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APPARATUS FOR PRODUCING MULTIPLE-PART PRINTED PRODUCTS

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(56) Prior Art Documents
US 5324014
US 5052667
US 5019716

(57) Claim

1. Apparatus for producing printed products comprising a plurality of part-products comprising:

a processing drum which is driven in rotation about an axis and includes at least two axially aligned individual portions with rests on which the part-products are positioned, the rests of the individual portions being in alignment with one another;

a product-feeding station which is arranged on a drum end region;

a product-removal station which is spaced apart in the axial direction from said product-feeding station and is arranged on an opposite drum end region;

transporting means for transporting the product-parts from the product-feeding station to the product-removal station, the transporting means of the individual portions being coupled to one another;

at least two product-processing stations disposed between the product-feeding station and the product-removal station; and

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at least one further product-removal station which can be selectively activated and deactivated, the at least one further product-removal station disposed between the two product-processing stations.

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C O M P L E T E S P E C I F I C A T I O N

FOR A STANDARD PATENT

O R I G I N A L

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Invention Title: "APPARATUS FOR PRODUCING MULTIPLE-PART PRINTED PRODUCTS"

The following statement is a full description of this invention, including the best method of performing it known to us:-

APPARATUS FOR PRODUCING MULTIPLE-PART PRINTED PRODUCTS

The invention relates to an apparatus for producing printed products comprising a plurality of part-products, for example newspapers, periodicals and the like, having a processing drum which is driven in rotation about an approximately horizontal axis and has saddle-like rests which are distributed uniformly in the circumferential direction and run essentially parallel to the axis, and also has transporting means for transporting the products along the saddle-like rests from a product-feeding station which is arranged in the axial drum end region to a product-removal station which is spaced apart in the axial direction from said product-feeding station and is arranged in the opposite drum end region, there being provided, between the product-feeding station and the product-removal station, at least two product-processing stations, in particular stations for the purposes of collecting, inserting, collating, stapling, adhesively bonding individual products, gluing, cutting and/or the like.

Apparatuses of this type are used for producing a vast range of different printed products which, in the case of a processing drum which is of a correspondingly multi-functional design, are joined together to form a finished printed product, for example, by collecting, inserting and/or collating in successive product-processing stations. If required, there may be provided, upstream and/or downstream of the individual product-processing stations responsible for collecting, inserting and/or collating, specific further product-processing stations which assume special functions, for example stapling, adhesively bonding individual products such as cards or product samples, gluing or cutting.

By providing such product-processing stations on a universally usable processing drum, both complex

as well as simple printed products of a vast range of different types may be produced.

The disadvantage with the described apparatus which is suitable for producing complex printed products is that the production of simple printed products is inefficient since, even in the case of the production of such simple printed products, passage through all the product-processing stations provided on the processing drum has to take place, some or most of these product-processing stations not having to fulfil any function in the case of the production of such simple printed products and thus being switched off.

This results, on the one hand, in insufficient utilisation of the product-processing stations provided and, on the other hand, also in an unnecessarily prolonged production time, since the products have to pass through all the product-processing stations and thus must also go through an unnecessarily high number of rotations of the processing drum until, finally, they are guided away from the processing drum by the product-removal station located in the drum end region.

It is an object of the present invention, at least in the preferred embodiment to overcome or substantially ameliorate one or more of the disadvantages of the prior art. According to a first aspect of the invention, there is provided an apparatus for producing printed products comprising a plurality of part-products comprising:

a processing drum which is driven in rotation about an axis and includes at least two axially aligned individual portions with rests on which the part-products are positioned, the rests of the individual portions being in alignment with one another;

a product-feeding station which is arranged on a drum end region;

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a product-removal station which is spaced apart in the axial direction from said product-feeding station and is arranged on an opposite drum end region;

transporting means for transporting the product-parts from the product-feeding station to the product-removal station, the transporting means of the individual portions being coupled to one another;

at least two product-processing stations disposed between the product-feeding station and the product-removal station; and

at least one further product-removal station which can be selectively activated and deactivated, the at least one further product-removal station disposed between the two product-processing stations.

