May 14, 1974 J. HERD ET AL 3,810,809

ARRANGEMENT FOR THE PRODUCTION OF CONNECTING POINTS BETWEEN SUPERIMPOSED WEBS, ESPECIALLY CONTINUOUS FORMS

Filed March 15, 1972 2 Sheets-Sheet 1

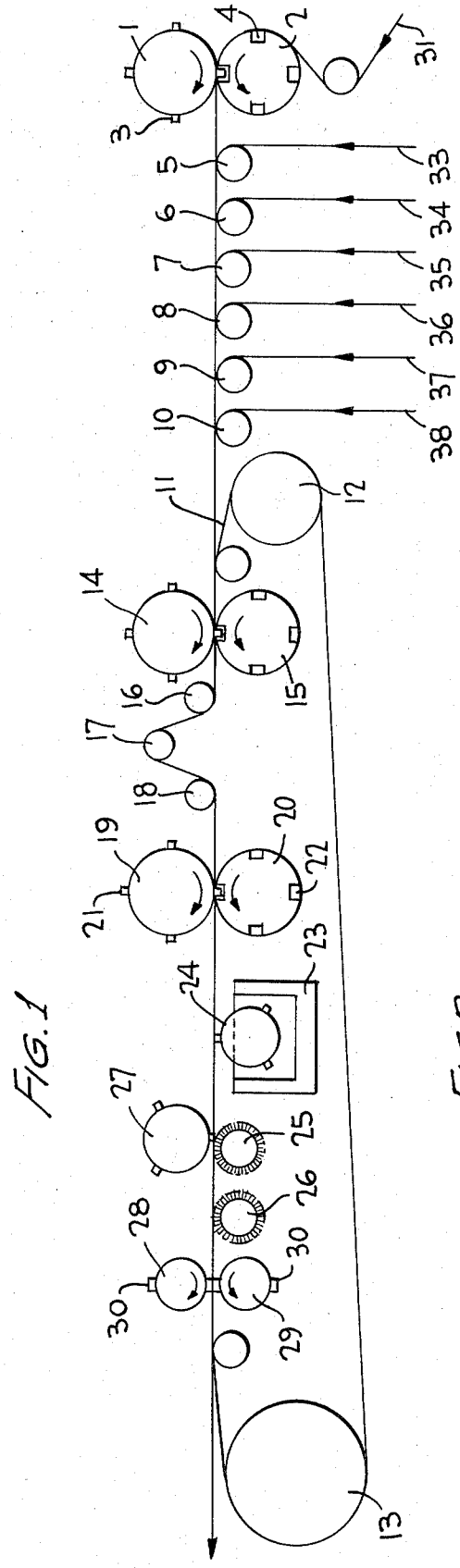

FIG. 1

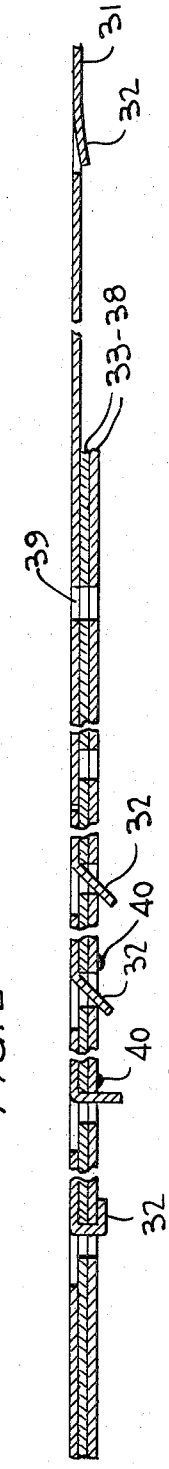

FIG. 2

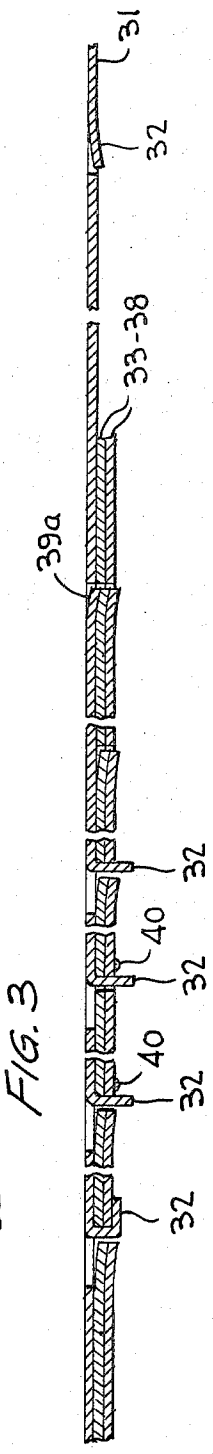

FIG. 3

ARRANGEMENT FOR THE PRODUCTION OF CONNECTING POINTS BETWEEN SUPERIMPOSED WEBS, ESPECIALLY CONTINUOUS FORMS

Filed March 15, 1972 2 Sheets-Sheet 2

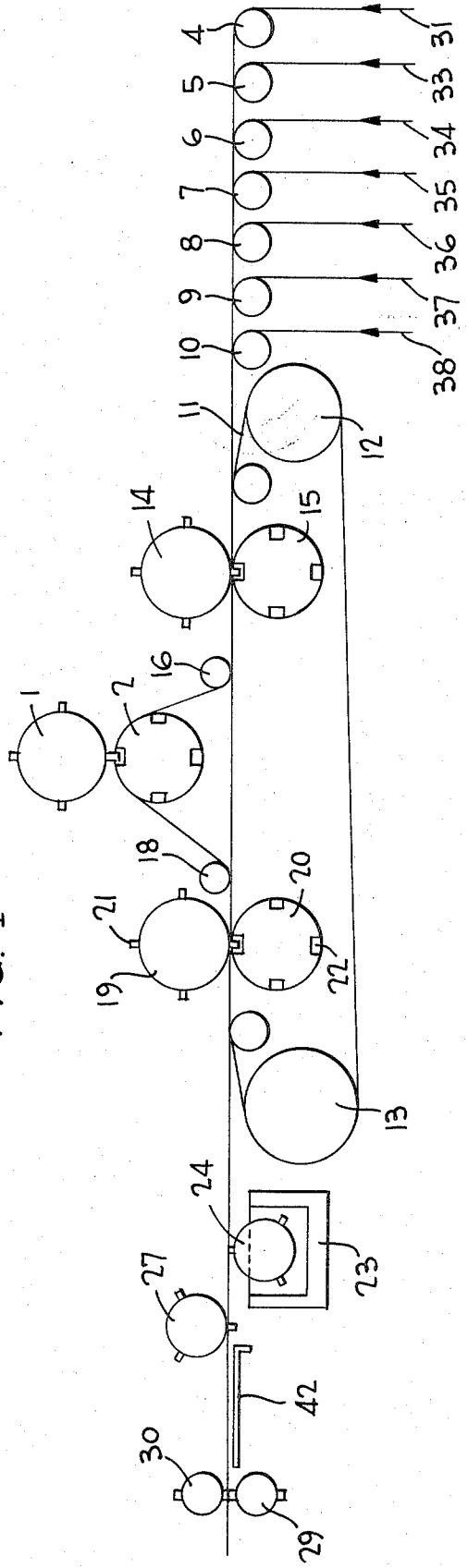

FIG. 4

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ARRANGEMENT FOR THE PRODUCTION OF CONNECTING POINTS BETWEEN SUPERIMPOSED WEBS, ESPECIALLY CONTINUOUS FORMS

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U.S. Cl. 156—468 5 Claims

ABSTRACT OF THE DISCLOSURE

An arrangement for producing connection points between superimposed continuous webs wherein tongues are formed in the topmost web by a punching mechanism, aligned notches are provided in all the webs by another punching mechanism, the top web is shifted relative to the remaining webs by a deflector means in a manner to cause the tongues to overlie the notches, the tongues are pushed through the notches by a tongue pushing means, glue spots are applied to the lowermost web, and the pushed-through tongues are bent against the lowermost web against the glue spots by a bending means.

