In a machine for packaging articles into boxes, an articles feeding line is formed by two runs and extends beside the machine according to different possible configurations. The runs can be oriented on a horizontal plane, independently, so as to allow different possible arrangements of the machine with respect to a production line. Likewise, an articles outlet line can be arranged in alignment with longitudinal extension of the machine or perpendicular to longitudinal extension of the machine, to allow the machine to be connected with working units arranged either in alignment or perpendicular to the machine.
MACHINE FOR PACKAGING ARTICLES INTO BOXES WITH VARIABLE ARRANGEMENT WITH RESPECT TO THE PRODUCTION LINE

FIELD OF THE INVENTION

[0001] The present invention relates to a machine for packaging articles into boxes.

[0002] In particular, the present invention concerns a machine, in which articles of various types, generally bottles, are introduced into boxes, usually obtained from tubular blanks.

DESCRIPTION OF THE PRIOR ART

[0003] There are machines, which package automatically articles into containers or boxes, in known way, varying in terms of the type of article and of the box.

[0004] For example, some containers used in the cosmetics field require previous introduction of a support into the box, because otherwise the particular container conformation does not allow it to be placed firmly in a respective box.

[0005] In these cases, the article is conveyed by suitable supports, called “godets” in the art, to be carried toward the station, in which the articles are placed in the boxes. Afterwards, the emptied godets must return to the machine for producing the articles to be packaged. The products are often supplied using a part of line, for example going out of the articles producing machine, arranged aligned longitudinally with the packaging machine. On the other hand, the point in which the articles reach the packaging machine is often situated on the machine side, according to a direction transversal with respect to the machine extension.

[0006] This requires a positioning of the packaging machine orientated perpendicular with respect to the producing machine, with obvious difficulty in reasonable handling of the spaces for the machines arrangement. In other cases, the arrangement of the machine with transversal orientation with respect to the production line becomes the need, which not always can be satisfied by the machines available at present, due to their specific constructive configuration.

[0007] Otherwise, it is necessary to prepare, during machine installation, connecting sections for the articles feeding line, which obviously results in constructive complications and a considerable increase of time and costs.

[0008] The same problem occurs downstream of the machine, for the removal of the articles already inserted into the boxes. The apparatuses working downstream of the machine are often arranged in line, i.e. aligned with the packaging machine. However, it often happens that it is necessary to pick up the filled boxes along a direction transversal to the machine.

[0009] If, for example, the machine is orientated transversal with respect to the production line, also the products outlet line could be orientated at 90 degrees.

[0010] Likewise, this necessity causes serious difficulties in positioning the machines and handling the available spaces or, in other cases, it cannot be satisfied.

SUMMARY OF THE INVENTION

[0011] From this point of view, it is a particular object of the invention to propose the machine constructed in such a way, that it can be easily associated to a line for supplying articles to be packaged, either aligned with the packaging machine, or perpendicular thereto.

[0012] Likewise, the proposed machine must have the possibility to be connected to a working unit, for example for packaging purpose, arranged downstream and oriented both in line and perpendicular to the same machine.

[0013] These and other objects are obtained by the machine for packaging articles into boxes, said machine including:

[0014] at least one magazine of blanks used to obtain boxes;

[0015] an inlet station, situated near said magazine of blanks;

[0016] blank withdrawing means for withdrawing and erecting the blanks, so as to obtain boxes with open ends;

[0017] a conveying line for the boxes, situated with an initial part in correspondence to the inlet station;

[0018] an article feeding line for supplying articles to be placed into the boxes;

[0019] articles withdrawing means for withdrawing articles from the articles feeding line and for introducing the articles into the boxes;

[0020] box closing means acting along said conveying line;

[0021] a box discharge station for delivering boxes filled with the articles, situated at the end of said conveying line;

[0022] wherein said articles feeding line extends beside the machine according to a selected configuration, among different possible configurations, to allow said machine to be connected with working units arranged either in alignment or perpendicular with respect to said machine.

[0023] According to a different embodiment, the box discharge station includes a first outlet line, arranged at 90 degrees with respect to the box conveying line, and a second additional outlet section, that can be arranged either in alignment or at 90 degrees with respect to said outlet line, to make the boxes leave either in alignment or at right angle to the longitudinal extension of the machine.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] The characteristic features of the invention, not resulting obvious from what has been said above, will be described in the following, with reference to the enclosed drawings, in which:

[0025] FIG. 1A is a perspective view of the machine on the whole;

[0026] FIG. 1B is a plan view of the machine;

[0027] FIG. 1C is a lateral view of the machine;

[0028] FIG. 1D is a perspective rear view of the machine;

[0029] FIGS. from 2A to 2R show different arrangements of the machine, according to the configuration adopted for the inlet and outlet of the articles and their containers.

