In order to introduce stacks of horizontally aligned flat, preferably disk-shaped, groups of items (23) formed by one or more items (18) into tubular bags (16) by means of a vertical tubular bag machine (1), it is proposed that a vertical filling pipe (6) is adapted with respect to its cross section to the horizontal dimensions of the group of items (23), the width (19) and the depth (20) of the filling pipe (6) being made to match the width (21) and the depth (22) of a group of items (23) and the group of items (23) being placed above the filling pipe (6) in such a way that a first equal spacing (26) in the direction of the width (19) and similarly a second equal spacing (27) in the direction of the depth (20) of the filling pipe (6) is provided on opposite sides of the group of items (23), in each case between an outer edge (24) of the group of items (23) and the inner surface (25) of the filling pipe (6), that these spacings (26, 27) do not all have the value zero, that the filling pipe (6) has a cross section that is symmetrical to axes of symmetry (28, 29) of the group of items (23), and that two pipe segments (30, 31) of the filling pipe (6) that are opposite and parallel to each other, extend in the transporting direction (10) and on which film takeoffs (8) of the tubular bag machine (1) act are provided.
VERTICAL TUBULAR BAG MACHINE FOR PACKING HORIZONTALLY ALIGNED GROUPS OF ITEMS

[0001] The invention relates to the packaging sector and, in that sector, to a vertical tubular bag machine with a web of film unwound from a supply roll. A machine of this type has a shaping shoulder for shaping the web of film into a film tube and a vertically aligned filling pipe, which receives the film tube and through which it is possible to fill the film tube. A filling station, above the filling pipe, serves for this filling operation. Two film takeoffs, acting from opposite sides of the filling pipe against the film tube, and consequently against the filling pipe, are provided for further transportation of the web of film and the film tube. A longitudinal sealing device serves for welding the film tube by means of a longitudinal seam, aligned in the transporting direction, and a transverse sealing device with two welding jaws, which can be moved toward each other and weld the film tube transversely, serves for producing top seams and bottom seams of tubular bags. The completed tubular bags are severed from the film tube by means of a cutting device.

[0002] Vertical tubular bag machines of this type are sufficiently known. They generally serve for packing flowable or pourable products, such as granules for example. In principle, products in piece form can also be packed.

[0003] The known vertical tubular bag machines have the disadvantage that they are not very suitable for packing a series of groups of items in the form of a stack produced in tubular bags, since the groups turn during their free fall in the filling pipe, and consequently land in an uncontrollable manner in the welded end of the film tube. For reasons of simplification, a group of items is intended for the purposes of this application to mean either a single, horizontally aligned item, such as for example a coffee pod, or a group of two or more items arranged directly next to one another in a horizontal direction (such as coffee pods for example).

[0004] Because of this problem with falling, horizontal groups of items (single, double, triple group, . . .) cannot be packed by means of vertical tubular bag machines. Instead, these groups are stacked into previously produced empty bags that are able to stand, which is comparatively laborious, and consequently expensive, since a vertical tubular bag machine has to be used in any case for producing the empty bags.

[0005] The invention is based on the object of designing a vertical tubular bag machine in such a way that it can be used for packing groups of items that are intended to form a stack in the tubular bag.

[0006] The object is achieved as specified in the defining part of claim 1. According to this, the filling station is intended for delivering in each case a horizontally aligned flat, preferably disk-shaped, group of items formed by one or more items, the filling pipe is adapted with respect to its cross section to the horizontal dimensions of the group of items in that the width and the depth of the filling pipe are made to match the width and the depth of a group of items and the group of items is placed above the filling pipe in such a way that there is a first equal spacing in the direction of the width and similarly there is a second equal spacing in the direction of the depth of the filling pipe on opposite sides of the group of items, in each case between the outer edge of the group of items and the inner surface of the filling pipe. These spacings do not all have the value zero. The filling pipe has a cross section that is symmetrical to two axes of symmetry of the group of items, and two pipe segments of the filling pipe that are opposite and parallel to each other, extend in the transporting direction and on which the film takeoffs act are provided.

