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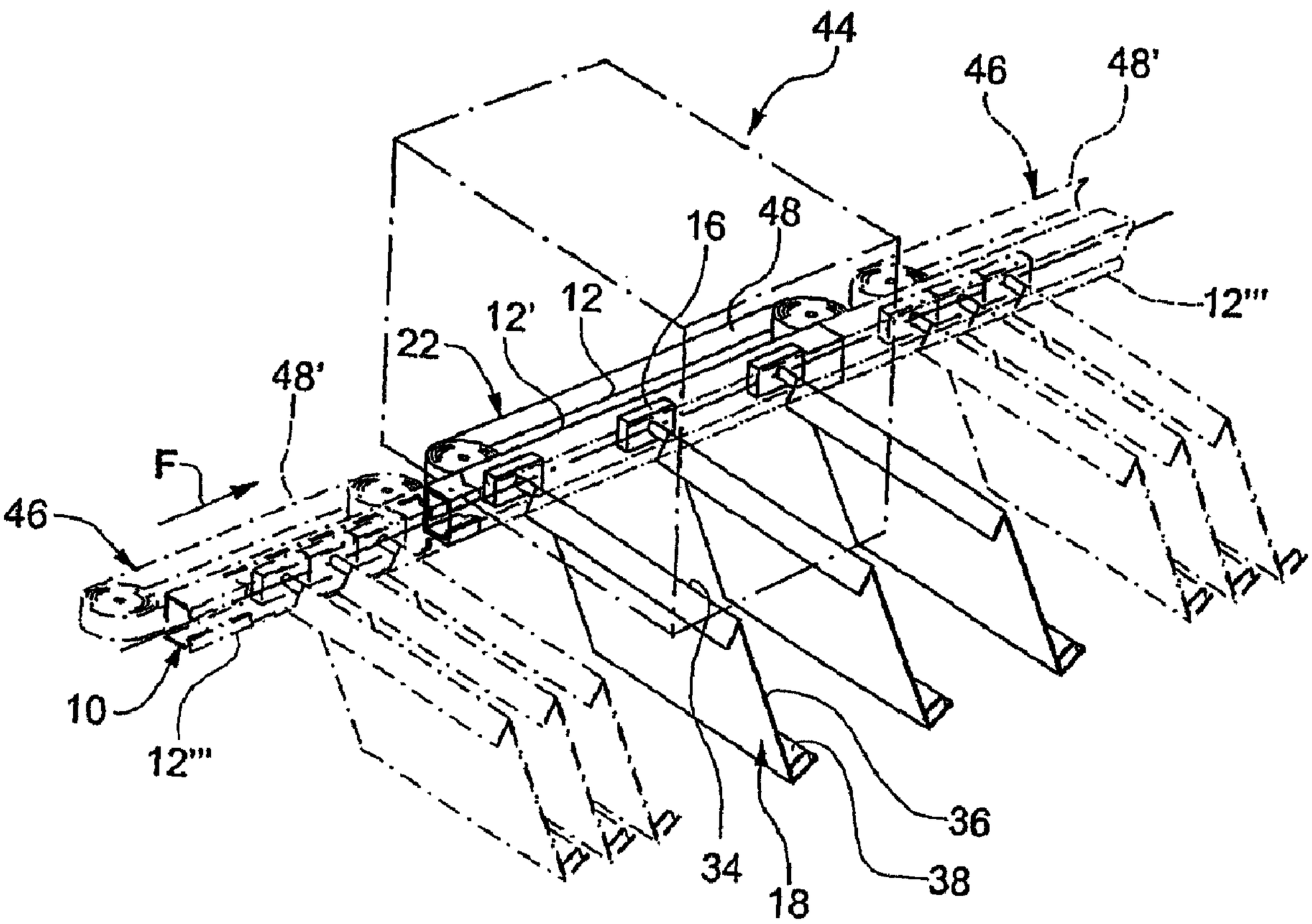
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(54) Titre : DISPOSITIF DE TRAITEMENT D'OBJETS PLATS, NOTAMMENT DE PRODUITS IMPRIMES
(54) Title: DEVICE FOR PROCESSING FLAT OBJECTS, ESPECIALLY PRINTED PRODUCTS



(57) Abrégé/Abstract:
The invention relates to a device for processing flat objects, especially printed products. The device has a track system (10) in which individual conveying elements (16) are located one behind the other, in such a way that they can move freely. Each of the

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(57) **Abrégé(suite)/Abstract(continued)**:
support elements (18) is positioned on a single conveying element (16) in the form of an extension arm. The device has stations (44) which can be configured as a supply station, processing station or output station. Each station (44) has its own drive device (22) for moving the conveying elements and support elements (16, 18) through the station (44) at the distance required and at the speed required by said designated station (44).

Abstract

The invention relates to a device for processing flat objects, especially printed products. The device has a track system (10) in which individual conveying elements (16) are located one behind the other, in such a way that they can move freely. Each of the support elements (18) is positioned on a single conveying element (16) in the form of an extension arm. The device has stations (44) which can be configured as a supply station, processing station or output station. Each station (44) has its own drive device (22) for moving the conveying elements and support elements (16, 18) through the station (44) at the distance required and at the speed required by said designated station (44).

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Device for processing flat objects, especially printed products

The present invention relates to a device for processing flat objects, especially printed products.

A device of this type has been disclosed in EP-A-0 771 754 and the corresponding US-A-5,765,823. A saddle-like rest as well as a rest wall and carrier elements having a base are arranged at a distance one behind the other in the manner of a cantilever on an endless flexible drive element which is driven continuously. The flexible drive element is configured as a conveyor chain guided in a channel over rolls. A first feed station is intended either for depositing folded printed products opened and in straddling form onto the saddle-like rest of the carrier elements moving past it or for feeding printed products to the carrier elements in such a way that they come into contact with the base and rest wall. Processing stations configured as further feed stations are arranged downstream of the first feed station as seen in the conveying direction of the flexible drive element forming the conveying mechanism, with the same intended purpose as the first feed station. At an output station downstream of the processing stations, the combined printing products are removed from the carrier elements and output for further processing.

In the case of this known device all the stations must operate synchronously with the continuously driven endless flexible drive element.

It is therefore an object of an embodiment of the present invention to develop the known device such that it can be adapted or is

adapted more flexibly to the boundary conditions required by the individual stations.

