Dec. 11, 1951 F. L. NASH 2,578,581

REINFORCING ASBESTOS-CEMENT SHEETS

Original Filed Aug. 18, 1948 3 Sheets-Sheet 1

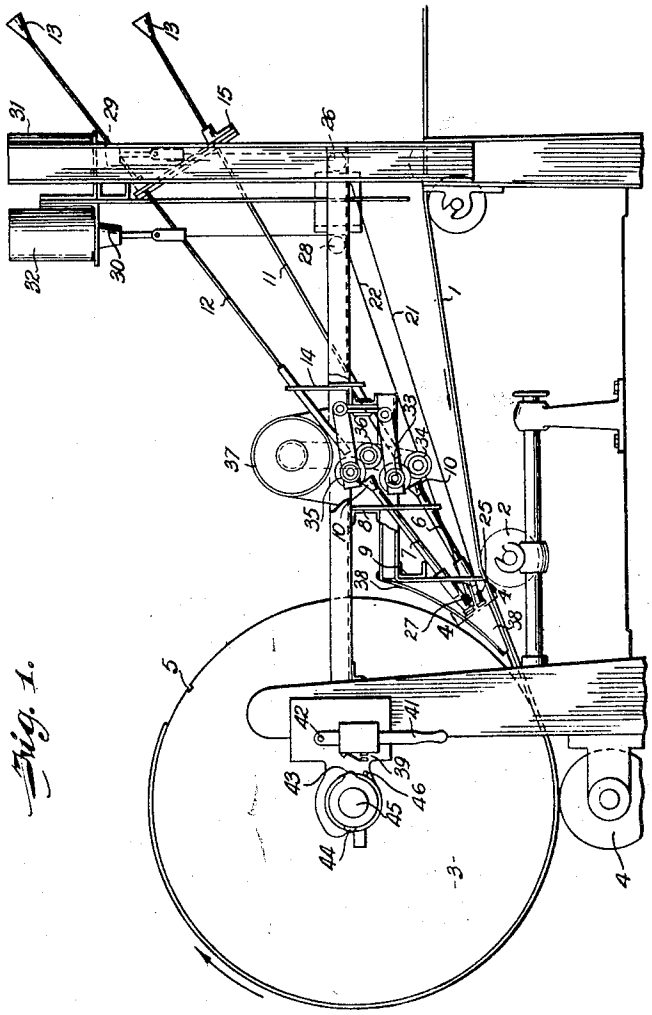


Fig. 1.

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Original Filed Aug. 18, 1948 3 Sheets-Sheet 2

