March 28, 1961 O. D. HART 2,976,537

FASTENER ASSEMBLY FOR JOINT FOR PAPER-MACHINE DRIER FELTS

Filed Aug. 2, 1955

Fig. 1.

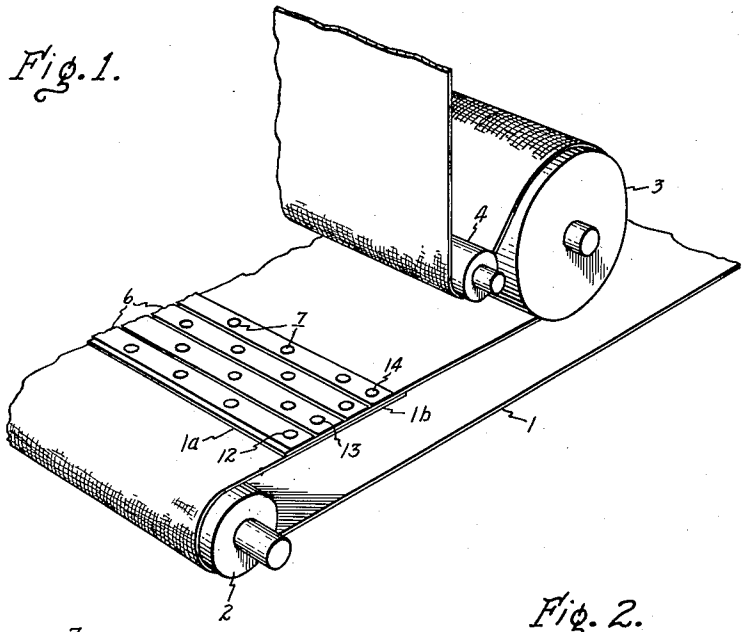
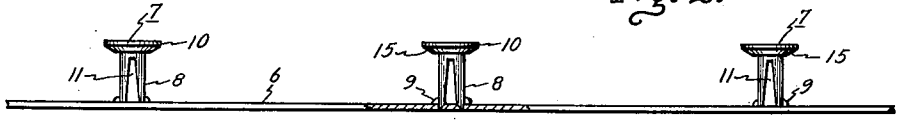


Fig. 2.



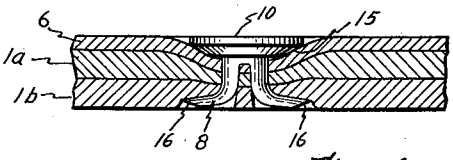


Fig. 4.

Fig. 3.

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FASTENER ASSEMBLY FOR JOINT FOR PAPER-MACHINE DRIER FELTS

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1 Claim. (Cl. 1—56)

This invention pertains to the endless webs, commonly known as drier felts, used on large paper-making machines to carry the wet pulp over heated rolls in process of being formed into paper, all well known in the Fourdrinier machine art. Because of the thickness of the felt and the repeated flexing to which it is subjected during its travel around the many rolls of the machine, serious difficulty is encountered in forming a durable joint where the ends are connected to make the felt continuous.

The purpose of my invention is to provide a joint which is both more durable than those at present known and capable of being put together faster. Thus my invention reduces "down time" of the costly paper-making machines in two ways.

A typical drier felt, which comprises a woven fabric web, for example such as described in U.S. Patent No. 2,612,190, to Hall, may have a width of approximately 20 feet and a length of 1000 feet or more. It is, accordingly, an expensive piece of material, and it is commercially important to extend the life of each felt for as long a period as possible. The joint is usually the point at which a felt first wears out, and it is a general object of this invention to improve the felt joint to provide maximum lasting qualities, at the same time decreasing the shut-down time of the machine required for joining felt ends.

Drier felt joints have heretofore been riveted by a team of at least two men, one man standing in the machine, necessarily close to hot drier rolls, with a hammer, receiving rivets one at a time from the second man, whose job it is to place rivets in a small holder to be handed to the man in the machine. Burns from hot rolls are frequent, the time required to complete the joint may be an hour or two, and a good job is very difficult to produce. It is necessary, for example, that the head of each rivet be struck squarely by the hammer to insure straight driving thereof and that an even spacing be maintained, difficult feats to perform in the hot confined space available for the workman.

In accord with this invention, the time required for completing a felt joint is reduced to about one-third of the time previously required, and only one man is required. The joint formed is improved in several respects as will further appear herein.

This invention comprises so preparing the fastening elements that they do not require individual placing, but can be positioned in groups, and in such manner that when the joint is completed metal fastening members will lie against the felt in a position minimizing their movement relative to the felt as the latter passes over rollers, and thus greatly reduce wear of the felt at the joint. In the practice of my invention I lightly fasten a line of two-pronged rivets along a tape by the points of the prongs, with the points all in the same line. I lay the tape across the everlapping end portion layers to be joined, and drive the rivets home against a backing

plate or an idler roll, cutting tape lengths equal to the width of the felt. On account of the alignment of the points the spread of the prongs is transverse to the travel of the felt, so that the prongs do not have their extreme tip ends, which tend to curl slightly upwardly into the lower surface of the lower one of the overlapped felt end portions or layers at the overlap, working in and out of the lower layer of the felt as the joint bends around the rolls of the machine.

