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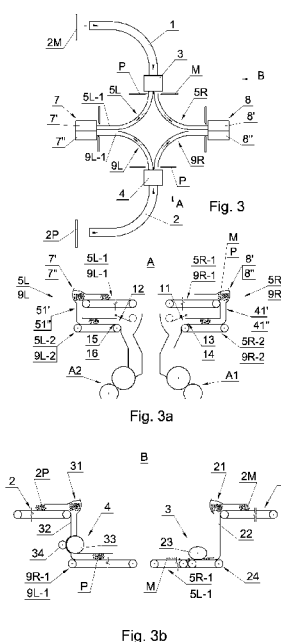
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(54) Title: CONVEYOR SYSTEM FOR CONVEYING PAPER STRAWS AND PRODUCTION LINE FOR MANUFACTURING PAPER STRAWS



(57) Abstract: The object of the application is a conveyor system for conveying paper straws of first and second type for assembling telescopic straws (T) comprising a first conveyor (1) for conveying double-length straws of the first type (2M), a second conveyor (2) for conveying double-length straws of the second type (2P), a first cutting unit (3) for cutting the double-length straws of the first type (2M) into single-length straws of the first type (M), a second cutting unit (4) for cutting the double-length straws of the second type (2P) into singlelength straws of the second type (P), a third conveyor (5R) and a fourth conveyor (5L) for conveying the single-length straws of the first type (M), a fifth conveyor (9R) and a sixth conveyor (9L) for conveying the single-length straws of the second type (P). The system has two outlets (11, 12), whereas the first outlet (11) of the conveyor system comprises an outlet (13) of the third conveyor (5R) for conveying the singlelength straws of the first type (M) and an outlet (14) of the fifth conveyor (9R) for conveying the single-length straws of the second type (P), and the second outlet (12) of the conveyor system comprises an outlet (15) of the fourth conveyor (5L) for conveying the single-length straws of the first type (M) and an outlet (16) of the sixth conveyor (9L) for conveying the single-length straws of the second type (P), the conveyors of the system being arranged so that at the outlets (11, 12, 13, 14, 15, 16) of the conveyor system the single-length straws of the first type (M) face, with their ends formed after cutting to the single length, the single-length straws of the second type (P). The object of the application is also a production line for manufacturing the telescopic paper straws (T).

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Conveyor system for conveying paper straws and production line  
for manufacturing paper straws

5 An object of the invention is a conveyor system for conveying paper straws of first and second type for assembling telescopic straws, and a production line for manufacturing telescopic paper straws.

The invention belongs to the field of apparatuses for conveying paper straws being components for assembling biodegradable telescopic drinking straws, for example made of paper.

10 There are various types of paper drinking straws, including one-piece straws, two-piece straws, straight straws and flexible bendable straws. The present invention relates to the conveying of individual parts of two-piece drinking straws, before they are assembled into telescopic straws. The two-piece drinking straws, also known as telescopic straws, have in their structure a locking latch which allows the two parts of the straws to be joined together in such a way that when one inner part of the straw is inserted into the other outer part of the straw, a tight connection is provided. In addition, this type of connection makes it possible to slide the inner part of the straw inside the outer part, thus to shorten the total length of the straw, for  
15 example in order to pack it in a foil. Such telescopic straws may be unfolded to their original size after unwrapping the foil, just before drinking. By means of a conveying system, the individual parts of the telescopic straw, i.e. the inner part and the outer part, are conveyed to an apparatus for assembling the telescopic straws where they are assembled into telescopic straws.

20 From the document EP3295810, tobacco industry filter conveyors on which double-length filters are cut to a single length are known. Such conveyors have the form of a drum conveyor system and form part of a tobacco filter manufacturing apparatus.

In the document US2407760, there was disclosed a system for conveying straws being components of a telescopic straw, comprising a conveying device using a chain conveyor with lugs that pick up individual straws. The system uses storage containers and guides the individual straws perpendicular to the conveyor  
25 chain.

The problem to be solved by the present invention is to provide a conveyor system for conveying telescopic paper straws, characterised by spatial compactness allowing it to be easily combined with existing apparatuses for assembling telescopic straws in various configurations.

The object of the invention is a conveyor system for conveying paper straws of the first and second types for assembling telescopic straws, comprising a first conveyor for conveying double-length straws of the first type, a second conveyor for conveying double-length straws of the second type, a first cutting unit for cutting the double-length straws of the first type into single-length straws of the first type, and a second cutting unit  
5 for cutting the double-length straws of the second type into single-length straws of the second type. The conveyor system according to the invention further comprises a third conveyor and a fourth conveyor for conveying the single-length straws of the first type, and a fifth conveyor and a sixth conveyor for conveying the single-length straws of the second type. Furthermore, the system according to the invention has two outlets, whereas a first outlet of the conveying system comprises an outlet of the third conveyor for conveying  
10 the single-length straws of the first type and an outlet of the fifth conveyor for conveying the single-length straws of the second type, and a second outlet of the conveying system comprises an outlet of the fourth conveyor for conveying the single-length straws of the first type and an outlet of the sixth conveyor for conveying the single-length straws of the second type. The conveyors of the system according to the invention are arranged so that at the outlets of the conveying system the single-length straws of the first  
15 type face, with their ends formed after cutting to the single length, the single-length straws of the second type.

The system according to the invention is further characterised in that the third conveyor for conveying the single-length straws of the first type is composed of two parts, whereas between the first part and the second part of the third conveyor there is a storage container for the single-length straws of the first type, and the  
20 fifth conveyor for conveying the single-length straws of the second type is composed of two parts. Furthermore, between the first part and the second part of the fifth conveyor there is a storage container for the single-length straws of the second type, the storage container for the single-length straws of the first type and the storage container for the single-length straws of the second type being adjacent to each other.

The system according to the invention is further characterised in that the first part of the third conveyor is  
25 situated at least partially above the second part of the third conveyor.

The system according to the invention is further characterised in that the fourth conveyor for conveying the single-length straws of the first type is composed of two parts, whereas between the first part and the second part of the fourth conveyor there is provided a storage container for the single-length straws of the first type, and the sixth conveyor for conveying the single-length straws of the second type is composed of two parts.  
30 Furthermore, between the first part and the second part of the sixth conveyor there is provided a storage container for the single-length straws of the second type, the storage container for the single-length straws of the first type and the storage container for the single-length straws of the second type being adjacent to each other.

The system according to the invention is further characterised in that the first part of the fourth conveyor is  
35 situated at least partially above the second part of the fourth conveyor.

The system according to the invention is further characterised in that the second part of the third conveyor and the second part of the fifth conveyor are arranged in parallel.

The system according to the invention is further characterised in that the second part of the fourth conveyor and the second part of the sixth conveyor are arranged in parallel.