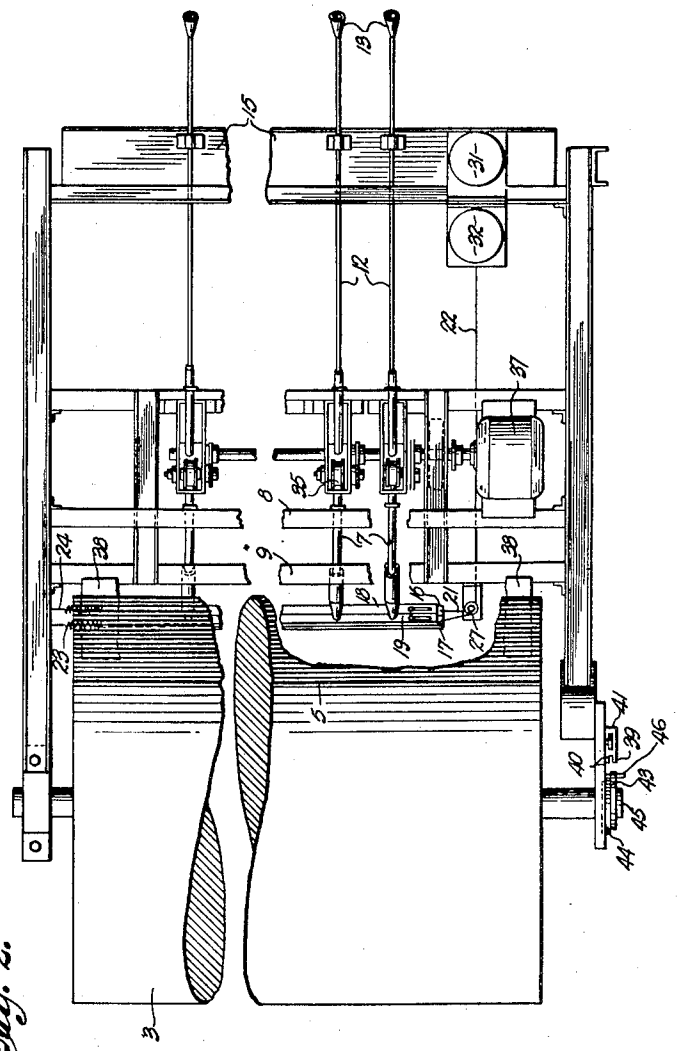


Fig. 2.

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REINFORCING ASBESTOS-CEMENT SHEETS

Original Filed Aug. 18, 1948 3 Sheets-Sheet 3

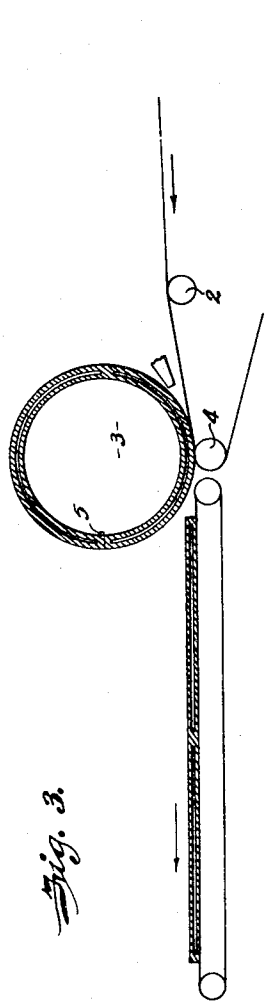


Fig. 3.

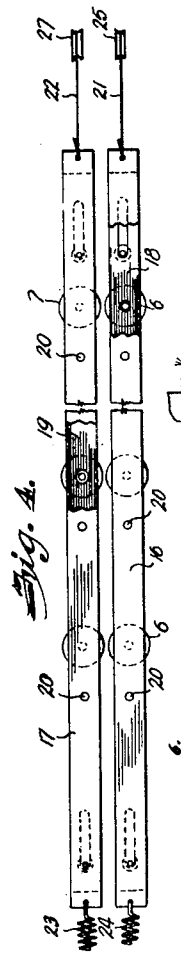


Fig. 4.

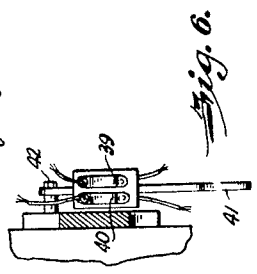


Fig. 6.

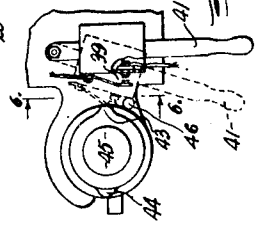


Fig. 5.

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Patented Dec. 11, 1951

2,578,581

UNITED STATES PATENT OFFICE

2,578,581

REINFORCING ASBESTOS-CEMENT SHEETS

Frank Lennard Nash, Widnes, England, assignor to Turners Asbestos Cement Company Limited, Rochdale, England, a British company

Original application August 18, 1948, Serial No. 44,828. Divided and this application June 22, 1950, Serial No. 169,755. In Great Britain October 20, 1947

4 Claims. (Cl. 92—41)

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The present invention relates in general to the internal reinforcement of objects, and it deals more particularly with the reinforcement of asbestos cement sheets or the like.

The common way of making asbestos cement or like sheets is to coat a rotating cylinder with the asbestos cement or other material in a moist state. The most common form of machine including such a rotating cylinder is of the Hatschek type in which successive laminations of the moist material are transferred from a carrier band to the cylinder (which is commonly known as a forming bowl). When the laminations have built up to the desired thickness a cut must be made parallel to the axis so that the laminated covering on the forming bowl can be detached from it and removed as a sheet. A groove is commonly made along the bowl and may be called the parting-off line, a knife being run along this groove by the operator to make the cut.