According to a second aspect of the invention there is provided a process for operating the above apparatus, comprising the steps of initially positioning part-products on the securing means, to the side of the rests, and subsequently, folded part-products are positioned in a straddling manner on the rests such that they cover over said part-products.

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By virtue of this measure according to the invention, a processing drum with the product-processing stations provided thereon can be used in the conventional manner for series operation for producing complex printed products, in this case the first part-products which are to be joined together with other part-products and the first part-products which are to be processed being fed to the processing drum via the product-feeding station which is arranged in the axial drum end region, whereupon, on passing through all the product-processing stations provided on the processing drum, they are joined together or processed with further part-products in order, finally, to be removed, as the finished product, from the product-removal station which is arranged in the opposite drum end region.

For the production of simple printed products there is provided, according to the invention, a further product-removal station which is arranged downstream of the product-processing stations which are required for producing said product and upstream of the product-processing stations which are not required for producing said product, as seen in the transporting direction, as a result of which an unrequired and time-consuming passage through the product-processing stations which are not required is avoided. In this manner, the time for producing simple printed products in an apparatus which is also suitable for producing complex printed products is considerably reduced.

In this arrangement, the further product-removal station can be activated if required, with the result that it can be put into operation for producing simple printed products and can be put out of operation for producing complex printed products.

In the case of a particularly preferred embodiment of the invention, a further product-feeding

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station is provided downstream of the further product-removal station and upstream of at least one product-processing station, as seen in the transporting direction.

This measure results in the fact that, in the case of the production of simple printed products and with the further product-removal station in the activated state, operation can be carried out in parallel, it being possible simultaneously to produce in each case one product by means of the product-processing stations which are arranged between the product-feeding station which is provided in the drum end region and the further product-removal station and by means of the product-processing stations which are arranged between the further product-feeding station and the product-removal station which is provided in the drum end region. In this manner, on the one hand, the time for producing a simple printed product can be considerably reduced and, on the other hand, the utilization of the product-processing stations which are provided on the processing drum may also be considerably improved since the parallel operation of two or more drum portions for the simultaneous production of a plurality of printed products avoids the situation where specific drum portions exhibiting a plurality of product-processing stations do not contribute in any way to the production of the product.

The invention is described hereinbelow, with reference to examples, with regard to the drawing, in which:

Figure 1 shows an apparatus according to the invention operating in parallel,

Figure 2 shows an apparatus according to the invention operating in series,

Figure 3 shows a possible embodiment of a saddle-like rest provided on a processing drum, and

Figure 4 shows a part-product which can be fed to an apparatus according to the invention.

The apparatus represented in Figure 1 comprises a processing drum 2 which is driven in rotation about a horizontal axis 1 and is made of a first portion 3 and of a second portion 4.

In this arrangement, the processing drum 2 exhibits a cylindrical core portion 5, on the outer surface of which there are arranged saddle-like rests 6 which are distributed uniformly in the circumferential direction and run parallel to the axis 1. Provided in that end region of the first portion 3 of the processing drum 2 which is directed away from the second portion 4 is a product-feeding station 7 by means of which folded individual products 8 are fed to the processing drum 2 in the direction of the arrow A and are deposited one after the other on in each case one rest 6 of the rotating processing drum 2.

Adjoining the product-feeding station 7 in the direction of the drum axis 1, offset with respect to the same, is a card adhesive-bonding station 9 to which cards 10 are fed in the direction of the arrow B and which bonds cards 10 adhesively onto the product 11.

Provided offset in the axial direction with respect to the card adhesive-bonding station 9 is a collecting station 12 in which folded products 13 are deposited in a straddling manner, in the direction of the arrow C, on the products 15 already provided with cards 10, adhesively bonded thereon.

