

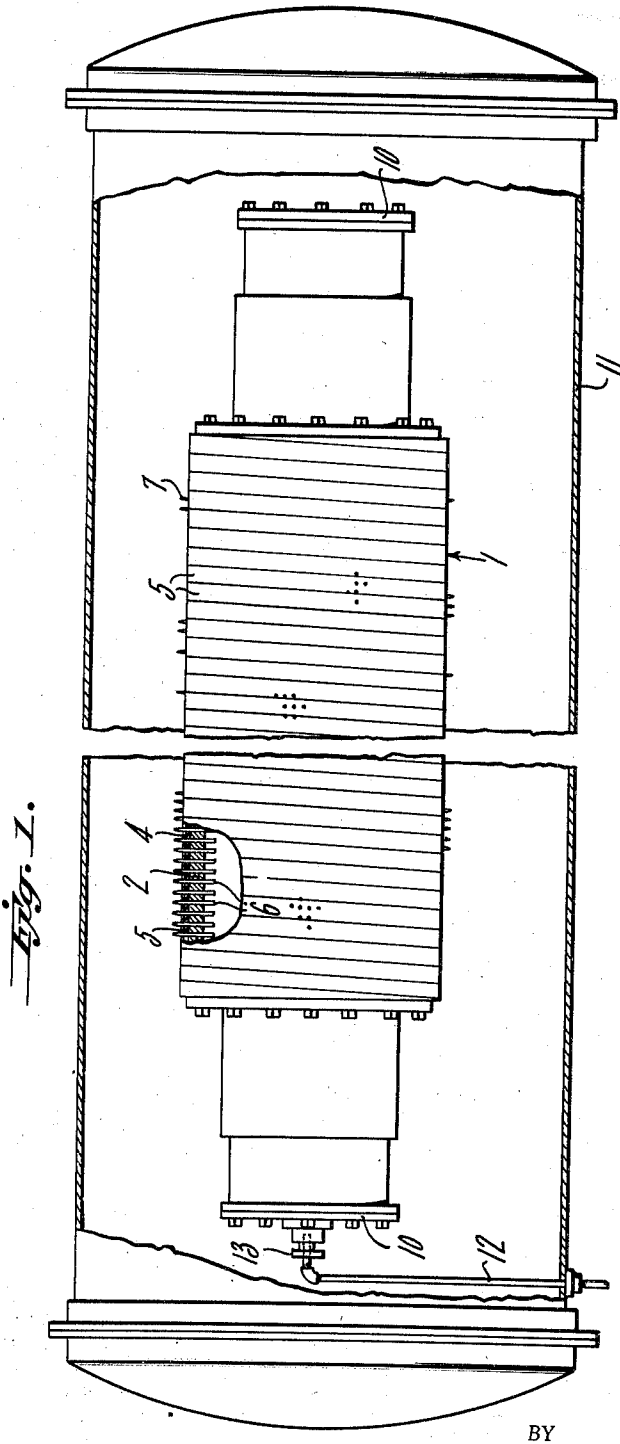
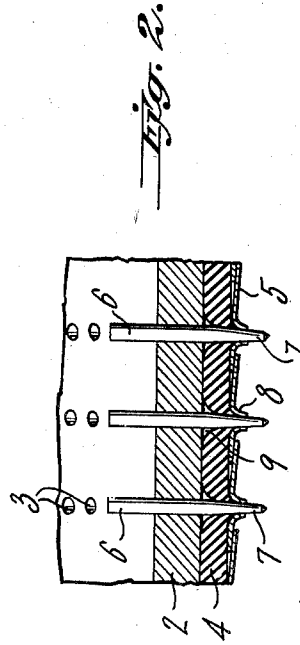
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PROCESS OF COVERING PERFORATED ROLLS

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PROCESS OF COVERING PERFORATED ROLLS

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This invention relates to a process of covering perforated rolls, more particularly to a process for forming perforated coverings of rubber-like material on perforated hollow rolls. The present invention, while applicable generally to the forming of perforated rubber coverings on perforated rolls, relates more particularly to the forming of such coverings on the perforated rolls used in the paper making industry, such as suction press and couch rolls.

