Aug. 10, 1937. L. A. DIX 2,089,469

PAPER WEB JOINING MEMBER

Filed June 22, 1933

Fig. 2.

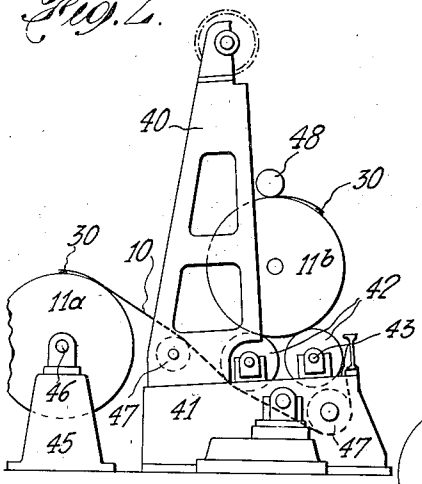


Fig. 1.

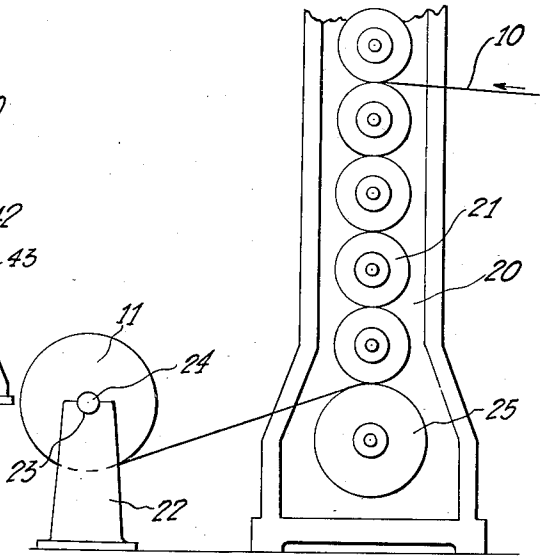


Fig. 3.

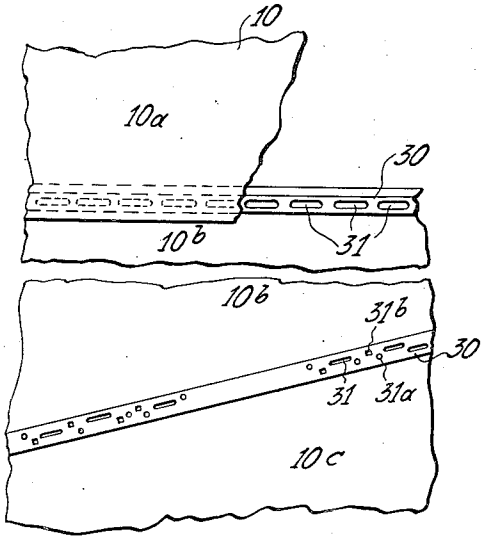


Fig. 4.

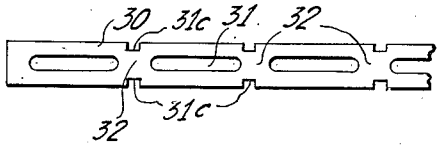
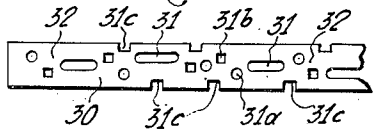


Fig. 5.



INVENTOR.
Lawton A. Dix.
BY
Austin & Dix
ATTORNEYS.

Patented Aug. 10, 1937 2,089,469

UNITED STATES PATENT OFFICE

2,089,469

PAPER WEB JOINING MEMBER

Lawton A. Dix, New York, N. Y.

Application June 22, 1933, Serial No. 676,987

6 Claims. (Cl. 154—42)

This invention relates to improvements in members for securing together the broken ends of paper webs, and the invention also pertains to the processes for producing and using the same.

