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(54) **FILLING HOPPER FOR A FILLING APPARATUS FOR MULTI-SEGMENT TRAYS**

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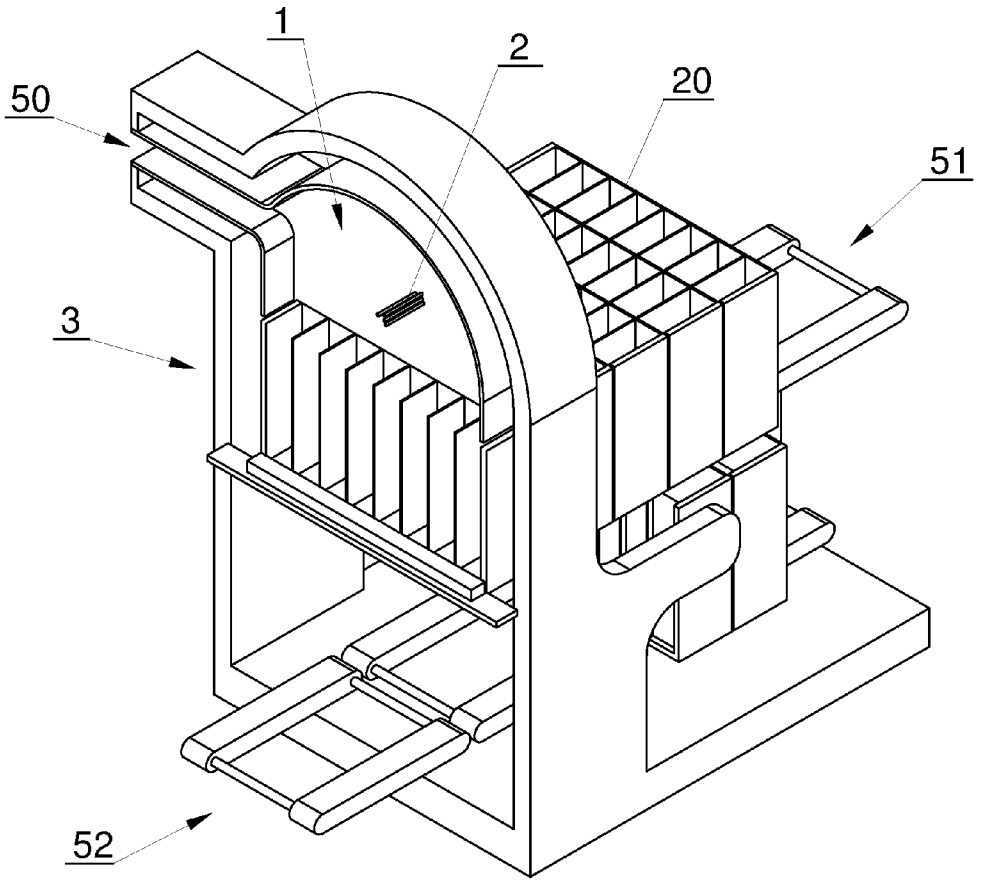
(57) **ABSTRACT**

The object of the application is a filling hopper for a filling apparatus for multi-segment trays in the tobacco industry with a receiving region for rod like articles in the form of a mass flow and a storing region for rod like articles comprising side walls (**8**, **9**) and a bottom wall (**10**), whereas the storing region has double partition walls (**16**) alternately forming a plurality of parallel cavities (**15**) and slots (**14**), where the partition walls (**16**) extend in principle along the entire height of the storing region. The partition walls (**16**) are connected with each other by means of a carrying framework so that at least from one side free access to the articles inside the cavities (**15**) is maintained. The carrying framework comprises at least one fastening area (**19**).