40 The system according to the invention is further characterised in that the third conveyor and/or the fourth conveyor for conveying the single-length straws of the first type has an arched section.

The system according to the invention is further characterised in that the fifth conveyor and/or the sixth conveyor for conveying the single-length straws of the second type has an arched section.

5 The system according to the invention is further characterised in that a gravity conveyor channel and a drum conveyor are arranged between the first conveyor of the double-length straws of the first type and the first cutting unit and/or between the second conveyor of the double-length straws of the second type and the second cutting unit.

The system according to the invention is further characterised in that the first cutting unit for cutting the double-length straw of the first type is adapted to cut at an acute angle.

10 The system according to the invention is further characterised in that the second cutting unit for cutting the double-length straw of the second type is adapted to cut at a right angle.

The system according to the invention is further characterised in that the outlet of the third conveyor of the single-length straws of the first type is connected to the outlet of the fifth conveyor of the single-length straws of the first type, and the outlet of the fourth conveyor of the single-length straws of the second type is connected to the outlet of the sixth conveyor of the single-length straws of the second type.

15 The object of the invention is also a production line for manufacturing the telescopic paper straws comprising at least one paper straw manufacturing apparatus and a conveyor system for conveying the paper straws.

20 An advantage of the conveyor system according to the invention is its compactness. The conveyor system according to the invention, due to its spatial compactness, can easily be connected to telescopic paper straw manufacturing apparatuses in various configurations, both horizontal and vertical, as well as to entire telescopic paper straw manufacturing systems located in already existing production buildings. Due to the compactness of the conveyor system according to the invention, it is possible to place it above the telescopic paper straw manufacturing system/apparatus.

The object of the invention was shown in more detail in a preferred embodiment in figures in which:

Fig. 1 shows a single-length straw of the first type and a single-length straw of the second type,

25 Fig. 2 shows a telescopic straw,

Fig. 3 shows a conveyor system in a first embodiment in a top view,

Fig. 3a shows a front view of the conveyor system of Fig. 3,

Fig. 3b shows a side view of the conveyor system of Fig. 3,

Fig. 4 shows the conveyor system in a second embodiment in a top view,

30 Fig. 4a shows a front view of the conveyor system of Fig. 4,

Fig. 5 shows the conveyor system in a third embodiment in a top view,

Fig. 6 shows the conveyor system in a fourth embodiment in a top view, and

Fig. 7 shows the conveyor system in a fifth embodiment in a top view.

35 The conveyor system according to the invention is adapted to convey straws of two types. The telescopic straw T (Fig. 2) is composed of an inner straw M and an outer straw P (Fig. 1). The inner straw M of the

telescopic straw T will also be referred to in the description as a single-length straw of the first type M, the outer straw P of the telescopic straw T will also be referred to in the description as a single-length straw of the second type P. Preferably, the inner straw M has a smaller diameter than the outer straw P. The conveyor system is supplied with double-length straws of the first type 2M, whereas two single-length straws of the first type M are formed by cutting one double-length straw of the first type 2M. Double-length straws of the second type 2P are supplied in a similar way, whereas from one double-length straw of the second type 2P two single-length straws of the second type P are formed by cutting. A first inlet conveyor 1 is supplied with the double-length straws of the first type 2M, a second inlet conveyor 2 is supplied with the double-length straws of the second type 2P. The conveyor system is adapted to convey the double-length straws 2M, 2P and to cut such straws and convey the single-length straws M, P.

Fig.3, Fig.3a and Fig.3b show the conveyor system in the same first embodiment in top, front and side views, respectively. The first conveyor 1 supplies the double-length straws of the first type 2M to a cutting unit 3 for cutting the double-length straws of the first type 2M into the single-length straws of the first type M. The second conveyor 2 supplies the double-length straws of the second type 2P to a cutting unit 4 for cutting the double-length straws of the second type 2P into the single-length straws of the second type P (Fig.3). Preferably, the cutting unit 3 may perform the cutting at an acute angle to the axis of the straw, and the cutting unit 4 may perform the cutting at a right angle to the axis of the straw. The conveyor system shown in Fig. 3 is provided with the first conveyor adapted to supply the double-length straws of the first type 2M in the form of a multilayer stream and with the second conveyor 2 adapted to supply the double-length straws of the second type 2P also in the form of a multilayer stream (Fig.3b). After cutting, the stream of the single-length straws of the first type M is distributed to two conveyors, respectively a third conveyor 5R and a fourth conveyor 5L. Similarly, the stream of the single-length straws of the second type P, after cutting, is distributed to a fifth conveyor 9R and a sixth conveyor 9L. The stream of the single-length straws of the first type M and the stream of the single-length straws of the second type P move next to each other so that the conveying system has two main outlets 11 and 12, with a combination of the single-length straws of the first type M and the single-length straws of the second type P being transported away from each outlet in the form of adjacent streams. The conveyors of the system are arranged such that at the outlets 11, 12, 13, 14, 15, 16 the ends of the single-length straws of the first type M formed after cutting to the single length face the single-length straws of the second type P. The outlet 11 of the conveyor system comprises two outlets, i.e. the outlet 13 of the first conveyor 5R for conveying the single-length straws of the first type M and the outlet 14 of the fifth conveyor 9R for conveying the single-length straws of the second type P. Respectively, the outlet 12 of the conveyor system comprises the outlet 15 of the fourth conveyor 5L for conveying the single-length straws of the first type M and the outlet 16 of the sixth conveyor 9L for conveying the single-length straws of the second type P (Fig. 3a).

Detailed features of the conveyor system according to the first embodiment are shown in Fig. 3a and Fig. 3b. According to the first embodiment of the conveyor system, at the end of the first conveyor 1 there is arranged a storage container 21 (Fig. 3b) to which a gravity channel 22 is attached. The gravity channel 22 is used to supply the straws of the first type to the first cutting unit 3 provided with a circular knife 23 and a conveyor 24. Preferably, the circular knife 23 is adapted to oblique cutting of the double-length straws of the first type 2M. The double-length straws of the first type 2M are cut into the single-length straws M. The single-length straws of the first type M formed after cutting are conveyed by means of the third conveyor 5R and the fourth conveyor 5L (Fig. 3). In the embodiment shown, the third conveyor 5R is embodied as a two-part conveyor, comprising a first part 5R-1 and a second part 5R-2. The fourth conveyor 5L for conveying the single-length straws of the first type M is also embodied as a two-part conveyor, comprising a first part 5L-1 and a second part 5L-2 (Fig. 3a). In Fig. 3b, the first part 5R-1 of the third conveyor 5R is in the foreground, the first part 5L-1 of the fourth conveyor 5L is not visible. As shown in Fig. 3b, at the end of the

