

United States Patent

[11] 3,545,371

[72] Inventor Walter Reist
Hinwil, Zurich, Switzerland
[21] Appl. No. 731,855
[22] Filed May 24, 1968
[45] Patented Dec. 8, 1970
[73] Assignee Ferag, Fehr & Reist AG
Zurich, Switzerland
[32] Priority May 26, 1967
[33] Switzerland
[31] No. 7460/67

[50] Field of Search..... 100/155,
160, 176; 29/121, 121(A), 124, 125; 72/180;
156/594; 101/23

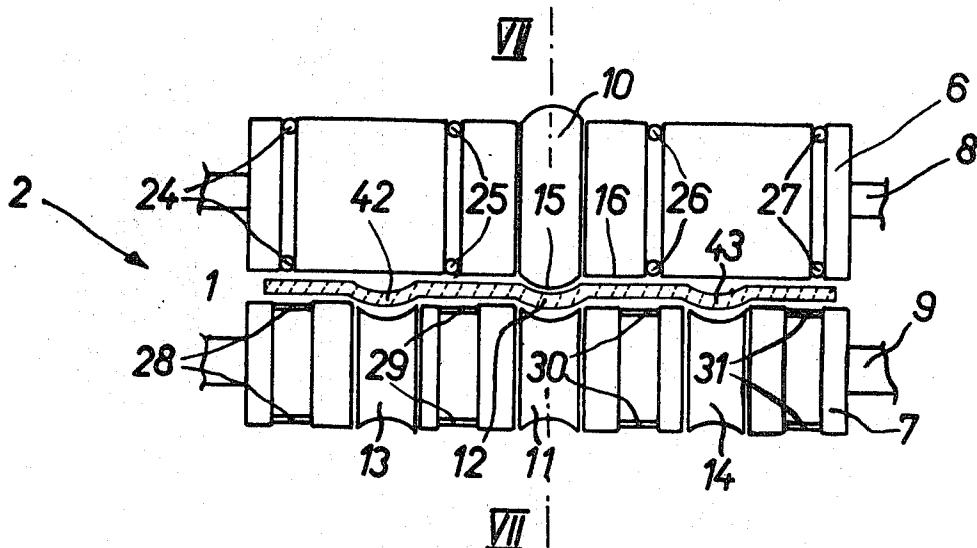
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Primary Examiner—Edward L. Roberts
Attorney—Waters, Roditi, Schwartz & Nissen

[54] DEVICE FOR THE PRESSING OF FLEXIBLE
SHEETS ARRIVING IN A CONTINUOUS STREAM
11 Claims, 7 Drawing Figs.
[52] U.S. Cl..... 100/176;
29/121, 29/125; 72/180; 101/23; 156/594
[51] Int. Cl..... B30b 3/04

ABSTRACT: A device for pressing flexible sheets, particularly newspapers, during conveyance of the same in a continuous overlapping or imbricated succession comprises a pair of upper and lower rollers between which the overlapping or imbricated formation of newspapers is passed, each roller having a freely rotatable roller section, the two sections being provided with mating bead and channel profiles adapted to impress a corrugation into the newspapers passing therebetween.