According to an aspect of the invention, there is provided a device for processing flat objects, especially printed products, having a rail system, carrier elements arranged on a conveying mechanism which is driven in the conveying direction and guided by the rail system, and said carrier elements having a saddle-like rest and/or a rest wall and a base, a feed station which is intended for feeding objects to the carrier elements moving past it, a processing station arranged downstream of the feed station as seen in the conveying direction, and an output station arranged downstream of the processing station as seen in the conveying direction and intended for removing the objects, wherein a plurality of individually movable, rail-guided conveyor elements are present, each of the carrier elements is arranged on a single one of the individual conveyor elements, the processing station is configured as a further feed station or has a processing assembly for processing the objects fed by means of the carrier elements, and each of the stations has a dedicated drive arrangement for the conveyor elements which is intended for transporting the conveyor and carrier elements at a spacing and a speed required by a assigned station.

The conveying mechanism is formed by a large number of conveyor elements which can be moved individually in a rail system, each of the carrier elements preferably being arranged on one of the conveyor elements in the manner of a cantilever. The conveyor elements and thus carrier

elements are decoupled from each other and can be moved individually in the rail system. If the conveyor elements rest on each other they can of course be moved forward by the transmission of impact forces, but they do not exert any tensile forces on each other. Each of the stations - the feed station, the processing station or stations and the output station - has a dedicated drive arrangement for the conveyor elements, which convey the conveyor and carrier elements at the spacing and speed required by the station in question. Each station can be operated optimally by virtue of the conveyor elements being decoupled and by virtue of the dedicated drive arrangements, the stations being independent of one another.

Sections of the rail system serving as a buffer-storage section allow buffer storage of carrier elements and of the objects transported by means of the latter. In this way it is also possible to considerably compensate for stations being interrupted.

Particularly preferred embodiments of the invention permit a modular construction of the device.

Further particularly preferred embodiments of the device according to the invention are specified in the further dependent patent claims.

The invention will be explained in more detail using exemplary embodiments depicted in the drawing. In the drawing, purely schematically:

Fig. 1 shows a plan view of a device embodied as a circulating system;

Fig. 2 shows a detail of the device according to fig. 1 with individual conveyor elements and carrier elements arranged in the manner of a cantilever on the latter;

Fig. 3 shows a further possible embodiment of a section of the device with a station and a three-dimensionally curved section of the rail system;

Fig. 4 shows a station together with a section of the rail system assigned to it and the drive arrangement assigned to it with further upstream and downstream sections of the rail system;

Fig. 5 shows a section of the rail system with a supporting means, acting, for example, as an auxiliary drive, for the carrier elements;

Fig. 6 shows a section of the rail system with a queuing element connected and a station arranged in the queuing section;

Fig. 7 shows two feed stations arranged one behind the other with associated drive arrangements which

move the carrier elements at a specific spacing through the stations;

Fig. 8 shows a section of a device according to the invention with a rectilinear section of the rail system and a stapling apparatus, and

Fig. 9 shows part of a device according to the invention with a stapling apparatus arranged in a curved section of the rail system.

The device shown in fig. 1 has a rail system 10 which extends in a horizontal plane and is intrinsically closed. Two semicircular rail sections 12 are connected to each other by means of rectilinear rail sections 14 to form a circulating system. A large number of individual conveyor elements 16 are arranged one behind the other in the rail system 10 and are guided so that they can move freely along the rail system. The number of conveyor elements 16 is selected such that they do not form an intrinsically closed impact chain by resting on each other; in other words there are gaps between individual successive conveyor elements.

A carrier element 18 is fastened to each of the conveyor elements in the manner of a cantilever, said carrier element projecting outward from the conveyor element 16 in the radial direction with regard to the rail system 10.

A first feed station 20 is indicated by a dash-dotted rectangle. It is assigned a dedicated drive arrangement 22 which is intended for moving conveyor elements 16 and hence the carrier elements 18 at a specific spacing A and at a specific speed v through the feed station 20 in the conveying direction F so that said feed station can feed a flat object, for example a printed product, to each carrier

element 18.

A processing station 24 likewise with a dedicated drive arrangement is arranged at a distance from and downstream of the feed station 20 as seen in the conveying direction F. This processing station is intended for moving the conveyor elements 16 in the buffer-stored state, i.e. resting on each other, and thus the relevant carrier elements 18 through the processing station 24 at a minimum spacing B and a speed specified by said processing station. In the processing station, a further object can be attached, for example adhesively bonded, to the objects fed in the feed station 20, or any other desired processing operation on the relevant objects can take place.

A further processing station which is configured as a further feed station 26 is arranged downstream of and at a distance from the processing station 24. Its construction and functioning correspond to those of the feed station 20.

A drive arrangement 22' is assigned to a further section of the rail system, the object of which drive arrangement is to drive the incoming conveyor elements 16 in the conveying direction F so that they reach an output station 28. Said output station in turn has a dedicated drive arrangement which is intended for moving the conveyor elements 16 through the output station 28 in the buffer-stored state - spacing B. The objects fed to the carrier elements 18 upstream and processed in the processing station 24 are removed from the carrier elements 18 in the output station 28 and fed to a further processing operation.

A drive arrangement 22' is assigned to a further rail section downstream of the output station 28 in order to feed the carrier elements 18 to the feed station 20 again.

The device can be adapted to the individual requirements as all the stations 44 mentioned and the rail system 10 are of modular construction. It is thus conceivable, for example, to arrange stations 44 in turn between the output station 28 and the feed station 20, as seen in the conveying direction F, it being possible for said stations to form a dedicated processing path for objects or said stations forming a single processing path together with the stations 44 shown further above.

Fig. 2 shows a section of the device represented in fig. 1 with three conveyor elements 16 resting on the end of each other in the buffer-stored state. Each of the conveyor elements 16 has a conveyor-element body 30 on which a horizontal carrier shaft 32 is fastened in the manner of a cantilever. Said carrier shaft carries a carrier element 18 formed, for example, from metal sheet at a distance from the conveyor-element body 30, said carrier element firstly forming a saddle-like rest 34 and secondly having a flat rest element 36 and an adjoining base 38. A multipart flat object 40, for example a first printed product, lies on the base 38 and on the rest wall 36, said object having been fed to the carrier element 18 by means of the feed station 20 (fig. 1), for example. A further folded object 40′ sits in straddling form on the rest 34 and covers the object 40. The object 40′ has been opened for example by means of the further feed station 26 (fig. 1), and deposited onto the rest 34.

Guide wheels 42 are mounted such that they can rotate freely on each conveyor-element body 30 and mount the conveyor element 16, in the manner of a carriage and such that it can move freely, on the rail which is C-shaped in cross section. The ends of the conveyor-element bodies 30 are configured as abutting surfaces in order to rest on the

facing end of the conveyor-element body 30 of the adjacent conveyor element 16 in the buffer-stored state.