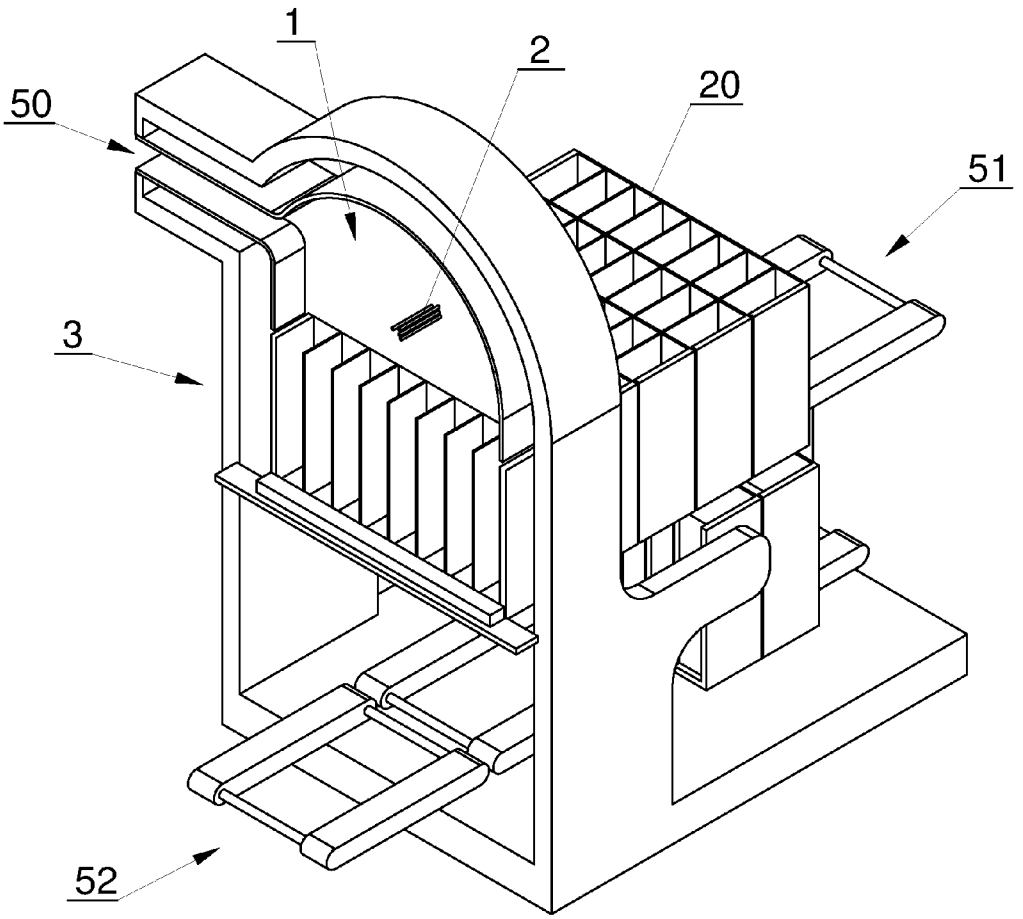


Fig. 1

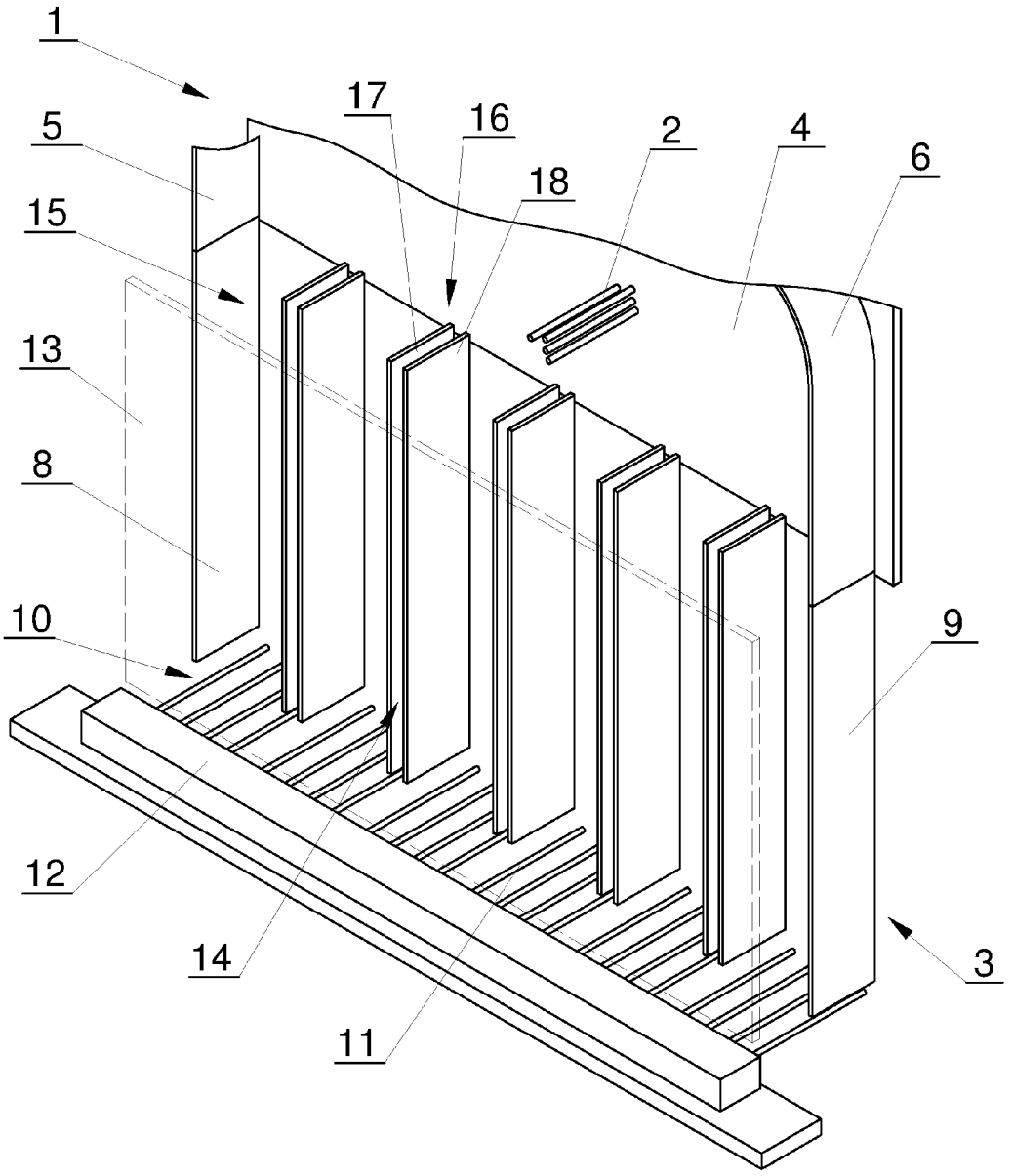


Fig. 2

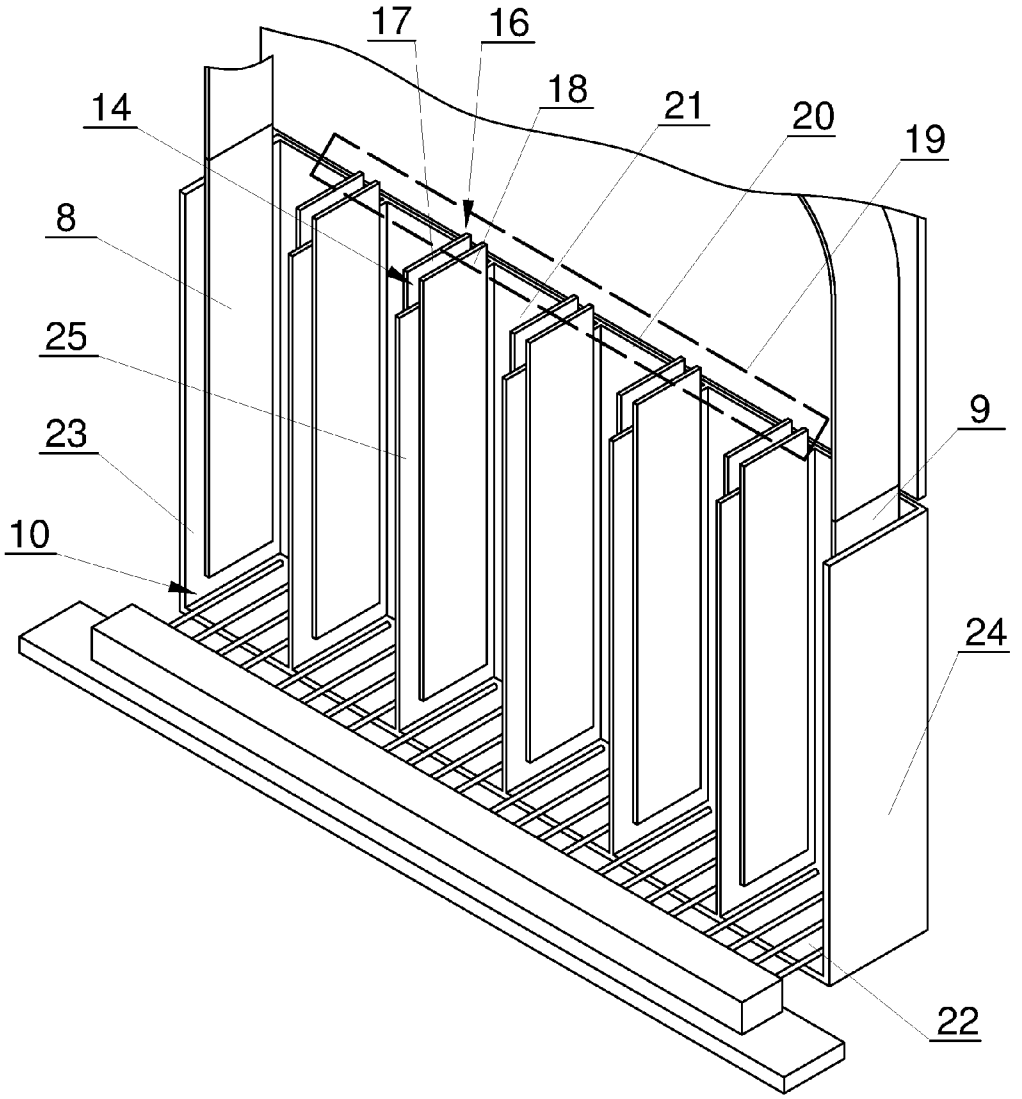


Fig. 3

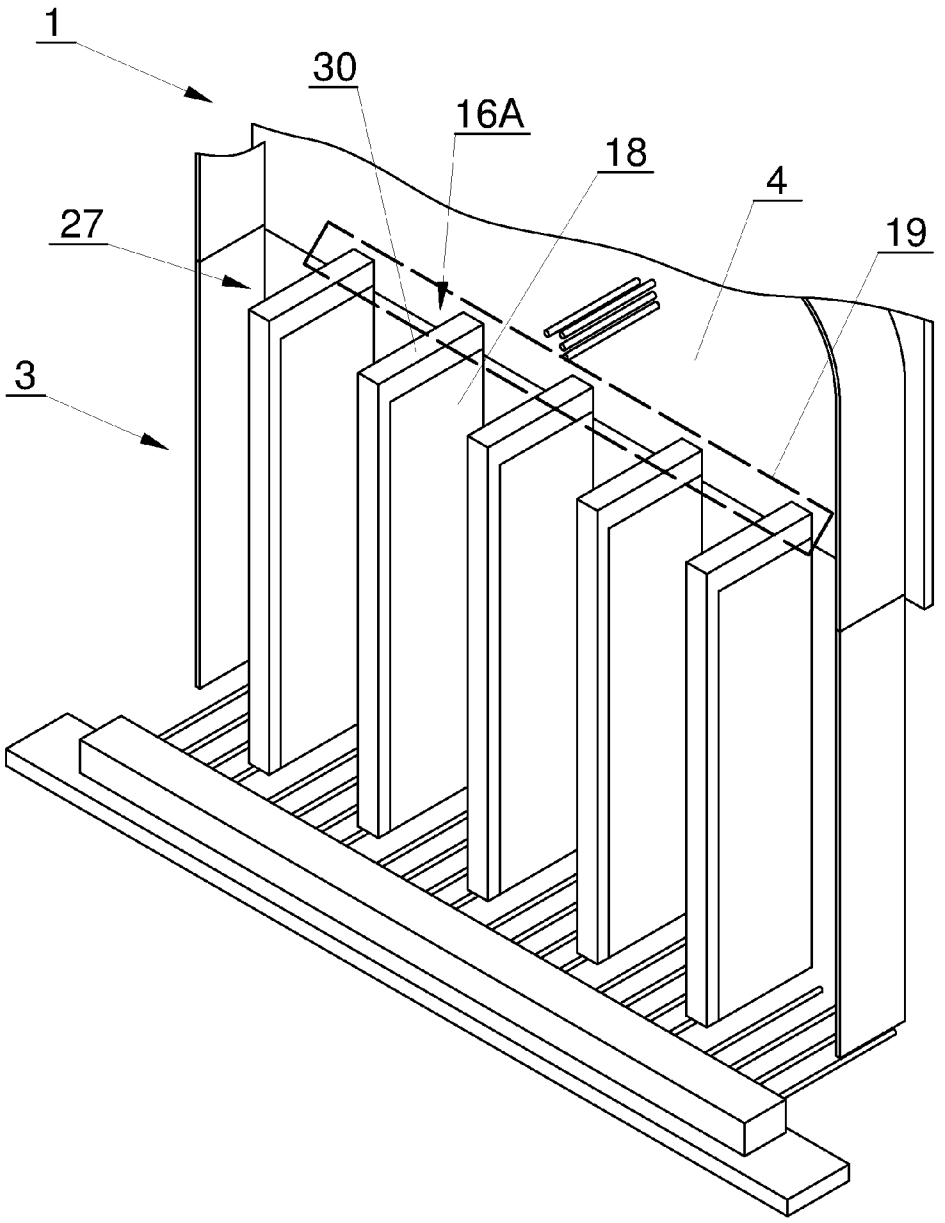


Fig. 4

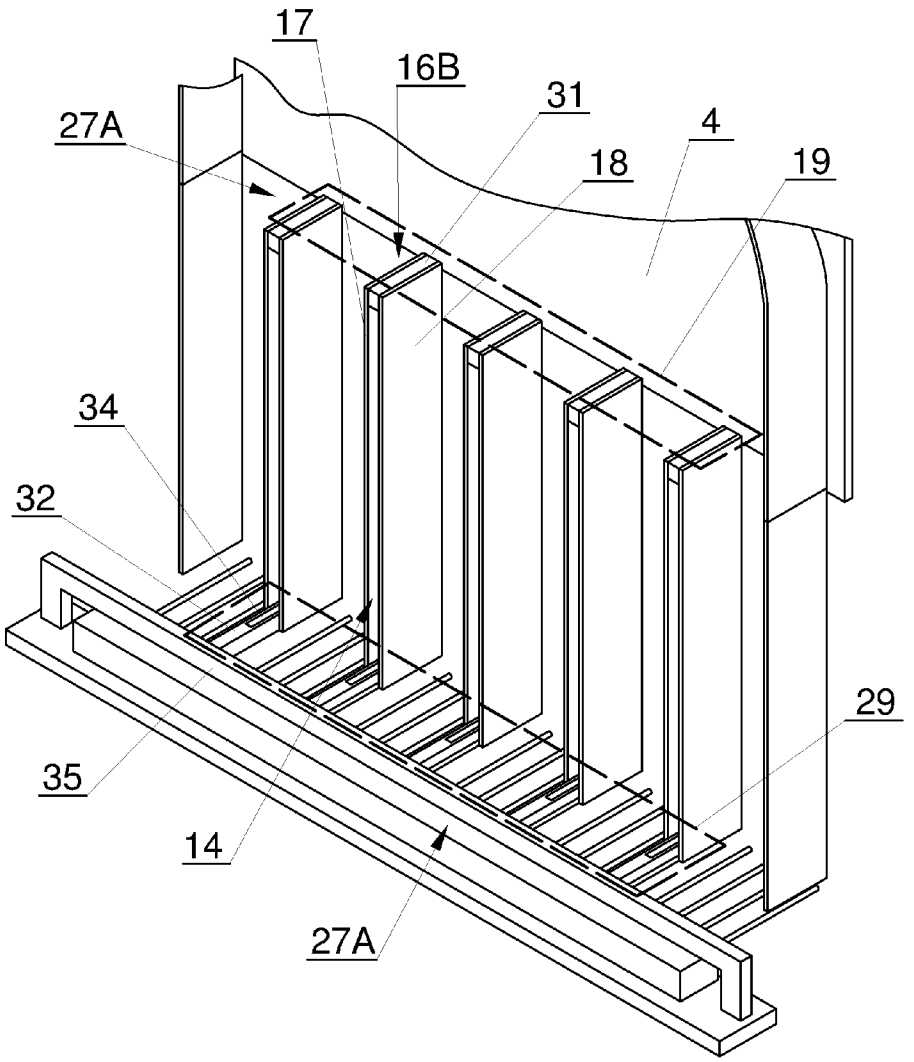


Fig. 5

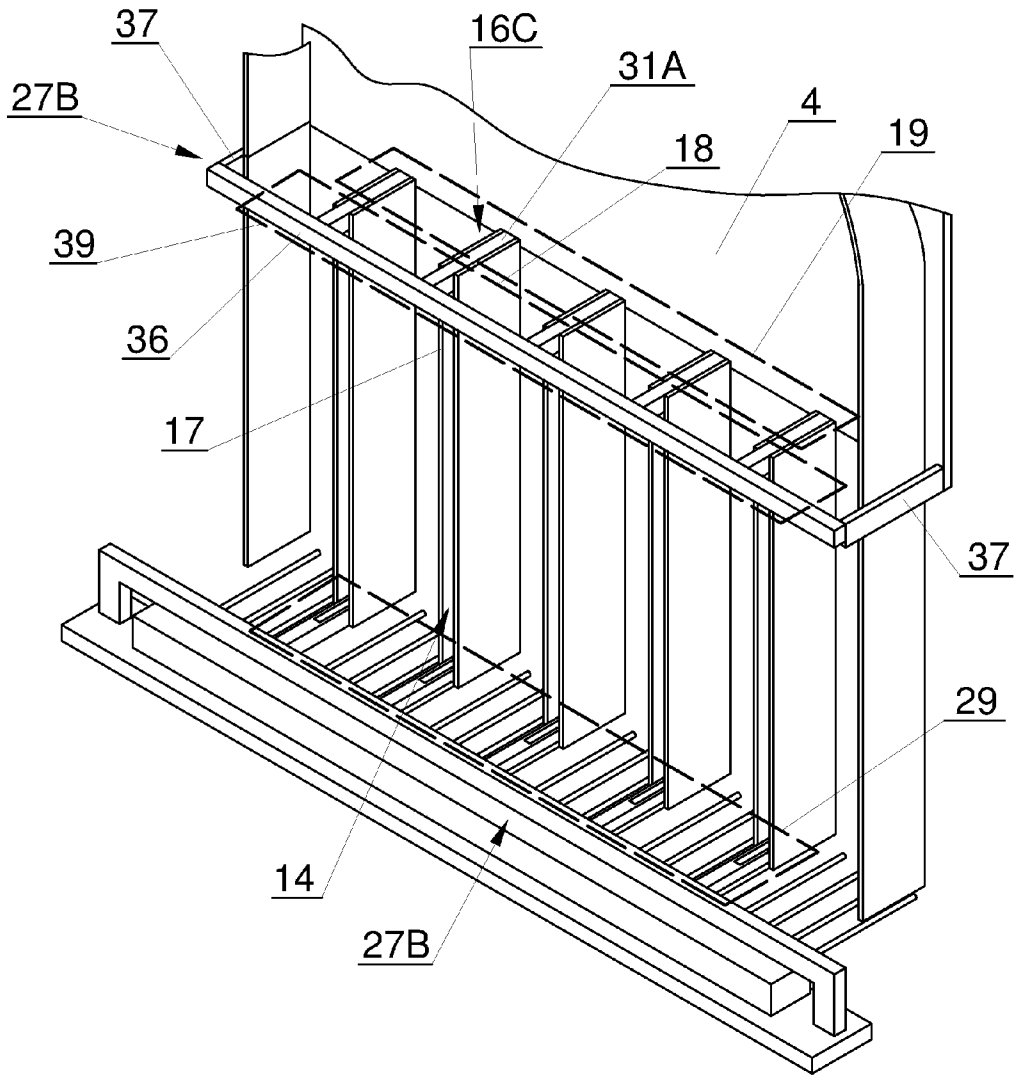


Fig. 6

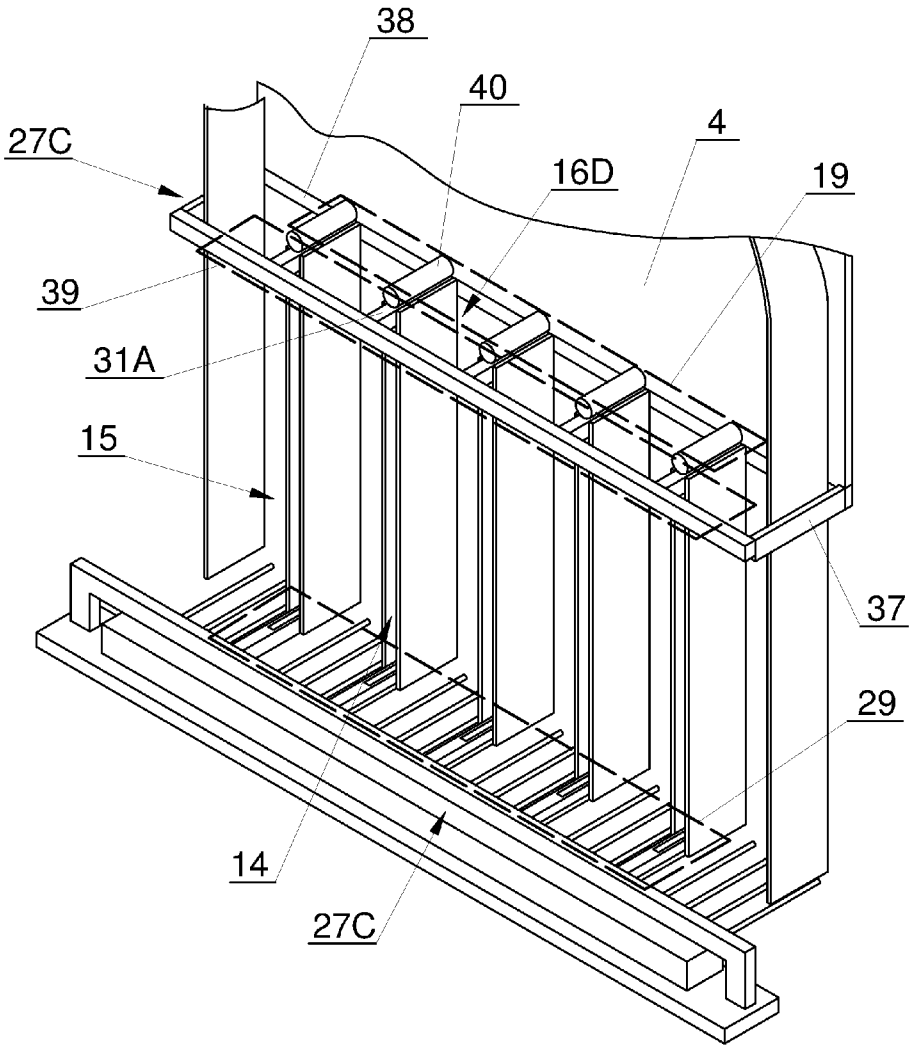


Fig. 7

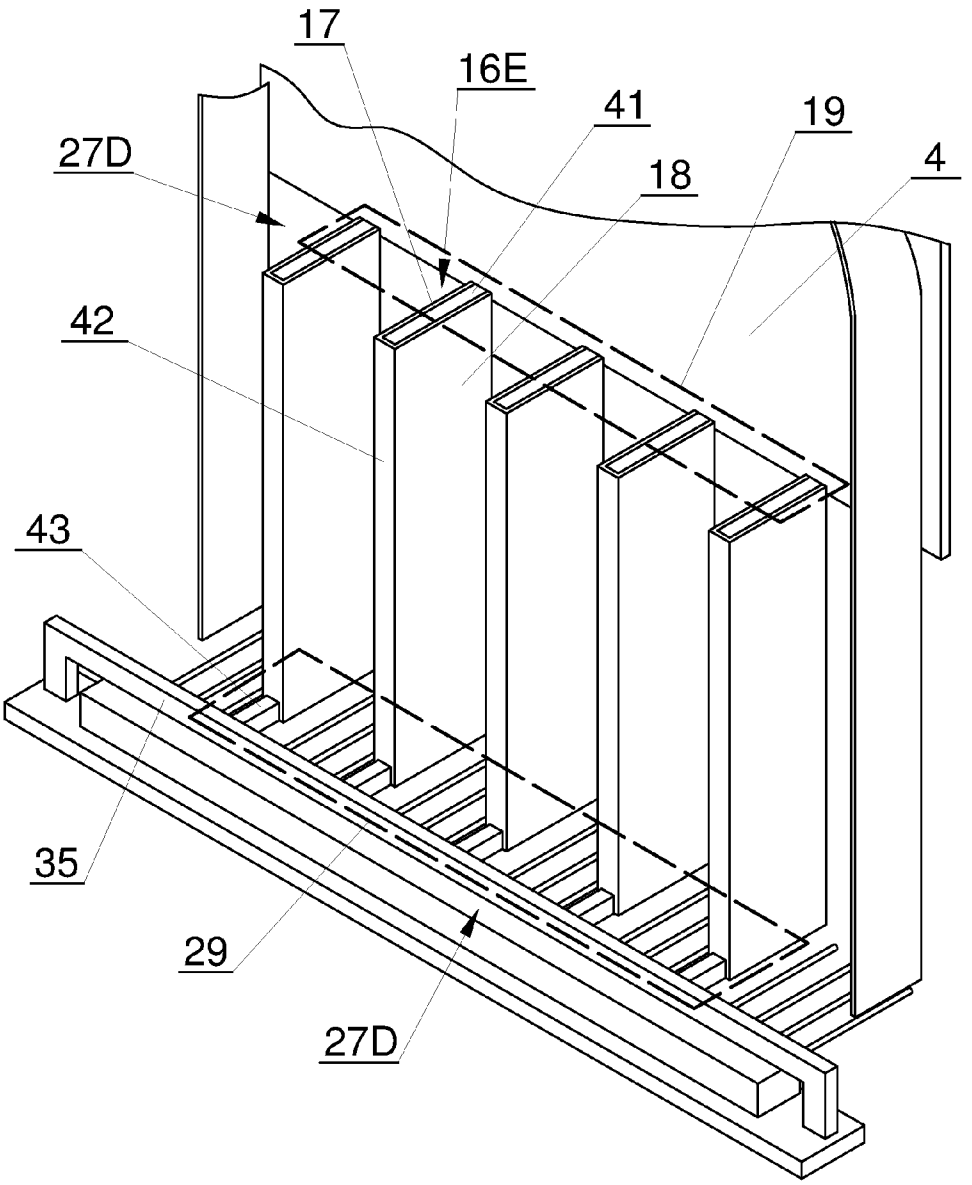


Fig. 8

FILLING HOPPER FOR A FILLING APPARATUS FOR MULTI-SEGMENT TRAYS

[0001] The object of the application is a filling hopper for a filling apparatus for multi-segment trays in the tobacco industry.