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Fig. 1

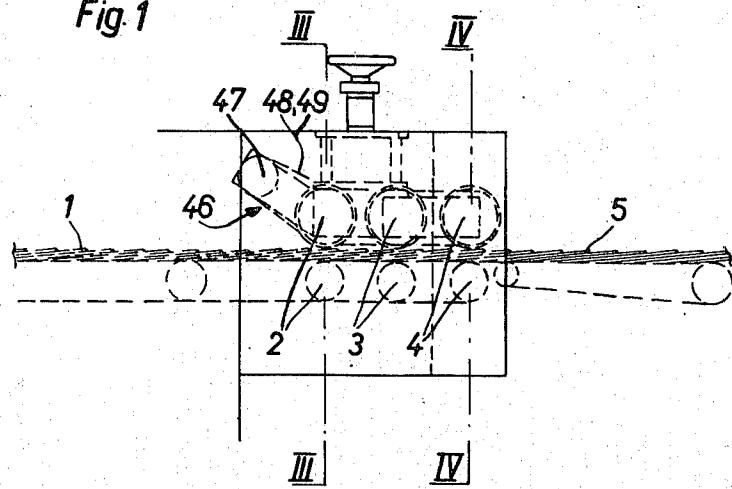
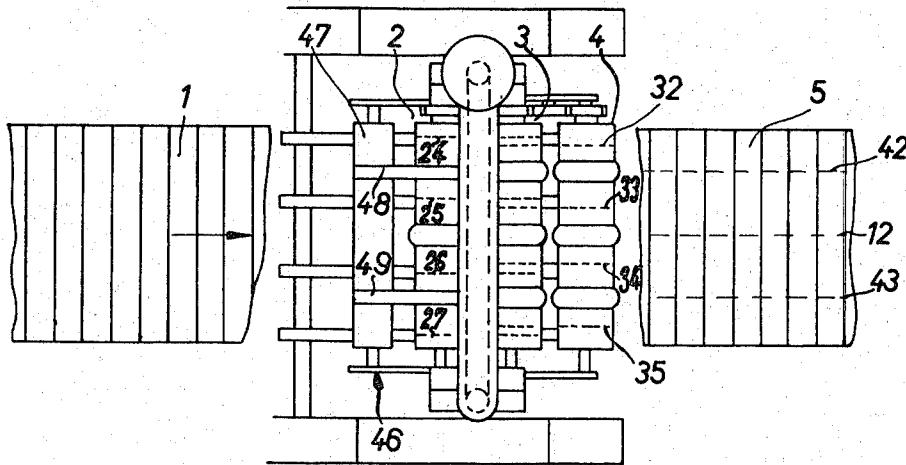


Fig. 2



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Fig. 3

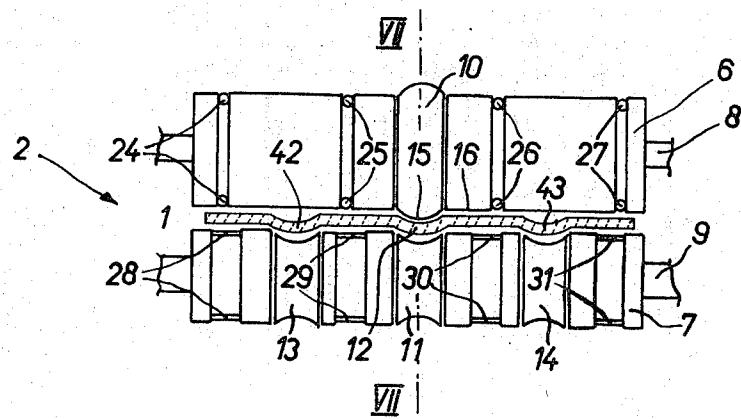
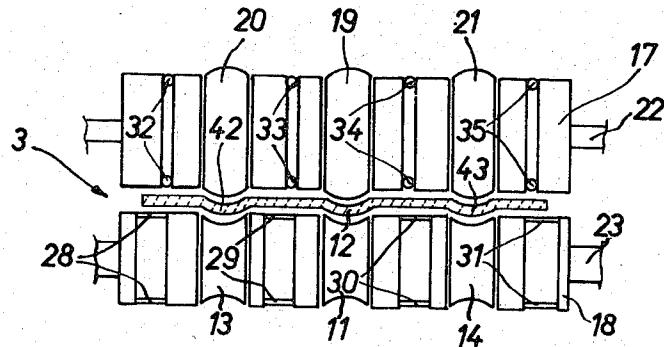


