United States Patent

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[72] Inventor **Walter Reist**
Hinwil, Switzerland

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[73] Assignee **Ferag, Fehr & Reist AG**
Hinwil, Zurich, Switzerland
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[33] **Switzerland**
[31] **1591/68**

[54] **APPARATUS FOR OPENING FOLDED ARTICLES, SUCH AS NEWSPAPERS**
6 Claims, 4 Drawing Figs.

[52] **U.S. Cl.** **270/54**
[51] **Int. Cl.** **B65h 39/02**
[50] **Field of Search** 270/55, 57

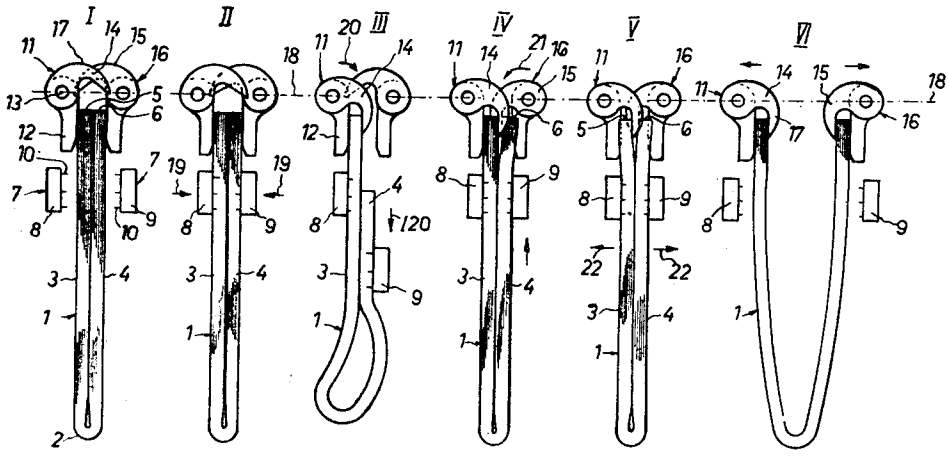
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Primary Examiner—Lawrence Charles
Assistant Examiner—L. R. Oremland
Attorney—Waters, Roditi, Schwartz & Nissen

ABSTRACT: Apparatus for opening folded newspapers which arrive from a printing press in imbricated succession and are separated into single copies, comprises conveyor means to carry the folded copies along in spaced relation. Opposite gripping jaws are provided to grip the two folded halves of the newspapers and cause a sliding movement of the two halves relative to each other in a direction at right angles to the fold to expose one edge portion of the folded newspaper while further gripping jaws grip the exposed edge portion and the edge portion of the other half of the folded newspaper. The gripping jaws are attached to endless conveyor means to move along with the moving newspapers and are controlled to open the two halves of the newspapers, while further conveyor means supply enclosures or supplemental sheets to be slipped laterally into the opened newspapers.