The collecting station 12 is adjoined by a stapling station 16 which exhibits a rotary stapler 14 and by means of which the part-products which form the finished printed product 17 are stapled to one another on their common fold.

The rotary stapler 16 is adjoined by a product-removal station 18 in which the finished products 19 are seized by means of in each case one automatically actuable clamp 20a of a removal conveyor 20 and are raised from the respective rest 6. The

removal conveyor 20 conveys the products 19 away from the processing drum 2 tangentially in the direction of the arrow E.

All the stations which have been described up until now are arranged in the region of the first portion 3 of the processing drum 2.

That region of the portion 3 of the processing drum 2 which is provided with the product-removal station 18 is adjoined, in an axially aligned manner, by the portion 4 of the processing drum 2, the saddle-like rests 6, 6′ of the two portions 3, 4 of the processing drum 2 being circumferentially aligned with one another - this not being absolutely necessary in the mode of operation according to Figure 1 - with the result that a flush transition between the rests 6, 6′ of the two portions 3, 4 of the processing drum 2 is obtained.

The portion 4 of the processing drum 2 is, analogously to portion 3, provided with corresponding stations 7′, 9′, 12′, 16′ and 18′.

If the apparatus according to Figure 1 is set in operation, the two portions 3, 4, driven preferably via a common drive shaft 21, of the processing drum 2 begin to rotate synchronously. The two product-feeding stations 7, 7′ then begin to operate simultaneously, as a result of which individual products 8, 8′ are fed, for the purpose of further processing, to the two portions 3, 4 of the processing drum 2.

The rests 6, 6′ are provided in a known manner with transporting means (not shown) by means of which the products deposited on the rests 6, 6′ can be conveyed along said rests 6, 6′ in the direction of the drum axis 1. By virtue of the combination of this conveying movement, caused by the transporting means, with the rotation of the processing drum 2, the products deposited on the rests 6, 6′ describe an essentially helical path, indicated by the arrows D, D′, about the drum axis 1, said products being

displaced, during one revolution of the drum, in the drum-axis direction in each case by the distance provided between two adjacent stations, with the result that, per revolution of the processing drum 2, in each case one processing operation can be carried out on each product located in the apparatus. The products are not pushed forwards in the region of the feeding stations and processing stations 9, 12, 16, 7′, 9′, 12′, 16′.

Consequently, these products pass, on the movement path mentioned, through all the stations 9, 12, 16 and 9′, 12′, 16′ provided on the respective portion 3, 4 of the processing drum 2, whereupon, at the respective product-removal stations 18, 18′, they are conveyed away, as finished product 19, 19′, by the removal conveyor 20, 20′ from the respective portion 3, 4 of the processing drum 2 in the direction of the arrows E, E′.

Accordingly, by means of the apparatus described, two identical products can be simultaneously produced on in each case one portion 3, 4 of the processing drum 2, all the stations provided on the processing drum 2 being constantly in operation and being utilized. In this manner, all the stations are utilized to the optimum extent and the production time necessary per product is reduced to a minimum.

This parallel operation, which is favourable from a commercial viewpoint, of an apparatus according to Figure 1 is made possible according to the invention in that there is provided a further product-removal station 18 between the two product-processing stations 16 and 9′ and a further product-feeding station 7′ which is arranged downstream of said product-removal station 18 and upstream of the product-processing station 9′.

For parallel operation, it is not absolutely necessary to drive the two portions 3, 4 of the processing drum 2 synchronously, in particular via a

common shaft 21, since the two portions 3, 4 may also be driven by different drive elements, different rotational speeds of the two portions 3, 4 also being possible.

Corresponding to the division of the processing drum 2 into two portions 3, 4, said drum may also be subdivided into three or more portions, correspondingly further product-removal stations and product-feeding stations then also having to be provided at the respective end regions of the individual portions.

The individual product-processing stations 7, 9, 12, 16, 7', 9', 12', 16' provided on the processing drum 2 can be optionally activated or deactivated in order thus to be able to produce different products.