The invention relates to an arrangement for the production of points of connection for superimposed webs, especially continuous forms, by means of notches and tongues, whereby the tongues of one of the outer webs are pushed through the notches of the remaining webs and are glued together to the other outer web.

It is an object of the invention to provide as simple an arrangement as possible with which this particularly favorable connection of continuous forms can be made. This object is achieved with the use of a punching mechanism which punches tongues into the edges of an outer web while another punching mechanism thereafter punches notches into the edges of the remaining webs. A deflection device is provided the one outer web for shifting this web relative to the other webs in such a way that, upon a renewed bringing together of all webs, the tongues of this outer web overlie the notches of the remaining webs. Means are provided for pressing the tongues of such outer web through the notches of the other webs, and a gluing arrangement is also provided for placing dots of glue adjacent the notches onto the other outer web. Also, a device for bending over and pressing the tongues against the dots of glue is provided.

This arrangement may be devised in such a way that the punching mechanism for the one outer web is disposed in the moving direction of said web in front of the second punch mechanism. However, in another embodiment, it is also possible for the punch mechanism for the one outer web to be disposed in the moving direction of said web behind the second punch mechanism and to serve at the same time as a deflecting device for the one web. The device for bending the tongues may consist of either one or more rotating brushes or of one or more abutting metal plates.

The invention will be explained in more detail with reference to embodiments shown schematically and by way of example in the drawings.

FIG. 1 shows an embodiment according to the invention, by way of example, wherein the punch mechanism for one of the outer webs is disposed in the direction of movement of said web in front of the second punch mechanism.

FIGS. 2 and 3 illustrate, respectively, the development of the points of connection for different embodiments.

FIG. 4 shows an embodiment, by way of example, according to the invention, wherein the punch mechanism for the one outer web is disposed in the direction of movement of said web behind the second punch mechanism.

In FIG. 1, an arrangement is shown as having a first punch mechanism comprising a cylinder **1** and a cylinder **2**. Both cylinders are mounted for rotation in a frame in any normal manner. Cylinder **1** is provided with punching tools **3** which may be removably mounted therein, and cylinder **2** is provided with corresponding punch receptacle means **4** which may also be removably mounted therein. Both cylinders revolve in the direction of the arrows in such a way that one tool of cylinder **1** cooperates with a corresponding receptacle of cylinder **2**.

Furthermore, the arrangement has one or more rotatably mounted rollers **5** to **10**, which may be provided with pegs for the holes perforated by **3** and **4**. In addition, the arrangement includes one or more continuously driven belts **11**, likewise provided with pegs (not shown), and which are guided and may be driven by rotatably mounted cylinders **12**, **13**. In order to accommodate the punched webs, to be hereinafter described, these belts must also have notches since the punching and other tools that are to be arranged in the same plane must pierce the belts.

Another punch mechanism similar to cylinders **1**, **2** comprises rotatably mounted cylinders **14** and **15**, which are, however, not provided with the same type punching tools and receptacles as described with reference to cylinders **1** and **2** of the first punch mechanism. For example, cylinders **14** and **15** are provided with corresponding male and female punch means on their peripheries to produce notches **39** or **39***a*. The deflecting arrangement for the upper web **31** comprises rotatably mounted rollers **16** to **18**, adjacent to which cylinders **19** and **20** are disposed, one of which is provided with noncutting and removable tools **21** for pushing the tongues through, which cooperate with the corresponding, removable counter tools **22** mounted on the other cylinder **20**. A series of glue spots may be applied by means of a glue applicator roller **24** mounted for rotation within a glue applicator device **23**. A supporting roller, not shown, may also be provided for guiding the superimposed webs.