The cutting of a sheet of asbestos cement while it is still in a plastic state is a simple matter. However, the sheets must often be internally reinforced and the reinforcement is introduced while the material is still on the forming bowl, being inserted between two laminations. To cut a reinforced sheet is not simple, as the reinforcement commonly consists of metal, and it is found to be practically impossible to cut through a reinforced sheet while the asbestos-cement is still plastic. It is at this stage, however, that it is desirable to cut any sheet to its final size.

Each length of reinforcement preferably takes the form of a number of parallel wires extending circumferentially around the rotating cylinder. Wm. H. Rooksby application Serial No. 673,791 filed June 1, 1946, describes a form of apparatus for feeding reinforcing wires lengthwise to the rotating cylinder of a machine of the Hatschek type so that they are located on the cylinder in predetermined positions in relation to the parting-off line. More particularly, each wire is wrapped around the cylinder with its opposite ends disposed in spaced-apart relationship on either side of the parting-off line; thus, the asbestos cement sheet can be cut from the cylinder without having to cut through the wires.

Now the length of the finished sheet is determined by the diameter of the forming bowl, and when it is desired to vary the length the forming bowl must be changed for another of a different diameter. It is inconvenient to have to provide a large number of forming bowls to allow sheets of different lengths to be made, and short sheets are sometimes made by using a forming bowl

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large enough to produce a long sheet and then cutting this long sheet into shorter lengths. In practice a long sheet is generally cut into two short sheets and to provide a large variety of different lengths of sheet, the lengths of these two short sheets may vary considerably in relation to one another. For instance, if a forming bowl is used which gives a sheet 12 feet long this sheet may be cut in half to give two lengths of 6 feet each or it may be cut to give sheets of 5 feet and 7 feet or yet again it may be cut to give sheets of 8 feet and 4 feet.

It is an object of the present invention to provide a method for forming long reinforced sheets which may easily be cut in shorter lengths.

Another object is to provide a method for forming a sheet of the character disclosed in the aforementioned Rooksby application Serial No. 673,791, except that the continuity of the reinforcing wires is interrupted along one or more lines extending crosswise of the sheet intermediate its ends thereby to facilitate cutting of the sheet into short lengths.

According to the present invention short reinforced sheets are made by building up a coating on a rotating cylinder to form a long sheet and introducing lengths of reinforcement into the material to wrap around the cylinder, these lengths of reinforcement being spaced a short distance apart circumferentially so as to leave at least two short circumferential lengths of the built-up coating unreinforced. One of these unreinforced lengths includes the parting-off line, that is to say, the line along which the operator makes the cut, whether or not it is defined by a groove on the forming bowl, and the other (or each other) includes the line (or lines) along which the long sheet is out to form short sheets. The long sheet can therefore be cut into short sheets without it being necessary to cut through the reinforcement. The present application may advantageously be carried out by modifying the apparatus disclosed in Rooksby application Serial No. 673,791, in a manner disclosed and claimed in my co-pending application Serial No. 44,828. To assist an understanding of the present invention one such apparatus suitable for making reinforced sheets each to be cut into two shorter sheets will now be described by way of example with reference to the accompanying drawings, in which:

Figure 1 is a side elevation of the apparatus,

Figure 2 is a plan view of the apparatus shown in Figure 1, and

Figure 3 shows diagrammatically the positions

of the reinforcing wires on the rotating cylinder and in the finished sheet,

Figure 4 is an enlarged detail view taken along the line 4—4 of Figure 1, in the direction of the arrows,

Figure 5 is a detail view of the cam operated switches and the associated manual control therefor, and

Figure 6 is a sectional elevation taken along the line 6—6 of Figure 5 in the direction of the arrows.