[0007] The proposed vertical tubular bag machine is suitable for bringing groups of items directly into tubular bags approximately horizontally, so that a stack of groups of items is in this way produced in tubular bags. An exact horizontal alignment of the groups of items while they are being introduced is not necessary, since the groups of items align themselves horizontally during their stacking if they did not previously have an excessively great vertical aligning component. This component is minimized, since the filling pipe is adapted to the group of items. In this way there is initially an equal spacing between the group of items and the filling pipe on each opposite side (in a horizontal direction), which has the effect that no tilting moments act on a group of items at the beginning of the free fall.

[0008] Further, advantageous refinements of the proposed tubular bag machine are described in claims 2 to 4.

[0009] A favorable horizontal alignment of the groups of items is maintained during its free fall in the filling pipe if, by analogy with claim 2, the spacings have a value between 0 and 10 mm. Then the air respectively forced past the groups of items on opposite sides is present in equal amounts in a stabilizing way, or scarcely present in the same way. It also satisfies the homogeneity of the air flow in the filling pipe if, in the case of round items, in particular round coffee pods, according to claim 3, the walls of the filling pipe that lie opposite one another and are not intended for the film takeoffs to act on have an outwardly facing arc, an outwardly directed bend or at least two outwardly directed bends. In this case, the pipe segments may extend entirely over opposite walls (claim 4), in order to offer the film takeoffs a large area of engagement, which is of advantage for correct film running.

[0010] The invention is described in more detail below on the basis of figures representing exemplary embodiments, in which:

[0011] FIG. 1 shows a vertical tubular bag machine in a side view, with a filling station above a vertical filling pipe, in order to produce a stack of groups of items in a tubular bag;

[0012] FIG. 2 shows a group of items in a section along A-A of FIG. 1, formed by two partially overlapping items and falling freely in the filling pipe, the cross section of the filling pipe being geometrically adapted to this group of items;

[0013] FIG. 3 shows a group of items in a sectional representation, formed by only one item in a partly arcuate filling pipe adapted to this item;

[0014] FIG. 4 shows the object of FIG. 3 in a sectional representation, but with modified filling pipe dimensions;

[0015] FIG. 5 shows an object analogous to FIGS. 3 and 4 in a sectional representation, but with a filling pipe adapted with regard to the width of the item, so that in this direction the item fits exactly into the filling pipe;
FIG. 6 shows an object analogous to FIG. 3 in a sectional representation, but with bent walls instead of arcuate walls of the filling pipe, and FIG. 7 shows an article to be stacked in a side view.

In the case of a vertical tubular bag machine 1 with a web of film 3 unwound from a supply roll 2, a shaping shoulder 4 serves for shaping the web of film 3 into a film tube 5 (FIG. 1). A vertically aligned filling pipe 6 receives the film tube 5 and serves for filling the film tube 5 by means of a filling station 7 above the filling pipe 6. Two film takeoffs 8, acting from opposite sides of the filling pipe 6 against the film tube 5, and consequently against the filling pipe 6, are provided for further transportation of the web of film 3 and the film tube 5. A longitudinal scaling device 9 serves for welding the film tube 5 by means of a longitudinal seam 11, aligned in the transporting direction 10. A transverse scaling device 12 with two welding jaws 13, which can be moved toward each other and weld the film tube 5 transversely, is intended for producing top seams 14 and bottom seams 15 of tubular bags 16. A cutting device 17 severs the tubular bags 16 from the film tube 5. The filling station 7 is intended for delivering in each case a horizontally aligned flat, disk-shaped group of items 23 formed by one or more items 18. The filling pipe 6 is adapted with respect to its cross section to the horizontal dimensions of this group of items 23 (FIG. 2), the width 19 and the depth 20 of the filling pipe 6 being made to match the width 21 and the depth 22 of the group of items 23 and the group of items 23 being placed above the filling pipe 6 in such a way that a first equal spacing 26, which has the value zero, in the direction of the width 19 and a second equal spacing 27, which has a value of about 1 mm, in the direction of the depth 20 of the filling pipe 6 is provided on opposite sides of the group of items 23, in each case between the outer edge 24 of the group of items 23 and the inner surface 25 of the filling pipe 6.