Fig. 4



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Fig.5

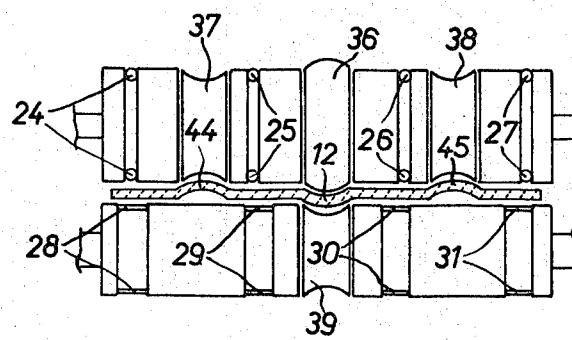
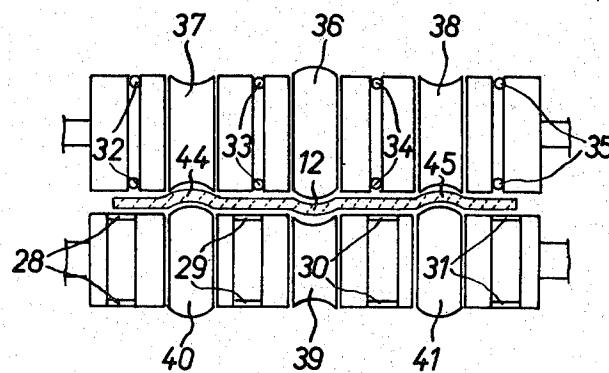


Fig.6

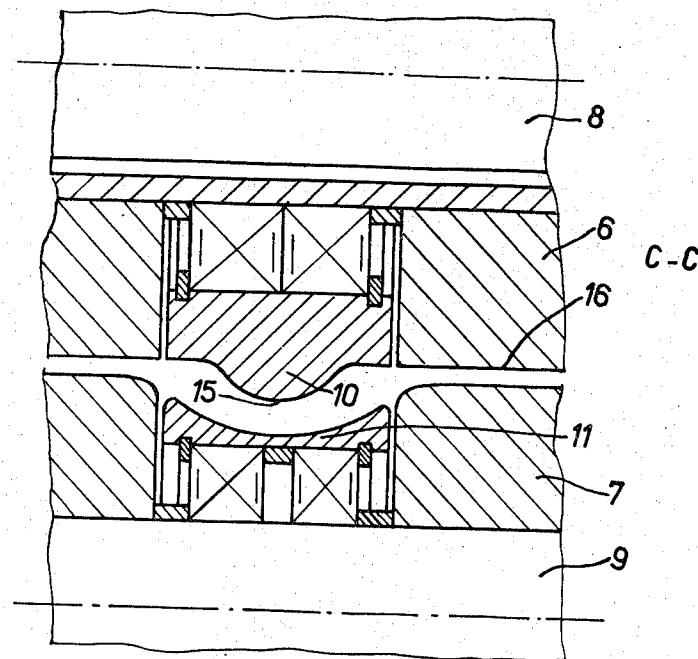


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Fig. 7



DEVICE FOR THE PRESSING OF FLEXIBLE SHEETS ARRIVING IN A CONTINUOUS STREAM

The present invention relates to a device for the pressing of flexible sheets arriving in a continuous stream, particularly of folded printed products arriving in an overlapping or imbricated succession, having at least one pair of rollers passing the stream between themselves, wherein the generatrix of at least the one roller has at least one roller section deviating from the straight line and in which at least one of the rollers is driven.

Such devices are particularly known in connection with newspaper conveyor systems and serve, with a stream of newspapers or periodicals arriving mainly in imbricated or overlapping formation, first to drive out the air from the folding operation still contained in the newspapers or periodicals, in addition to improve the fold already present, i.e. to impress it. Moreover, pressing devices of the said kind are known which, in addition, impress corrugate channels running in the direction of conveyance on the individual a newspapers in order, by this means, to stiffen it in the direction of conveyance and to give to the conveyed stream in this way a form lateral coherence which, at the subsequent handling points, is conductive to, for example, the improvement of numerical exactness, of the separation operation, of the stacking in parcels and also of the alignment in the stack etc.

The known devices have usually the disadvantages that the parts effecting the corrugate channels in the newspaper, e.g. the so-called channelling rollers frequently damage the newspaper itself or smudge the print print.