DISCLOSURE OF THE PREFERRED EMBODIMENTS

[0030] The machine M, shown in FIGS. 1A, 1B, 1C and 1D, is commonly called “vertical”, with this term actually referring to the direction, in which the articles are placed in the boxes.

[0031] This constructive configuration of the machine is used preferably when the articles to be packaged have such a shape that allows them to be stable only in vertical position, which is a frequent need in the perfumery and cosmetics field, in general.
[0032] From here derives the necessity to pick up the articles arranged vertical on the feeding line, possibly placed inside the so-called godet (supports that match internally with the shape of the lower part of the containers and externally have a shape which can be easily handled).

[0033] The blanks are placed in the magazine 60 side by side and lying on one of their folded edges, that is with the lateral flaps and the closing wings turned toward the opposite sides of the magazine.

[0034] A withdrawing device 3, for example similar to the one described in the Italian Patent Application No. B02006A000123, filed by the same Applicant, described in the following only schematically, includes a rotor-translating arm 30, that withdraws one blank at a time from the magazine 60, maintaining it in horizontal and then rotating it to arrange it in vertical, that is with the lateral flaps and the closing wings turned upwards and downwards.

[0035] Erecting means 4, provided with suction cups, receive the blank and erect it obtaining each time a box 2, while the loading means 40 receive the boxes 2, already formed by the erecting means and introduce them into the seats of a conveying line 1.

[0036] For this purpose, as described in the above mentioned Italian Patent Application B02006A000739, the conveying line 1 includes a series of withdrawing modules 10, associated to a motion group 20 and aimed at determining their forward movement along a loop path P, including an upper active run RA and a lower backward run RR.

[0037] The terminal part of the active run RA is situated in correspondence to a discharge station SS, from which an outlet line LU originates, along which the completed boxes leave the machine.

[0038] A station for withdrawing and placing of a sheet of ribbed material FC from a related magazine 70, provided optionally, is situated, likewise optionally, along the path of the active run RA of the conveying line. The sheet of ribbed material is suitably shaped, so as to obtain a support or a protection for the article, that is to be introduced into the box 2. Consequently, also the shaped sheet of ribbed material is introduced into the box by suitable means 75, here not described and not shown in detail, but only schematically, since not relevant for the invention.

[0039] After the station for placing the sheet of ribbed material, there is a station for placing the articles SC, where terminates a feeding line LC of the articles to be packaged.

[0040] One does not dwell on the description of the means 80 for picking up the articles from the feeding line, aimed at placing the articles in the boxes, since they are of known type, for example of pick-and-place type, and are not relevant for the description of the invention.

[0041] As far as the feeding line of the articles LC is concerned, it is important to notice that it includes a section 78, extending longitudinally along the side of the packaging machine.

[0042] As it is seen in FIGS. 1B and 1D, the section 78 is formed by two runs 78A and 78B, that can be oriented together in the same direction or separately in different directions.

[0043] The terminal part of the feeding line LC extends horizontally, like a close loop 79, thus allowing the return, to the production line, of possible not picked up articles, that are subsequently collected by known systems, or of godets, emptied of the respective article by the pick-and-place means, in case such supports are used.

[0044] The two runs 78A and 78B of the access section 78 are connected to the terminal close loop section 79 during the construction of the machine and the two runs 78A and 78B are oriented, together or separately, according to the specific collocation that the machine will have to assume in the environment, in which it will work.

[0045] In particular, the orientation of the runs 78A and 78B depends on the machine arrangement with respect to a working unit, situated upstream, with respect to which the machine can be aligned or perpendicular.

[0046] In the case shown in FIG. 1A, for example, the articles feeding line LC presents to the machine head aligned with its longitudinal extension, allowing the coupling with a unit that supplies the articles, aligned with the same machine.

[0047] FIGS. 1B and 1D show also a transversal orientation of the runs 78A and 78B of the access section 78, that allows the coupling with a production unit, arranged at 90° with respect to the machine.

[0048] After the station for placing articles SC, there is a station for placing informative leaflets SF.

[0049] There are additional closing means for closing the supports of ribbed material before closing the boxes, likewise arranged or activated optionally, if the supports of ribbed material have been introduced and if they must be closed.

[0050] Afterwards, along the feeding line 1, there is a device for the application of a print (if required) on a part of the box bottom, in particular the closing flap, which is still open and turned downwards. These means are not shown, as of known type and not relevant for the invention purposes.