Perforated metal suction rolls have been used in the paper industry for a long time, and more recently there have been applied to these rolls perforated rubber coverings. However, considerable difficulty has been had in properly forming the perforations and in properly adhering the covering to the metal body of the roll. One method of application has been to apply a rubber covering to the perforated metal roll, vulcanize the covering, and then drill holes from the outside through the rubber covering in registry with the perforations in the metal roll. However, the rolls in many cases are very long and the perforations are relatively small and closely spaced, and it has therefore been very difficult in drilling from the outside to obtain proper registry of the drilled holes in the rubber covering with the perforations in the metal roll. As a result, it was customary to make the drilled holes in the covering somewhat smaller than those in the roll body to insure that the drilled hole in the covering would be entirely within the circumference of the corresponding perforation in the roll. This cutting down the size of the hole in the rubber covering necessarily limits the flow of water into the roll from the paper web being operated upon, and in addition the drilled hole in the rubber has not the desired smoothness.

To obviate the above objection, another procedure was devised in which the rubber covering was applied to the outer surface of the perforated metal roll, then tightly wrapped with cloth to retain the rubber in place during vulcanization, after which pins were driven through the perforations of the roll from the inside outwardly and entirely through the rubber covering and retaining layer of fabric. The roll was then vulcanized, the fabric covering removed, and the pins driven back inwardly and removed from the interior of the roll. This procedure is disclosed in patent of Wellsford No. 1,988,640, and is an improvement over the prior process in that the holes in the rubber covering are exactly in registry with the holes in the metal roll and also the walls of the holes in the rubber have a smooth molded surface.

However, there has been serious difficulty in securing good adhesion of the rubber to the metal, because when the pins are driven outwardly

through the holes in the metal roll, they tend to lift away both the rubber covering and its confining fabric wrapping, and as a result, air pockets are formed between the roll and its rubber cover around each of the pins. When the covering is vulcanized and the roll put in use, the covering then tends to separate.

An object of the present invention is to provide an improved process for forming a perforated covering of rubber-like material on perforated rolls.

Another object is to provide an improved union between the rubber covering and the metal roll.

For a detailed disclosure of the nature and objects of the invention reference is had to the accompanying specification and drawing, in which latter:

Figure 1 is a more or less diagrammatic sectional view of a vulcanizer and roll, and

Figure 2 is a detail enlarged section through the roll at an intermediate stage in the process.

The process will be described in connection with the appended drawing, and in carrying out the invention in one embodiment a roll designated generally by the numeral 1, such as a suction press roll, has a metal shell 2 provided with numerous small perforations 3. Over this shell is disposed the covering 4 of suitable material, such as unvulcanized rubber. This rubber may be compounded in any suitable way to impart the desired properties to the covering when in use, and usually is applied by rolling around the roll a suitable number of layers of sheet stock until the desired thickness has been obtained. In applying the sheet rubber stock to the roll, any of the usual expedients for obtaining good adhesion may be employed. A strong wrapping of suitable confining material, such as fabric strip 5, is then wrapped around the rubber covering so as to firmly bind it to the roll during vulcanization.

Pins 6 are then driven through the perforations 3 of the roll from the inside outwardly and entirely through the rubber covering 4 and fabric wrapping 5. These pins are tapered at their outer ends as shown at 7. Due to the pressure exerted when the pins 6 are driven through the rubber layer 4 and fabric 5, and also to the frictional resistance of the rubber and fabric, these are forced upwardly in a more or less conical shape around the exposed end of each pin, as shown at 8. This results in the formation of small air pockets 9 disposed around each pin at the point where it projects outside of the roll body 2. As before pointed out, if the roll were vulcanized in this condition, these air pockets 9 would remain and would prevent proper adhesion of the rubber covering to the roll. By the present invention the roll, in the condition shown in Fig. 2, is sealed at each end as by the caps 10 and is then placed in a vulcanizer 11. A pipe 12 communicates at one

end with the outer atmosphere, and at its other end is connected through a swivel joint 13 with the interior of the roll. The roll is rotatably mounted in the vulcanizer in any suitable manner (not shown) for a purpose to be later described.

Steam and air pressure are then applied in the vulcanizer to the exterior of the roll, the steam pressure being gradually raised until a pressure sufficient to give the desired vulcanizing temperature is attained. As the rubber covering is initially heated up, and before vulcanization has set it, it becomes softened and plastic, and by reason of the external steam and air pressure, the covering is forced down firmly into union with the metal roll at all points. Since the pins 6 have only a slide fit in the perforations 3, the air in the pockets 9 can escape around the pins into the interior of the roll and thence by way of the pipe 12 to the outer air. After this partial differential cure or vulcanization has proceeded to the desired extent, the pipe 12 and cap 10 are removed so as to permit free access to the interior of the roll. The vulcanizer is then again closed and steam and air pressure again applied, the steam pressure being gradually raised to the desired vulcanizing pressure, and since the interior of the roll is now open, the pressure will be the same on the interior and exterior of the roll.