2 Sheets-Sheet 1

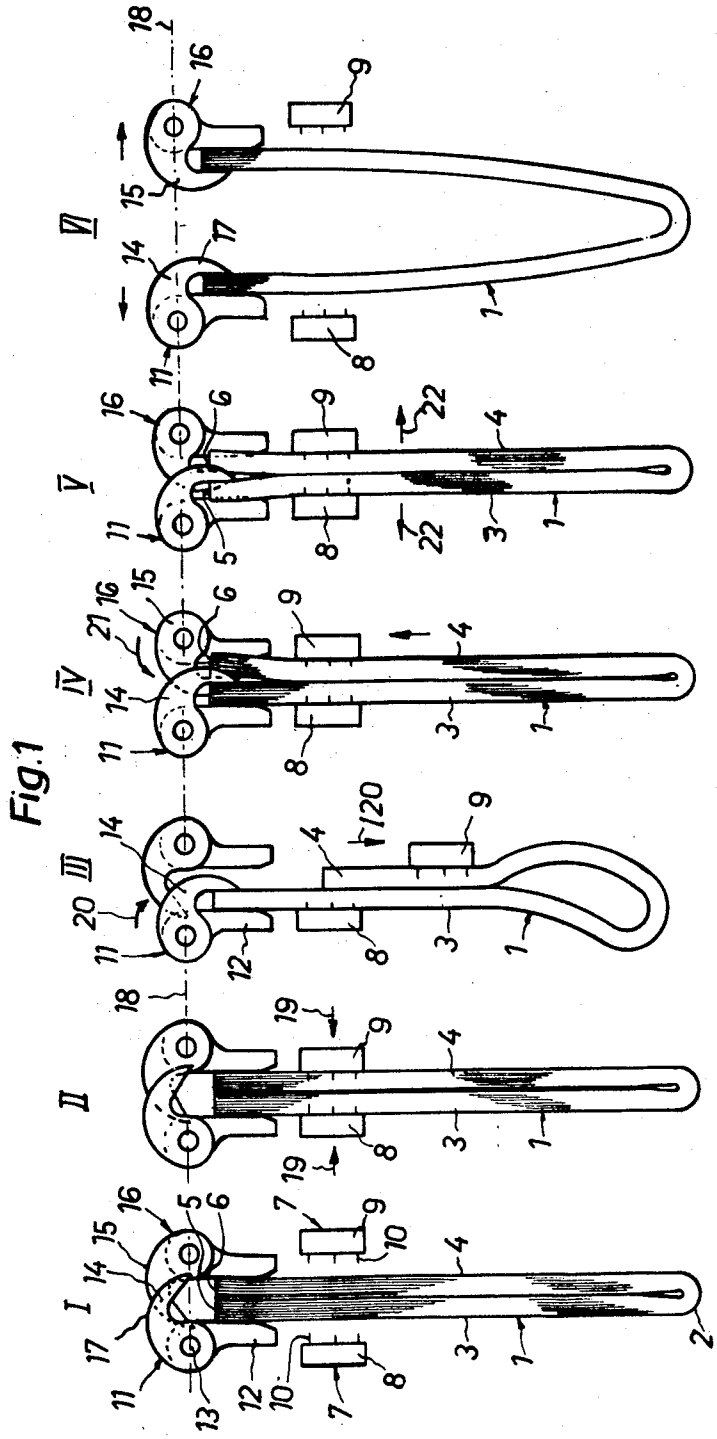


Fig.1

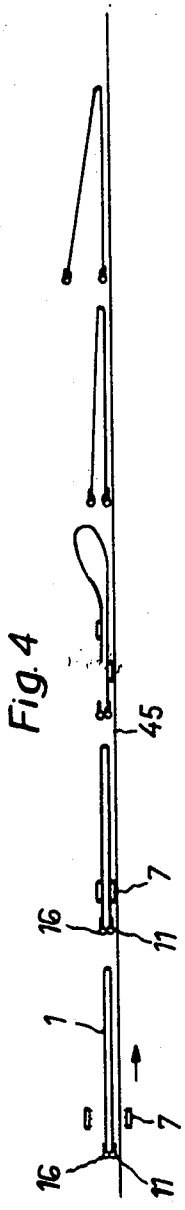


Fig.4

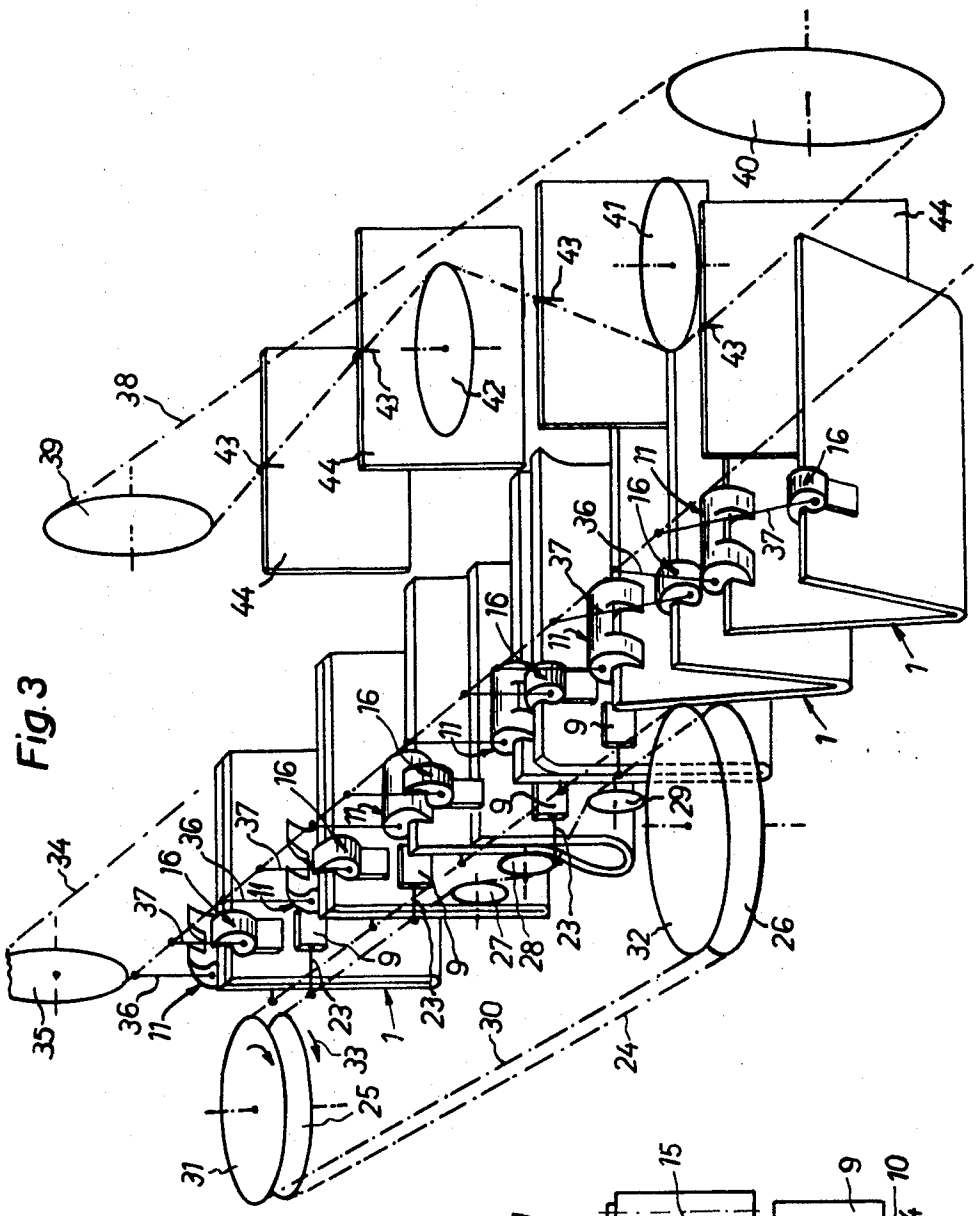


Fig. 3

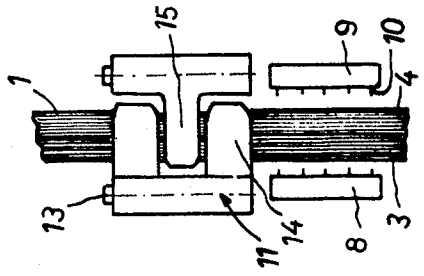


Fig. 2

APPARATUS FOR OPENING FOLDED ARTICLES, SUCH AS NEWSPAPERS

The present invention relates to a device for opening folded articles. The expression "folded article" is intended to include, for example, one or more sheets of paper folded together, as well as other folded products.

The invention has, as a basis, the idea of employing an inherent mechanical property of the folded article which is to be opened, namely the stiffness of each side of the folded article and its resilience in the region of the crease or fold, to assist the opening process.

The present invention consists in apparatus for opening folded articles, such as newspapers, comprising a first gripper having a pair of gripping jaws provided with means for gripping both halves of the folded article at a zone remote from the fold of the article, said gripping jaws in article gripping position being movable relative to each other in the plane of the folded article to shift said halves of the folded article and expose the edge portion of one of said halves, and a second gripper adapted to grip said edge portion of the article exposed by the relative movement of said halves.

The invention further consists in a production line having a device as defined in the preceding paragraph for handling folded articles arriving in an overlapping or imbricated stream, the arriving folded articles being separated from one another and relayed onwards, wherein the grippers and jaws are moved along with the thus relayed individual folded articles, the grippers being opened after the jaws have closed.

In the accompanying drawings:

FIG. 1 schematically illustrates the essential elements of one embodiment of the invention, in various phases of movement, viewed at a narrow side of the product;

FIG. 2 is a plan view of part of the embodiment of FIG. 1 in the phase of movement shown at the left in said FIG.;

FIG. 3 is a perspective illustration of a section of a production line for printed products which contains the embodiment of the device shown in FIG. 1, which section is one in which the opened products are simultaneously provided with an enclosure or a supplemental sheet or sheets; and

FIG. 4 schematically illustrates a modification in which successive products are located substantially in one plane.