[0051] Before reaching the discharge station SS, below and above the active run RA of the conveying line 1, there are closing means 36, that close the lower and upper wings of the box 2, which have been open up to this moment, while the blank has moved, translating on the closed lower flaps and lying on the conveying belt 141.

[0052] The conveying belt 141 is connected to the same motion mechanism of the conveying line 1, so as to be operated with the same forward movement speed.

[0053] In the discharge station SS, extracting means 50, that include a pusher 51, operated in a direction transversal to the conveying line 1, move the boxes 2, with the articles and already closed, out of an outlet line LU, formed by a conveying belt, arranged at right angle with respect to the conveying line 1.

[0054] Besides the outlet line LU, there is also an additional line LA, which can be arranged aligned or at right angle with respect to the outlet line LU. This allows the filled boxes to leave in alignment with respect to the longitudinal extension of the machine M.

[0055] Now, some characteristic working step of the machine will be described.

[0056] The boxes 2 are moved stepwise along the conveying line 1 and reach the pick-and-place picking up and collocation means 80.

[0057] The articles to be placed in the boxes, move forward along the run 78A of the access section 78 of the feeding line LC, arranged freely thereon, or placed inside the respective supports, called also “godets”.

[0058] Along the close loop section 89, the articles are picked up by the pick-and-place means 80 and placed into the boxes during the dwelling on the conveying line 1.

[0059] In case in which the articles are conveyed on the godet, the latter, once emptied, go back toward the production
unit, completing the path along the close loop section 79 and then, along the backward run 78B.

[0060] If the articles are conveyed in a free condition, without godets, the backward run of the articles feeding line LC is not used and can be omitted.

[0061] After having placed an informative leaflet, the heads of the box 2 are closed, thus practically completing the pack.

[0062] When the withdrawing module 10 stops in the discharge station SC, the pusher 51 is operated to push the box on the outlet line IU, oriented perpendicular with respect to the active run RA.

[0063] Therefore, the box goes out in a direction transversal to the machine longitudinal extension, so as to be transferred to another machine, to be subjected to further finishing operations or to be packed and then sent.

[0064] If the additional outlet section LA is arranged at right angle with respect to the outlet line IU, it is possible to deliver the boxes to another machine or subsequent working unit in a longitudinal direction with respect to the machine extension.

[0065] This possibility to supply the articles at the outlet in longitudinal direction, as well as in the transversal direction, makes the machine uncommonly versatile, and makes it possible to couple it to other machines or working units with less positioning constraints.

[0066] The versatility and easiness of coupling with other machines or working units are further increased by predisposition of the articles feeding line, that extends longitudinally or perpendicular to the machine rear side.

[0067] In practice, a machine is delivered already provided with the means that allow it to be coupled with other working units of the production line, without further interventions, both in line and at right angle.

[0068] The different combinations of the arrangements of the articles feeding line LC, and in particular of the two runs 78A and 78B forming it, allow obtaining different configurations of the machine and of its coupling with the working units upstream and downstream, according to the examples shown in FIGS. from 19A to 19R.

[0069] For example, in FIGS. 2A and 2B the machine is supplied with the run of 78A of the line LC, arranged longitudinally to the machine side and respectively with the discharge of the boxes filled in line or at right angle.

[0070] The arrows indicate the movement direction of the articles and the moving away direction of the filled boxes. In this case, the backward run 78B of the line LC is not provided, as not used.

[0071] In FIG. 2A, the machine M is oriented aligned with the production working unit, situated upstream, as well as with the working unit, situated downstream (both not shown). In FIG. 2B the machine is aligned with the production working unit situated upstream and is perpendicular to the direction, in which the boxes are sent to the working unit, situated downstream.

[0072] In the case of FIGS. 2C and 2D, the articles are supplied in a direction perpendicular to the machine M.

[0073] In the case of FIG. 2C, the machine is oriented perpendicular to the production working unit, situated upstream, and aligned with the working unit situated downstream.

[0074] In FIGS. 2E and 2F the origin of the articles supplied to the machine is changed.

[0075] In FIGS. 2G, 2H, 2I and 2J also the backward run 78B of the feeding line LC is added, for example because the godets are used for conveying the articles and the configurations of the previous figures are reproduced.

[0076] Finally, in FIGS. from 2K to 2R the previous combinations are proposed again, but with the runs 78A and 78B oriented in different directions.