It is the object of the invention to provide a device for pressing flexible sheets arriving in a continuous stream in which the said disadvantages are largely avoided.

This is attained according to the invention in that said roller sections having a generatrix deviating from a straight line are mounted freely rotatable about the roller arbor.

Conveniently, the outer surfaces of the roller sections of said pair of rollers are complementary to one another, and formed by a ring having a convex outer surface for one roller of the pair and by a ring having a complementary concave outer surfaces for the other roller of the pair, conveniently at least one pair of complementary rings being arranged median longitudinally on a pair of rollers.

By this means, several successive roller pairs can be provided with differently arranged roller sections and joined together by means of rotating endless guide members.

The invention will now be described with reference to the accompanying drawings, which illustrate the invention but in no restrictive sense.

FIG. 1 shows a diagrammatic side-elevation of a device for pressing a stream of newspapers.

FIG. 2 is a plan view of the device according to FIG. 1,

FIG. 3 is an elevation of the first roller pair in section along the line III-III in FIG. 1,

FIG. 4 is an elevation of the second and third roller pairs in section along the lines IV-IV in FIG. 1,

FIG. 5 is a view in elevation of another embodiment of a first roller pair,

FIG. 6 is a view in elevation of the second and third roller pair belonging to the first roller pair according to FIG. 5,

FIG. 7 is a fragmentary sectional view of a convex and concave ring arrangement along the line VII-VII in FIG. 3.

FIG. 1 is a diagrammatic side-elevation of a pressing device for a continuously arriving, loose stream 1 of newspapers. The stream 1 runs in an overlapping, imbricated formation into the device, wherein it is first fed through a first roller pair 2, then through a second roller pair 3 and finally through a third roller pair 4 which compresses the newspapers at each stage and, by means of channelling rollers, is provided with a corrugate channel running in the direction of conveyance, whereby the stability of the overlapping conveyor stream is improved, so that this as stream 5 at the right in FIG. 1 leaves the device in a relatively flat compressed condition and provided over its whole length with at least one longitudinally running channel

and consequently largely protected against lateral displacement of individual newspapers.

FIG. 2 shows the same arrangement diagrammatically in plan view with three channels 12,42,43 shown by dotted lines in stream 5.

In FIG. 3 and 4 are represented the roller pairs 2,3 and 4 wherein FIG. 3 shows the first roller pair 2 and FIG. 4 the second and third roller pairs 3 or 4. The first roller pair 2 consists of an upper roller 6 and a lower roller 7, the two generatrices of which are maintained at a definite distance from one another by a suitable mounting of the shafts 8,9. Both rollers 6 and 7 have a basically cylindrical form, which is interrupted by intermediate sections deviating from the generatrices of the rollers. These intermediate sections are freely rotatable relative to the associated roller, whereby the deviant section of the upper roller 6 is formed as a convex ring 10 which is rotated owing to contact with the overlapping stream 1 of newspapers transported between the two rollers 6,7.

Lying opposite to the convex ring 10 on the roller 7 is a concave ring 11 opening outwardly and likewise freely rotatable on its roller 7, which forms the counterpart to the convex ring 10 and, when newspaper material is passing through, serves as an underlay for the channel pressed in the newspaper by the convex ring 10. This channel is shown at 12 in the overlapping stream 1 (FIG. 3). The roller 7 possesses in addition two concave rings 13,14, likewise freely rotatable, arranged laterally to the concave ring 11, the function of which will be explained later.

If in this arrangement the convex ring 10 were not freely rotatable, as in the usual devices, then with the turning of roller 6 there would arise a greater peripheral speed at the peripheral surface 15 of the convex ring 10 than on the cylindrical underlay surface 16 of the roller 6, thereby causing a relative movement between newspaper and convex ring, so that the newspaper present between the roller 6 and the counter-roller 7 would either be damaged, or at least the print thereof smudged. Owing to the fact, however, that the convex ring 10, and also the concave ring 11, associated therewith on the counter-roller 7 and likewise freely rotatable relative to its roller 7, is corotated by means of the through-running newspaper material driven by one of the rollers, the peripheral speed at the underlay surface 15 having the greater diameter matches the speed of the newspaper material and there is neither damage of the newspapers nor smudging of the print.