Furthermore, it is not absolutely necessary to operate the stations of the first portion 3 and of the second portion 4 of the processing drum 2 in the same manner in order to produce identical products; rather, it may, in specific cases, be desirable to provide the individual drum portions 3, 4 with different stations and/or to activate different stations on the individual portions 3, 4 in order, in this manner, simultaneously to be able to produce different products on each of the two portions 3, 4. A process of this type is of interest, in particular, for the regionalization of daily or weekly newspapers since, in this arrangement, specific parts of the product to be produced are the same for all regions and other parts, depending on the specific region of the product produced, are different. Such printed products which are regionally different, but identical with respect to specific parts can be produced particularly advantageously, by means of an apparatus according to the invention, in parallel operation according to Figure 1.

The apparatus represented in Figure 2 corresponds to an apparatus according to Figure 1, for

which reason, for better clarity, not all the reference numerals are drawn in in the representation according to Figure 2.

In series operation, shown in Figure 2, of an apparatus according to the invention, it is essential that the two portions 3, 4 of the processing drum 2 are either fixedly connected to one another by mechanical means via the gap 22, which is formed between them on the end sides, or - if such a connection is not provided - are activated by two synchronously running drives. In this arrangement, the two portions 3, 4 have to be located in such an angular position with respect to one another that the saddle-like rests 6, 6' of the two portions 3, 4 are in alignment with one another.

Furthermore, the transporting means (not shown) of the two portions 3, 4, by means of which the products are pushed or pulled in the direction of the axis 1 via the rests 6, 6', have to be coupled to one another in such a manner that the products can be conveyed from a rest 6 of the portion 3, via the gap 22, to a rest 6' of the portion 4. In this manner, it is made possible for the products which have already been processed in the region of the portion 3 to be subsequently further processed in the region of the portion 4.

For series operation represented in Figure 2, it is important that the further product-removal station 18, and thus also the removal conveyor 20, is at rest, with the result that, during series operation, the products are not conveyed away in the end region of the portion 3, but only in the end region of the portion 4, by the removal conveyor 20' at the product-removal station 18'.

The station 7' serving, in parallel operation according to Figure 1, as product-feeding station to the second portion 4 is, in the case of series operation according to Figure 2, operated just as in the case of parallel operation, with the difference

that, in series operation, it acts as a collecting station which positions additional part-products on products which have already been processed in the region of the portion 3.

Since, in series operation, a greater number - in the example according to Figures 1 and 2, double the number - of product-processing stations is available per product produced, considerably more complex products can be produced in series operation than in parallel operation. In the case of series operation, all, or only some of, the product-processing stations provided on the various portions of the processing drum can be used one after the other for processing and producing an individual product. In this arrangement, the individual product-processing stations may, as required, be engaged or disengaged.

By means of an apparatus according to the invention, both simple and complex printed products can thus be produced rapidly and cost-effectively. Moreover, existing systems comprising, for example, only one processing-drum portion can be readily expanded to a system comprising a plurality of processing-drum portions, as a result of which the variability and efficiency of the entire system can be increased, it being possible not to scrap existing apparatuses, but to utilize them further in conjunction with the system expansion. This modularity obtained upon dividing the processing drum into a plurality of portions opens up to the user a considerably higher degree of flexibility in planning and possible subsequent expansion of the apparatuses required by said user for producing printed products.

Figure 3 shows a saddle-like rest 6" as can be used in an apparatus according to Figures 1 and 2.

The rest 6" is provided on one side with a profile rail 24 which is fastened on an angle element 23, extends parallel to the saddle 25 of the rest 6"

and forms a receiving region for products 26, 26', 26" which are to be inserted.

The product represented at 27 comprises a single-part or multiple-part individual product, which bears on the profile rail 24, to the side of the rest 6", and is optionally folded, as well as a folded product 28 which is deposited on the rest 6", over said individual product 26, and has a card 29 adhesively bonded on it. The intermediate product 26, 28, 29 made up in this manner is transported, by a linearly movable pusher 30, in the direction of the arrow F.