Fig. 3 schematically shows a processing station 24 with an associated rail section 12'. The drive arrangement assigned to this processing station 24 is not shown. It is intended for moving the conveyor elements 16 - these and the carrier elements 18 are configured identically to those shown in fig. 2 and described further above - at a predetermined spacing and at a predetermined speed through the processing station 24. This movement can of course be carried out continuously or in start/stop operation.

A further rail section 12" serving as a connecting path is connected downstream of the rail section 12' and is three-dimensionally bent with narrow radii. It is also an object of the processing station 24 to release the conveyor elements 16 with such a spacing that they can move through the pronounced curvature of the rail section 12" without hindering each other. This rail section 12" may, for example, be sloped so that no further drive arrangement is necessary.

A further possibility for arranging the rail guidance means with regard to the conveyor and carrier elements 16, 18 is indicated by dash-dotted lines. The conveyor elements 16 are correspondingly located adjacent to the base 38, for example approximately centrally as seen in its longitudinal direction.

Fig. 4 shows a station 44, configured as a module or modular insert, which may be a feed station 20, a processing station 24 or an output station 28 and has a permanently assigned rail section 12' and a dedicated drive arrangement 22. Rail sections of adjacent stations adjoin

both ends of the rail section 12′, the two adjacent stations in the example shown being configured as buffer-storage stations 46 each having a dedicated rail section 12″′ and a dedicated drive arrangement 22.

The drive arrangement 22 of the station 44 has a belt 48 which is driven in circulation and moves the conveyor elements 16 through the station 44 with a form-fitting or force-transmitting connection at a predetermined mutual spacing and at a stipulated speed. A feeder wheel or a controlled release device, for example, may be provided on the entry side of the drive arrangement 22 in order to feed or release in each case a conveyor element 16 to the belt 48 at the desired times for driving.

The buffer-storage stations 46 have a further belt 48′ which is driven in circulation in the conveying direction F and drives the conveyor elements 16 in the conveying direction F, for example by means of a frictional or magnetic connection, until said conveyor elements rest on one another in the buffer-stored state.

In the embodiment shown in fig. 5, the carrier shafts 32 of the carrier elements 18, on the side facing away from the conveyor elements 16, project beyond the rest 34 and the rest element 36. The rail section 12′ shown is likewise assigned a drive arrangement 22 which drive the conveyor elements 16 in the conveying direction F in a manner which permits slip to occur. The station 44 shown in fig. 5 has an auxiliary drive arrangement 50 which also serves as a supporting device and has a pulling element 52 which is driven in the conveying direction F, is intrinsically closed and has groovelike recesses 52′ at predetermined spacings for accommodating the free end regions of the carrier shafts 32. The spacing and the conveying speed of

the carrier elements 18 is stipulated in this case by the auxiliary drive arrangement 50. Upstream of the station 44, a rail section 12"' serving as a buffer-storage path is provided, for example with a slope, from which rail section in each case one conveyor element 16 is sequentially taken by means of the auxiliary drive arrangement 50 and moved through the station 44 at the desired spacing from the preceding carrier element 18. The carrier elements 16 are supported at both ends in the station 44 shown in fig. 5. This can be advantageous in particular when processing operations are to be performed on the objects 40, 40', for example if objects deposited on top of one another are to be connected to one another by means of staples.

Figure 6 shows part of a station 44 which has a queuing element 54 connected at its downstream end. Adjoining the queuing element 54 in the upstream direction, the station 44 has a dedicated drive arrangement 22 with a belt 48 which is driven in circulation in the conveying direction F. Said belt is intended for driving conveyor elements 16 which come into its active region until they come into contact with the respective preceding conveyor element 16. The force-transmitting coupling between the belt 48 and the conveyor elements 16 can be formed, for example, by a frictional connection or magnetic connection. In this case the station 44 requires the carrier elements 18 to be stationary for it to process objects 40, 40' which are either to be fed to the conveyor elements 16 or have already been fed to them earlier by means of a feed station 20. At the cycle rate stipulated by the station 44, the queuing element 54 releases in each case one conveyor element 16, which is fed to the next rail section 12 in the conveying direction F by means of the drive arrangement 22.

Figure 7 shows a feed station 20 and a processing station

24 arranged at a distance and configured as a further feed station 26, these two stations each having an associated rail section 12' and an associated drive arrangement 22. Each of the two drive arrangements 22 has a belt 48 which is driven in circulation in the conveying direction F at a specific conveying speed and from which catching cams 56 project at a spacing one behind the other. These cams are intended for achieving form-fitting engagement with the conveyor elements 16 in order to move them through the feed stations 20, 26 at the desired spacing and at the required conveying speed.

The feed station 20 is intended for feeding an object 40 from above to each of the carrier elements 18. In the example shown, the object is a folded printed product in which a further part product is arranged. The printed products are fed with the fold at the front so that their fold comes into contact with the base 38 and they can be transported further with their flat side lying on the rest element 36. The further feed station 26 is intended for opening, in a known manner, objects 40' configured as folded printed products and depositing them in straddling form onto the saddle-like rests 34 of the carrier elements 18 in such a way that they cover the objects 40 fed in the feed station 20.

Fig. 8 shows a rectilinear rail section 12' which is assigned to a processing station 24 having a stapling apparatus 58. The drive arrangement 22 of this processing station 24 is intended for moving the conveyor elements 16 resting on one another through the processing station 24 at the cycle rate of the stapling apparatus 58. The stapling apparatus 58 has stapling heads 62 arranged at equal spacings along the circumference of a carrying disk 60 driven in rotation. The spacing between the stapling heads

62 and the rotational speed of the carrying disk 60 are matched to the spacing B between successive carrier elements 18 in such a way that a stapling head 62 coincides with each carrier element 18 with the result that said stapling head can insert a staple into the objects 40' deposited in straddling fashion onto the rests 34. Each carrier element 18 is assigned a bending-over device 64 which is controlled, for example, by means of a slotted guide 66 in such a way that the staples inserted into the objects 40' are bent over in a known manner.

The mutual spacing of the carrier elements 18 is minimal in the station 44 with the stapling apparatus 58 and thus substantially smaller than in the feed stations 20, 26 shown in fig. 7. With the same processing capacity, the conveying speed is thus slower in the case of the processing station 24 shown in fig. 8 than in the feed stations 20, 26.