The novel features which are believed to be characteristic of this invention are set forth with particularity in the appended claim. The invention itself, however, both as to its organization and method of operation, together with further objects and advantages thereof, may best be understood by reference to the following description taken in connection with the accompanying drawings, in which:

Fig. 1 is a fragmentary perspective view of a felt and some rollers of a paper-making machine, showing a joint made according to my invention;

Fig. 2 is a side elevation of my improved fastener ready for use, on a larger scale than Fig. 1, with part broken away;

Fig. 3 is a fragmentary perspective, showing a partly completed joint and the method of making it; and

Fig. 4 is an enlarged section indicated at 4—4, Fig. 3, with a rivet in elevation.

The felt 1 is illustrated in Fig. 1 as passing over a few of the rolls, such as 2, 3, and 4, of a paper-making machine, with the joint in a flat part of its run. All details of the machine are omitted since they form no part of my invention. The ends of the felt 1 are cut square where they overlap. The top layer is designated as 1*a* and the bottom layer as 1*b*. The construction of the joint will be understood from the following description of the method of making it.

In forming the joint, the felt ends are overlapped, accurately aligned, on a backing element, a suitable backing element being the bar 5 or one of the idler rolls of the machine, and strips of asbestos tape 6, having several broad-headed double-pronged rivets 7 fastened thereto in the manner shown in Fig. 2, are laid on the joint parallel to the cut ends of the felt. The rivets are pre-arranged on the tape 6 with prongs 8 aligned lengthwise of the tape, so that when the strips or lengths of tape are positioned as shown in Fig. 3, and the rivets driven through both plies of the joint, the prongs will spread transversely of the felt 1, as shown in Fig. 4.

The preferred way of pre-arranging the rivets is by putting a little glue 9 on the points of the prongs 8 and setting them by a very light tap into the asbestos tape 6, standing up in proper position. While a spot of glue 9 is shown in Fig. 2 for each rivet tine, the amount of glue required is very little and is largely absorbed into the tape, being, therefore, hardly visible in actual operative embodiments of the fastener assembly. The rivet-loaded tape can be prepared in continuous lengths and cut off in sections to fit the width of the felt. These sections are best applied one at a time, the rivets of the section nearest the end of the top ply 1*a* being hammered home before the next section is placed, and so on, as seen in Fig. 3. To equalize the pulling stresses of the joint the successive lengths of the tape 6 are applied with rivets staggered.

The rivet head 10 is hammered down flush with the top of the tape 6, and the prongs 8 bend out against the bar 5 to each side longitudinally of the tape and thus transversely of the felt 1, compressing the felt of the bottom ply 1*b* up, while the head 10 compresses the tape and the top ply 1*a* down. The tape 6 makes a sort of reinforcing cushion under the head, and the portions of tape

between the rivets are held down on the felt, further strengthening the joint. The effect of the transverse disposition of the prongs is that as each rivet goes over a roller the axis, so to speak, of the pair of extended prongs rides parallel to the axis of the roller, minimizing the play between prong and felt. If the prongs extended longitudinally of the felt, or with a longitudinal component, the prongs would ride tangentially to the roller, working the prong ends in and out, loosening the rivets and wearing the felt.

A typical fastener in accord with my invention which has proved satisfactory in use comprises a woven asbestos web strap or tape approximately one inch wide and approximately one-sixteenth inch thick to which the rivets are attached at the prong tips by means of a small amount of glue or cement **9**, such as a pyroxylin-base cement, and by a soft tapping of the prong tips into the tape. The rivets are preferably spaced approximately two and one-half inches on centers. The two tine rivets themselves are of aluminum, steel or a suitable metal or metal alloy, and may have heads **10** approximately seven-sixteenths of an inch in diameter. The rivets may be seven-sixteenths of an inch in overall height, before driving, and the two tines or prongs **8** are separated by a wedge shaped or tapered slot or groove **11**. The lower edges of the rivet heads may be bevelled as at **15** to reduce the cutting effects of sharp edges.

In applying the rivets and tape to form the felt joint, the worker first drives the end rivet at an edge of the felt, such as rivet **12** of Fig. 1, and then holds the tape in one hand guiding it in the proper direction striking one after another of the rivets progressively across the width of the felt. At the other edge of the felt, the tape is merely cut off and the process repeated back across the width of the felt for the next-applied row of rivets. If desired, extra rivets may be individually applied through the tape immediately adjacent the edge of the felt, as indicated by rivets **13** and **14** in Fig. 1, in those instances in which one of the rivets pre-attached to the tape does not occur as close to the edge as is thought appropriate.

The tip ends **16** of the rivet tines are seen in Fig. 4 to curl slightly upwardly into the lower surface of the lower felt **1***b*.

While only certain preferred embodiments of this invention have been shown and described by way of illustration, many modifications will occur to those skilled in the art and it is, therefore, desired that it be understood that it is intended in the appended claim to cover all such modifications as fall within the true spirit and scope of this invention.

What is claimed as new and what it is desired to secure by Letters Patent of the United States is:

A fastener assembly for paper-machine felt joints comprising a flat strip of flexible, soft, cushioning tape of substantial wear resistance, a plurality of double-pronged rivets upstanding from and adhesively attached to said tape by their prong tips only, substantially the complete length of said rivets being exposed above said tape, said rivets being arranged in a row substantially along the axis of said tape and each said rivet being spaced from the next along said tape.

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