The times of vulcanization will, of course, be varied in a manner well known to those skilled in the art according to the size of the roll, thickness of the cover, composition of the rubber stock, and plastometer reading required by the customer. Rotation of the roll during the vulcanizing periods is necessary in order to prevent water pockets forming inside the roll from condensed steam.

Upon completion of the vulcanization the roll is removed from the vulcanizer, the outer fabric wrapping released, and the pins 6 driven back into the interior of the roll. The surface of the rubber covering may then be ground to the size and finish desired for the purpose.

While the invention has been specifically described in connection with the use of rubber as the covering material, it is obvious that any suitable rubber-like material having the desired properties may be employed, such as synthetic rubbers or imitation rubbers, or polychlorobutadiene, commonly known as "Duprene".

It will be seen that by the invention, a perforated rubber cover for a perforated roll can be formed in such a manner that the holes in the rubber and metal are in exact registry, the walls of the holes in the rubber are smoothly molded, and at the same time strong adhesion has been secured between the rubber cover and metal body throughout the unperforated area of the roll.

It is obvious that modifications may be made in the process and it is not desired to limit it otherwise than as set forth in the appended claims.

Having thus described my invention, what I claim and desire to protect by Letters Patent is:

1. A method of forming perforated coverings of rubber-like material on perforated hollow rolls which comprises applying a covering of said material in at least a partially plastic condition to a perforated roll, enclosing the covering with perforatable confining material, driving pins from the interior of the roll through its perforations, the covering material and the confining material, whereby the covering material is separated from

the roll around said perforations, applying heat and external pressure around the projecting portions of said pins to produce complete union of the covering and roll at the separations around the roll perforations, setting the covering to an elastic, non-plastic condition, withdrawing said pins, and removing the confining material.

2. A method of forming perforated coverings of rubber-like material on perforated hollow rolls which comprises applying a covering of said material in at least a partially plastic condition to a perforated roll, enclosing the covering with perforatable confining material, driving pins from the interior of the roll through its perforations, the covering material and the confining material, whereby the covering material is separated from the roll around said perforations, temporarily softening the covering material while maintaining an excess of fluid pressure on the exterior of the assembly, to thereby reunite the covering and the roll at the points of separation, setting the covering to a non-plastic condition, withdrawing said pins, and removing the confining material.

3. A method of forming perforated coverings of rubber-like material on perforated hollow rolls which comprises applying a covering of said material in at least a partially plastic condition to a roll, wrapping the covering with sheet confining material, driving pins from the roll interior through its perforations, the covering material and the confining material, whereby the covering material is separated from the roll around said perforations, softening and then partially setting the covering material by heat while maintaining an excess of fluid pressure on the assembly exterior, to thereby reunite the covering and roll at the points of separation, completely setting the covering to a non-plastic condition by heat, withdrawing said pins, and removing the confining material.

4. A method of forming perforated rubber coverings on perforated hollow rolls which comprises applying a covering of plastic rubber to a roll, wrapping the covering with textile fabric, driving pins from the roll interior through said perforations, whereby the covering material is separated from the roll around said perforations, rubber covering and fabric, softening and inducing vulcanization of the covering by heat while maintaining an excess of fluid pressure on the roll exterior, to thereby reunite the covering and roll at the points of separation, completing the vulcanization under equalized exterior and interior pressure, withdrawing said pins, and removing the fabric wrapping.

5. A method of forming perforated rubber coverings on perforated hollow rolls which comprises applying a covering of unvulcanized rubber to a roll, wrapping the covering with textile fabric, driving pins through said perforations, rubber covering and fabric, whereby the covering material is separated from the roll around said perforations, partially vulcanizing the covering in the presence of an excess of steam pressure on the roll exterior, to thereby reunite the covering and roll at the points of separation, completing the vulcanization under equalized exterior and interior steam pressure on the roll, rotating the roll during vulcanization, withdrawing said pins, and removing the fabric wrapping.

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