Jan. 26, 1937. A. H. STANDLEY ET AL 2,069,119

RUBBER COVERED SUCTION ROLL

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Fig. 1.

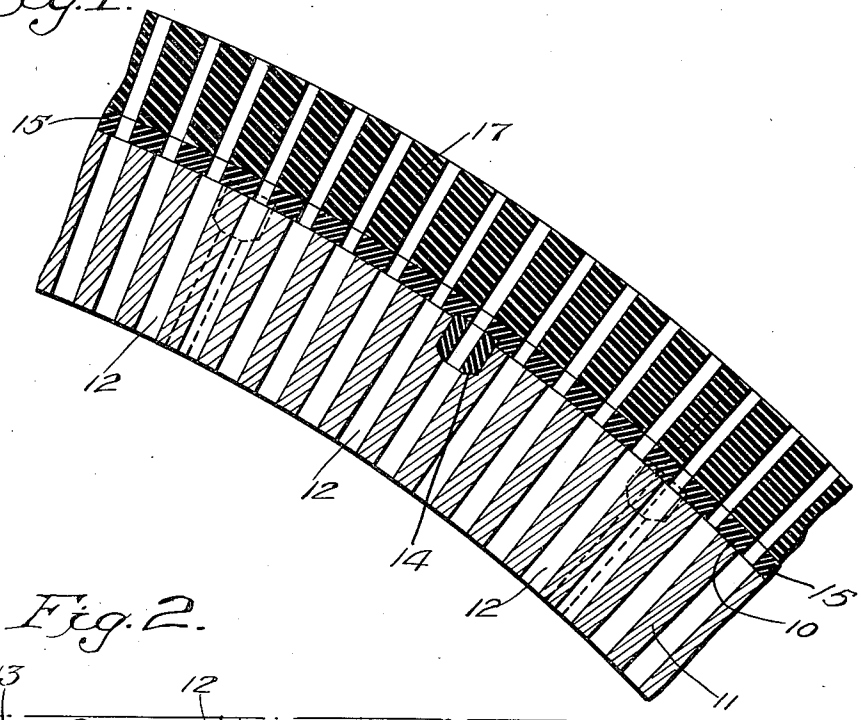
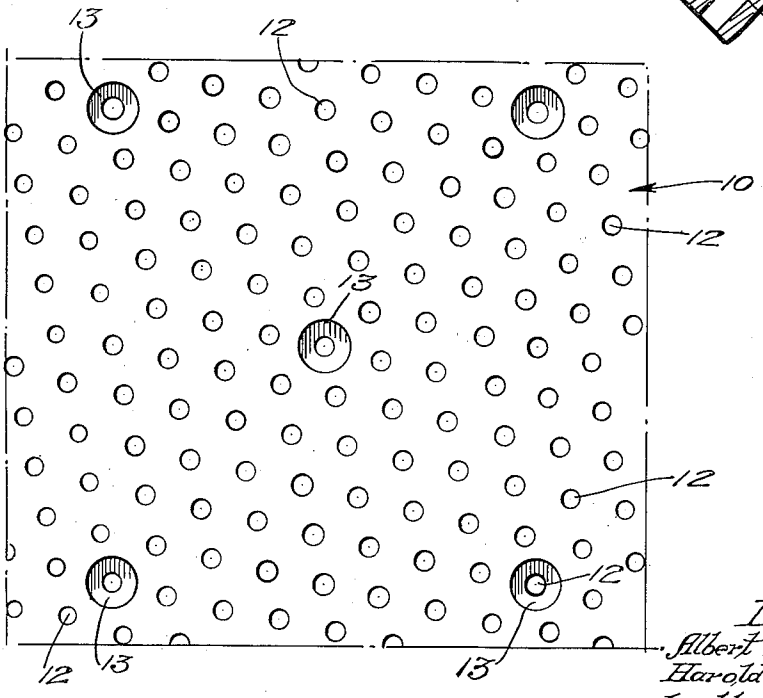


Fig. 2.



