Feb. 18, 1941. H. W. BRUKER 2,232,365

CORRUGATING MACHINE GUIDE MECHANISM

Filed Nov. 30, 1940 2 Sheets-Sheet 1

Fig. 1.

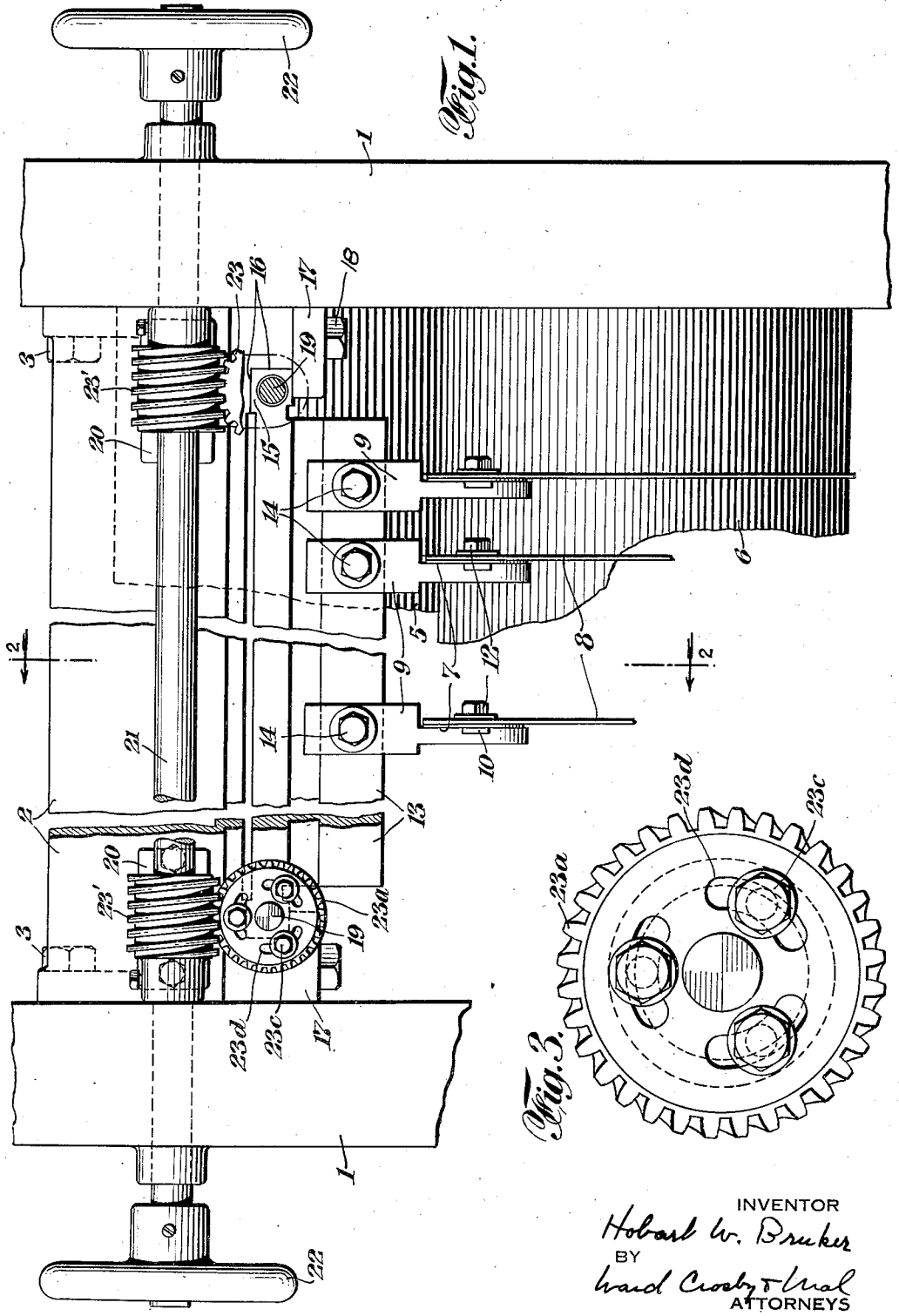


Fig. 3.