Fig. 9 likewise shows a processing station 24 with a stapling apparatus 58 of the same construction as shown in fig. 8 and described further above. The associated rail section 12', however, is convexly curved with respect to the stapling apparatus 58. This has the advantage that the change in angle between the stapling head 62 and the carrier element 18 takes place more slowly than in the case of the embodiment according to fig. 8 with a rectilinear rail section. The drive arrangement 22 in turn has a belt 48 which is driven in the conveying direction F and has catching cams 56 for driving the conveyor elements 16 with a form-fitting connection. As said conveyor elements are moved through a curve, they are preferably held by means of the drive arrangement 22 at a spacing from one another which can be very small. A bending-over device 64 with bending-over means is also attached in this case to the

rest element 36 of each carrier element 18, said bending-over means being moved by means of a slotted-guide control means so as to bend over staples.

The modules can be combined as desired to form a device because the stations 44 and the rail system 10 are constructed in modular fashion.

The carrier elements 18 can naturally also be of pocket-shaped configuration and/or have opening and holding-open elements or closing elements for the objects 40.

For the sake of completeness, it should be mentioned that the device always has a feed station 20 and an output station 28 and, between them, at least one processing station 24, it being possible for the latter also to be configured as a feed station 26. The processing station can, however, fulfill any other desired function.

In the embodiments shown, the rail system 10 has an intrinsically closed rail which comprises rail sections 12, 12′, 12″, 12‴ arranged one behind the other. A more complex rail system with diverters and the like is, however, also feasible, the diverters in turn preferably being configured in the manner of a processing station 24.

The carrier elements 18 do not necessarily have to have saddle-like rests 34 if objects 40′ are not to be deposited in straddling fashion onto said rests. They can, however, also only have such rests 34 but no rest elements 36 or bases 38 if the objects 40′ are only to be deposited in straddling fashion onto the rests 34 for processing.

In particular it is possible to keep the spacing of successive carrier elements small when collating objects

and to select a larger spacing when collecting because spread products are to be deposited in straddling fashion onto the rests during collecting.

The device according to the invention is also suitable in particular for addressing objects, for gluing in cards, for example, or for inside printing, as the spacing between successive carrier elements can be selected in the stations 44 according to the requirements.

The device according to the invention allows the most diverse functions and processing operations to be performed on the same conveying path (i.e. rail system) without impairing smooth processing. The correspondingly required spacings can be set in the entire process sequence even in the case of mixed feeds - for example as shown in fig. 7 - and/or mixed processing.

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CLAIMS:

1. A device for processing flat objects, especially printed products, having a rail system, carrier elements arranged on a conveying mechanism which is driven in the conveying direction and guided by the rail system, and said carrier elements having a saddle-like rest and/or a rest wall and a base, a feed station which is intended for feeding objects to the carrier elements moving past it, a processing station arranged downstream of the feed station as seen in the conveying direction, and an output station arranged downstream of the processing station as seen in the conveying direction and intended for removing the objects, wherein a plurality of individually movable, rail-guided conveyor elements are present, each of the carrier elements is arranged on a single one of the individual conveyor elements, the processing station is configured as a further feed station or has a processing assembly for processing the objects fed by means of the carrier elements, and each of the stations has a dedicated drive arrangement for the conveyor elements which is intended for transporting the conveyor and carrier elements at a spacing and a speed required by an assigned station.

2. The device as claimed in claim 1, wherein a section of the rail system serving as a buffer-storage section is connected upstream of each of the stations.

3. The device as claimed in claim 1 or 2, wherein a section of the rail system is permanently assigned to each of the stations.

4. The device as claimed in claim 3, wherein the rail system has individual sections, some sections being permanently arranged at a station and other sections serving as a buffer-storage or connecting section, and it being

possible to combine the sections as desired to form an intrinsically closed rail system.

5. The device as claimed in any one of claims 1 to 4, wherein the drive arrangement of the feed station has drivers driven in the conveying direction synchronously with the feed of objects, said drivers moving the conveyor elements through the feed station at a predetermined spacing.

6. The device as claimed in any one of claims 1 to 5, wherein the processing station has a supporting device which preferably serves as an auxiliary drive and is intended for supporting the carrier elements at their free end remote from the associated conveyor element.

7. The device as claimed in any one of claims 1 to 6, wherein each carrier element with a saddle-like rest has a bending-over device for bending over staples inserted into the objects.

8. The device as claimed in any one of claims 1 to 7, wherein the processing station has a stapling apparatus which is intended for introducing staples into the folded objects deposited in straddling form onto the saddle-like rests of the carrier elements.

9. The device as claimed in claim 8, wherein the stapling apparatus has stapling heads which move along a closed circulating path, and the associated drive arrangement is intended for moving the conveyor elements according to the speed and the spacing of the stapling heads.

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10. The device as claimed in claim 8 or 9, wherein the associated section of the rail system is convexly curved with respect to the stapling apparatus.

11. The device as claimed in claim 7, further comprising at least two feed stations and the processing station, which is arranged downstream with respect to said feed stations, comprising a stapling apparatus, the spacings between the conveyor elements in the feed stations being greater than in the processing station having the stapling apparatus.

12. The device as claimed in any one of claims 8 to 10, further comprising at least two feed stations and the processing station, which is arranged downstream with respect to said feed stations, comprising the stapling apparatus, the spacings between the conveyor elements in the feed stations being greater than in the processing station having the stapling apparatus.

13. The device as claimed in any one of claims 1 to 11, wherein the carrier elements are arranged on the assigned conveyor elements on one side in the manner of a cantilever.