In the apparatus shown, an endless felt band 1, carrying a layer of asbestos cement slurry passes over a roller 2 into contact with a rotary cylinder or forming bowl 3. The asbestos cement is transferred to the forming bowl at the point where the band 1 passes through the nip between the forming bowl and a pressure roller 4, and as the operation proceeds successive laminations are built up on the bowl. When the desired thickness has been attained the coating is removed from the bowl as the result of a cut made by a knife guided by a groove or parting-off line 5 on the surface of the bowl, the coating then peeling off in the form of a flat sheet during the subsequent revolution of the bowl.

Two separate feeding devices are provided, one for each set of wires constituting a length of reinforcement. The devices include a lower set of inclined guide-tubes 6 and an upper set of guide-tubes 7 arranged immediately above the tubes 6 and inclined at a slightly greater angle to the horizontal, so that the two sets of tubes converge towards the forming bowl, being supported by brackets 8 and 9. The tubes have funnel-shaped mouths 10 and are arranged in alignment with two further sets of tubes 11 and 12 which also have funnel-shaped mouths 13 and are supported by brackets 14 and 15.

A reinforcing wire of the appropriate length is placed in each of the tubes 11 and 12 and extends into the corresponding tube 6 or 7, being prevented from passing beyond the end of the tube by plates 16 and 17 closing the ends of the tubes 6 and 7 respectively. These plates slide in guides 18 and 19 and are provided with ports 20 corresponding to the ends of the tubes. The plates are pulled into the position in which the ports 20 register with the ends of the tubes by wires 21 and 22 against the action of tension springs 23 and 24 which return the plates to the position of non-register when the tension is released from the wires. The wires 21 and 22 pass over pulleys 25 and 26 and 27 and 28 respectively and are attached to the armatures 29 and 30 of solenoids 31 and 32. Thus when the solenoids are energised the armatures are attracted and apply tension to the wires 21 and 22 to move the plates 16 and 17 into the position in which the ports register with the ends of the tubes and as soon as the solenoids are de-energised the plates return to the position of non-register.

When wires are in position in the tubes each is exposed over a short axial length corresponding to the gap between the sets of tubes 6 and 11 or 7 and 12 as the case may be. Each wire is acted on frictionally at this point by a pair of rollers 33 and 34 or 35 and 36 which are driven from an electric motor 37 and serve to urge the wire downwards along the tube. The operation of these rollers is exactly analagous to that of the rollers 23 and 24 shown in Figures 5 and 6 of application Serial No. 673,791.

As soon as either solenoid 31 and 32 is energised to move the corresponding plate into the registering position the wires in the corresponding set of tubes are fed forward under the influence of the friction rollers, being guided by a sheet-metal extension-piece 38 on the end of the tubes so that they wrap smoothly around the forming bowl 3 and lie in the positions shown in Figure 3.

Each of the solenoids is energised by way of an electrical circuit which includes a cam-operated switch. A switch 39 controls the solenoid 31 and a switch 40 the solenoid 32. The switches are carried on a lever arm 41 pivoted at 42 and are actuated by cams 43 and 44 carried on an extension 45 of the main shaft of the forming bowl. In its free position the arm 41 hangs so that the switches are clear of the respective cams, but it may be moved by the operator into a position (shown dotted in Fig. 5) in which it is in contact with a stop 46 and in which the switches may be actuated by the projections on the respective cams.

The cam 43 which serves to initiate the feed of the wires in the set of tubes 6 is set on the shaft to time the feeding so that the leading ends of the wires lie close to the parting-off line 5. Since, whatever the relative lengths of the two shorter sheets into which the sheet is to be cut, the end of the reinforcement must lie close to the end of the sheet, the setting of the cam 43 will be constant and will not require alteration. The position of the ends of the second set of wires in the tubes 7 will, however, depend on the relative lengths of the two shorter sheets and the angular position of the cam 44 must therefore be adjusted accordingly.

In use the operator allows the coating to build up until it has reached approximately half the desired thickness. He then moves the lever arm 41 into contact with the stop to bring the surfaces of the cams 43 and 44 into contact with the respective switches. The two sets of reinforcing wires are then fed to the forming bowl at the appropriate instants and wrap smoothly around it. The coating then continues to build up on top of the reinforcing wires until the final thickness is reached, when the coating is removed from the forming bowl in the usual manner.