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Fig. 2.

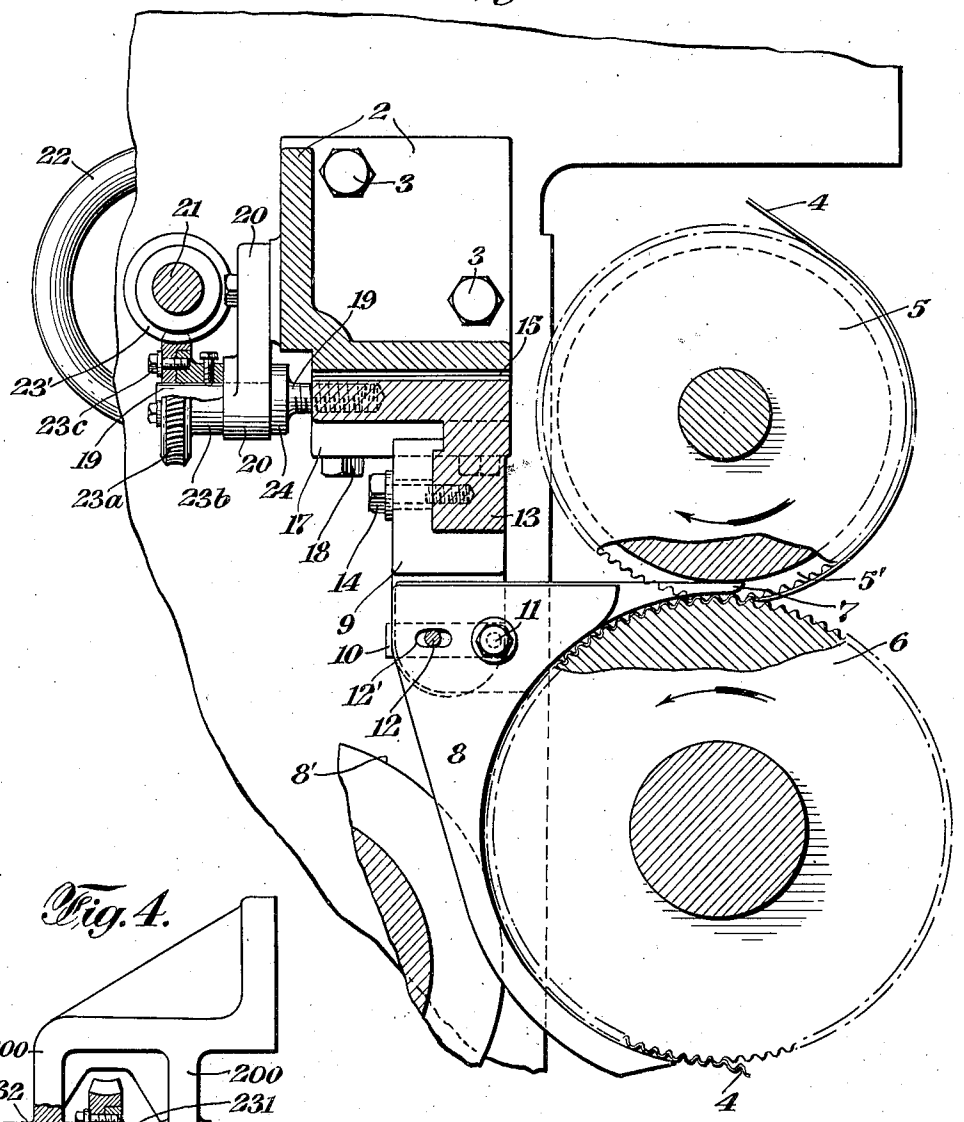
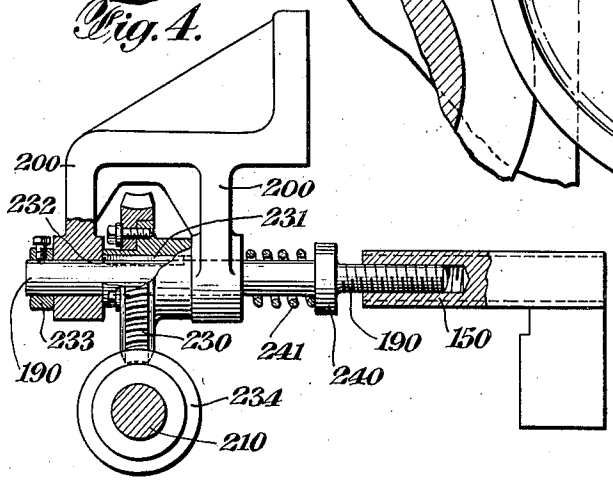


Fig. 4.



