Jan. 6, 1970 C. L. DOUGLAS 3,487,517

PAPERMAKING ROLLS

Filed March 28, 1968

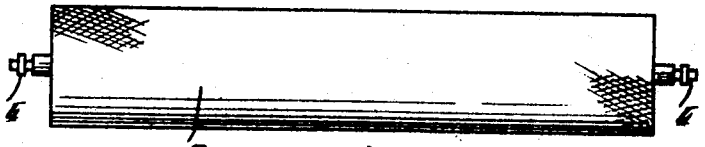


Fig. 1.

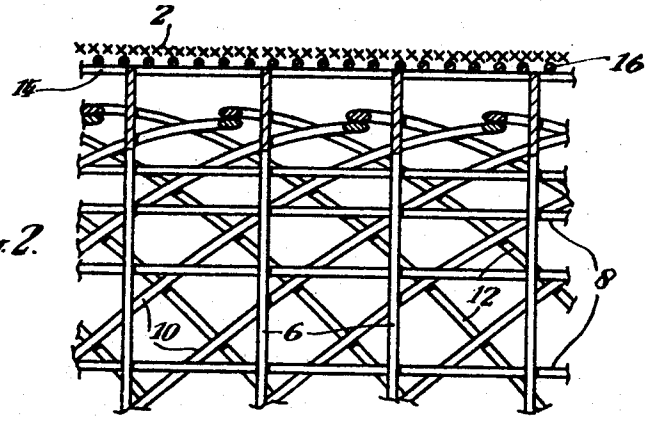


Fig. 2.

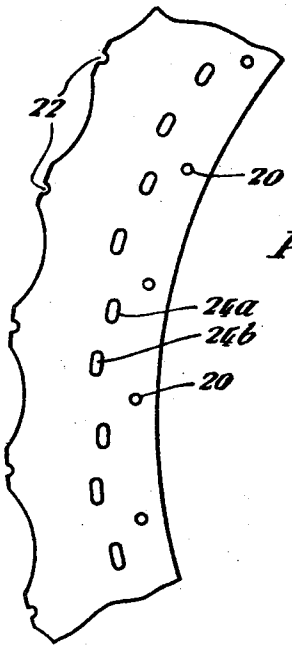


Fig. 3.

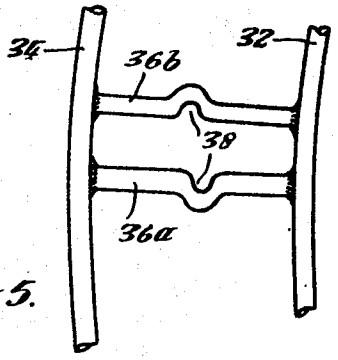


Fig. 5.

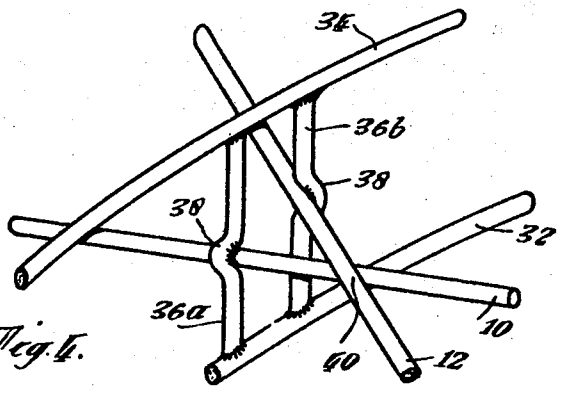


Fig. 4.

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3,487,517

PAPERMAKING ROLLS

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Int. Cl. B21b 27/02
U.S. Cl. 29—121 9 Claims

ABSTRACT OF THE DISCLOSURE

A watermark roll or dandy roll has an inner structure of ring formers and counterwound series of spiral wires secured to the formers at individually spaced locations, the cross-over and contact points of the spiral wires of the respective series thereby also being spaced from their points of contact with the ring formers. Securing by welding, soldering or the like is performed at the contact points between the ring formers and the spiral wires and at the contact points between the respective spiral wires of the two series. In a preferred arrangement the ring formers themselves are fabricated from wire, the locations for the spiral wires being laterally open recesses in wire struts spanning inner and outer rings of the formers: to assist assembly, each strut having a locating recess is placed adjacent another strut with the open side of its recess facing that other strut.

This invention relates to dandy rolls and watermark rolls. Such rolls are employed in papermaking processes at the stage in which the fibrous web has a considerable moisture content and it is important for the efficiency of the paper-making process that they allow water to be removed relatively freely from the web through the interior of the roll.