Although the invention is primarily useful in its application to the manufacture of asbestos-cement sheets, it may also be applied to the manufacture of sheets from any similar material which will set rigid from the plastic state, containing for example other fibres or another binding agent.

This application is a division of my copending application Serial No. 44,828, made August 18, 1948.

I claim:

1. The process of forming reinforced sheets comprising the steps of winding a web of thin plastic material on a rotary cylinder to form a multi-layer tube, placing a first reinforcing segment whose length is a fractional part of the circumference of the tube between the web and the last layer already formed on the tube, the leading end of said first reinforcing segment being positioned adjacent the point where the web reaches the tube, continuing the winding of the web on the cylinder through part of a revolution to wrap the first reinforcing segment around the tube, spacing the leading end of a second reinforcing segment whose length is slightly less than the difference between the circumference of the tube and the length of the first segment slightly behind the trailing end of said first segment,

continuing the winding to wrap said second segment about the tube whereby said segments are located between two of the layers and have their adjacent ends spaced slightly from one another to provide the tube with two circumferentially spaced unreinforced parts, cutting said tube longitudinally through one of said unreinforced parts, and flattening out the tube to form a sheet.

2. The process of forming reinforced sheets comprising the steps of winding a web of thin plastic material on a rotary cylinder to form a multi-layer tube, placing a first reinforcing segment whose length is a fractional part of the circumference of the tube between the web and the last layer already formed on the tube, the leading end of said first reinforcing segment being positioned adjacent the point where the web reaches the tube, continuing the winding of the web on the cylinder through part of a revolution to wrap the first reinforcing segment around the tube, spacing the leading end of a second reinforcing segment whose length is slightly less than the difference between the circumference of the tube and the length of the first segment slightly behind the trailing end of said first segment, continuing the winding to wrap said second segment about the tube whereby said segments are located between two of the layers and have their adjacent ends spaced slightly from one another to provide the tube with two circumferentially spaced unreinforced parts, cutting said tube longitudinally through one of said unreinforced parts, flattening out the tube to form a sheet, and dividing the sheet into lengths by cutting through the other unreinforced part.

3. The process of forming reinforced sheets comprising the steps of winding a web of thin plastic material on a rotary cylinder to form a multi-layer tube, placing a first set of parallel wires having a common length equal to a fractional part of the circumference of the tube between the web and the last layer already formed on the tube, the wires being aligned longitudinally of the web and having their leading ends positioned adjacent the point where the web reaches the tube, continuing the winding of the web on the cylinder through part of a revolution to wrap the first set of wires around the tube, spacing the leading ends of a second set of parallel wires having a common length slightly less than the difference between the circumference of the tube and the length of the first wires slightly behind the trailing ends of said first wires, continuing the winding to wrap said second set of wires about the tube whereby said sets of wires are located between two of the layers and have their adjacent ends spaced slightly from one another to provide the tube with two circumferentially spaced unreinforced parts, cutting said tube longitudinally through one of said unreinforced parts, and flattening out the tube to form a sheet.

4. The process of forming reinforced sheets comprising the steps of winding a web of thin plastic material on a rotary cylinder to form a multi-layer tube, placing a first set of parallel wires having a common length equal to a fractional part of the circumference of the tube between the web and the last layer already formed on the tube, the wires being aligned longitudinally of the web and having their leading ends positioned adjacent the point where the web reaches the tube, continuing the winding of the web on the cylinder through part of a revolution to wrap the first set of wires around the tube, spacing the leading ends of a second set of parallel wires having a common length slightly less than the difference between the circumference of the tube and the length of the first wires slightly behind the trailing ends of said first wires, continuing the winding to wrap said second set of wires about the tube whereby said sets of wires are located between two of the layers and have their adjacent ends spaced slightly from one another to provide the tube with two circumferentially spaced unreinforced parts, cutting said tube longitudinally through one of said unreinforced parts, flattening out the tube to form a sheet, and dividing the sheet into lengths by cutting through the other unreinforced part.

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The following references are of record in the file of this patent:

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