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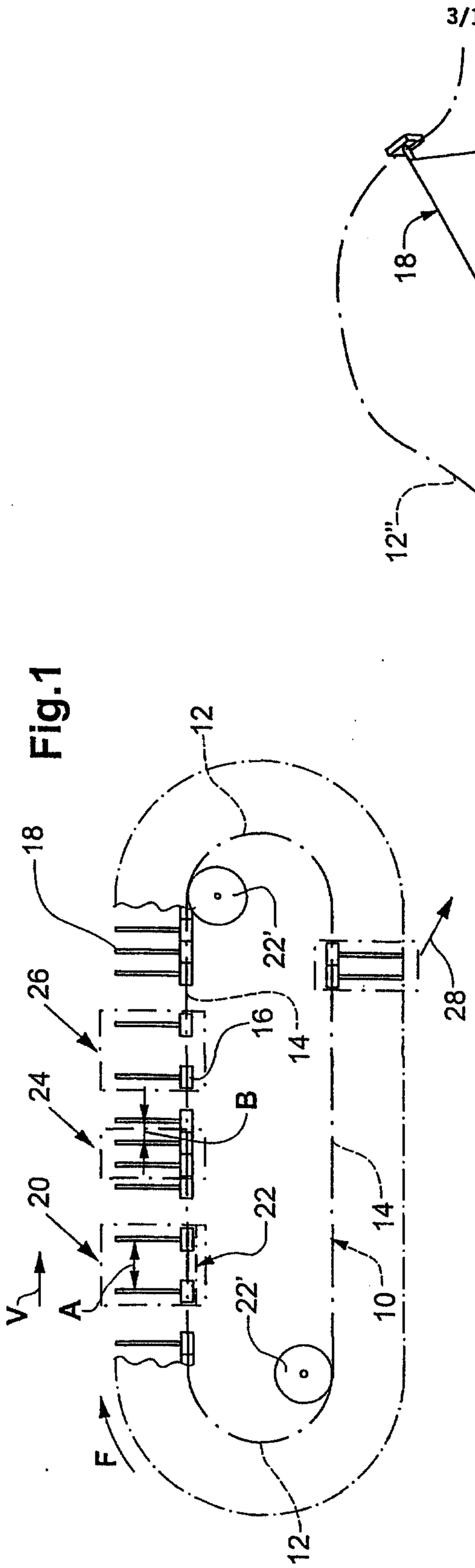