[0077] Besides the advantage of a more free arrangement of the machine with respect to the production line in general, it appears obvious that the machine arrangement time is reduced, which is obtained due to the orientation of the runs 78A and 78B (when provided) and of the additional line LA, already executed during the machine construction.

[0078] This preventive preparation of the articles feeding line and of the boxes outlet line allows elimination of time necessary for the preparation of the joining sections, when it is not possible to arrange the machine as it would be required.

[0079] Obviously, the quickest machine placing, following the described arrangement, also allows a considerable cut-back of the preparation time of the system in general.

What is claimed is:

1. A machine for packaging articles into boxes, said machine including:
   at least one magazine of blanks used to obtain boxes;
   an inlet station, situated near said magazine of blanks;
   blank withdrawing means for withdrawing and erecting the blanks, so as to obtain boxes with open ends;
   a conveying line for the boxes, situated with an initial part in correspondence to the inlet station;
   an article feeding line for supplying articles to be placed into the boxes;
   articles withdrawing means for withdrawing articles from the articles feeding line and for introducing the articles into the boxes;
   box closing means acting along said conveying line;
   a box discharge station for delivering boxes filled with the articles, situated at the end of said conveying line;
   wherein said article feeding line extends beside the machine according to a selected configuration, among different possible configurations, to allow said machine to be connected with working units arranged either in alignment or perpendicular with respect to said machine.

2. A machine, according to claim 1, wherein said box discharge station includes a first outlet line, arranged at 90 degrees with respect to the boxes conveying line, and a second additional outlet section, that can be arranged in alignment or at 90 degrees with respect to said outlet line, to make the boxes leave either in alignment or at right angle to the longitudinal extension of the machine.

3. A machine, according to claim 1, wherein said article feeding line includes an access section, formed by two runs, that can be oriented independently from each other on a horizontal plane, and a close loop terminal section, that joins the two runs of said access section and that passes in correspondence to said article withdrawing means for introducing the articles into the boxes.

4. A machine for packaging articles into boxes, said machine including:
   at least one magazine of blanks used to obtain boxes;
   an inlet station, situated near said magazine of blanks;
   blank withdrawing means for withdrawing and erecting the blanks, so as to obtain boxes with open ends;
   a boxes conveying line, situated with an initial part in correspondence to the inlet station;
an article feeding line for supplying articles to be placed into the boxes;  
article withdrawing means for withdrawing articles from the articles feeding line and for introducing the articles into the boxes;  
box closing means, acting along said conveying line;  
a box discharge station for delivering the boxes filled with the articles, situated at the end of said conveying line; wherein said box discharge station includes a first outlet line, arranged at 90 degrees with respect to the box conveying line, and a second additional outlet section, that can be arranged either in alignment or at 90 degrees with respect to said outlet line, to make the boxes leave either in alignment or at right angle to the longitudinal extension of the machine.

5. A machine, according to claim 4, wherein said articles feeding line extends beside the machine according to a selected configuration, among different possible configurations, to allow said machine to couple with working units arranged either in alignment or perpendicular therewith.

6. A machine, according to claim 4, wherein said article feeding line includes an access section, formed by two runs, that can be oriented independently from each other on a horizontal plane, and a close loop terminal section, that joins the two runs of said access section and that passes in correspondence to said article withdrawing means for introducing the articles into the boxes.

7. A machine for packaging articles into boxes, said machine including:
   at least one magazine of blanks used to obtain the boxes; an inlet station, situated near said magazine of blanks; blank withdrawing means for withdrawing and erecting the blanks, so as to obtain boxes with open ends; a box conveying line, situated with an initial part in correspondence to the inlet station; an article feeding line for delivering articles to be placed into the boxes; article withdrawing means for withdrawing the articles from the articles feeding line and for introducing the articles into the boxes; box closing means, acting along said conveying line; a box discharge station for delivering the boxes filled with the articles, situated at the end of said conveying line; wherein said box discharge station includes a first outlet line, arranged at 90 degrees with respect to the box conveying line, and a second additional outlet section, that can be arranged either in alignment or at 90 degrees with respect to said outlet line, to make the boxes leave either in alignment or at right angle to the longitudinal extension of the machine; and wherein said articles feeding line extends beside the machine according to a selected configuration, among different possible configurations, to allow said machine to be connected with working units arranged either in alignment or perpendicular with said machine.

8. A machine, according to claim 7, wherein said article feeding line includes an access section, formed by two runs, that can be oriented independently from each other on a horizontal plane, and a close loop terminal section, that joins the two runs of said access section and that passes in correspondence to said article withdrawing means for introducing the articles into the boxes.

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