second conveyor 2 there is arranged a storage container 31 to which a gravity channel 32 is attached, The gravity channel 32 is used to supply the straws of the first type to the second cutting unit 4 provided with a drum conveyor 33 and a circular knife 34. The drum conveyor 33 may also be used in the gravity channel 22 to form a single-layer flow of the double-length straws of the first type 2M on the conveyor 24. The double-length straws of the second type 2P are cut, preferably at a right angle, into single-length straws. The single-length straws of the second type P formed after cutting are conveyed by means of a fifth conveyor 9R and a sixth conveyor 9L. In the embodiment shown, the fifth conveyor 9R is embodied as a two-part conveyor, comprising a first part 9R-1 and a second part 9R-2. The sixth conveyor 9L for conveying the single-length straws of the second type P is also embodied as a two-part conveyor, comprising a first part 9L-1 and a second part 9L-2. In Fig. 3b, the first part 9R-1 of the fifth conveyor 9R is in the foreground, the first part 9L-1 of the sixth conveyor 9L is not visible. The second part 5R-2 of the third conveyor 5R and the second part 9R-2 of the fifth conveyor 9R may be arranged in parallel, and also the second part 5L-2 of the fourth conveyor 5L and the second part 9L-2 of the sixth conveyor 9L may be arranged in parallel.

The first part 5R-1 of the third conveyor 5R and the first part 5L-1 of the fourth conveyor 5L are partially embodied as arched. Similarly, the first part 9R-1 of the fifth conveyor 9R and the first part 9L-1 of the sixth conveyor 9L are partially embodied as arched. The aforementioned conveyors may comprise arched sections and linear sections. The first part 5R-1 of the third conveyor 5R supplies the single-length straws of the first type M to a storage container 8'. The first part 9R-1 of the fifth conveyor 9R supplies the single-length straws of the second type P to a storage container 8". The storage container 8' of the single-length straws of the first type M and the storage container 8" of the single-length straws of the second type P are situated adjacent to each other, in Fig. 3a the storage container 8' is in the background and is not visible. Preferably, the storage container 8' is situated between the first part 5R-1 and the second part 5R-2 of the third conveyor 5R, and the storage container 8" is situated between the first part 9R-1 and the second part 9R-2 of the fifth conveyor 9R. The single-length straws of the first type M face, with their ends formed when cutting the double-length straws of the first type 2M, the single-length straws of the second type P. The first part 5L-1 of the fourth conveyor 5L supplies the single-length straws of the first type M to the storage container 7'. The first part 9L-1 of the sixth conveyor 9L supplies the single-length straws of the second type P to the storage container 7'. The storage container 7' of the single-length straws of the first type M and the storage container 7" of the single-length straws of the second type P are situated adjacent to each other. Preferably, the storage container 7' is situated between the first part 5L-1 and the second part 5L-2 of the fourth conveyor 5L, and the storage container 7" is situated between the first part 9L-1 and the second part 9L-2 of the sixth conveyor 9L. Furthermore, the first part 5R-1 of the third conveyor 5R may be situated at least partially above the second part 5R-2 of the third conveyor 5R, while the first part 5L-1 of the fourth conveyor may be situated at least partially above the second part 5L-2 of the fourth conveyor 5L. In Fig. 3a, the storage container 7' is in the background and is not visible. The single-length straws of the first type M face, with their ends formed when cutting the double-length straws of the first type 2M, the single-length straws of the second type P. The second part 5R-2 of the third conveyor 5R is situated below the first part 5R-1 of the third conveyor 5R, and the single-length straws of the first type M are conveyed to the second part 5R-2 through a channel 41'. The second part 5L-2 of the fourth conveyor 5L is situated below the first part 5L-1 of the fourth conveyor 5L, and the single-length straws of the first type M are conveyed to the second part 5L-2 through a channel 41". The second part 9R-2 of the fifth conveyor 9R is situated below the first part 9R-1 of the fifth conveyor 9R, and the single-length straws of the second type P are conveyed to the second part 9R-2 through a channel 51'. The second part 9L-2 of the sixth conveyor 9L is situated below the first part 9L-1 of the sixth conveyor 9L, and the single-length straws of the second type P are conveyed to the second part 9L-2 through a channel 51". The outlet 13 of the second part 5R-2 of the third conveyor 5R and the outlet 14 of the second part 9R-2 of the fifth conveyor 9R are situated adjacent to each other. The outlet 15 of the second part 5L-2 of the fourth conveyor 5L and the outlet 16 of the second part 9L-2 of

the sixth conveyor 9L are situated adjacent to each other. An advantage of the conveyor system according to the first embodiment is the possibility of combining with telescopic paper straw T assembling systems with high capacity, provided with two separate telescopic paper straw T assembling apparatuses A1 and A2, in Fig. 3a, the upper sections of the two apparatuses A1 and A2 are shown.

5 Fig. 4 and Fig. 4a show the conveyor system according to the second embodiment, in top view and front view, respectively. In the conveyor system according to the second embodiment, similarly to the system according to the first embodiment of Fig. 3, Fig. 3a and Fig. 3b, the outlet 13 of the second part 5R-2 of the third conveyor 5R and the outlet 14 of the second part 9R-2 of the fifth conveyor 9R are arranged adjacent to each other. The outlet 15 of the second part 5L-2 of the fourth conveyor 5L and the outlet 16 of the second  
10 part 9L-2 of the sixth conveyor 9L are arranged adjacent to each other. In contrast to the first embodiment, in the second embodiment, the outlets 13 and 15 lead to one buffer storage container 17 for the single-length straws of the first type M which are distributed to two telescopic paper straw T assembling apparatuses A1 and A2. Furthermore, the outlets 14 and 16 lead to one buffer storage container 17' for the single-length straws of the second type P which are also distributed to the two telescopic paper straw T  
15 assembling apparatuses A1 and A2. The buffer storage container 17 is in the background and is not visible in the figure. In the embodiment shown, it is possible to combine the conveyor system with a telescopic paper straw T assembling system comprising two telescopic paper straw T assembling apparatuses, connected by buffers connecting the flows. As a result, it is possible to keep both assembling apparatuses A1 and A2 in operation, even if the inflow of the straws takes place only via conveyors situated on only one  
20 supply side.

