundenen Gewindeteil (42) im Gewindegreifer steht, so dass sich die Achse (34) und somit das Tragglied (30) und der Behälter (31) bei ihrem mittels des Rades erfolgenden Umlauf ebenfalls senkrecht abwärts bewegen, wobei der Gewindeteil (42) von Hand mit der Achse (34) ausser Eingriff schwenkbar ist, wenn die Achse in ihre Ausgangslage zurückgeführt wird.

7. Maschine nach einem der Ansprüche 3—6, dadurch gekennzeichnet, dass ein vorzugsweise in Längsrichtung des Behälters (31) oszillierbare Scheibe (44) im Behälter (31) angebracht ist, welche Scheibe vom Rahmen (10) getragen ist, eine Öffnung aufweist, durch die sich der Wickelkopf (25) erstreckt, und dazu eingerichtet ist, sich gegen das schlingenförmig in den Behälter (31) gelegte Seil (21) anzulegen bzw. dieses zusammenzudrücken.


Revisions

1. Procédé de conditionnement d’une corde (21) dans un récipient (31) d’une manière qui permet une extraction facile de la corde, dans lequel la corde (21) est retirée d’un rouleau d’alimentation (20) et est conduite vers le bas dans le récipient (31) afin qu’elle y forme des spires, le centre des spires étant placé entre l’axe central et la périphérie du récipient (31), pendant que le récipient (31) tourne et pendant qu’un déplacement relatif axial simultané est réalisé entre une tête de bobinage (25) et le récipient (31), une pression étant exercée sur la corde placée dans le récipient, caractérisée par l’extraction de la corde du rouleau d’alimentation (20) par introduction de la corde entre une pièce centrale fixe (29) placée dans la tête de bobinage (25) et un dispositif tubulaire (26) de traction qui tourne autour de cette pièce, si bien que la corde est ainsi obligée de se déplacer au moins en formant une partie de spire autour de la pièce centrale (29) avant de sortir sous forme d’une spire à l’extrémité inférieure du dispositif de traction (26) et d’y être évacuée dans le récipient (31), et par rotation ou torsion de la corde autour de son axe longitudinal, sur son trajet vers le bas à l’intérieur du récipient.

2. Tête de bobinage destinée à extraire une corde (21) d’un rouleau de corde (20), à enrouler la corde et à l’évacuer dans un récipient, caractérisée par un dispositif tubulaire (26) placé dans la partie de l’extrémité inférieure d’un manchon qui est monté sur un axe vertical fixe (13) et qui est rigidement raccordé à un dispositif rotatif de support de rouleau de corde afin qu’il tourne avec celui-ci, le dispositif tubulaire (26) délimitant un espace cylindrique, et une butée (29) approximativement cylindrique, montée sur l’axe fixe (13) dans l’espace cylindrique et délimitant avec la surface interne de la paroi du dispositif tubulaire (26) un espace annulaire (57) dans lequel la corde (21) est destinée à être disposée tout en étant légèrement pincée lors de la rotation du dispositif tubulaire (26) la corde, après avoir parcouru au moins une partie d’une spire autour de la butée, étant destinée à être évacuée à partir de cet espace sous forme d’une spire, à l’extrémité inférieure ouverte.

3. Machine de conditionnement d’une corde (21) dans un récipient (31) de manière que la corde puisse en être facilement extraite, comprenant un châssis (10) ayant un axe (13) qui est fixé à son extrémité supérieure et qui descend verticalement sur une distance prédéterminée, un dispositif (15) de support monté sur l’axe (13) afin qu’il puisse tourner et ayant un rouleau (20) de corde qui est monté afin qu’il puisse tourner, un dispositif (30) de support du récipient (31) destiné à supporter celui-ci de manière que son axe central soit parallèle à l’axe fixe (13) mais décalé latéralement par rapport à celui-ci, l’axe fixe dépassant dans le récipient (31) avec son axe placé dans l’espace compris entre l’axe central et la périphérie du récipient, et un dispositif de tassement de la corde placée dans le récipient, caractérisée par une tête rotative de bobinage (25) disposée à l’extrémité libre de l’axe fixe (13) dépassant dans le récipient (31), la tête de bobinage (25) comprenant un manchon cylindrique (23) monté sur l’axe vertical fixe (13) et rigide ment raccordé au dispositif (15) de support de rouleau de corde afin qu’il tourne avec lui, un dispositif tubulaire (26) placé à l’extrémité inférieure du manchon (23) placé du côté opposé au dispositif de support (15), le dispositif tubulaire (26) délimitant un espace cylindrique, et une butée sensiblement cylindrique (29) montée sur l’axe fixe (13) dans l’espace cylindrique et délimitant avec la surface interne de la paroi du dispositif tubulaire (26) un espace annulaire (57) dans lequel la corde (21) est destinée à se loger tout en étant légèrement pincée lors de la rotation du dispositif tubulaire (26), la corde, après avoir parcouru au moins une partie de spire autour de la butée, étant destinée à être évacuée de l’espace sous forme d’une spire, à l’extrémité inférieure.
ouverte, la tête de bobinage, lors de la rotation, étant destiné à extraire la corde (21) du rouleau (20) de corde pendant la rotation du dispositif de support de rouleau (15) et à enrouler la corde, le centre des spires étant placé entre l’axe central et la périphérie du récipient, et un dispositif (34, 42) destiné à faire tourner le dispositif de support (15) du rouleau de corde (20), la tête de bobinage (25) et le dispositif de support (30) avec le récipient (31) et à déplacer axialement le dispositif de support (30) en direction verticale descendante simultanément.

4. Machine selon la revendication 3, caractérisée en ce que le dispositif (15) de support du rouleau de corde a un tube (24) de guidage de la corde (21) du rouleau (20) à la surface externe du manchon (23), la corde étant destinée à être introduite, depuis cette surface externe du manchon, dans ledit espace (57) par l’intermédiaire d’une cavité (28) formée dans la paroi du dispositif tubulaire (26).

5. Machine selon l’une des revendications 3 et 4, caractérisée en ce que le dispositif tubulaire (26) a un revêtement (27) d’une matière plastique et la butée sensiblement cylindrique (29) a des gorges axiales (56) à sa surface périphérique.

6. Machine selon l’une quelconque des revendications 3 à 5, caractérisée en ce que le dispositif (30) de support du récipient (31) est fixé sur un arbre fileté vertical (34) qui est destiné à être entraîné en rotation par une roue menée fixée à l’arbre et qui coopère par filetage avec une partie taraudée (42) raccordée au châssis (10) afin que l’arbre (34) et ainsi le dispositif de support (30) et le récipient (31), lorsqu’ils sont entraînés en rotation à l’aide de la roue, se déplacent aussi verticalement vers le bas, la partie taraudée (42) pouvant être basculée manuellement en position de non-coopération avec l’arbre (34) lorsque celui-ci est ramené en position initiale.

7. Machine selon l’une quelconque des revendications 3 à 6, caractérisée en ce qu’un disque (44) est placé dans le récipient (31) et peut de préférence osciller (54) dans la direction longitudinale du récipient (31), le disque étant supporté par le châssis (10) et ayant une ouverture par laquelle passe la tête de bobinage (25), le disque étant en outre destiné à être en butée contre la corde (21) enroulée dans le récipient (31) et à la tasser.

8. Machine selon l’une quelconque des revendications 3 à 7, caractérisée en ce que le récipient (31) comporte, autour de son axe, un manchon axial central (32) qui délimite un espace annulaire dans le récipient (31), les spires de corde étant placées dans cet espace annulaire.