Fig.1

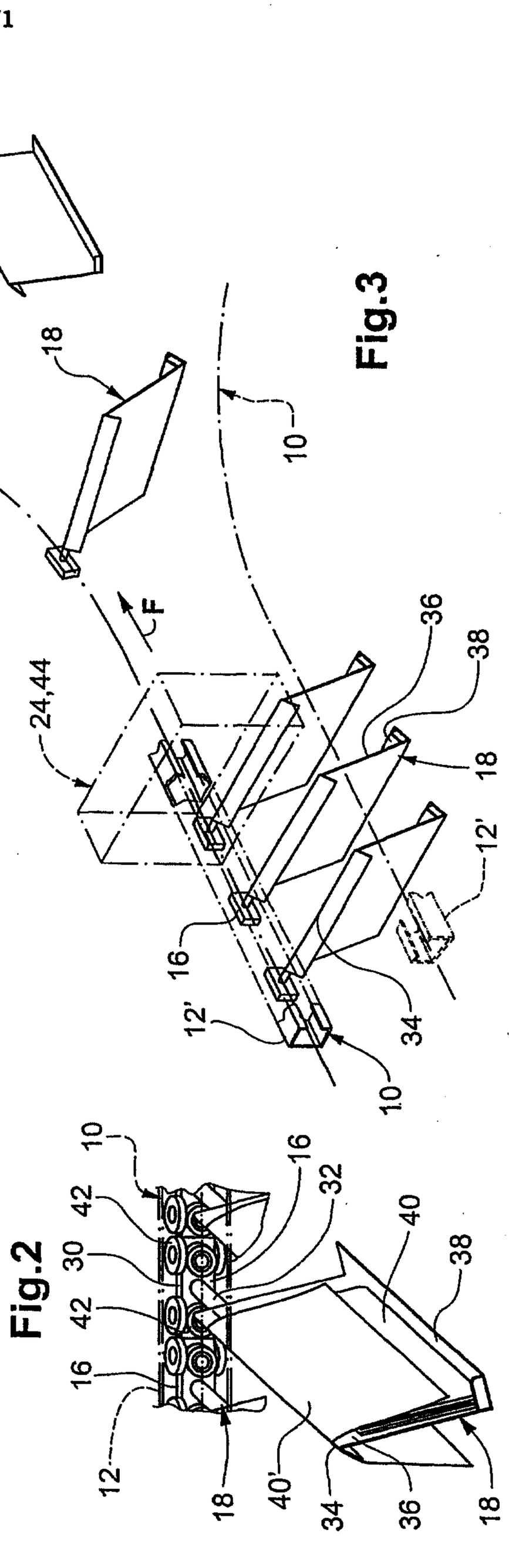


Fig.2

Fig.3

Fig.4

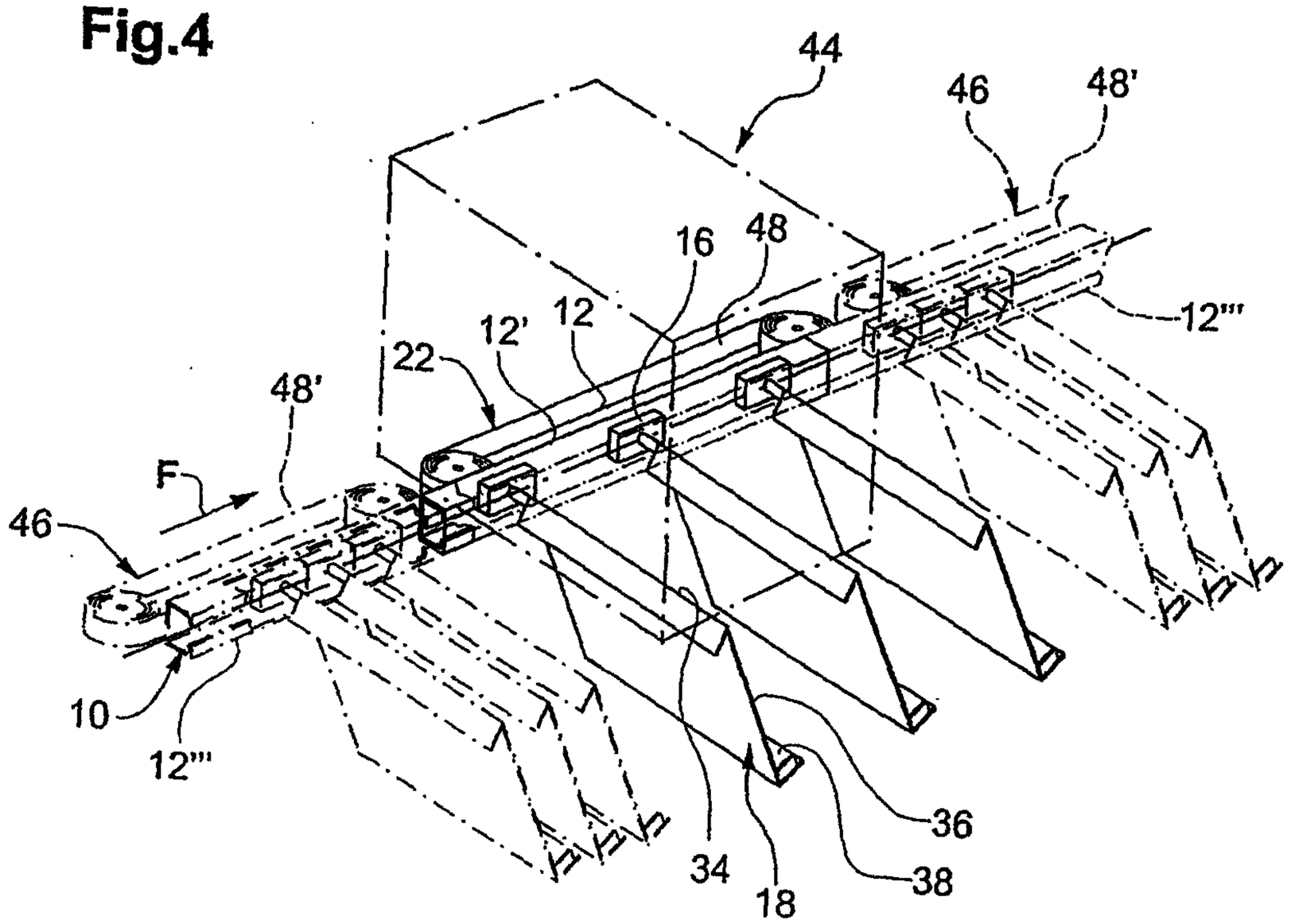
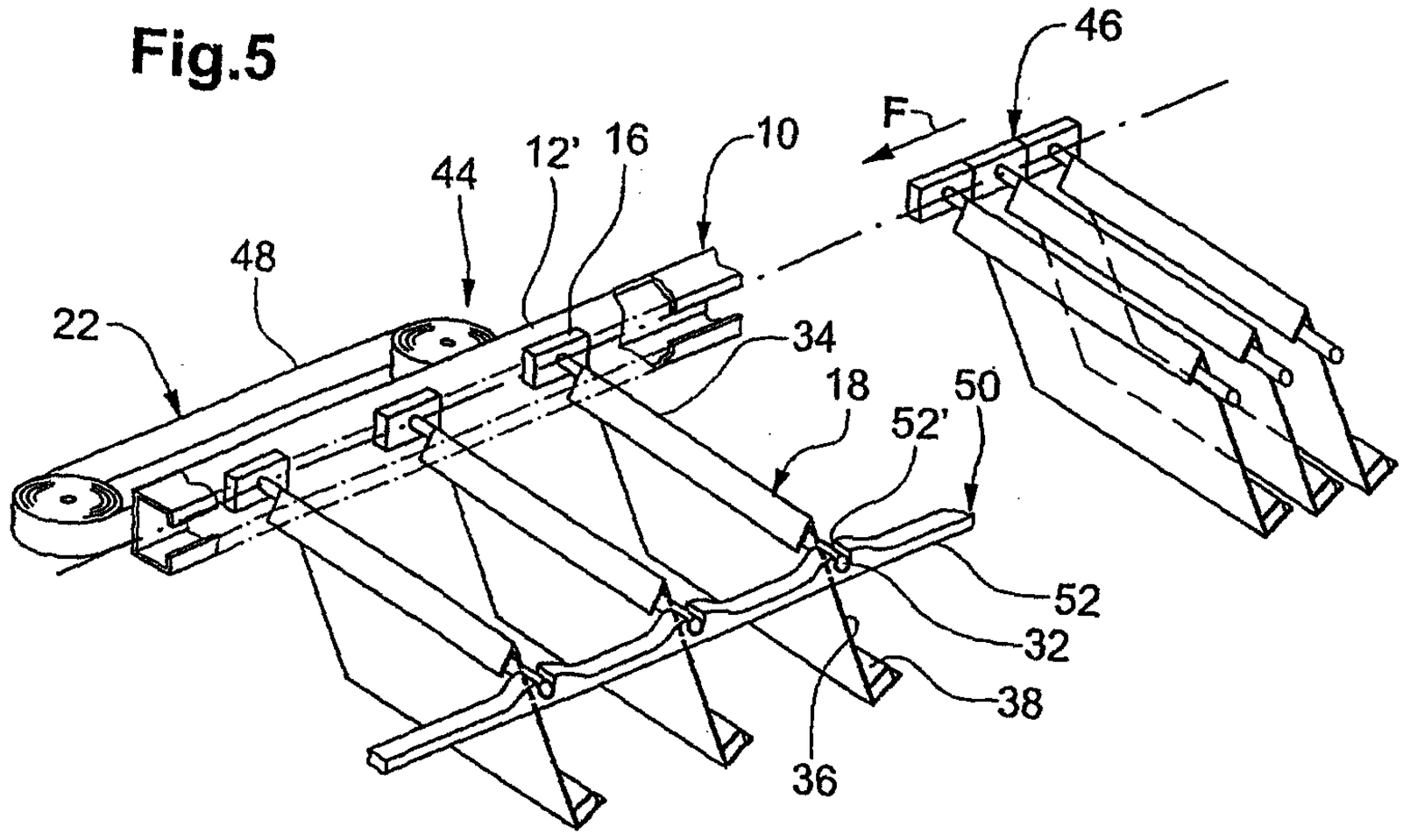