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CORRUGATING MACHINE GUIDE MECHANISM

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Application November 30, 1940, Serial No. 367,981

8 Claims. (Cl. 154—30)

The invention relates to corrugating machines of the general type which has long been used in the manufacture of corrugated paper and paper board, having fluted rolls between which the web to be corrugated is passed, and a series of stripper fingers spaced along the rolls to separate the web from the first corrugating roll and guide it partially around the second corrugating roll, as well as into proper contact with the mechanism which applies adhesive to the exposed peaks of the corrugations formed in the web, to the end that neither too little nor too much adhesive be so applied.

It is important to the proper operation of such a machine that the above-mentioned stripper fingers be positioned with precise accuracy in respect to the corrugating rolls, and the adjustment of these stripper fingers to suit different conditions of operation, and their withdrawal and resetting incident to cleaning the rolls, has long consumed substantial amounts of time and required shut-down periods during which production was interrupted.

The present invention aims primarily to improve the machine in respect to the facility and accuracy with which adjustment of the stripper fingers may be made, the invention in its preferred forms enabling adjustments of the character normally needed in shifting from one grade of paper to another, or in correcting errors in the spacing of the stripper fingers from the corrugating rolls, to be made while the machine is running and thus avoid shut-down periods. Further objects and advantages of the invention will be in part obvious and in part specifically mentioned in the description hereinafter contained which taken in conjunction with the accompanying drawings discloses a corrugating machine constructed to operate in accordance with the invention. From the standpoint of the invention in its broader aspects, however, the disclosure should be regarded as merely illustrative of the principles thereof. In the drawings:

Fig. 1 is a front elevation, with certain parts cut away, showing the portion of a corrugating machine with which the present invention is most directly concerned, and illustrating a construction adapted to operate in accordance with the invention.

Fig. 2 is a section on line 2—2 of Fig. 1.

Fig. 3 is a detail elevation looking from the left of Fig. 2.

Fig. 4 is a detail vertical section illustrating a somewhat modified form of the invention.

The invention is illustrated as applied to a corrugating machine having side frames 1, with a transverse brace member 2 extending between them and clamped thereto by bolts 3. As shown in Fig. 2, the paper web 4 to be corrugated first passes partially around a first corrugating roll 5, and then between roll 5 and a second corrugating roll 6 in such manner that the meshing flutes of rolls 5 and 6 form the corrugations in the web.

Stripping or guide fingers 7, spaced along the roll 5, project into peripheral grooves 5' in the roll and separate the corrugated web therefrom, causing it to follow around with corrugating roll 6. Similar fingers 8 guide the corrugated web partially around the second corrugating roll 6.

The above described parts of the machine (and other accompanying parts neither illustrated nor described since suitable forms thereof are known in the art) are to be regarded as typical of suitable so-called single-facing machine construction in connection with which the present invention is adapted to be used, it being understood that the stripping and guiding fingers preferably are individually adjustable toward and from roll 6 in order to conform their spacing from the roll to the grade of paper being operated on, and are also adjustable angularly (as by a rocking or tilting movement) to position their curved edges properly with respect to the curvature of roll 6. In the particular construction illustrated, each set of stripping and guiding fingers 7 and 8 is carried by a bracket 9 having a block 10 slidably mounted therein for movement toward and from the corrugating rolls. Fingers 7 and 8 are clamped to block 10 by a bolt 11 (Fig. 2) which passes through members 7, 8 and 10 but does not pass into bracket 9. A clamping bolt 12 passes through elongated slots 12' in the members 7, 8 and 10, and bottoms in bracket 9. Thus when bolt 12 is loosened, the spacing of fingers 7 and 8 from the periphery of roll 6 may be adjusted without otherwise altering their relationship to the curvature of roll 6 (if bolt 11 be then tight) by sliding block 10 toward or from roll 6. When both bolts 11 and 12 are loosened, the guiding fingers may be rocked about bolt 11 as an axis, the slots being somewhat wider than the diameter of bolt 12. The last described construction should be regarded as typical of means (of which various forms are known in the art) whereby the web guiding fingers may be adjusted as to spacing from roll 6, and to properly position their curvatures with respect to the periphery of the roll. Preferably the active surfaces of the guide members 8 are so shaped that when properly set, the corrugated sheet bulges out slightly from the