At 31, a further product 32 is deposited over the product 28 from a collecting station (not shown) in the direction of the arrow G. Beneath the product 32 is thus located, at 31, the product 28 which cannot be seen and is provided with the card 29 which is adhesively bonded on it and is represented in broken lines at 31.

The product which is joined together in this manner is then transported further in the direction of the arrow F until, at 33, two staples 34, 35 are provided on the common fold of the products 28, 32 by means of a stapling station (not shown).

The representation in Figure 3 is intended to clarify that an apparatus according to the invention may also be used to produce end products in the case of which the inner part-products are not only collected, as is shown in Figure 1, but are also, at least in part, inserted or collated.

Represented in Figure 4 is an individual product which can be processed by an apparatus according to the invention and is provided, as a 2-fold product 36, with an end-side fold 37 and a fold 38 which, in the event of individual products 36 being collected on a rest 6, 6', 6", comes to lie on the saddle 25 according to Figure 3. By means of an apparatus according to the invention, apart from part-products which have been folded once, so-called

tabloids, 2-fold products may thus also be processed, i.e. collected and provided with cards and the like.

The foregoing invention provides an apparatus of the type mentioned in the introduction such that the production of simple printed products and the production of complex printed products can be carried out economically with one and the same apparatus. In this arrangement, in particular the utilization of the product-processing stations provided is intended to be increased and the production time for simple printed products is intended to be reduced.

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THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. Apparatus for producing printed products comprising a plurality of part-products comprising:

a processing drum which is driven in rotation about an axis and includes at least two axially aligned individual portions with rests on which the part-products are positioned, the rests of the individual portions being in alignment with one another;

a product-feeding station which is arranged on a drum end region;

a product-removal station which is spaced apart in the axial direction from said product-feeding station and is arranged on an opposite drum end region:

transporting means for transporting the product-parts from the product-feeding station to the product-removal station, the transporting means of the individual portions being coupled to one another;

at least two product-processing stations disposed between the product-feeding station and the product-removal station; and

at least one further product-removal station which can be selectively activated and deactivated, the at least one further product-removal station disposed between the two product-processing stations.

2. Apparatus according to claim 1, further comprising a further product-feeding station disposed downstream of the further product-removal station and upstream of at least one product-processing station, as seen in the transporting direction.

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3. Apparatus according to Claim 2, wherein all the portions of the processing drum can be activated by a single drive element, in particular via a common drive shaft.

4. Apparatus according to Claim 2, wherein portions of the processing drum can be activated by different drive elements which can be synchronised with one another.

5. Apparatus according to one of the preceding claims, wherein individual product-processing stations or all the product-processing stations can be activated and/or deactivated in accordance with the type of products to be processed.

6. Apparatus according to one of Claims 2 to 5, wherein the further product-feeding station is arranged directly downstream of the further product-removal station, as seen in the transporting direction.

7. Apparatus according to one of Claims 2 to 6, wherein mutually corresponding product-processing stations are arranged, in particular in the same sequence, between the drum-end-side product-feeding station and the further product-removal station and between the further product-feeding station and the drum-end-side product-removal station.

8. Apparatus according to one of the preceding claims, wherein an insertion region is formed in each case between two saddle-like rests, which are adjacent in the circumferential direction of the processing drum.

9. Apparatus according to Claim 8, wherein the saddle-like rests of the processing drum are each provided on one side with a securing means which runs in the axial direction, preferably a profile rail for receiving products which are to be inserted.

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10. Process for operating the apparatus according to Claim 9, comprising the steps of initially positioning part-products on the securing means, to the side of the rests, and subsequently, folded part-products are positioned in a straddling manner on the rests such that they cover over said part-products.

11. An apparatus for producing printed products substantially as herein described with reference to any one of Figures 1 to 3 of the accompanying drawings.