44
46
48'
16
48
12'
12
12''''
22
48'
F
46
10
12'''
34
18
36
38

Fig.5


46
F
10
16
12'
44
48
22
34
18
50
52'
52
32
38
36

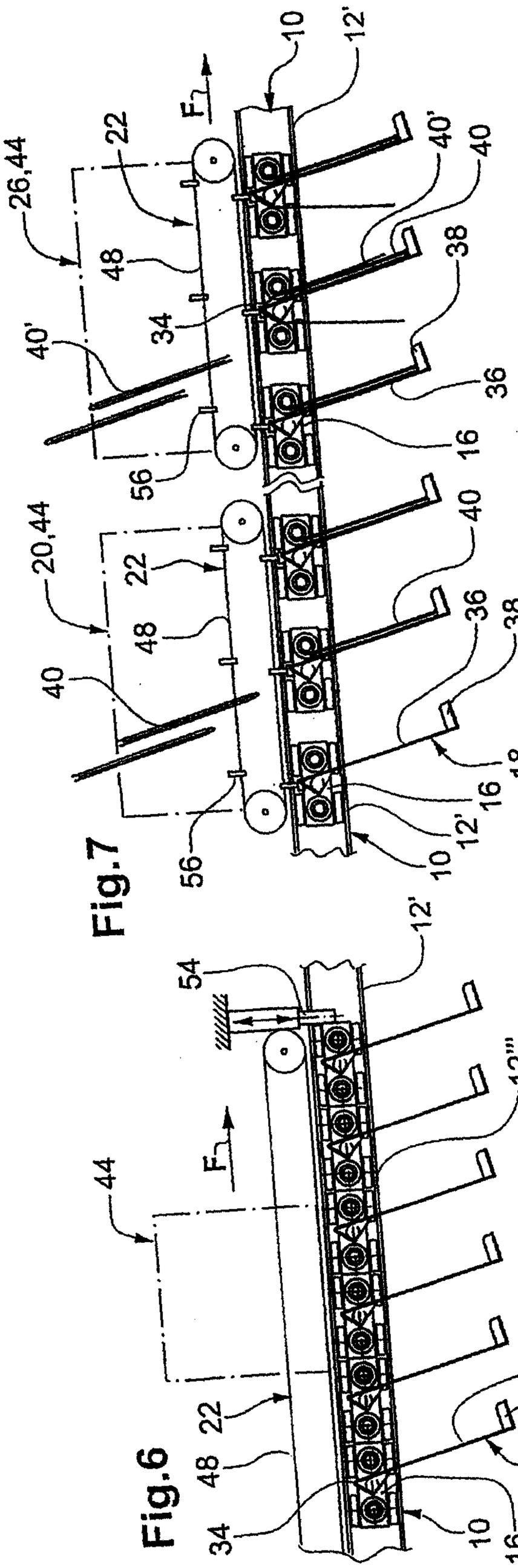


Fig.7

Fig.6