In the embodiment shown in Fig. 5 in the third embodiment of the conveyor system, the first conveyor 1 supplying the double-length straws of the first type 2M and the cutting unit 3 for cutting the double-length straws of the first type 2M into the single-length straws of the first type M are arranged parallel to the second  
25 conveyor 2 supplying the double-length straws of the second type 2P and the cutting unit 4 for cutting the double-length straws of the second type 2P into the single-length straws of the second type P. The cut straws of the first type M are conveyed by the third conveyor 5R and the fourth conveyor 5L. The cut straws of the second type P are conveyed by the fifth conveyor 9R and the sixth conveyor 9L. In addition, the main outlet 11 of the conveyor system comprising the outlet 13 of the single-length straws of the first type M and the outlet 14 of the single-length straws of the second type P is situated opposite the main outlet 12 of the  
30 conveyor system comprising the outlet 15 of the single-length straws M of the first type and the outlet 16 of the single-length straws of the second type P. The outlet 11 and the outlet 12 lead to one storage container of the telescopic paper straw T assembling system. An advantage of the system according to the third embodiment is the simple shaping of the system, the third conveyor 5R and the fourth conveyor 5L being shaped as one-piece conveyors. The system may feed a single telescopic straw T assembling apparatus or  
35 two apparatuses arranged next to each other as in previous embodiments.

In the fourth embodiment shown in Fig. 6, similarly to the embodiment shown in Fig. 5, the first conveyor 1 with the cutting unit 3 are arranged parallel to the second conveyor 2 with the cutting unit 4. In addition, the main outlet 11 of the conveyor system comprising the outlet 13 of the single-length straws of the first type M and the outlet 14 of the single-length straws of the second type P is arranged parallel to the main outlet  
40 12 of the conveyor system comprising the outlet 15 of the single-length straws of the first type M and the outlet 16 of the single-length straws of the second type P. According to the fourth embodiment, the outlet 11 and the outlet 12 lead to two separate storage containers of the telescopic paper straw T assembling system in two separate telescopic straw T assembling apparatuses A1, A2. The apparatus A1 is fed with the single-length straws of the first type M supplied by the third conveyor 5R and with the single-length straws of the  
45 second type P supplied by the fifth conveyor 9R. An advantage of the system according to the fourth embodiment is a very simple configuration of the system.

- Fig.7 shows the fifth embodiment of the conveyor system. In this embodiment, the first conveyor 1 supplying the double-length straws of the first type 2M and the cutting unit 3 for cutting the double-length straws of the first type 2M into the single-length straws of the first type M are situated opposite the second conveyor 2 supplying the double-length straws of the second type 2P and the cutting unit 4 for cutting the double-length straws of the second type 2P into the single-length straws of the second type P. In addition, the main outlet 11 of the conveyor system is situated parallel to the main outlet 12 of the conveyor system. The outlet 11 and the outlet 12 lead to two separate storage containers of the telescopic paper straw T assembling system, from which containers two separate telescopic straw T assembling apparatuses A1 and A2 are fed. An advantage of the system according to the third embodiment is also a very simple configuration of the system.
- 10 The conveyor system in any of the embodiments described above may be connected to at least one telescopic paper straw T manufacturing apparatus, for example it may be situated above such apparatus to form together with it a production line for manufacturing telescopic paper straws T.

## Patent claims

1. A conveyor system for conveying paper straws of the first and second types for assembling telescopic straws (T), comprising
  - a first conveyor (1) for conveying double-length straws of the first type (2M),
  - a second conveyor (2) for conveying double-length straws of the second type (2P),
  - a first cutting unit (3) for cutting the double-length straws of the first type (2M) into single-length straws of the first type (M),
  - a second cutting unit (4) for cutting the double-length straws of the second type (2P) into single-length straws of the second type (P),
  - a third conveyor (5R) and a fourth conveyor (5L) for conveying the single-length straws of the first type (M),
  - a fifth conveyor (9R) and a sixth conveyor (9L) for conveying the single-length straws of the second type (P),

the system further has two outlets (11, 12), whereas a first outlet (11) of the conveyor system comprises an outlet (13) of the third conveyor (5R) for conveying the single-length straws of the first type (M) and an outlet (14) of the fifth conveyor (9R) for conveying the single-length straws of the second type (P), and the second outlet (12) of the conveyor system comprises an outlet (15) of the fourth conveyor (5L) for conveying the single-length straws of the first type (M) and an outlet (16) of the sixth conveyor (9L) for conveying the single-length straws of the second type (P),

the conveyors of the system being arranged so that at the outlets (11, 12, 13, 14, 15, 16) of the conveying system the single-length straws of the first type (M) face, with their ends formed after cutting to the single length, the single-length straws of the second type (P).
2. The system as in claim 1 wherein the third conveyor (5R) for conveying the single-length straws of the first type (M) is composed of two parts, whereas between the first part (5R-1) and the second part (5R-2) of the third conveyor (5R) there is a storage container (8') for the single-length straws of the first type (M), and the fifth conveyor (9R) for conveying the single-length straws of the second type (P) is composed of two parts, whereas between the first part (9R-1) and the second part (9R-

- 2) of the fifth conveyor (9R) there is a storage container (8") for the single-length straws of the second type (P), the storage container (8") for the single-length straws of the first type (M) and the storage container (8") for the single-length straws of the second type (P) being adjacent to each other.
3. The system as in claim 2, characterised in that the first part (5R-1) of the third conveyor (5R) is situated at least partially above the second part (5R-2) of the third conveyor (5R).
  4. The system as in claim 2 or 3 wherein the fourth conveyor (5L) for conveying the single-length straws of the first type (M) is composed of two parts, whereas between the first part (5L-1) and the second part (5L-2) of the fourth conveyor (5L) there is provided a storage container (7') for the single-length straws of the first type (M), and the sixth conveyor (9L) for conveying the single-length straws of the second type (P) is composed of two parts, whereas between the first part (9L-1) and the second part (9L-2) of the sixth conveyor (9L) there is provided a storage container (7") for the single-length straws of the second type (P), the storage container (7") for the single-length straws of the first type (M) and the storage container (7") for the single-length straws of the second type (P) being adjacent to each other.
  5. The system as in any of the claims 2 to 4, characterised in that the first part (5L-1) of the fourth conveyor (5L) is situated at least partially above the second part (5L-2) of the fourth conveyor (5L).
  6. The system as in any of the claims 2 to 5, characterized in that the second part (5R-2) of the third conveyor (5R) and the second part (9R-2) of the fifth conveyor (9R) are arranged in parallel.
  7. The system as in any of the claims 2 to 6, characterised in that the second part (5L-2) of the fourth conveyor (5L) and the second part (9L-2) of the sixth conveyor (9L) are arranged in parallel.
  8. The system as in any of the claims 1 to 7 wherein the third conveyor (5R) and/or the fourth conveyor (5L) for conveying the single-length straws of the first type (M) has an arched section.
  9. The system as in any of the claims 1 to 8 wherein the fifth conveyor (9R) and/or the sixth conveyor (9L) for conveying the single-length straws of the second type (P) has an arched section.
  10. The system as in any of the claims 1 to 9 wherein a gravity conveyor channel (22, 32) and a drum conveyor (33) are arranged between the first conveyor (1) of the double-length straws of the first type (2M) and the first cutting unit (3) and/or between the second conveyor (2) of the double-length straws of the second type (2P) and the second cutting unit (4).
  11. The system as in any of the claims 1 to 10 wherein the first cutting unit (3) for cutting the double-length straws of the first type (2M) is adapted to cut at an acute angle.
  12. The system as in any of the claims 1 to 11 wherein the second cutting unit (4) for cutting the double-length straws of the second type (2P) is adapted to cut at a right angle.
  13. The system as in any of the claims 1 to 12 wherein the outlet (13) of the third conveyor (5R) of the single-length straws of the first type (M) is connected to the outlet (15) of the fifth conveyor (9R) of the single-length straws of the first type (M), and the outlet (14) of the fourth conveyor (5L) of the

single-length straws of the second type (P) is connected to the outlet (16) of the sixth conveyor (9L) of the single-length straws of the second type (P).