Inventors:—
Albert H. Standley
Harold H. Burrows
by their Attorneys
Howson & Howson

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Fig. 3.

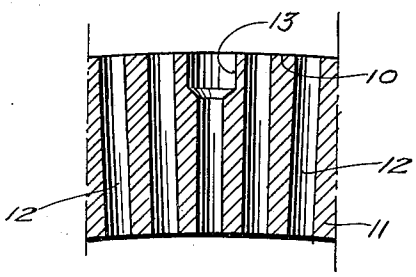


Fig. 4

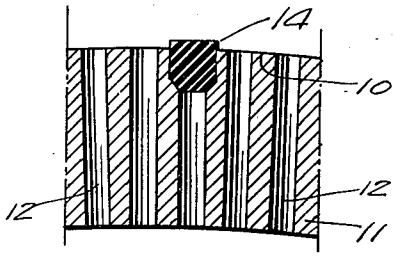


Fig. 5.

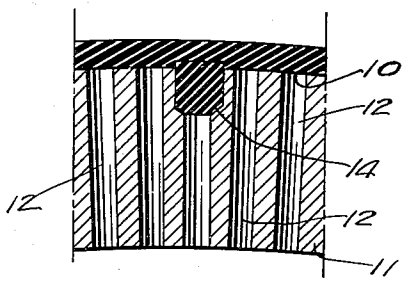


Fig. 6.

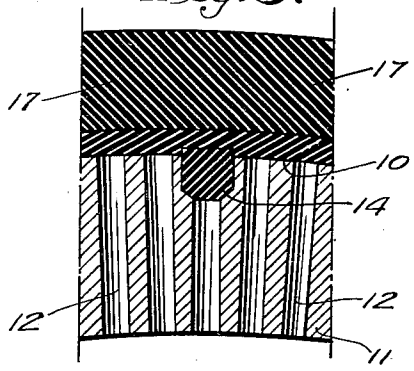


Fig. 7.

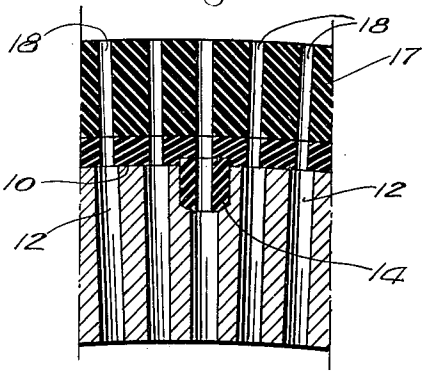


Fig. 8.

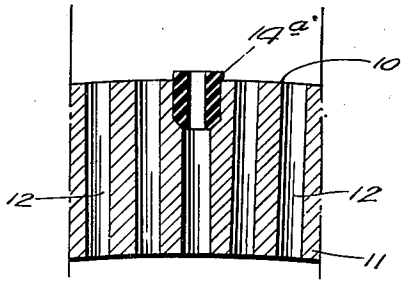
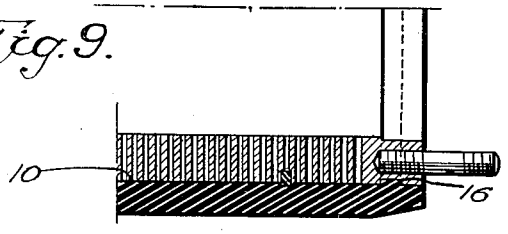


Fig. 9.



Inventors:—
Albert H. Standley
Harold H. Barrows
by their Attorneys
Howson & Howson

Patented Jan. 26, 1937 2,069,119

UNITED STATES PATENT OFFICE

2,069,119

RUBBER COVERED SUCTION ROLL

Albert H. Standley, Downingtown, Pa., and Harold H. Burrows, Clifton, N. J., assignors to Downingtown Manufacturing Company, Downingtown, Pa., a corporation of Pennsylvania

Application March 21, 1935, Serial No. 12,290

4 Claims. (Cl. 92—53)

This invention relates to press rolls, and more particularly to rubber-covered press rolls for use in paper machinery, and a method of producing the same.