12. A process for operating an apparatus for producing printed products substantially as herein described with reference to any one of Figures 1 to 3 of the accompanying drawings.

DATED this 28th day of November, 1997

FERAG AG

Attorney: JOHN B. REDFERN
Fellow Institute of Patent Attorneys of Australia
of SHELSTON WATERS

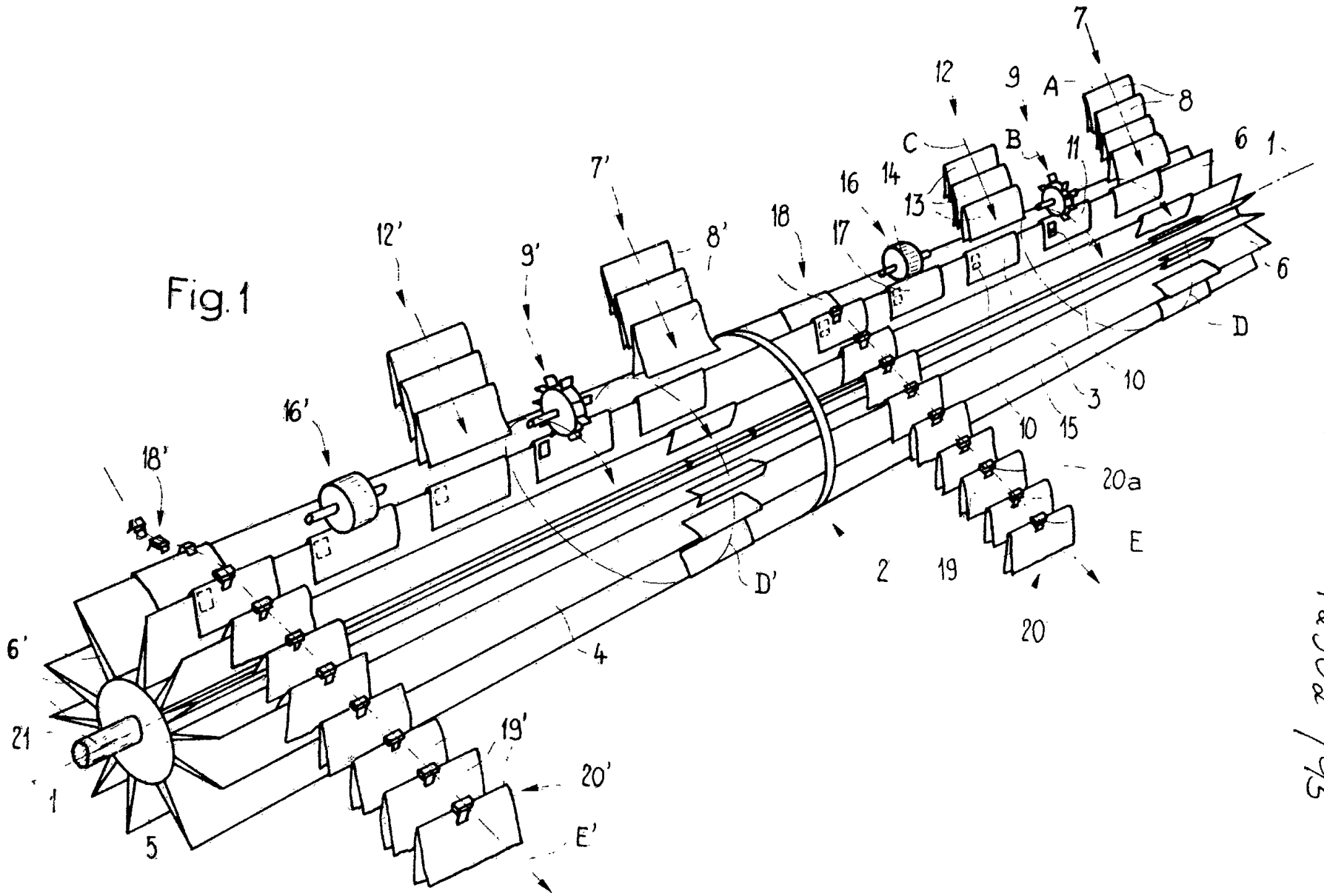
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ABSTRACT

