

UNITED STATES PATENT OFFICE.

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PAPER-MACHINE PRESS.

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The object of the present invention is to provide certain improvements in paper machine presses of the type employing suction press rolls; an example of such equipment being illustrated in the Millspaugh Patent 1,163,253, dated December 7, 1915.

The invention will be hereinafter described with reference to the accompanying drawing and will be particularly pointed out in the claims appended to this specification.

The drawing is a diagrammatic representation of one practicable form of press equipment embodying the invention.

In the drawing, the numeral 1 denotes a sheet of paper which is being manufactured in a continuous sheet on any approved type of paper-making machine. The sheet is shown passing from means 2 to the receiving end of an endless press felt 3. The means 2 may be the delivery end of a preceding felt or the delivery end of the wet machine on which the paper sheet is formed. For instance the means 2 may be the delivery end of a wet machine of the type in which the paper is completely formed by vacuum-induced collection and compacting of pulp fibres on an endless traveling wire cloth.

The felt 3, typifying any suitable absorbent carrier for carrying the wet sheet through press rolls, is shown passing over a suction roll 4, and is trained around the rolls 5 and 6 and is guided and tensioned by suitable system of rolls 7.

The suction roll 4 may be of any suitable type adapted for use as a press roll, i. e. for coaction with a squeeze roll, and mechanically adapted for maintenance of vacuum action on a desired portion or portions of its cylindrical surface, for instance the suction roll may be of the type disclosed in the Millspaugh Reissue Patent No. 13,100, dated April 19, 1910, consisting of a closely perforated or reticulated cylindrical metal shell, mounted to rotate in suitable bearings, and equipped with one or more suction boxes. In this instance the suction roll is shown having a suction box 8 which in conjunction with the interior surface of the cylinder provides a vacuum chamber; it being understood that the vacuum chamber is in communication with a suitable pump or pumps or other vacuum producing apparatus.

Cooperating with the suction roll 4 to squeeze or press the felt and paper carried

thereby on the vacuum area of said roll is a plain press roll or squeeze roll 9, preferably of rubber, and also in this instance another similar press roll 10; the suction box 8 of the suction roll being disposed to maintain vacuum action on opposite sides of the bite of each roll 9 and 10 with the suction roll, so as to suck off the moisture which is expressed from the sheet and felt between the rolls, as well as to hold the felt to the suction roll and the sheet of paper to the felt and for other advantages as explained in the aforesaid Millspaugh Patent 1,163,253.

Thus, by the provision of the additional press roll 10, with the use of appropriate suction box equipment in the suction roll, a single section of press felt equipment is made to perform the functions of two such sections, resulting in a material reduction in equipment and compactness of machinery in cases requiring a plurality of pressing operations over suction rolls.

The press rolls 9 and 10 may be mounted for adjustment radially of the suction roll 4, or they may be mounted with their axles or journals adjustable toward each other for the purpose of adjusting the pressure between the co-acting rolls 4, 9 and 4, 10 while at the same time adjusting the positions of the respective bites.

By employing in the suction roll 4 a single suction box of appropriate size, rather than a plurality of separate suction boxes, a prolonged vacuum area is maintained between the bites of the rolls, thus exposing the sheet or felt to the advantage of a vacuum-induced draft of air through the sheet and felt for draining off moisture and cleansing the felt while contributing to dry the sheet. The sheet may be passed from the delivery end of the illustrative pressing equipment to a succeeding press roll, if necessary or desired, or it may be passed directly to dryers.

In pressing a wet sheet of paper on a felt or moisture absorbing carrier upon the vacuum area of a suction press roll, the paper sometimes exhibits a water-marking effect corresponding in general to the surface pattern of the perforated cylindrical shell of the suction roll. This may perhaps be attributable to the sucking of the felt in the perforations of the cylinder, or perhaps to the interruptions of the vacuum area by the narrow walls between the cylinder perforations. Whatever the cause

may be, the present inventor has discovered by experimentation and tests that the water-marking effect referred to may be obviated or reduced to a degree of negligible consequence by interposing supporting material, such for instance as wire cloth, between the felt and the vacuum area of the suction roll, such material slightly spacing the felt from the suction roll surface and bridging the holes or perforations of the roll and affording a more uniform support for the felt. In the illustrative construction such material is continuously supplied on the vacuum area of the suction roll by an endless wire cloth band 12 trained over the vacuum area of the suction roll and which may pass around suitable guide rolls, in this instance being shown passing around the same rolls 5 and 6 about which the felt is trained and being guided and tensioned by the roll 11.

Obviously the present invention is not limited to the particular details of construction and arrangement shown and described, because such details may obviously be variously modified to suit various requirements and conditions. Nor is it essential that all the features of the invention be used conjointly, since they may be advantageously used in various combinations and sub-combinations.

I claim:—

1. An apparatus of the class described comprising in combination, a suction press roll; a cooperating squeeze roll; an absorbent carrier for the paper sheet trained on the suction roll; said suction roll being equipped for maintenance of vacuum action opposite the bite of said rolls; and a porous supporting medium for the felt interposed between the felt and vacuum area of the suction roll.

2. An apparatus of the class described comprising, in combination, a suction press roll; a cooperating squeeze roll; an endless felt or absorbent carrier trained on the suction press roll; and wire cloth or the like supplying a supporting medium for the felt on the vacuum area of the suction roll.

3. An apparatus of the class described comprising, in combination, a suction press roll; a cooperating squeeze roll; a felt or absorbent carrier for the paper sheet

trained on the suction press roll; and a travelling wire cloth under the felt.

4. An apparatus of the class described comprising, in combination, a suction press roll; an absorbent carrier for the paper sheet trained on said roll; and a plurality of press or squeeze rolls cooperating with said suction press roll; the suction roll being equipped for maintenance of vacuum action opposite the bite of each of such plurality of cooperating rolls; and wire cloth or the like supplying a supporting medium for the said absorbent carrier on the vacuum area of the suction roll.

5. An apparatus of the class described comprising in combination, a suction press roll; an absorbent carrier for the paper sheet trained on said roll; and a plurality of press or squeeze rolls cooperating with said suction press roll; the suction press roll being equipped for maintenance of vacuum action opposite a plurality of bites of cooperating rolls and continuously between such bites; and a traveling wire cloth under the said absorbent carrier.

6. An apparatus of the class described comprising in combination, the delivery end of a paper forming means; a felt or absorbent carrier for carrying the paper from said delivery end; and coacting press rolls through which the felt carries the paper; said coacting rolls including a suction press roll and a plurality of squeeze rolls cooperating therewith; and said suction press roll equipped for maintenance of vacuum action opposite the bites of said coacting squeeze rolls.

7. An apparatus of the class described comprising, in combination, a suction press roll equipped for maintenance of vacuum action on a segmental area not substantially greater than one-fourth of the circumference of said roll; a felt or absorbent carrier for the paper sheet trained on said area of said roll; and a plurality of squeeze rolls coacting with said suction press roll; said squeeze rolls being arranged adjacent to one another and coacting with the suction press roll within the limited vacuum area aforesaid.

In testimony whereof I have signed my name to this specification.

WILLIAM H. MILLSPAUGH.