[0002] In the tobacco industry, filling apparatuses for multi-segment trays are used in which filter rods, cigarettes, cigarillos or other tobacco industry products, hereinafter referred to as rod like articles, are temporarily stored, for example in storages or for the transport between the manufacturing machines. Such articles are most frequently conveyed between the machines in the form of a mass flow where the articles are arranged principally parallel to each other, perpendicular to the direction of movement of the flow. However, it happens that in the mass flow of rod like articles incorrectly arranged articles or fragments thereof move, most frequently on the side invisible to the operator, along rear stationary plates guiding the flow and for that reason are not removed from the flow. Such incorrectly arranged articles, in the course of filling in the filling apparatus of the tray, are fed thereinto from the side of the rear wall and remain there until the moment when the tray is emptied. Hereinafter the filling apparatus for multi-segment trays will be also referred to as a multi-segment tray filler or a tray filler.

[0003] The problem to be solved by this invention is to develop a filling hopper for the tray filler which ensures that incorrectly arranged articles or fragments thereof moving together with the mass flow supplied to the tray filler are not fed into the tray.

[0004] The object of the invention is a filling hopper for a filling apparatus for multi-segment trays in the tobacco industry comprising a receiving region for rod like articles in the form of a mass flow and a storing region for rod like articles which comprises side walls and a bottom wall. The storing region has double partition walls alternately forming a plurality of parallel cavities and slots, where the partition walls principally extend along the entire height of the storing region.

[0005] The partition walls are connected with each other by means of a carrying framework so that at least from one side free access to the articles inside the cavities is maintained.

[0006] Preferably a filling hopper according to the invention is characterised in that the partition walls are connected with each other by means of a carrying framework so that from both sides free access to the articles inside the cavities is obtained.

[0007] Preferably a filling hopper according to the invention is characterized by additionally comprising a front wall, where the partition walls are connected with each other by means of a carrying framework so that free access from behind to the articles inside the cavities is obtained.