The outer edges 24 of the items 18, which are coffee pods with a disk-shaped bottom foil (FIG. 7), overlap one another, so that the group of items 23 is stabilized somewhat as a result. In order to have an identical flow resistance through the group of items 23 moving downward in the filling pipe 6 on opposite sides of the group of items 23, the filling pipe 6 has a symmetrical cross section in relation to two axes of symmetry 28, 29 of the group of items 23 that run at right angles to each other. For this purpose, two walls 32 of the filling pipe 6 which lie opposite each other and are not intended for the film takeoffs 8 to act on in each case have two outwardly directed bends 35, and the two other walls are likewise double-bent in each case, in order to form two pipe segments 30, 31 of the filling pipe 6 that are opposite and parallel to each other, in the transporting direction 10 and on which the film takeoffs 8 act.

In the case of a second exemplary embodiment (FIGS. 3 to 6), the pipe segments 30, 31 extend entirely over opposite walls 36. The two outer walls have either an outwardly facing arc 33 (FIGS. 3 to 5) or an outwardly directed bend 34, in order to achieve an identical air stream between the group of items 23, which comprises only one item 18, and the inner surface 25 of the filling pipe 6.

All the exemplary embodiments share the common feature that the edge 24 (FIG. 7) can bend upward during the free fall, provided that the air resistance at one point of the edge is relatively great. Moreover, three items 18 may also form a group of items 23.

1. A vertical tubular bag machine (1) with a web of film (3) unwound from a supply roll (2), a shaping shoulder (4) for shaping the web of film (3) into a film tube (5), a vertically aligned filling pipe (6), which receives the film tube (5) and through which it is possible to fill the film tube (5), a filling station (7), above the filling pipe (6), two film takeoffs (8), acting from opposite sides of the filling pipe against the film tube (5), and consequently against the filling pipe (6), for further transportation of the web of film (3) and the film tube (5), a longitudinal scaling device (9) for welding the film tube (5) by means of a longitudinal seam.
(11), aligned in the transporting direction (10), a transverse sealing device (12) with two welding jaws (13), which can be moved toward each other and weld the film tube (5) transversely, for producing top seams (14) and bottom seams (15) of tubular bags (16) and also a cutting device (17) for severing the tubular bags (16) from the film tube (5), wherein the filling station (7) is intended for delivering in each case a horizontally aligned flat, preferably disk-shaped group of items (23) formed by one or more items (18), wherein the filling pipe (6) is adapted with respect to its cross section to the horizontal dimensions of the group of items (23), the width (19) and the depth (20) of the filling pipe (6) being made to match the width (21) and the depth (22) of a group of items (23) and the group of items (23) being placed above the filling pipe (6) in such a way that a first equal spacing (26) in the direction of the width (19) and similarly a second equal spacing (27) in the direction of the depth (20) of the filling pipe (6) is provided on opposite sides of the group of items (23), in each case between the outer edge (24) of the group of items (23) and the inner surface (25) of the filling pipe (6), wherein these spacings (26, 27) do not all have the value zero, wherein the filling pipe (6) has a cross section that is symmetrical to axes of symmetry (28, 29) of the group of items (23), and wherein two pipe segments (30, 31) of the filling pipe (6) that are opposite and parallel to each other, extend in the transporting direction (10) and on which the film takeoffs (8) act are provided.

2. The tubular bag machine as claimed in claim 1, wherein the spacings (26, 27) have a value between zero and 10 mm.

3. The tubular bag machine as claimed in claim 1, wherein walls (32) of the filling pipe (6) that lie opposite one another and are not intended for the film takeoffs (8) to act on have an outwardly facing arc (33), an outwardly directed bend (34) or at least two outwardly directed bends (35).

4. The tubular bag machine as claimed in claim 3, wherein the pipe segments (30, 31) extend entirely over opposite walls (36).

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