14. A production line for manufacturing the telescopic paper straws (T) comprising at least one paper straw manufacturing apparatus and a conveyor system for conveying the paper straws as in any of the claims 1 to 13.

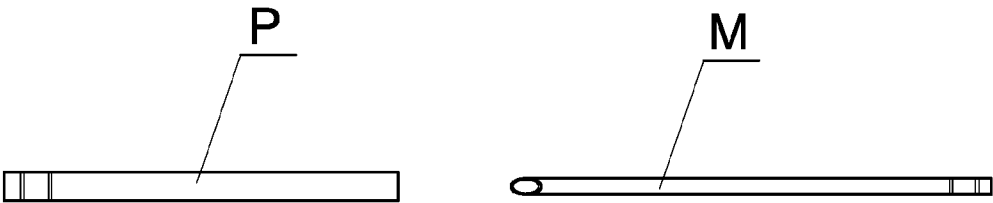


Fig. 1

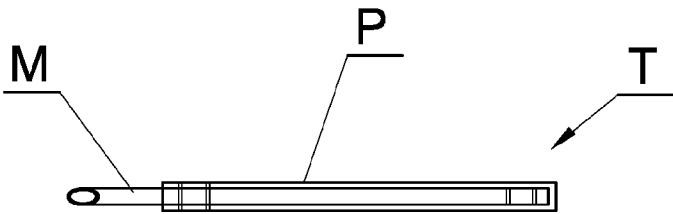


Fig. 2

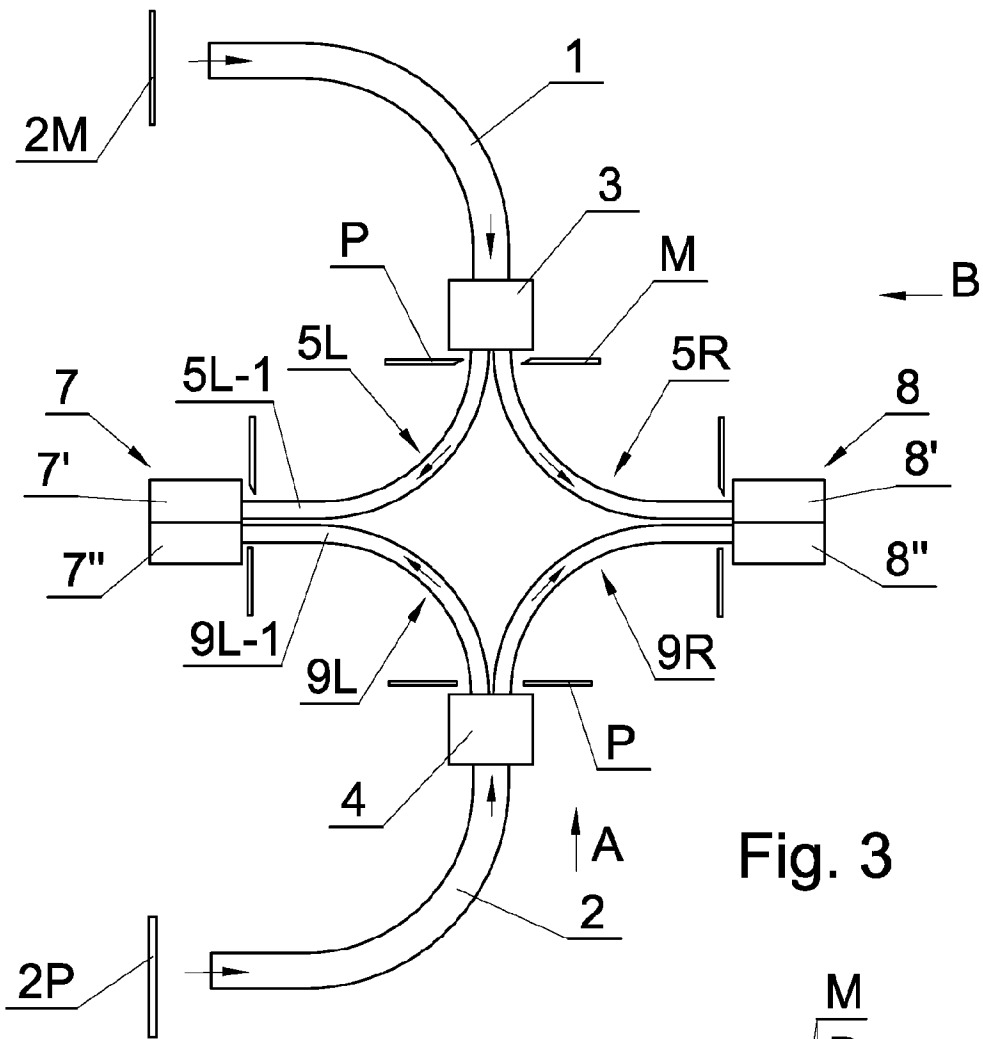


Fig. 3

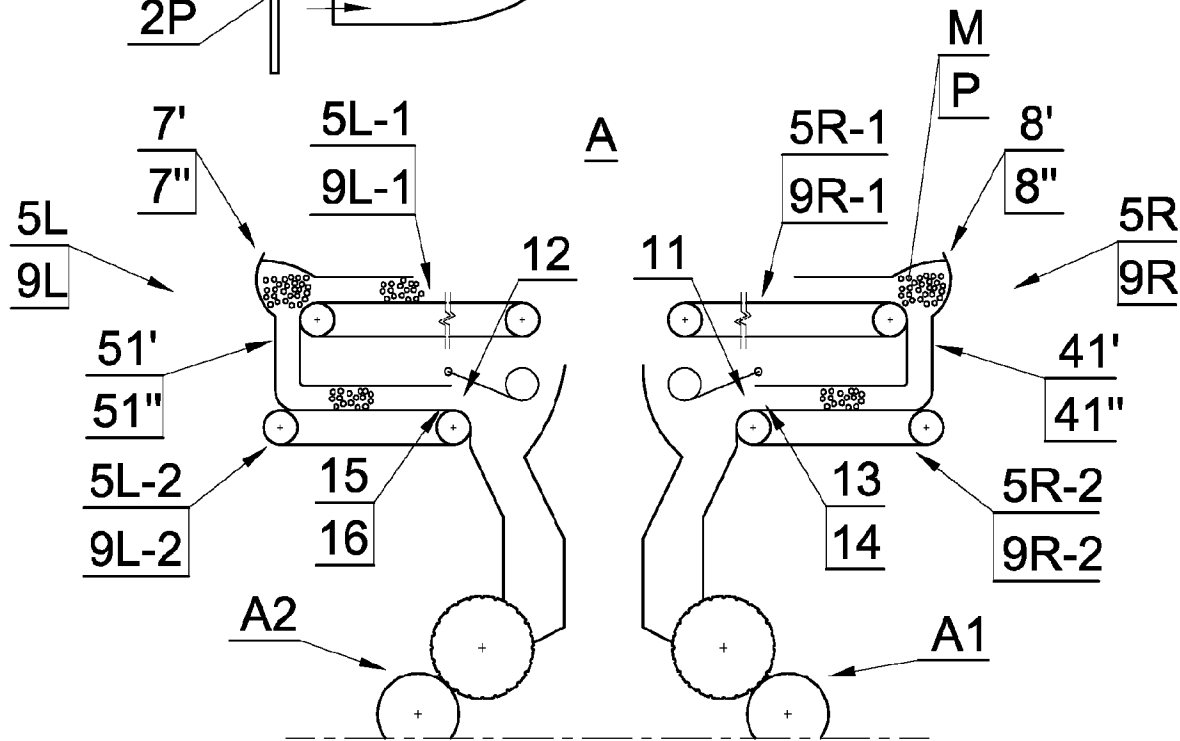


Fig. 3a

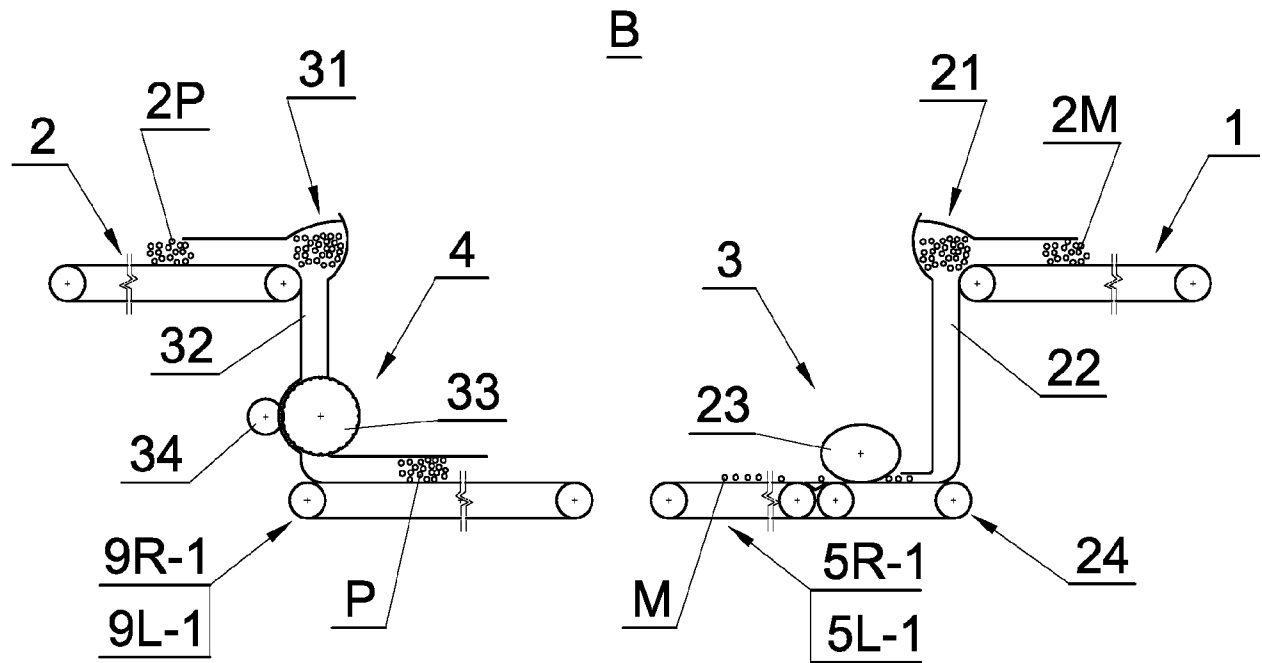


**Fig. 3b**

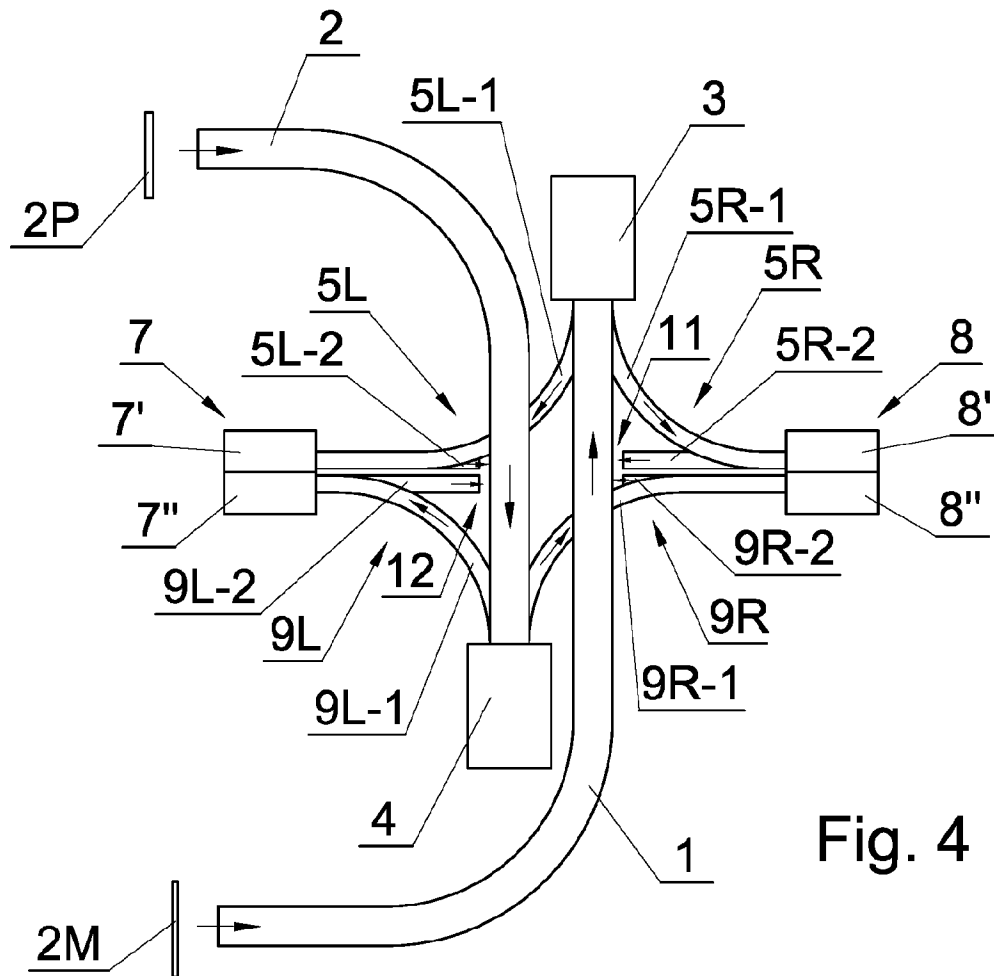


**Fig. 4**

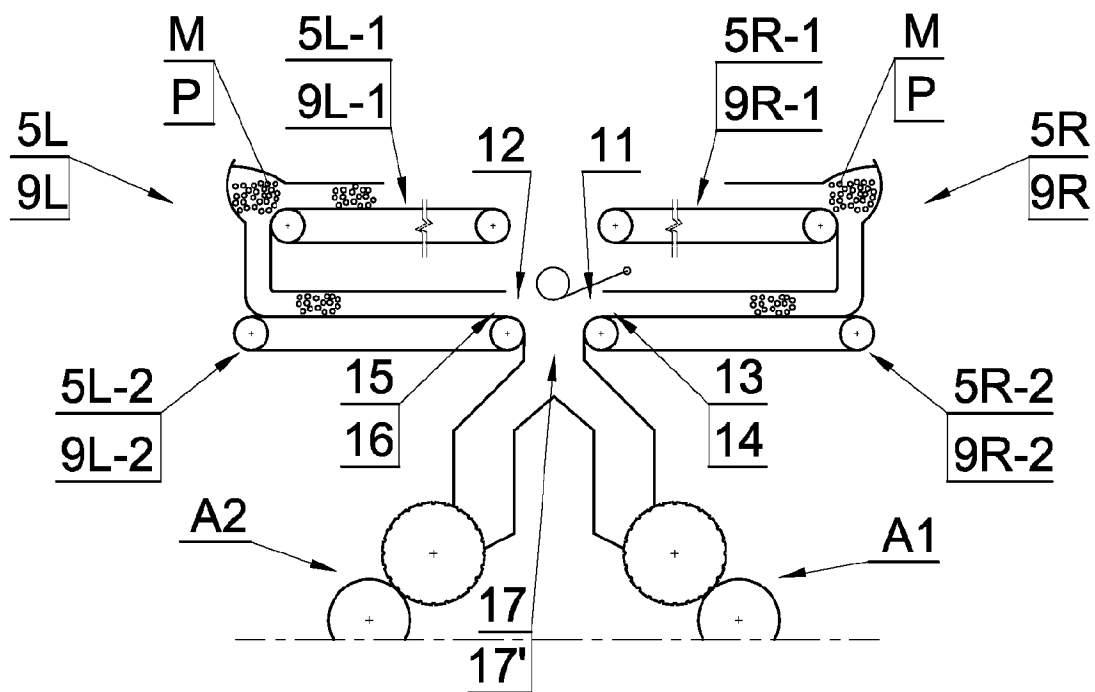


**Fig. 4a**

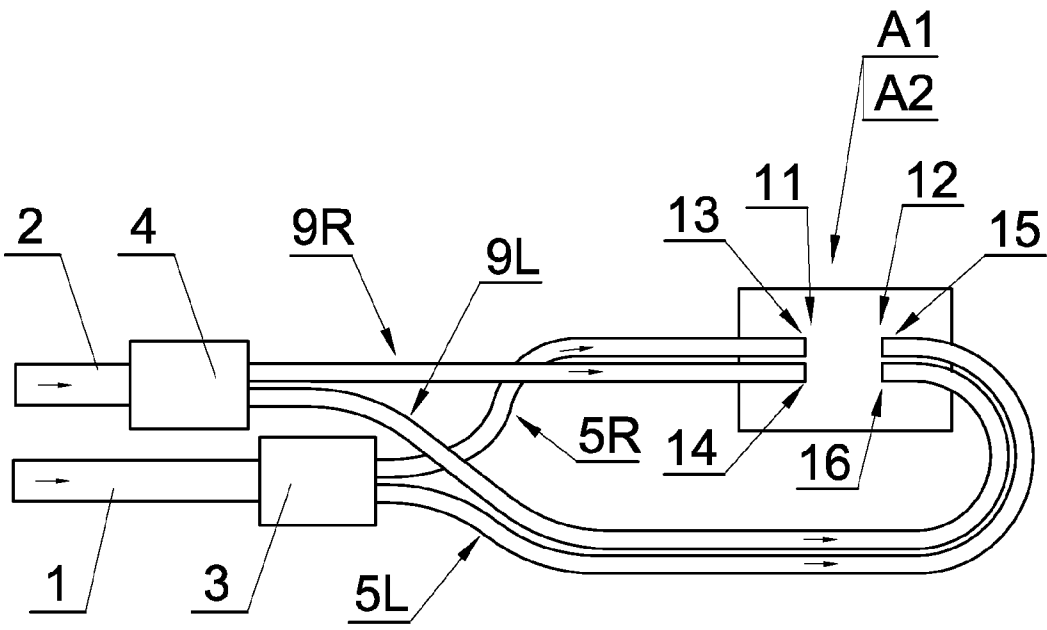


Fig. 5

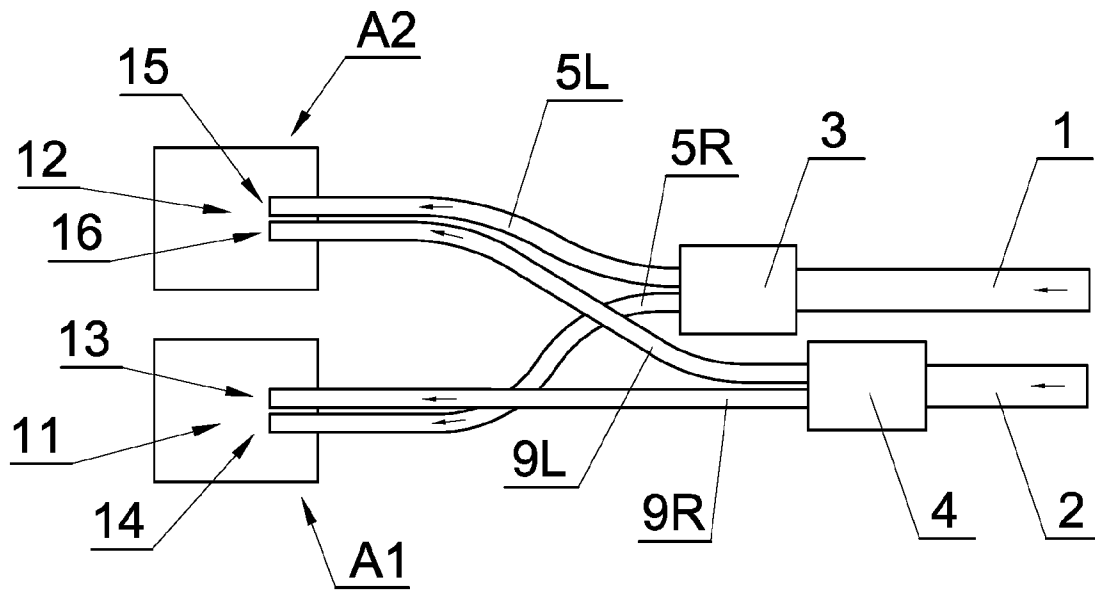


Fig. 6

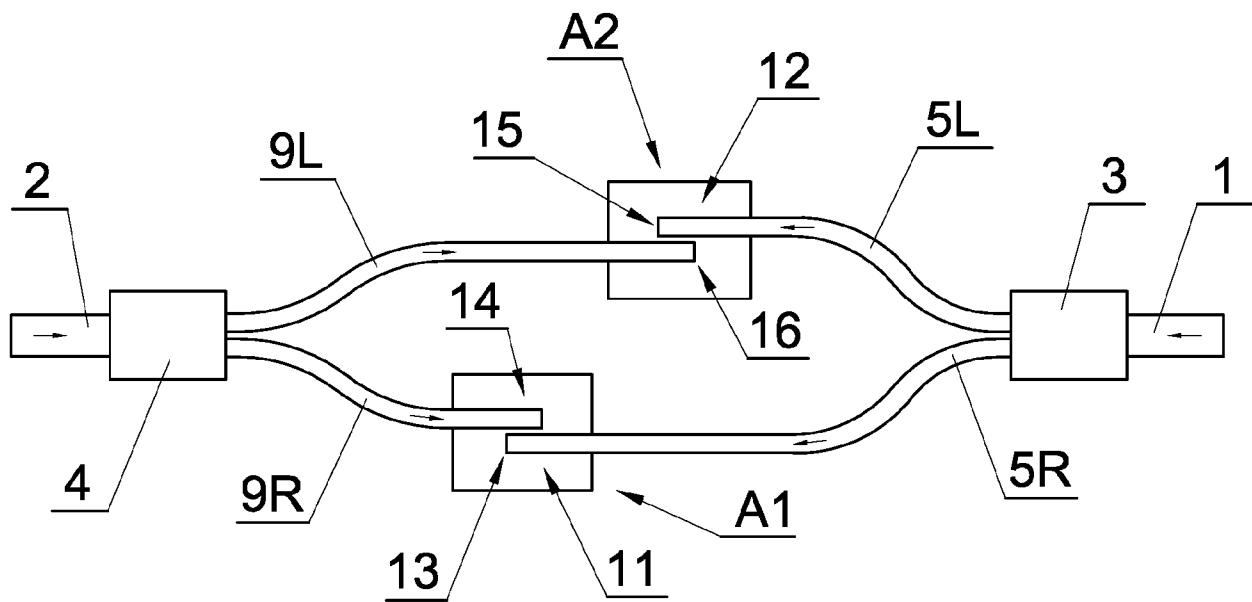


Fig. 7

# INTERNATIONAL SEARCH REPORT

International application No  
**PCT/IB2022/050202**

## A. CLASSIFICATION OF SUBJECT MATTER

**INV. B31D5/00**  
**ADD. A47G21/18**

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

**B31D A47G B29L**

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**EPO-Internal, WPI Data**

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages | Relevant to claim No. |
|-----------|------------------------------------------------------------------------------------|-----------------------|