Hitherto, in the preparation of paper in continuous webs, as on a paper making machine and in rewinding and cutting machines, as well as in the feeding of such continuous webs to printing machines and the like, considerable difficulty is occasioned due to the breaking of the web or webs while passing through the machines. This is particularly characteristic of paper making machines where the newly formed web at the wet or Fourdrinier end of the machine has very little tensile strength and, even though initially compressed in the calenders, may be readily disrupted. In rewinding machines and on printing presses, the breaking of the paper web or sheet is especially costly in both time and expense.

When a paper sheet breaks and it is desirable to make a splicing of the sheets, it is customary to square off the edges and lap two meeting edges together, using paste or adhesives to secure them together, the securing action being increased or consolidated by passing the disjoined web members, as continuous sheets through the remainder of the machine. The strength of the joint in most instances is low and the machines must be run at just a moving speed until the joint has passed through the machine, and even under such circumstances the joint or splice does not always hold together.

To avoid the necessity of pasting the adjacent edges of a broken sheet or web and to give greater strength to the joint, it has been proposed to use strips of adhesive material, such as gutta-percha, and the gutta percha may be compressed by a heated iron before starting the machine to secure the web members together. However, owing to the fact that gutta-percha is inherently brittle it has been found that rolls of relatively large diameter must be provided in the machine to provide sufficient flatness of curvature to avoid breaking or cracking of the gutta-percha joining member while the joint is being run through the machine. Where relatively small sized rolls are used, such as are normally used in rewinding machines and printing presses, this difficulty is appreciably increased due to the smallness of the arc or curvature of the surface of the rolls.

It is an important feature of this invention to provide an improved strip joining member for broken paper webs or sheets, and the like, which is non-frangible on any arc of curvature.

It is a further feature of the invention to provide an improved paper web joining member of gutta-percha having means incorporated therein to prevent cracking of the same after being positioned to join the two ends of the paper web together. This improved joining member gives a material increase in the flexibility of the joint.

Yet another important feature of this invention is the provision and use of an improved gutta-percha joining member for paper webs, which member is characterized by a plurality of slot portions co-extensive with its length and disposed centrally of the member.

These and other desirable features and objects and advantages of the present invention will be described with reference to the accompanying drawing showing the mode of application of the improved, joining member with respect to paper webs and also showing a plurality of forms of said member, it being understood that the examples here disclosed are given by way of illustration only, as it is not intended to be limited in the structures or method herein shown, except as such limitations are clearly imposed by the appended claims.

In the drawing like numbers refer to similar parts throughout the several views, of which

Fig. 1 is a side elevation, partly in broken section of the calendering end of a paper making machine;

Fig. 2 is a side elevation, partly in phantom view, of a reel or roll winding mechanism.

Fig. 3 is an idealized top plan view, partly in broken section, of a web showing a variety of methods and means of joining detached parts of the same;

Fig. 4 is a plan view of a portion of an improved web joining member; and

Fig. 5 is a view similar to Fig. 4 showing a modified form of joining member.

In the formation of paper, in a paper making machine, a web 10 passes through a plurality of stands of rolls, indicated generally by the numeral 20, each provided with a series of rolls 21, which series or stands may be any desired number. The web 10 is woven through the several rolls and compressed and sometimes subjected to outside heat. The take-up end of the machine may be provided with a plurality of supporting standards 22 having bearings 23 adapted to receive shafts 24, which support the take-up rolls of paper 11. The rolls 11 are driven through shafts 24 by suitable gearing, not shown, as are the calender rolls 21 of the machine.