Conventionally, such rolls have an inner cylindrical supporting structure comprising a series of axially spaced ring formers joined by axially directed wires and by two counterwound series of spiral stiffening wires, apertures in the ring formers intermediate their radial width each receiving a pair of spiral wires, one of each series, at the cross-over points of said wires. In addition, over a further series of axially directed wires attached to the outer peripheries of the ring formers may be wound fairly closely a further spiral wire forming a close-spaced support for an outermost layer having closely spaced apertures, e.g. a sheet of wire gauze, to ensure that the cylindricality of this outermost layer is maintained to a close tolerance under operational stresses.

In order to keep deflections of the outermost layer to acceptable limits, the stiffness of its underlying supporting structure must be high and for this purpose soldering or other securing processes are employed at the intersections of the various elements of the structure. At each point where the spiral stiffening wires penetrate the ring formers, a secure joint must be made between the overlapping elements but inevitably access to the region is restricted making it difficult to perform a secure soldered joint and in any case the joint must be a relatively large one to attach all three elements to each other. The presence of any large solid obstacle to the free escape of water removed from the pulp web, as may be presented by such a soldered joint, can have a deleterious effect on the efficiency of operation of the roll; moreover the joint area itself can then form a nucleus for a build-up of fibres that find their way through the outermost layer and

this can eventually close a larger area to the passage of water.

It is an object of the present invention to provide a dandy roll or watermark roll construction in which such large joints can be avoided thereby facilitating the secure fastening of the elements together and reducing the area of obstruction each individual joint will offer to the passage of water and pulp fibres.

According to the invention, the two counterwound series of spiral wires secured to the ring formers are so arranged that the engagement points of the respective spiral wires with a ring former are each spaced from the other. The joints to be secured are then between two constructional elements only thereby facilitating access and permitting the individual joints to be of a smaller size.

If the two series of spirals are disposed in contiguous cylindrical envelopes as in conventional roll constructions the wires of the respective series will now contact each other at points spaced from the ring formers. Preferably, they are in turn secured to each other at these points with the result that the single joint of a conventional construction at the meeting point of two wires and a ring former is now replaced by a series of three spaced joints forming a triangular constructional pattern that enhances the stiffness of the roll.

The invention will now be more particularly described with reference to the accompanying drawing, wherein:

FIG. 1 is an elevational view of a dandy roll,

FIG. 2 is a part axial section of the roll of FIG. 1 showing details of the construcion according to the invention,

FIG. 3 is a part side view of a ring former of the roll of FIGS. 1 and 2,

FIG. 4 is a perspective view of part of a modified construction according to the invention, and

FIG. 5 is a part side view of a ring former of the construction in FIG. 4.

Referring more particularly to FIGS. 1 to 3, the dandy roll is a cylindrical unit having a wire gauze outer cover **2** and end trunnions **4** for support in a paper-making apparatus. As shown in FIG. 2, the inner structure of the roll comprises a series of axially spaced ring formers **6** secured to a radially innermost series of axial wires **8** disposed at circumferentially spaced positions relative to the roll axis. At a small radial distance from the wires **8** are two similarly distributed, counter-wound series of spiral wires **10, 12** the radial positions of which are contiguous so that the two series overlap and touch each other. At the outer periphery of the ring formers, a second series of circumferentially spaced axial wires **14** is secured and over this a fairly close wire spiral **16** is wound to assist the formation of a concentric cylindrical surface by the wire gauze layer **2** that is laid upon it. For simplicity, the elements **2, 14, 16** are shown only at the upper edge region of FIG. 2.

As indicated in FIG. 3, the ring formers have circular apertures **20** and recesses **22** to receive the two series of axial wires **8, 14**. Intermediate these, the spirals **10, 12** are received in two series of apertures **24***a*, **24***b* that are of elongate form to accommodate the obliquity of the circular section wires. In accordance with the invention, the two series of apertures are angularly staggered so that the spiral wires each engage a ring former at individual, spaced locations. The construction is secured during assembly by silver soldering or other conventional means at each intersection between a ring former and the axial and spiral wires. In addition, since the two series of spiral wires are on contiguous pitch circles, they will touch each other at points some distance from the ring formers. Further soldering at these points produces a triangular securing pattern for each pair of counter-wound wires in the region of their overlap, comprising the contact

point between the two wires and the two contact points between the respective wires and the ring former, this multiple pattern taking the place of the single securing joint of a conventional construction.