| <b>X</b>  | <b>JP S62 55123 A (TETRA PAK INT)</b>                                              | <b>1, 11-14</b>       |
|           | <b>10 March 1987 (1987-03-10)</b>                                                  |                       |
| <b>A</b>  | <b>figures 1-4</b>                                                                 | <b>2-7</b>            |
|           | -----                                                                              |                       |
| <b>X</b>  | <b>JP S59 197215 A (SANYO SHIKI KK)</b>                                            | <b>1, 11-14</b>       |
|           | <b>8 November 1984 (1984-11-08)</b>                                                |                       |
| <b>A</b>  | <b>figures 3, 4, 7</b>                                                             | <b>2-7</b>            |
|           | -----                                                                              |                       |

☐

Further documents are listed in the continuation of Box C.

☒

See patent family annex.

\* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

**5 May 2022**

Date of mailing of the international search report

**04/07/2022**

Name and mailing address of the ISA/

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Authorized officer

**Sundqvist, Stefan**

## INTERNATIONAL SEARCH REPORT

International application No.  
**PCT/IB2022/050202**

### Box No. II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This international search report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:  
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:  
because they relate to parts of the international application that do not comply with the prescribed requirements to such an extent that no meaningful international search can be carried out, specifically:
3. ☐ Claims Nos.:  
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

### Box No. III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

**see additional sheet**

1. ☐ As all required additional search fees were timely paid by the applicant, this international search report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fees, this Authority did not invite payment of additional fees.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this international search report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☒ No required additional search fees were timely paid by the applicant. Consequently, this international search report is restricted to the invention first mentioned in the claims;; it is covered by claims Nos.:

**1-7, 11-14**

#### Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest and, where applicable, the payment of a protest fee.
- ☐ The additional search fees were accompanied by the applicant's protest but the applicable protest fee was not paid within the time limit specified in the invitation.
- ☐ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-7, 11-14

Buffer container in a conveyor system (claim 2 as dependent on claim 1).

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2. claims: 8, 9

Arched sections in a conveyor system (claims 8 and 9 as dependent on claim 1).

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3. claim: 10

Gravity feed in a conveyor system (claim 10 as dependent on claim 1).

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2022/050202

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s)       | Publication<br>date      |
|-------------------------------------------|---------------------|----------------------------------|--------------------------|
| JP S6255123 A                             | 10-03-1987          | JP H0524826 B2<br>JP S6255123 A  | 09-04-1993<br>10-03-1987 |
| JP S59197215 A                            | 08-11-1984          | JP H0151244 B2<br>JP S59197215 A | 02-11-1989<br>08-11-1984 |