The bending means for such an arrangement comprises one or more brushes **25**, each mounted for opposite rotation at point of contact with the passing webs, whereby the tongues of the upper web may be bent backwards after having been pushed through the remaining webs. In order to assure that these brushes will contact said tongues, a roller **27** may be disposed a short distance in front of them so that the fingers thereof will align with the tongues to place them in a substantially vertical downward position. Compression rollers **28**, **29**, having a smooth surface, are provided with a resilient surface, as for example rubber, or they are provided with stoppers **30**. They are pressed against each other by some suitable means, such as springs, not shown, and they rotate at their point of contact in the same direction as the web and, in so doing, they press the tongues against the dots of glue.

FIG. 1 shows only one pair of punching or other tools and arrangements at each processing position. Naturally, several such tools or arrangements may also be provided over the width of the continuous forms, should several rows of web connections be desired for the width of the multi-ply web. The rotatable cylinders for the punching tools, the tool **27** forcing the tongues through, etc., are then replaced by revolving shafts with disks holding such tools. Likewise, the sheet plies may be provided with one or more perforations, to which are assigned a corresponding nummber of belts with pegs.

The method of operation of the above-described arrangement is as follows:

Web **31**, provided with the standard perforated holes, is moved toward the first punch mechanism **1**, **2**, which

punches tongues 32 into said web, as shown in FIGS. 2 and 3. After leaving the first punch mechanism, additional webs 33 to 38, of paper or carbon sheet, etc., are superimposed beneath web 31 which, therefore, now constitutes an outer web. The other webs, 33 to 38, are likewise provided with the standard perforated holes similar to those for web 31. All webs are subsequently moved forwardly in superimposed relation by means of the peg studded belt 11 engaging with the standard perforated holes in such a way that their mutual position is fixed. All webs are then moved toward the second punch mechanism 14, 15, which punches notches 39 or 39*a* into all webs, as shown in FIG. 2 or FIG. 3. By reason of the deflection device 16 to 18 which follows, upper web 31 is shifted by extension of its path in relation to the remaining webs 33 to 38 in such a way that the tongues 32 of upper web 31 are made to overlie perforations 39 of the remaining webs 33 to 38 after all the webs are subsequently brought together as they move beyond roller 18. All webs are then fed toward tool 19, 20 designed to push tongues 32 of upper web 31 through notches 39 of the remaining webs 33 to 38. Subsequently, all webs pass over glue applicator device 23, the roller 24 of which applies dots of glue 40 adjacent the notches 39 on the lowermost web, i.e.,the other outer web 38. Thereafter, the tongues 32, which have been pushed through aligned notches 39 by the fingers of roller 27, which also forces them into a vertical position, are bent rearwardly by brushes 25 and 26 into contact with the dots of glue 40 already placed on the lowermost web 38. All the webs then pass through compression rollers 28, 29 which press the tongues 32 of upper web 31 firmly against the dots of glue 40 on the lowermost web 38.

The embodiment according to FIG. 3 differs from that of FIG. 2 in that the notches 39 of FIG. 2 are entirely punched out, as a result of which preferably rectangular notches are provided. After the upper web 31 is shifted relative to the lower webs, tongues 32 are pushed through these openings. In the FIG. 3 embodiment, however, notches 39*a* are not punched out completely, but are substantially U-shaped, as a result of which tongues are formed in each of the webs which are connected with their respective webs. Nevertheless, these tongues each define openings through which the tongues 32 of upper web 31 may be pushed.

The tongues 39*a* may be formed by simply designing punching tools 3 and their corresponding punch receptacles 4 as being U-shaped. Upon formation of these tongues 39*a*, they are together bent slightly downwardly, as seen in FIG. 3. The device described in connection with FIG. 1 is substantially the same for both the FIGS. 2 and 3 embodiments, with exception of the different punch tools used for the punch mechanism 14, 15.

FIG. 4 shows a modified embodiment of the arrangement according to the invention, which differs essentially from the FIG. 1 embodiment in that the first punch mechanism 1, 2 for upper web 31 is disposed behind the second punch mechanism 14, 15 in the direction of web travel and serves at the same time as a deflecting device. Otherwise, the tools and other devices are substantially the same as those of FIG. 1, so that they have been designated with the same reference numerals.