In paper machinery, rubber-covered press rolls or couch rolls are fairly extensively employed, and, where the roll is subjected to any appreciable pressure or drag against the covering thereof, difficulty is met with in properly securing the rubber covering to the roll. This is particularly true in connection with bronze rolls as, for example, the bronze shells of suction rolls which, in later day paper practice, have been rubber covered to enable the suction roll to be employed in a press with certain types of paper in the production of which the conventional bronze shell cannot be employed.

The difficulty in manufacture of a rubber-covered roll arises from the fact that the rubber does not tend to adhere to the shell and particularly to a bronze shell, firmly enough to withstand the high pressures to which the roll is subjected and in use the covering often breaks free from the shell due to the pressure, or water seepage occurs between the rubber covering and the shell and this, in turn, loosens the rubber covering.

There have been many attempts made to more securely fasten the rubber covering to the shell by the use of some mechanical means to provide anchorage; for example, longitudinal dovetailed or undercut grooves have been formed in the shell and the rubber forced into these grooves to secure the necessary anchorage. While the use of such grooves is somewhat beneficial, it is highly undesirable for the following reasons: (1) The mere fact that the shell is grooved longitudinally for the full length thereof weakens the shell structurally, rendering it necessary to use a shell of increased thickness to provide the necessary strength for proper roll operation. (2) With longitudinal grooves the anchorage is secured only in lines, leaving vast areas between the lines unsupported by anchorage, and in service the roll covering breaks loose from the shell between the lines or grooves. (3) The undercut grooves tend to produce sharp lines of cleavage within the rubber support, and although attempts have been made to reduce this tendency by rounding the sharp edges of the undercut grooves, there is still a tendency to formation of lines of cleavage. (4) When undercut grooves are employed, it is difficult to properly fill the grooves with rubber without trapping air, which tends to weaken the bond of the hard rubber to the perforated shell.

An important object of the present invention is the provision of a method and means for attaching the rubber covering eliminating the above difficulties and providing a structure in which the strength of the shell is not impaired, thereby enabling the use of a light shell.

A further object of the invention is the provision of a structure of this character in which the rubber covering has integral anchoring plugs projecting into sockets formed in the roll body and in which these anchoring plugs are provided without the necessity of subjecting the covering to a process which will drive portions thereof into the sockets.

These and other objects we attain by the construction shown in the accompanying drawings wherein, for the purpose of illustration, we have shown a preferred embodiment of our invention and wherein:

Fig. 1 is a fragmentary transverse sectional view through a suction press roll having a rubber covering applied thereto in accordance with our invention;

Fig. 2 is a fragmentary plan view showing the arrangement of the drilled openings of the shell and the sockets;

Figs. 3 to 7 are sectional views illustrating the successive steps of the process of producing the roll;

Fig. 8 is a detail sectional view illustrating the use of a modified form of plug; and

Fig. 9 is a fragmentary detail view showing a method of anchoring and sealing the ends of the rubber covering.

Referring now more particularly to the drawings, the numeral 10 generally designates the periphery of a press roll body, that at present illustrated comprising a suction press roll the body of which is in the form of a rotating shell 11. As is well known to those familiar with the art, such shells are bored with a series of perforations 12, these perforations being in the ordinary procedure of suction roll manufacture drilled while the shell is held in the jig so that the openings thereof are uniformly spaced.

In accordance with our invention, at the time of drilling these openings certain selected openings are countersunk at their outer ends, as indicated at 13, the selected openings being well spaced from one another both longitudinally and circumferentially of the shell. Additionally, these openings are preferably arranged on longitudinal lines with the openings of one line stag-