In carrying the invention into effect in one convenient mode by way of example, the drawings show in FIGS. 1 and 2, a newspaper 1 consisting of several individual sheets, folded at 2 so that two superimposed pages 3 and 4 are produced whose edges 5, 6 opposite the fold 2 are flush with one another. The device illustrated schematically in FIG. 1 has a gripper 7 mounted for coaction with the portion of the folded sheet 1 remote from the fold 2. Each gripper 7 comprises two jaws 8 and 9 whose opposite gripping faces are provided with points 10 facing towards the newspaper 1. As the sequence of phases I—VI illustrated in FIG. 1, shows, these grippers 7 and 8 can move into the closed position (phase II) and in the closed position then can move relative to one another in the plane defined by the face of newspaper 1 (phase III), either towards or away from the fold 2.

Associated with the gripper 7 is a second gripper 11 whose jaw opening receives edge 5 of the newspaper 1. The gripper 11 also comprises two jaws 12 and 14. The jaw 12 is stationary and the other jaw 14 is pivotally mounted at 13 on jaw 12. Jaw 14 is somewhat beaklike.

As FIG. 2 shows, the jaw 14 is forked and in the space between the two parts of the jaw 14 there engages a jaw 15 of another gripper 16 of similar structure as the gripper 11.

The back 17 of the jaw 14 is wedge-shaped in form and accordingly fulfills an additional function which will be described in greater detail hereinafter in relation to phase IV.

FIG. 1 does not show the mechanisms for operating the grippers 7, 11 and 16. It is within the scope of those skilled in the art to contrive the requisite operating mechanism, either by using cam-operated or slide-operated linkages or, for example, where the grippers 11 and 16 are concerned, using toothed segments and racks.

The phases I to VI shown in FIG. 1 can represent the sequential action of a single device with a single set of grippers and jaws or can show the action of a device having a plurality of sets of grippers and jaws attached one behind the other to a conveyor system which is indicated by a broken line 18.

The operation of the apparatus will be described with reference to the phases I to IV in FIG. 1. In starting position (phase I) the newspaper 1 is located between the open jaws of grippers 7, 11 and 16. It is held in position there by other means which have not been shown. Then (phase II), the grippers 7 are closed as indicated by the arrows 19. In so doing, the points 10 on the two jaws 8 and 9 penetrate the opposite pages or set of pages 3 and 4 of the newspaper 1. In the phase III, the jaw 9 is displaced relatively to the jaw 8 in the direction of the arrow 120. In so doing, the set of pages 4 of the newspaper is carried along with it causing the fold 2 of the newspaper 1 to belly out more or less as indicated. It has been shown that even where the points 10 on the jaws 8 and 9 only penetrate through part of the sets of the pages 3 or 4, in phase III the entire set of pages 4 is nevertheless displaced and thus exposes the entire upper portion of sheet 3. The explanation for this result probably lies in the fact that because of the resilience of the paper being bent at the fold 2, the fold has the tendency to force the two halves 3 and 4 apart and at any rate to reduce the friction between the two immediately contacting pages of the sets of pages 3 and 4.

Whereas during phases I and II, both grippers 11 and 16 were held open, at the end of phase III gripper 11 closes, the jaw 14 swinging in the direction of the arrow 20 towards the jaw 12 and thus gripping the page or sets of pages 3 exposed by the relative displacement of jaws 8 and 9.

At the beginning of phase IV, jaw 8 returns to its former position opposite jaw 9. In so doing, the edge 6 of the page 4 runs onto the wedge-shaped back of jaw 14, and is thus lifted away from the page 3 and consequently gripped by jaw 15 of the gripper 16, which then closes in the direction of the arrow 21 towards the other jaw 9.

This results in the position shown in phase V. The edges 5, 6 of the two pages 3, 4, and therefore the whole newspaper 1, are held by the grippers 11, 16 so that the jaws 8, 9 of the grippers 7 can be opened again in the direction of the arrows 22. The grippers 11, 16 (as indicated in phase VI), are then moved apart while remaining in the closed position, so that the newspaper 1 now is open.

Making reference to FIG. 3, the practical use of the described device in the course of a production line handling printed products shall now be explained.

FIG. 3 illustrates a succession of four grippers 7, from each of which only the jaw 9 is visible. These jaws 9 are connected by articulating links 23, schematically indicated by a line, to an endless conveyor, e.g. a chain 24, which passes around chain wheels 25, 26 with their axles vertically disposed, and guide rollers 27, 28, 29 with their axles horizontally disposed.

The jaws 8 of the grippers 7 (concealed) are likewise connected to another endless chain 30 by articulating links, the chain 30 passing around chain wheels 31 and 32 with their axles vertically disposed. The chains 24 and 30 are driven synchronously in the direction of the arrow 33 and, with the exception of the section of chain 24 which passes around the rollers 27, 28, 29, are substantially parallel with one another.