In the construction shown in Fig. 2, there is disclosed a rewinding assembly comprising a

standard 40 mounted on a base 41 and provided with idler or cradle rolls 42 on which a take-up reel 11b is adapted to be rotatably supported and moved thereby. The rolls 42 are mounted on shafts 43. A take-off roll 11a may be mounted between a pair of standards 45 being supported on a shaft 46. The web 10 from the take-off roll is shown as broken at the top of the roll, a joining member 30 being disposed between the broken portions, as shown more in detail in Fig. 3. A like break is shown in the drawing on the take-up roll 11b. Guide rolls 47 are provided for directing the web and a smoothing or riding roll 48 is provided at the top of roll 11b and is adapted to engage and smooth down the web 10 as it is rolled up on the circumference of the roll 11b. The roll 11b may be driven through the rolls 42 in any suitable manner, not shown, and forms, per se, no part of the present invention. Suitable pressure may be applied through roll 48 to cause the web 10 to form a close compact roll when wound up in the roll 11b.

In the course of the operation, the web often breaks to form two or more parts, indicated generally in Fig. 3, at 10a and 10b. As the break may occur in any portion of the paper machine, or the rewinding machine or printing machine, it has been shown in the accompanying drawing, as occurring in front of the take-off roll, and also on the take-up roll, in Fig. 2 although it will be understood that such showing is intended to cover the breaks in the paper web occurring in any part of the machines. When a break occurs, a strip 30 of a suitable gutta-percha composition is placed between the meeting edges of the broken web, which have usually been previously trimmed to remove jagged portions.

The joining member 30 may be made of a gutta-percha and paraffin composition and is caused to adhere to the overlapped web portions, for example, 10a and 10b, by means of suitably applied pressure and/or heat, either by hand tools or other means.

The joining members 30 of the present invention are characterized by a degree of bendability transverse to the longitudinal axis or center, which permits them to be bent over relatively small diameter rolls without cracking, such rolls being standard in paper making machines and printing presses. With the larger diameter of roll, there is less tendency of the brittle gutta-percha members to crack, due to the flatter curvature of the surface.

Members 30 are provided with a plurality of cut-out portions 31 defining bridge portions or sections 32 between the several cut-out portions. These cut-outs may have any desired configuration, as indicated in Figs. 3, 4, and 5, some of the holes or cut-outs 31 being substantially rectangular and elongated, while certain cut-outs 31a may be circular, and the sections 31b square or any type of cut-out desired. The bridging or joining sections 32 provide a desired resilience and bendability to the structure so that when the strip 30 is bowed transversely of its longitudinal axis, there is no extended area of the material to be buckled or cracked, but a plurality of fingers or bridging sections 32 which, severally, are not of sufficient extent in area to be subject to any tendency to buckle or crack.

The variously configured cut-out sections 31, 31a, 31b and the like, may not only be arranged in a substantially straight line, as indicated in the construction of joining member 30, shown in Fig. 4 and in the upper section of Fig. 3, but these cut-out sections may be disposed over the surface of member 30 in any desired arrangement, as for example in Fig. 5 and in the lower section of Fig. 3, and along the edges as indicated at 31c.

The old form of joint was non-bendable and stiff and in passing around a small diameter roll caused the paper web to break as one edge of the joint would be held close to the roll and the other edge due to the stiffness of the joint would not conform to the roll and would therefore stand out from it, thereby creating a sharp edge over which the paper sheet under material tension is stretched. The added tension, due to the paper being forced away from the roll by the stiff joint, and the sharpness of the edge of the joint operate to break or cut the paper at the edge of the joint.

While the above described structure of joining member functions very satisfactorily, other forms may be readily employed so long as there is sufficient flexibility for the joint to bend around a small diameter roll without the paper web breaking.

By the use of these improved flexible joining members, it is possible to use them directly on paper making machines, rewinding machines or printing machines, without reference to the size of rolls over which the paper is passed at any stage of its manufacture and use, and, due to the fact that the improved, perforated, joining strips may be made up in quantity, and kept available at a machine without requiring refrigerating or other treatment, the application thereof to the mending of broken webs is greatly facilitated. In addition, due to the fact that these improved, perforated joining members are dry, it is not necessary to use glues, paste or other materials, which are inherently messy, and which also have the disadvantage of having an appreciably lesser adhesion capacity than the improved flexible pressure-flowed gutta-percha member or its equivalent. Such improved joining strips are of particular use in printing presses where the available working space is at a substantial minimum, and the improved strips may be passed through the machine on holders or the like with the greatest facility and ease.