gered with relation to those of adjacent lines. The openings 13 then have inserted therein plugs 14 of rubber or some similar substance having an affinity for rubber and readily vulcanizable thereto. These plugs are of such length that when fully inserted, they project above the peripheral surface 10 of the roll, preferably to an extent of about $\frac{1}{16}$''. A rubber layer 15 is then applied to the outer surface of the roll and vulcanized upon the shell, with the result that this cover not only adheres to the shell periphery 10 but becomes integrally connected with the plugs 14 so that it is securely anchored thereto and will not move thereon even though subjected to heavy pressures. If desired, further anchorage against longitudinal movement and a seal against entrance of condensation water during vulcanization can be provided by grooving the ends of the shell as suggested at 16 in Fig. 9. A coating of soft rubber 17 having the proper density is applied to the outer surface of the harder rubber covering 15 and vulcanized securely thereto, following which the roll is returned to the jig in which it was initially drilled and drilled as indicated at 18 through the soft rubber coating, the hard rubber coating, and the plugs.

While a solid plug has been illustrated and heretofore described, the plugs employed may, if so desired, be in the form of tubes 14—*a* as indicated in Fig. 8. Due to the fact that the openings 12 converge toward one another at their inner ends, the plugs will have an effect similar to dovetails and serve to very firmly lock the cover. It has been demonstrated that a bond between the rubber cover and the roll, secured as above described, will enable such rolls to be employed with extremely heavy pressures and without any movement of the covering. Obviously, the uniform distribution of the counterbores eliminates the formation of any weakened areas in the roll.

While we have illustrated in Fig. 2, one arrangement of the openings in which the plug sockets are well separated, it will, of course, be obvious that this is merely a selected illustration and that the openings may be made much more closely spaced than disclosed in that illustration. While we have hereinbefore consistently referred to the use of rubber, it must be understood that this term includes the use of rubber-like materials such as olefin-polysulfide, chloroprene or the like, or any of the synthetic resins. Without regard to the type of covering which is employed, it is, of course understood, that the plug employed will be of a material integrating with the covering in the natural course of application thereof.

Since the construction illustrated is capable of considerable modification without departing from the spirit of our invention, we do not wish to be understood as limiting ourselves thereto except as hereinafter claimed.

We claim:

1. A rubber-covered press roll comprising a body having small uniformly longitudinally and circumferentially distributed sockets in its periphery the diameter of said sockets at any point being equal to or greater than the diameter of the socket at any other point nearer the center of the roll, plugs of material readily vulcanizable to hard rubber inserted in said sockets, a layer of hard rubber vulcanized to the body and to said plugs and a layer of soft rubber vulcanized to said hard rubber layers.

2. The method of producing a rubber-covered press roll comprising providing a press roll body forming small uniformly longitudinally and circumferentially distributed sockets in the periphery of the body while so forming said sockets that the diameter thereof at any point is equal to or greater than the diameter thereof at any point nearer the center of the roll, inserting plugs in said sockets of material readily vulcanizable to hard rubber, applying a hard rubber cover to the body and vulcanizing the same to said body and said plugs and applying a soft rubber cover to said hard rubber cover and vulcanizing the same thereto.

3. A suction roll shell comprising a shell body having uniformly distributed suction openings therein, the outer ends of certain of said suction openings being counterbored, the diameter of said counterbores at any point being equal to or greater than the diameter of the counterbores at any point near the center of the roll, plugs of hard material inserted in said counterbores, a covering of hard material for the shell integrated with said plugs and bonded to the shell, and a rubber covering bonded to said hard covering, said rubber covering, said hard covering and said plugs having openings formed therethrough aligning with the counterbored openings.

4. The method of producing a suction roll shell comprising providing a shell body forming suction openings therein, counterboring certain uniformly spaced openings at the outer surface of the shell while so forming said counterbores that the diameter thereof at any point is equal to or greater than the diameter thereof at any other point near the center of the shell, inserting plugs of hard material in said counterbores, applying a hard covering to the roll having characteristics such that it is readily integrated with said plugs and bonded to the shell and to the rubber, integrating said covering to said plugs and bonding it to the shell, applying a soft rubber covering over the first-named covering and bonding it to the first-named covering and drilling openings aligning with the suction openings of the shell in said rubber cover, said hard cover and said plugs.

ALBERT H. STANDLEY.
HAROLD H. BURROWS.