Connected to a further endless conveyor, e.g. to the chain 34, which passes around chain wheels with their axles horizontally disposed (only the wheel 35 being visible), are the grippers 11 and 16 (six each being visible), the connection being a suspension arrangement involving an articulating mechanism 36, 37.

Slides, which have not been shown, are provided in order to operate the jaws of the sets of jaws 11, 16 at the proper time when they pass the section of the line defined by the chains 24, 30 and to separate the grippers 11, 16 from one another.

There extends up to the indicated section of the production line, an additional conveyor 38 which passes about two wheels 39, 40 with their axles disposed horizontally and is also passed

around two rollers 41, 42 with their axles disposed vertically, at intervals approximately corresponding to those between the sets of grippers 11, 16 on the chain 34, the conveyor 38 carries mechanically operable grippers 43 each of which holds an enclosure or supplemental sheet 44 intended for insertion into the newspaper 1.

As the illustration shows, the path of the chains 34 and 38 is so contrived that the enclosures 44 are slid laterally into the newspaper 1, as soon as the latter are opened. At the roller 41, the gripper 43 is opened so that the enclosure 44 is released by the conveyor 38. The newspaper now contains the appropriate enclosure.

FIG. 3 does not illustrate the feed devices for the newspaper 1 and for the enclosures 44, which devices precede the chains 34 and 38, and neither does it show the output of the illustrated section of the production line.

Any conventional conveyor devices can be used for this purpose, as long as they are able to separate the newspapers arriving in imbricated succession into single copies and to position these copies upright as described with reference to FIG. 3, so that the fold is directed downwardly. Also the delivery end of the section of the production line shown in FIG. 3 can be followed by a conventional conveyor device which reestablishes the original imbricated formation of newspapers with the fold forming the leading edge.

Of course, the device illustrated is not limited to operation in connection with products which are fed in upright or suspended fashion. In FIG. 4, an embodiment has been illustrated in which the newspaper 1, originally arriving in overlapping, imbricated formation, have been separated by a conveyor belt 45 operating at a higher speed, into a formation with individual copies lying flat on the belt. Both the grippers 7 with the point-carrying jaws, and the grippers 11 and 16, are moved parallel and synchronously with this conveyor belt, these jaws, during the period of dwell in relation to the conveyor belt 45, acting in the manner aforedescribed in relation to each individual printed item, i.e. opening each one of said items to an extent such that an enclosure can be slid or projected in between the opened newspapers, for example.

I claim:

1. Apparatus for opening folded articles, such as newspapers, comprising a plurality of first grippers each

adapted for receiving a folded article and each including a pair of gripping jaws provided with means for gripping both halves of a folded article at a zone remote from the fold of the article, one of said gripping jaws having means for moving said jaw relative to the other jaw in a plane parallel to the plane of the folded article such that one half of the folded article will be offset with respect to the other half, and a plurality of second grippers each adapted to grip the edge portion of the half of the article exposed by relative movement of said halves, each said second gripper including a pair of jaws adapted to grip the opposed faces of said exposed edge portion of said exposed half of the respective folded article, one of said second gripper jaws having a wedge-shaped back arranged to allow the edge portion of the second of said halves of the folded article to ride up said back when said edge portion of the second of said halves has been released by the associated first gripper and is shifted back to overlie the exposed portion of said one of the halves of the folded article, and endless circulating conveyor elements connected to the first and second grippers to operate the same in synchronism.

2. Apparatus as claimed in claim 1 comprising a plurality of third grippers each associated with a second gripper and each including a pair of gripping jaws adapted to grip the edge portion of the second half of a respective folded article after movement thereof up said wedge-shaped back of said one jaw of an associated second gripper.

3. Apparatus as claimed in claim 1, wherein the gripping jaws on said first grippers comprise points projecting towards the folded article.

4. Apparatus as claimed in claim 1, wherein said first grippers are adapted to be moved relatively to one another in the article gripping position, at right-angles to the fold in the folded article.

5. Apparatus as claimed in claim 1, wherein said first grippers are so arranged that their gripping areas engage the folded article in the region of one of the two corners remote from the fold.

6. Apparatus as claim in claim 1, in which one gripping jaw of said first grippers and the other gripping jaw of said first grippers respectively are attached to two distinct endless conveyor elements circulating in substantially parallel direction.