[0008] Preferably a filling hopper according to the invention is characterised in that the width of the partition walls is smaller than the depth of the storing region.

[0009] Preferably a filling hopper according to the invention is characterised in that the carrying framework comprises at least one fastening area, preferably two or three fastening areas.

[0010] Preferably a filing hopper according to the invention is characterised in that the bottom wall is a filling unit.

[0011] The proposed solution ensures that incorrectly arranged rod like articles situated at the back of the mass flow, after passing through the receiving region of the filling hopper are not held on the side of the rear wall of the tray being filled, are detached from correctly arranged articles and fall outside the tray. Through the framework shape of the filling hopper according to the invention the observation of the process of movement of the articles in the cavities of the storing region from behind of the machine is possible, which in the known tray fillers was heretofore impossible. In addition, the walls of the tray after feeding it in the filling position will be visible from the front of the machine, which was either heretofore impossible.

[0012] The object of the invention has been shown in a preferred embodiment in a drawing in which:

[0013] FIG. **1** shows a filling apparatus for multi-segment trays with rod like articles, with a hopper according to the invention;

[0014] FIG. **2** shows in simplified view a fragment of the front part of a filling hopper of a tray filler according to the invention;

[0015] FIG. **3** shows in simplified view a filling hopper together with a tray situated in the filling position;

[0016] FIG. **4** shows a filling hopper according to the invention in another embodiment;

[0017] FIG. **5** shows a filling hopper according to the invention in another embodiment,

[0018] FIG. **6** shows a filling hopper according to the invention in another embodiment being a modification of the embodiment of FIG. **5**;

[0019] FIG. **7** shows a filling hopper according to the invention in another embodiment;

[0020] FIG. **8** shows a filling hopper according to the invention in another embodiment.

[0021] FIG. **1** shows a filling apparatus for multi-segment trays with rod like articles provided with a filling hopper comprising a receiving region **1** for articles **2** in the form of a mass flow **50** and a storing region **3** from which the articles are fed to trays **20**. The trays **20** are fed to the filling hopper along a conveyor for empty trays **51** disposed on the rear side of the apparatus, whereas full trays are conveyed along a conveyor for full trays **52**, whereas full trays can be collected from the front or from behind of the apparatus.

[0022] FIG. **2** shows in simplified view a fragment of the front part of a filling hopper of a tray filler, namely the bottom part of a receiving region **1** for rod like articles **2** and a storing region **3** to which the rod like articles are conveyed from the receiving region **1**. The rod like articles **2** are stored in the storing region **3** in the form of multiple columns. The receiving region **1** is limited by a rear plate **4**, a not shown front plate and side walls **5** and **6** which can take different shapes, for example can be rectilinear or arched. The receiving region **1** is joined with its bottom part with the storing region **3**. The storing region **3** is limited by side walls **8** and **9** and a bottom wall **10** formed by working elements **11** of a filling unit **12**, optionally it can be also limited by a front wall **13** marked with a broken line, for example in the form of a door. The region **3** is divided into a plurality of cavities **15**, whereas the cavities **15** are separated from each other by double partition walls **16** comprising single plates **17** and **18** forming slots **14**. The partition walls **16** extend in principle along the entire height of the storing region **3** and can be fastened to the bottom edge of the rear plate **4** limiting the receiving region **1**. It should be noted that the storing region does not have a rear wall. The operator is provided with access to the articles in the cavities **15** both from behind and from the front of the filling hopper if the storing region **3** is not provided with a front wall **13**, or only from behind if the storing region **3** is provided with

a front wall **13**. The width of the partition walls **16** is smaller than the depth of the storing region **3** defined as the distance between the bottom edge of the plate **4** and the front wall **13**.

[0023] FIG. **3** shows in simplified view a filling hopper together with a tray **20**, disposed in the filling position, provided with a rear wall **21**, a bottom wall **22**, side walls **23** and **24** and a plurality of partition walls **25**. In the filling position the side walls **23** and **24** comprise walls **8** and **9** limiting a storing region **3**, the bottom wall **22** is situated below a wall **10**, the rear wall **21** of the tray is situated below a wall **4**, whereas the partition walls **25** of the tray are inserted inside the partition walls **16**, into slots **14** between plates **17** and **18**. The plates **17** and **18** are fastened to the wall **4** in the fastening area **19**.

[0024] FIG. **4** shows a filling hopper in which the partition walls **16**A are provided with angle brackets **30** fastened to a plate **4**, where the said brackets connect the plates **17** and **18** along the upper and front edges, whereas the bottom edges of the plates **17** and **18** are not supported. The brackets **30** together with the bottom edge of the plate **4** form a carrying framework **27** connecting the partition walls **16**A, whereas the brackets **30** are fastened in a fastening area **19** of the walls **16**A extending along the bottom edge of the plate **4**.