The apparatus for producing printed products comprising a plurality of part-products, for example newspapers, periodicals and the like, exhibits a processing drum (2) which is driven in rotation about an approximately horizontal axis (1). Said processing drum is provided with saddle-like rests (6) which are distributed uniformly in the circumferential direction and run essentially parallel to the axis (1), and with transporting means for transporting the products along the saddle-like rests (6) from a product-feeding station (7) which is arranged in the axial drum end region to a product-removal station (18') which is spaced apart in the axial direction from said product-feeding station and is arranged in the opposite drum end region. Provided between the product-feeding station (7) and the product-removal station (18') are at least two product-processing stations, in particular stations for the purposes of collecting, inserting, collating, stapling, adhesively bonding cards, gluing, cutting (12, 7', 12', 16, 16', 9, 9') and/or the like. Provided between two product-processing stations (16, 9') which are spaced apart from one another in the axial direction, and thus also between the product-feeding station (7) which is arranged in the drum end region and the product-removal station (18') which is arranged in the opposite drum end region, is at least one further product-removal station (18) which can be optionally activated or deactivated, this making it possible for the portions (3, 4), which are separated from one another by this further product-removal station (18) and belong to the processing drum (2), to be able to operate in parallel with respect to one another or in series.

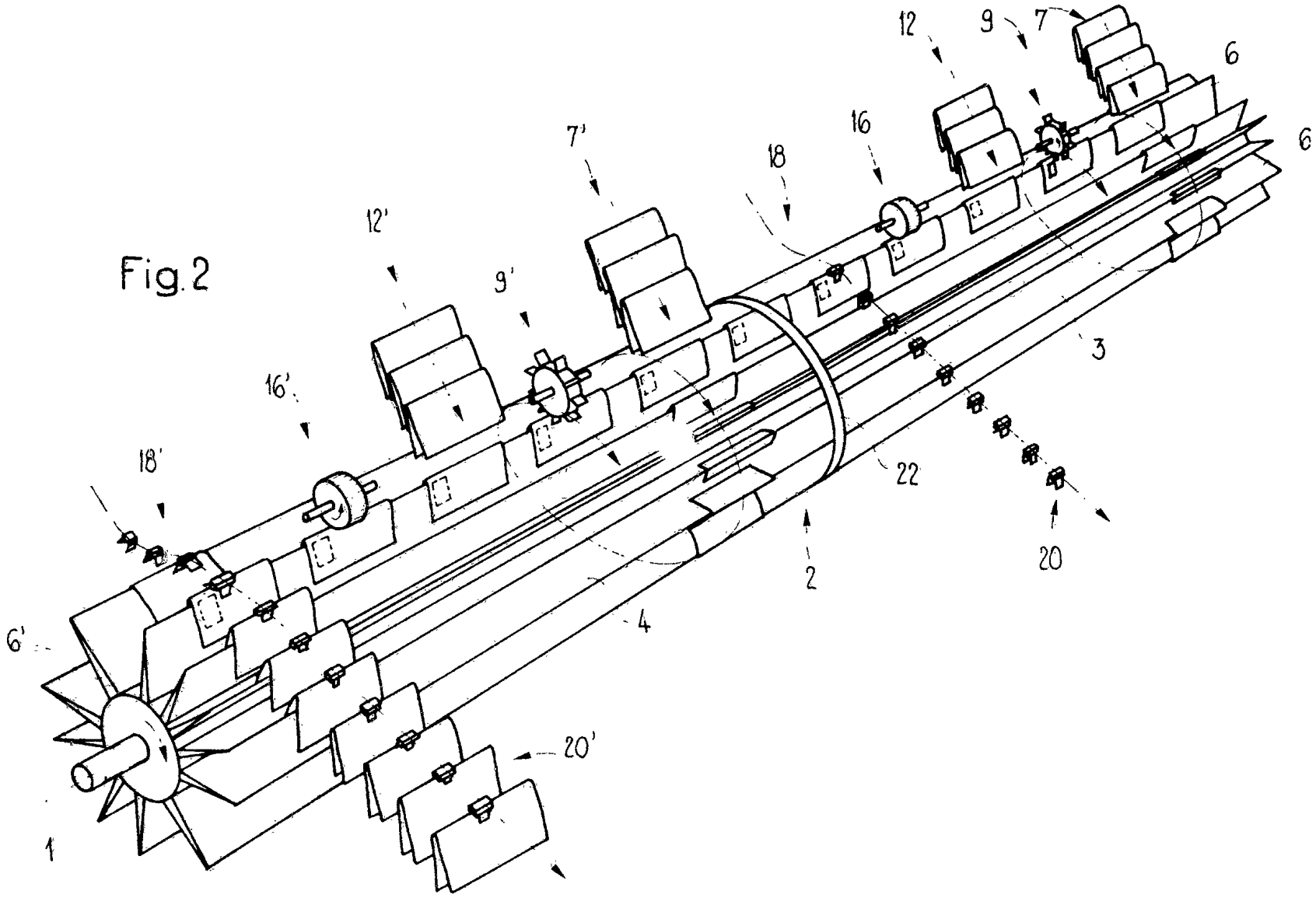
(Figure 1)