In the modified arrangement according to the invention illustrated in FIGS. 4 and 5, the sheet ring formers of the first example are replaced by fabricated wire formers each comprising inner and outer wire rings **32, 34** connected at intervals by pairs of intermediate struts **36***a*, **36***b*. Each strut has a substantially semi-circular recess **38** spaced from the rings **32, 34**, the two recesses being staggered but contiguous to each other in the radial direction of the former. These recesses form locations for the spiral wires **10, 12** in an analogous way to the apertures **24** of a sheet metal former and similarly provide spaced securing points for an adjacent pair of oppositely wound spirals. Again, similarly to the first example, the spiral wires are themselves secured together at their points of mutual contact **40** to give triangular structural elements, as can be seen in FIG. 5.

The securing of the parts can again be performed by any conventional means but since all the parts are of wire in this instance, the use of stainless steel in the construction may be facilitated in which case argon arc welding may be a preferred method for the interconnection of the parts.

The spacing of the intersection of the two spiral wires is shown in the second example in particular to be relatively close to a ring former. This is not an important consideration where an apertured sheet former is used but in the fabricated former of FIGS. 4 and 5, it has the result that the spacing of the two struts **36***a*, **36***b* is relatively small and the initial assembly and retention of the spiral wires in their proper locations before they are secured is therefore facilitated.

The other structural elements of the roll are not illustrated in FIGS. 4 and 5. However, it will be appreciated that they can be arranged similarly to the first-described example. As is known in the art, the outer roll surface may be of gauze, for example, which can be provided with watermarking devices; alternatively, in a laid or vergé roll, outer ring formers may be mounted on the main supporting structure at the outer peripheral layer of axially directed wires **14**.

What I claim and desire to secure by Letters Patent is:

1. A dandy roll or watermark roll comprising, in combination, a series of ring formers spaced along the axis of the roll, at least two counterwound series of rounded section spiral stiffening wires joining said formers, and an outer cylindrical surface structure supported upon said formers, both said spiral series of wires being inwardly spaced from said outer cylindrical structure, the respective wires of each of said two spiral series being disposed at circumferentially spaced positions relative to the roll axis and the two series being so arranged relative to each other that the engagement points of the respective spiral wires to each ring former are spaced from each other.

2. A roll according to claim **1** wherein the two series of spiral wires are disposed in contiguous cylindrical envelopes so that the wires of the respective series contact each other at points spaced from the ring formers, said wires being secured to each other at these points.

3. A roll according to claim **1** wherein plate-form ring formers are provided and respective series of apertures are arranged intermediate their radial extent to receive said two counterwound series of spiral wires.

4. A roll according to claim **3** wherein the apertures are elongated in the circumferential direction of the former and are so disposed that the radially inner edges of one series of apertures are at the same distance from the roll axis as the radially outer edges of the second series of apertures.

5. A roll according to claim **1** wherein each ring former comprises inner and outer circular members and intermediate members joining said circular members to locate them concentrically to each other, the wires of the two spiral series being attached to respective ones intermediate members.

6. A roll according to claim **5** wherein each intermediate member providing a spiral wire attachment comprises an open-sided recess in which its spiral wire is located.

7. A roll according to claim **6** wherein said intermediate members attaching the spiral wires are grouped in pairs with a small spacing between the members of each pair and each member having the open side of its recess facing the other member of its pair.

8. A roll according to claim **5** wherein the ring formers are fabricated from wire and the joints between the members and the spiral wires are secured by a welding process.

9. A roll according to claim **1** wherein each ring former comprises inner and outer circular members and intermediate members securing said circular members concentrically to each other, at least some of said intermediate members being grouped in pairs with a small spacing between the members of each pair, a recess open towards the other member of the pair being provided in at least some of said grouped members, said recesses providing attachment locations for the wires of the two spiral series, said two series being disposed in contiguous cylindrical envelopes so that the wires of the respective series contact each other at points spaced from said intermediate member recesses and said wires being secured together at said points.

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L. G. MACHLIN, Assistant Examiner

(5/69)

UNITED STATES PATENT OFFICE

CERTIFICATE OF CORRECTION

Patent No. 3,487,517 Dated January 6, 1970

Inventor(s) CECIL LEONARD DOUGLAS

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 4, line 20, after "respective ones" insert --of said--

SIGNED AND SEALED JUN 9 1970

(SEAL)
Attest:

Edward M. Fletcher, Jr.
Attesting Officer

WILLIAM E. SCHUYLER, JR.
Commissioner of Patents