[0025] FIG. **5** shows a filling hopper in which the partition walls **16**B are fastened to brackets **31** belonging to the upper part of the carrying framework **27**A. The brackets **31** fastened to a plate **4** connect the top ends of the plates **17** and **18** of individual partition walls **16**B in the fastening area **19**. On the other hand, the bottom ends of the plates **17** and **18** are fastened to brackets **32** belonging to the bottom part of the framework **27**A in the fastening area **29** of the walls **16**B. In the brackets **32** the sections **34** are formed into which the partition walls **25** of the trays **20** are inserted. The brackets **32** for individual partition walls **16**B of the storing region **3** are fastened to a bracket **35**, joining the walls **16**B, belonging to the bottom part of the framework **27**A, disposed on the frame of the machine. The partition walls **25** of the tray **20** after inserting into the slots **14** between the plates **17** and **18** are visible for the operator. The embodiment shown in FIG. **6** is a modification of the embodiment of FIG. **5**. The walls **16**C are fastened by means of brackets **31**A, belonging to the upper part of the framework, longer than the brackets **31**, whereas the brackets **31**A are joined by means of a beam **36** disposed in the fastening area **39** of the walls **16**C, whereas the beam **36** joining individual walls **16**C is fastened to the frame of the machine or through the brackets **37** to the plate **4**. In this embodiment the plates **17** and **18** of the partition walls **16**C are fastened in three fastening areas **19**, **29** and **39**. In the embodiment shown in FIG. **7** the partition walls **16**D are fastened to a beam **38** by means of the brackets **31**A and **37** belonging together with the beam **38** to the upper part of the carrying framework **27**C, in the fastening area both **19** and **29**, whereas the beam **38** is disposed below the plate **4** and fastened to the bottom edge of the plate **4** or to the frame of the machine. The fastening areas **19**, **29** and **39** in FIG. **7** run in principle as in FIG. **6**, the bottom part of the carrying framework **27**C is shaped similar to **27**B. Above the partition walls **16**D rotary elements **40** supporting the insertion of rod like articles **2** into the cavities **15** are disposed.

[0026] FIG. **8** shows another embodiment where the top ends of the walls **17** and **18** belonging to the wall **16**E are fastened through brackets **41** to the bottom edge of the plate **4**, whereas the walls **17** and **18** are connected with each other by means of a front element **42**. The bottom ends of the walls **17** and **18** are fastened to a bracket **43** attached to the frame of the machine or the bracket **35**. The walls **17** and **18** are fastened to the carrying framework **27**D in two fastening areas **19** and **29**. The embodiment shown in FIG. **9** is a modification of the embodiment of FIG. **8** where the top ends of the plates **17** and **18** of the walls **16**F are joined by means of a roof **44** for the separation of rod like articles **2** before the entry into the cavities **15**.

[0027] In each of the described embodiments, at the moment of feeding an empty tray **20** for filling, the rod like articles **2** collected in the cavities **15** of the storing area **3** are not limited from behind by any element. If next to the rod like articles **2** collected in the cavities **15** principally parallel to each other incorrectly arranged articles disposed perpendicular to the other articles, in the area below the plate, were situated then before feeding the tray **20** for filling they would fall down, but not into the tray. In the area beneath the storing region **3** a suitable container for falling articles can be provided. When feeding an empty tray for filling, the articles **2** in the cavities **15** do not move, thus in the course of feeding an empty tray **20** to the filling position there is no risk that incorrectly arranged elements fall into the tray. When filling the tray **20** the rear wall **21** of the tray **20** adheres to the articles **2** in the cavities **15** of the storing region **3** and when moving the tray **20** downward in the course of the filling, incorrectly arranged articles, which can appear in the flow of the articles **2** downward in the area uncovered from behind between the plate **4** and the tray **20**, will fall not inside but outside the tray.

[0028] The carrying framework in terms of this application is not a fragment of the apparatus which can be separated from other units of the apparatus as a compact subassembly. The carrying framework being a space structure can consist for example of two parts or of more parts comprising a plurality of elements attached to the frame of the apparatus. Presented structures of carrying frameworks do not exhaust possible spatial combinations of the partition walls, but are only non-limiting embodiments of a hopper according to the invention. It should be noted, however, that a feature of the carrying framework is the absence of a rear wall.

[0029] The partition walls, carrying frameworks and other elements of the receiving and storing region presented above have been shown in a simplified view without structural details and without typical joining elements.

1-6. (canceled)

7. A filling hopper for a filling apparatus for multi-segment trays (**20**) in the tobacco industry

with a receiving region (**1**) for rod like articles (**2**) in the form of a mass flow (**50**) and

with a storing region (**3**) for rod like articles (**2**) comprising side walls (**8**, **9**) and a bottom wall (**10**), whereas

the storing region (**3**) has double partition walls (**16**, **16**A, **16**B, **16**C, **16**D, **16**E, **16**F) alternately forming a plurality of parallel cavities (**15**) and slots (**14**), where the partition walls (**16**, **16**A, **16**B, **16**C, **16**D, **16**E, **16**F) extend in principle along the entire height of the storing region (**3**),

wherein the partition walls (**16**, **16**A, **16**B, **16**C, **16**D, **16**E, **16**F) are connected with each other by means of a carrying framework (**27**, **27**A, **27**B, **27**C, **27**D, **27**E) so that at least from one side free access to the rod like articles (**2**) inside the cavities (**15**) is maintained.

8. The hopper as in claim **7**, wherein the partition walls (**16**, **16**A, **16**B, **16**C, **16**D, **16**E, **16**F) are connected with each other by means of a carrying framework (**27**, **27**A, **27**B, **27**C, **27**D,

27E) so that from both sides free access to the rod like articles (2) inside the cavities (15) is obtained.

9. The hopper as in claim 7, wherein it additionally comprises a front wall (13), where the partition walls (16, 16A, 16B, 16C, 16D, 16E, 16F) are connected with each other by means of a carrying framework (27, 27A, 27B, 27C, 27D, 27E) so that free access from behind to the rod like articles (2) inside the cavities (15) is obtained.

10. The hopper according to claim 7, wherein the width of the partition walls (16, 16A, 16B, 16C, 16D, 16E, 16F) is smaller than the depth of the storing region (3).

11. The hopper according to claim 7, wherein the carrying framework (27, 27A, 27B, 27C, 27D, 27E) comprises at least one fastening area (19), preferably two or three fastening areas (19, 29, 39).

12. The hopper according to claim 7, wherein the bottom wall (10) is a filling unit (12).

* * * * *