While the improved joining members 30 have been disclosed as single strips having cut-out portions 31, 31a, 31b and the like, it will, of course, be appreciated that a plurality or pair of strips may be laid in parallel and joined by separate transverse strips of any desired size and configuration whereby to secure the same effective result. Owing to the type of material used, these members may be joined together to form a substantially continuous strip having lateral or continuous edge sections joined by a plurality of transverse fingers or bridging sections to form a continuous hinge or longitudinal bendable member. This improved unit type of joining members are much more easily handled and applied than the several members.

It will now be appreciated that there has been provided an improved method and means for joining paper webs in machines, whether in paper making machines, or in rewinding machines, or in printing machines, and irrespective of the size of the rolls over which the paper webs are passed or to be passed. This is made possible by the provision of a plurality of bridging sections or joining fingers between the main adhesive sections so that a bendable hinge member is formed which permits any desired degree of flexibility in the paper webs. It is also to be

understood that the scope of this invention includes the adjustment or balancing of the thickness of the material being employed, the width of it, and the number and locations of the cut-outs. Where there is greater thinness of the joining member then there may be a smaller number of holes or cuts-outs. This balancing gives the desired flexibility and paper functioning. The shapes, sizes and positioning of the holes or cut-outs usually have a bearing on the flexibility and successful results.

It will now be appreciated that there has been provided a new and novel means and method for combining or joining broken segments of continuous fabrics, and particularly in machine operations where the fabric is to be wound upon or unwound from supply reels. In addition, the improved article and process permits the rapid, economical and secure joining of broken webs of fabric or paper, and in machines, by means of pressure-plasticizable strips which are provided with a plurality of desirably shaped joining sections which may be cut out from the body of the mass and which permit the use of normally brittle members on rolls having diminished arcs of curvature as opposed to the structures hitherto required and which were characterized by the relatively large arcs of curvature to prevent bending and breaking of the joining strips. The invention is further characterized by utilization of strips of gutta-percha or like frangible materials which, although capable of exerting a cementing action when subjected to pressure and/or heat do not lose their normal brittleness.

What is claimed is:

1. An improved web-joining member for paper ends comprising a gutta percha strip having perforations therein.

2. A gutta-percha strip for joining paper webs into a continuous sheet, comprising at least a pair of continuous edge sections joined by a plurality of spaced transverse strips.

3. A gutta-percha strip for joining paper webs into a continuous sheet, comprising at least a pair of substantially parallel and continuous edge sections joined by a plurality of spaced transverse strips of the same material.

4. A gutta-percha strip for joining paper webs into a continuous sheet, comprising at least a pair of parallel and continuous edge sections joined in a unitary member by a plurality of spaced transverse strips of the same material.

5. An improved paper roll joint for high speed presses, comprising a trailing edge of a paper sheet and a leading edge of a similar sheet, and a heat compressible perforated strip of gutta percha mounted and compressed between said edges to form a means for joining said edges together, the said various openings in said gutta percha being positioned to give flexibility when the joint moves around a roll of relatively small diameter so as to prevent the lifting of any part of said joint or of the paper at or adjacent to said joint from said roll, thereby preventing the tearing of the paper at the joint.

6. An improved joint of two ends of paper webs, comprising a strip of adhesive material normally frangible, said strip being perforated to allow flexing thereof on a relatively sharp radius without breaking, and two ends of paper web secured together by said perforated material strip without having said perforations filled, said strip as affixed between said ends forming a joint that allows the paper webbing to pass around a roller of relatively small radius without either of the paper web ends tearing at the edges of said strip material.

LAWTON A. DIX.