The method of operation of the FIG. 4 embodiment is also similar to that of the embodiment according to FIG. 1. All webs 31, and 33 to 38 are provided with one or more sets of the standard perforation holes and are fed to the arrangement via the rollers 5 to 10, and 41, each provided with pegs. As before, all the webs will be moved in their superimposed relationship toward the peg studded belt 11 and will be thereby moved toward punch mechanism 14, 15. There, all the webs 31, and 33 to 38 are provided with notches 39*a*. Upper web 31 is thereafter deflected via guide roller 16 and is provided with tongues 32 by the punch mechanisms 1, 2.

After upper web 31 passes beneath roller 18, it is again united with the remaining webs 33 to 38 in such a way

that tongues 32 of the upper web are made to lie above perforations 39 of the remaining webs. Subsequently, tongues 32 are pushed through notches 39 of the remaining webs 33 to 38 by means of tools 21, 22. The webs 33 to 38 then pass over the glue applicator device 23, the roller 24 of which applies dots of glue 40 on the lowermost web 38 adjacent the notches 39. The tongues then must be bent back and pressed against the dots.

The same arrangement can be used for pressing tongues 32 rearwardly, as described in connection with FIG. 1. However, in the case of both embodiments of the invention, these operations can be executed by the somewhat modified devices shown in FIG. 4, wherein brushes 25 and 26 are replaced by one or more abutting metal plates 42. However, a combination of brush and abutting metal plate is also possible. Roller 27 and compression rollers 29, 30 can be arranged in the same manner as described with reference to FIG. 1.

Guidance of the webs through studded belt 11, according to FIG. 4, terminates before the webs reach the glue applicator device. Therefore, an additional conveying device (not shown), provided with pegs and mounted on rollers 29, 30, must be provided for pulling of the webs. The various possibilities for guiding the webs are applicable for both embodiments of the invention described.

It should be noted that the first and second punch mechanisms may consist of a common cylinder housing the punch receptacle means, without departing from the scope of the present invention. Accordingly, web 31 may be guided similarly as in the embodiment according to FIG. 1, so that it will first of all pass alone between a cylinder with punching tools and the cylinder containing the punch receptacle means. Before this cylinder, it must be guided in a loop around the cylinder of the first punch mechanism containing the punching tools. After passing through the first punch mechanism, it is deflected in another loop, and then united with the remaining webs, so that all webs pass through the second punch mechanism, which consists of the same cylinder containing the punch receptacle means and of a second cylinder containing the corresponding punching tools.

Obviously, many other modifications and variations of the present invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. An arrangement for the production of connecting points between moving superimposed webs, especially continuous forms, by means of notches and tongues punched from the webs, the arrangement comprising a first punch mechanism for punching out tongues along the edges of a top one of said webs, a second punch mechanism for punching out axially aligned notches along the edges of said top web and of the remaining ones of said webs out of alignment with said tongues of said top web whereby said top web is provided with both said tongues and said notches while said remaining webs are provided only with said notches, means for deflecting said one web to thereby shift said one web relative to said remaining webs in such a manner that said tongues will be made to overlie said notches of said remaining webs after said one web passes through said deflecting means, means for forcing said tongues to extend through said notches of said remaining webs, a glue applicator means for applying dots of glue adjacent said notches on the lowermost one of said webs, means for bending over said extended tongues so as to overlie said dots of glue and means for pressing said bent-over tongues against said dots of glue so as to effect a positive connection between only said top and said lowermost webs.

2. An arrangement according to claim 1 wherein said first punch mechanism is disposed ahead of said second punch mechanism in the direction of movement of said one web.

3. An arrangement according to claim 1 wherein said first punch mechanism is disposed behind said second punch mechanism in the direction of web travel, said first punch mechanism also serving as said deflecting means for said one web.

4. An arrangement according to claim 1 wherein said means for bending over said extended tongues comprises at least one brush rotatably mounted for contact with said extended tongues.

5. An arrangement according to claim 1 wherein said means for bending over said extended tongues comprises at least one plate mounted to abut said extended tongues.

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