teeth of corrugating roll 6 (as has been previously known in the art) at the point where the peaks of the corrugations move past the adhesive applying member 8' (Fig. 2). The adhesive applying member 8' may also be constructed as previously known in the art. A roll has usually been employed for this purpose, and constructions have long been known whereby the adhesive applying mechanism could be retracted from operative position to afford ready access to the guide members 8 and adjacent corrugating roll 6 for purposes of cleaning or repair.

In addition to the individual adjusting devices for the guide members as above referred to, I provide mechanism whereby adjustment may be made, preferably while the machine is running, as between the corrugating roll 6 and all of the guide fingers, thus altering their positions simultaneously and conjointly to a like extent with respect to the roll.

In the illustrated embodiment of the invention all of the guide fingers are supported ultimately by a cross piece 13, to which the various brackets 9 are secured by bolts 14. The cross piece 13 positions all the active edges of the guide fingers in line with each other and in the same relation to the periphery of roll 6 when the initial individual adjustments of the guide fingers have been properly made, and appropriate connections are made at the opposite sides of the machine to the opposite end portions of cross piece 13, to move these end portions equal amounts toward or from the corrugating rolls when an adjusting mechanism is actuated by the operator. Thus the spacings of all of the guide fingers from roll 6 may be adjusted simultaneously by equal amounts.

In the specific construction shown in Figs. 1 and 2, the opposite ends of cross piece 13 are provided with blocks 15 fitting slidably in ways 16 formed in the brace member 2, bottom plates 17 fastened to member 2 by bolts 18, underlying the blocks 15. Screws 19 journaled in bearing brackets 20, engage in the blocks 15 and thus serve to move the cross piece 13, and the guide fingers, toward or from the corrugating rolls. In the illustrated form of the invention this adjustment is made by a cross shaft 21 suitably journaled in the side frames of the machine and provided with hand wheels 22 at the opposite sides of the machine, the shaft 21 being provided with worms 23' meshing with worm wheels 23 and 23*a* which are respectively fastened to the screws 19. The screws 19 are held against endwise movement by the hubs of worm wheels 23 and 23*a*, and collars 24 on the screws, engaging with the bearing brackets 20. The hub 23*b* of worm wheel 23*a* may be made separate therefrom and secured thereto by bolts 23*c* passing through arcuate slots 23*d* (Fig. 3) in worm wheel 23*a*. Thus by loosening up bolts 23*c*, either hand wheel 22 may be turned to move one end only of the cross piece 13 toward or from the corrugating rolls, an adjustment which is useful in setting the cross piece parallel to the axes of the rolls.

In setting up a machine constructed as above described, the individual adjustments of the guide fingers to properly position their active surfaces with respect to the curvature of the corrugating roll 6 as well as to properly position these active surfaces with respect to each other, may be made directly in the machine while at rest, without the use of any preliminary forms such as have been heretofore commonly employed. In so doing, the various fingers may be seated directly against the periphery of roll 6 without interposing any paper sheet between them and the roll as has been heretofore commonly done in setting up with the use of forms, and the holding bolts for the various guide fingers may be then tightened up. The corrugating rolls are commonly made slightly barrel-shaped, and this direct setting insures that the various guide members will each be positioned properly with respect to the resulting larger or smaller diameter of the roll in the zone in which each guide member operates. In other words, the guide members in the central portion of the roll will project out slightly less further from the brackets 9 than at the end portions of the roll, which has not been true of the above described seting up operations using forms. Then with the various guide members each having their active surfaces properly related to the circular curvature of the corrugating roll and projecting to the proper amounts in respect to the diameters of the zones of the roll in which the several guide members operate, the various guide members may be conjointly, simultaneously and equally adjusted to secure the proper spacing of all of their active surfaces from roll 6, by operation of one of the hand wheels 22. This may be done either while the machine is at rest or in motion.