A section through the convex ring 10 and the ring concavity 11 is shown to a greater scale in FIG. 7, wherein the mounting of the convex ring 10 and of the concave ring 11 independently of the rollers 6 and 7 is clearly visible.

It is noteworthy in this connection that the convex ring 10 passes on both sides without a break into the straight line of the roller 6, while in the case of the concave ring 11, the continuous transition takes place into a straight line on the roller body of roller 7.

Moreover it is also visible in FIG. 7 that the radius of curvature of the profile of the convex ring 10 is smaller than that of the concave ring 11, wherein the difference of the radii of curvature is so chosen that it corresponds approximately to the thickness of the newspaper material passed therethrough. Naturally the convex ring 10 and the concave ring 11 in FIG. 7 are representative of the other convex and concave rings. The roller pairs 3 and 4 are identical with one another and are represented in FIG. 4. In consequence of the equality of the two pairs, only the roller pair 3 is now described. This consists of an upper roller 17 and a lower roller 18, each of which is mounted on a corresponding arbor 22 or 23. As in roller pair 2, the rollers 17 and 18 of the roller pair 3 have a basically cylindrical form which is likewise interrupted by the sections deviating from the generatrices. In comparison with the roller pair 2 according to FIG. 3, it can be established that the lower roller 18 of the second roller pair 3 is identical with the lower roller 7 of the first roller pair 2, therefore the same reference numbers are also used. The upper roller 17 has, additional to

the convex ring 19 arranged median longitudinally, as already provided in roller 6 of the first roller pair 2, two additional convex rings 20 and 21 arranged on both sides of the convex ring 10 on the roller 17 which are identical with the convex ring 19, and consequently with the convex ring 10 of roller 6, and consequently likewise are freely rotatable on their respective roller 17. These convex rings 20 and 21 lie opposite to the concave rings 13 and 14 formed as freely rotatable roller sections, already mentioned in the explanation of FIG. 3, together with which they fulfill the same function as the convex ring 19 with the concave ring 11, namely the formation of a "corrugate" channel on the newspaper material, wherein the peripheral speeds at the relative underlay surfaces likewise match the speed of the newspaper material, which is made possible by the free rotatability of the convex ring, concave ring-pairs 20,13 and 21,14 by means of the newspaper material passing through. There is therefore at this point also in the second and also in the third roller pair, no damage to the newspapers.

Coming back to the two freely rotatable concave rings 13 and 14, already previously mentioned, of the first roller pair 2, which, of course, possess no convex rings associated with them, these concave rings 13,14 serve for accepting the channel formation retroactive from the second roller pair 3. Provision of channels with the concave rings 13,14 of the first roller pair 2 thus does not take place, but there is merely space provided for the reception of the retroactive channels.

The lower rollers of the roller pairs 2,3 and 4 are joined to one another with parallel-running endless belts 28,29,30 and 31 (FIGS. 3, 4), while the upper rollers of pairs 2 and 3 are joined by endless cords 24,25,26 and 27 and that of pairs 3 and 4 with corresponding endless cords 32,33,34, and 35. These belts and cords possess in themselves no driving, pressing or conveying function but merely serve to prevent the newspapers in transit from being able to accumulate between the rollers and in this way would cause stoppages.

In FIGS. 5 and 6 is represented another embodying example of a combination of roller pairs wherein the pair represented in FIG. 5 with reference to FIGS. 1 and 2 corresponds to the first roller pair 2 and the roller pair represented in FIG. 6 to the second and third roller pair 3 and 4. The individual roller elements are the same; only their arrangement on the rollers is different from the example described above. The first roller pair (FIG. 5) possesses a freely rotatable convex ring 36 arranged median longitudinally and two concave rings 37 and 38 located on either side of it on the roller, likewise freely rotatable. The same is true of the upper two upper rollers of the second or third roller pair 3 and 4 (FIG. 6). The lower roller of the first pair (FIG. 5) merely possesses a concave ring 39 arranged median longitudinally which is intended for cooperation with the convex ring 36. The concave rings 37 and 38 serve for the reception of channels retroactive from the second roller pair 3.