Fig.1



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Fig.2



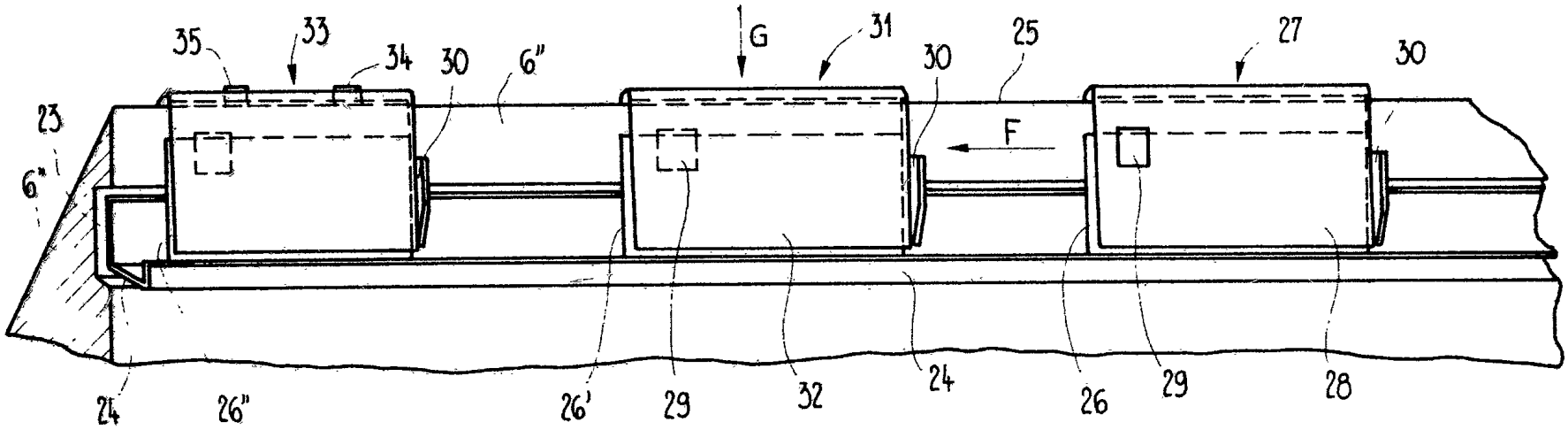


Fig.3

Fig.4