And when the machine has to be altered from time to time to corrugate paper webs of different thicknesses, or to correct an error in setting, one of the hand wheels 22 may be turned the necessary amount by the operator, to make the needed adjustment while the machine is running, thus avoiding the shut-down periods and subsequent individual adjustments of the guide fingers which heretofore have been necessary under such circumstances. Subsequent individual adjustments in the positions of the guide members will be needed only in the event that they are not properly set initially or somehow become moved out of their correct positions with respect to each other. Suitable indicators may be provided in connection with shaft 21 or hand wheels 22 to show the spacing of the guide fingers from roll 6, such indicators being neither illustrated nor described in detail since devices of this character are well known in the art. And if the paper should begin to wind up on roll 6, as sometimes happens during faulty operation of the machine, the guide fingers may be retracted from the rolls to avoid injury thereto. The machine has similar advantages of rapid withdrawal of the guide fingers from operative position, with quick and accurate replacement, when it is desired to clean the flutes of the corrugating roll.

In Fig. 4 I have shown a somewhat modified form of the invention in which the construction is such as to automatically relieve the guide members from strains and distortions such as may be otherwise imposed upon them in case the paper begins to wind up on roll 6, although operation with Figs. 1 to 3, under normal conditions. Parts of the machine which are not shown in Fig. 4 may be understood as similar in construction and mode of operation to those already described, and the relief of the guide members from abnormal strains in the particular form shown in Fig. 4, is secured by interposing between certain of the various parts which support and adjust the guide members, springs which are strong enough to urge the guide members into operative position under normal conditions but yield to permit the guide members to recede from roll 6 in the event that the paper begins to wind

up on the latter. As shown in Fig. 4 the adjusting screw 190 (being in other respects similar to the screw 19 previously described) has a collar 240 which is spaced from the bearing bracket 200, and a spring 241 is interposed between the parts 200 and 240. A worm gear 230 (corresponding in general to either the gear 23 or gear 23a previously described) turns the screw 190 when adjustment is to be made, but in this instance the drive is through a key 231 in the gear 230, which operates in an elongated key way 232 in member 190. The outer end of member 190 has attached thereto a collar 233 which under normal conditions of operation the spring 241 holds up against the bracket 200, and thus when worm gear 230 is turned in either direction by a worm 234 on a shaft 210 (corresponding in general to the shaft 21 previously described but in this instance positioned below the worm wheel) the part 150 of Fig. 4 (corresponding to the part 15 previously described) will be moved in one direction or the other. In other words, under normal conditions the screw 190 will rotate whenever gear 230 is turned, but will be held against endwise movement by the spring 241, and the spacing of the guide members from roll 6 will be adjusted in the same way as previously described in connection with Figs. 1 to 3. But if the paper should start to wind up on roll 6, the abnormal pressure thereby imposed upon the guide members will be strong enough to overcome the opposing pressure of spring 241 and will push the block 150 and screw 190 toward the left as these parts appear at Fig. 4, thus automatically allowing the guide members to recede temporarily from roll 6 under such abnormal conditions. This cuts down the risk of distorting the guide members or forcing them out of their proper positions with respect to each other.

While the invention has been disclosed as carried out by a machine having certain specific features of mechanical construction, it should be understood that many changes may be made therein without departing from the invention in its broader aspects, within the scope of the appended claims.

This application is a continuation-in-part of my prior copending application Serial Number 293,902 filed September 8, 1939.

I claim:

1. A corrugating machine of the class described, having in combination a corrugating roll, an adhesive applying member adjacent said corrugating roll, a plurality of guide members spaced along said roll and constructed and arranged to guide the web being operated on partially around said roll and to control the position of the web with respect to said roll and adhesive applying member, a common supporting member carrying said guide members, devices for holding said guide members in position with respect to said roll and said supporting member, mechanism constructed and arranged to afford movement of said supporting member toward and from said roll thereby to conjointly and equally shift the positions of said guide members with respect to said roll and thereby regulate the position of the web with respect to said roll.