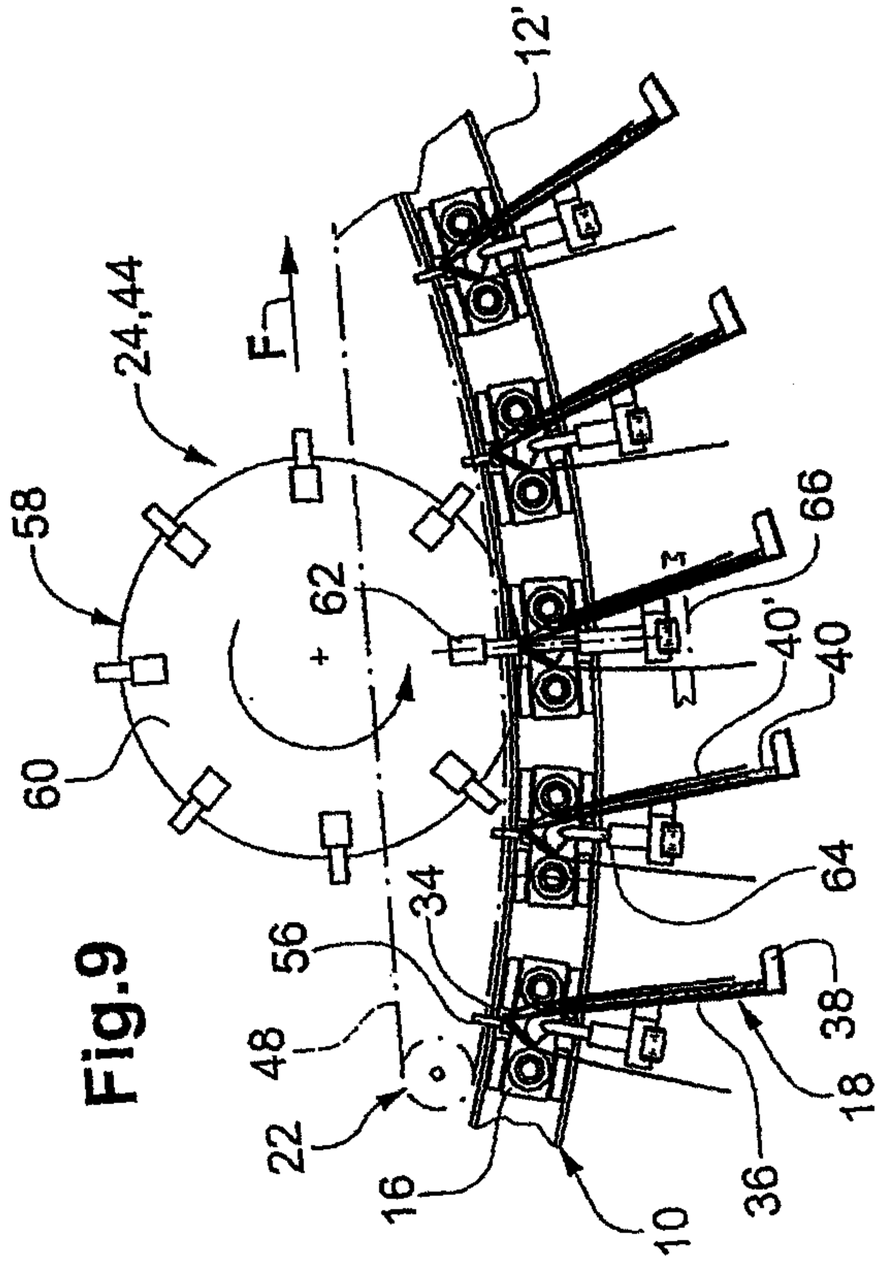


Fig.9

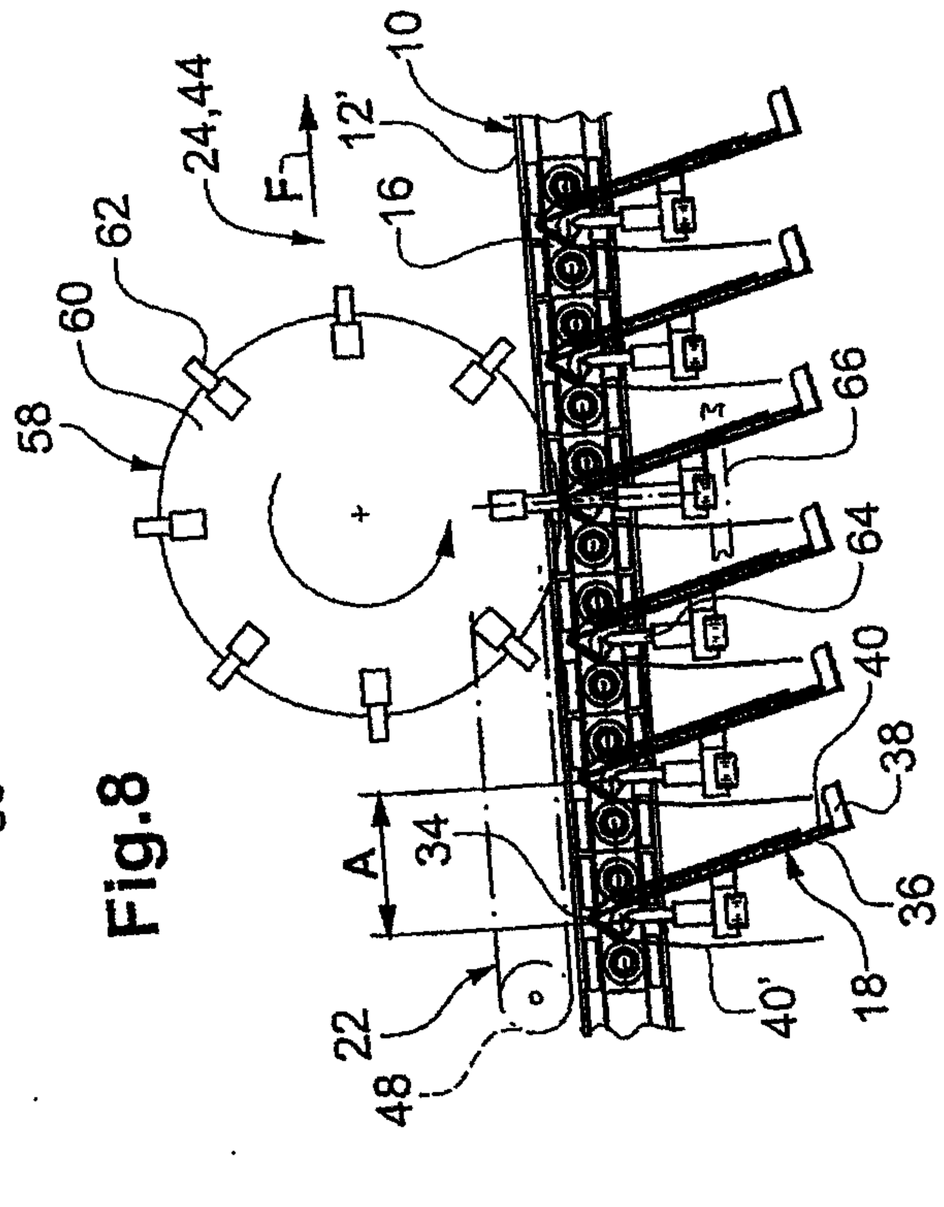
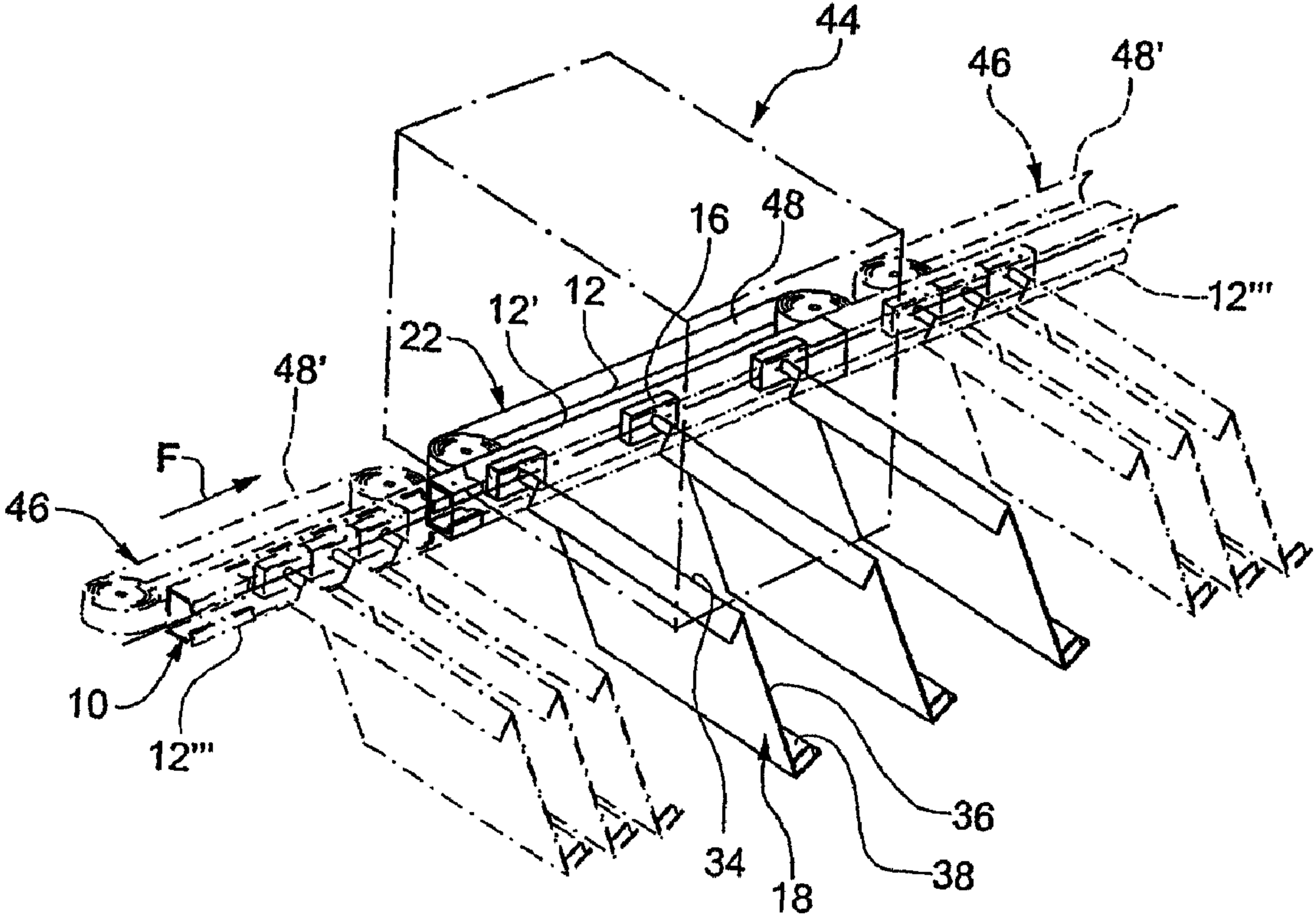


Fig.8


44
46
48'
16
48
12'
12
22
12'''
48'
F
46
10
12'''
34
18
36
38