The lower rollers of the second and third roller pair (FIG. 6) are identical and have, in addition to a concave ring 39 arranged median longitudinally, two convex rings 40,41 fitted on both sides thereof on the same roller, which are intended for cooperation with the corresponding concave rings 37,38 of the upper rollers of the second and third pair 3 or 4.

The difference between the first and the second embodying example consists in the nature of the corrugate channels applied. While in the first embodiment (FIGS. 3 and 4) all the three channels 12,42,43 applied project downwardly, this is the case in the second embodiment (FIGS. 5 and 6) only with respect to the middle channel 12. The two outer channels 44 and 45 project upwards.

The arrangement of the belts 28,29,30,31 and cords 24,25,26,27 and 32,33,34,35 is the same as in the first example.

For certain uses, the convex rings serving as counterparts to the concave rings can be simply omitted, whereby in this case

recesses would be provided opposite to the convex rings in the respective roller, which can be bridged over by thin-walled distance sleeves so that for the channel production simply a free space would be left open.

Obviously, the gap between the upper and the lower roller can be continuously adjustable which can take place manually or automatically.

In addition, there is provided at the entry into the device (FIG. 1) a guide means 46 which, by means of belts 48,49 running from a roller 47 obliquely downwards, against the point of entry of the newspaper material within the range of the first roller pair 2, prevents an accumulation of newspapers in front of the roller pairs.

I claim:

1. In a device for pressing and conveying a continuous succession of flexible sheets arriving in overlapping imbricated relationship, in combination: at least one pair of conveying roller means, a driven shaft for each roller means, each of said roller means of one pair comprising cylindrical roller sections cooperating with opposed cylindrical roller sections of the associated roller means of the same pair for conveying said continuous succession therebetween, said cylindrical roller sections being fixedly mounted on said shafts to define an axial space therebetween, at least one of said roller means of said one pair comprising a pressing roller section having an outwardly convex generatrix and disposed in said space, and means mounting said pressing roller section on the associated shaft for free rotation thereabout.

2. A device as claimed in claim 1 further comprising a roller section having an inwardly concave generatrix for cooperation with a respective of said pressing roller sections, said roller section with the concave generatrix being mounted in the space between said cylindrical roller sections on the associated shaft for free rotation thereon.

3. A device as claimed in claim 2 wherein the cylindrical roller sections are disposed in alternate succession with pressing roller sections and their associated roller sections with the concave generatrices.

4. A device as claimed in claim 2, in which the radius of curvature of the profile of the convex roller section is smaller than the radius of curvature of the corresponding concave generatrix, the difference of the two radii of curvature substantially corresponding to the thickness of the imbricated succession of products passed between them.

5. A device as claimed in claim 1 wherein the cylindrical roller sections are disposed in alternate succession with pressing roller sections.

6. A device as claimed in claim 1, having a plurality of pairs of roller means composed of upper and lower rollers, and endless travelling flexible guide members connecting together all upper rollers of the pairs and all lower rollers of the pairs.

7. A device as claimed in claim 6, in which all lower rollers each have three concave roller sections while the first of the upper rollers possesses one and the other upper rollers three pressing sections each.

8. A device as claimed in claim 6, in which all upper rollers each have a median pressing roller section and two outer concave roller sections, the first of the lower rollers having a concave roller section and the other lower rollers each a median concave roller section and two outer pressing roller sections.

9. A device as claimed in claim 1 wherein said pressing roller section includes end cylindrical portions merging with said convex generatrix.

10. A device as claimed in claim 1 comprising guide means for the imbricated succession of products on the upstream side of the pair of conveying roller means.

11. A device as claimed in claim 10, in which said guide means comprises an endless conveyor belt arrangement including a belt converging towards said imbricated succession of products and passing about one of the roller means of the pair.