2. A corrugating machine of the class described, having in combination a corrugating roll, an adhesive applying member adjacent said corrugating roll, a plurality of guide members spaced along said roll and constructed and arranged to guide the web being operated on partially around said roll and to control the position of the web with respect to said roll and adhesive applying member, devices for holding said guide members in position with respect to said roll, and mechanism being also provided which is constructed and arranged to afford relative conjoint and equal movement between said members and roll toward and from one another whereby the distance between said roll and said guide members may be altered thereby to conjointly and equally adjust the spacings of said guide members from said roll and thereby regulate the position of the web with respect to said roll.

3. A corrugating machine of the class described, having in combination a corrugating roll, an adhesive applying member adjacent said corrugating roll, a plurality of guide members spaced along said roll and constructed and arranged to guide the web being operated on partially around said roll and to control the position of the web with respect to said roll and adhesive applying member, supporting means for said guide members, said machine including mechanism operable while the machine is running which is constructed and arranged to afford conjoint and equal movement of said guide members toward and from said roll thereby to conjointly and equally shift the positions of said guide members with respect to said roll and correspondingly regulate the position of the web with respect to the roll.

4. A corrugating machine of the class described, having in combination a corrugating roll, an adhesive applying member adjacent said corrugating roll, a plurality of guide members spaced along said roll and constructed and arranged to guide the web being operated on partially around said roll and to control the position of the web with respect to the roll and adhesive applying member, a cross piece mounted to move longitudinally of the machine toward and from said first mentioned roll and connected to said guide members, devices for initially determining the positions of said guide members with respect to said roll, and gearings located respectively near the opposite sides of the machine for moving the opposite end portions of said cross piece toward and from said roll thereby to conjointly and equally alter the spacings between said guide members and the roll and thereby regulate the position of the web with respect to the roll.

5. A corrugating machine of the class described, having in combination a corrugating roll, an adhesive applying member adjacent said corrugating roll, a plurality of guide members spaced along said roll and constructed and arranged to guide the web being operated on partially around said roll and to control the position of the web with respect to the roll and adhesive applying member, supporting means for said guide members, said machine including mechanism constructed and arranged to afford conjoint and equal movement of said guide members toward and from said roll thereby to conjointly and equally shift the position of the web with respect to the roll, means operable independently of said last mentioned mechanism being provided whereby said guide members may recede from operative position with respect to the first mentioned roll upon the occurrence of abnormal pressure between the guide members and the first mentioned roll.

6. A corrugating machine of the class described having in combination a corrugating roll, an adhesive applying member adjacent said corrugating roll, a guide member positioned adjacent

said roll and constructed and arranged to guide the web being operated on partially around said roll and to control the position of the web with respect to the roll and adhesive applying member, devices for adjusting the position of said guide member with respect to said roll, and means operable independently of said last mentioned devices which is constructed and arranged to afford a receding movement of said guide member from operative position with respect to said first mentioned roll upon the occurrence of abnormal pressure between said guide member and first mentioned roll.

7. A corrugating machine of the class described having in combination a corrugating roll, a plurality of guide members spaced along said roll and constructed and arranged to guide the web being operated on partially around said roll, supporting means for said guide members, devices for adjusting the positions of said guide members with respect to said roll, and means normally holding said guide members in positions where they are operatively related to said roll, said last mentioned means however being yieldable whereby said guide members are withdrawn from operative position with respect to said roll upon the occurrence of abnormal pressure between the guide members and the roll.

8. A corrugating machine of the class described having in combination a corrugating roll, a guide member positioned adjacent said roll and constructed and arranged to guide the web being operated on partially around said roll, devices for adjusting the position of said guide member with respect to said roll, a spring normally urging said guide member into a position dependent upon the setting of said devices, said spring however being yieldable to afford movement of said guide member away from said roll upon the occurrence of abnormal pressure upon the guide member, irrespective of adjustment of the aforesaid devices.

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