

[54] PAPER MACHINE PRESS ARRANGEMENT WITH STACKED PRESS ROLLS

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[56] References Cited
UNITED STATES PATENTS

1,472,572	10/1923	Tompkins.....	162/358 X
2,386,584	10/1945	Berry	162/360
2,672,078	3/1954	Hornbostel	162/360
3,268,390	8/1966	Ely.....	162/358 X
3,355,350	11/1967	Reynolds	162/358
3,600,779	8/1971	DeNoyer.....	162/358 X

3,607,626 9/1971 Nilsson 162/358
FOREIGN PATENTS OR APPLICATIONS

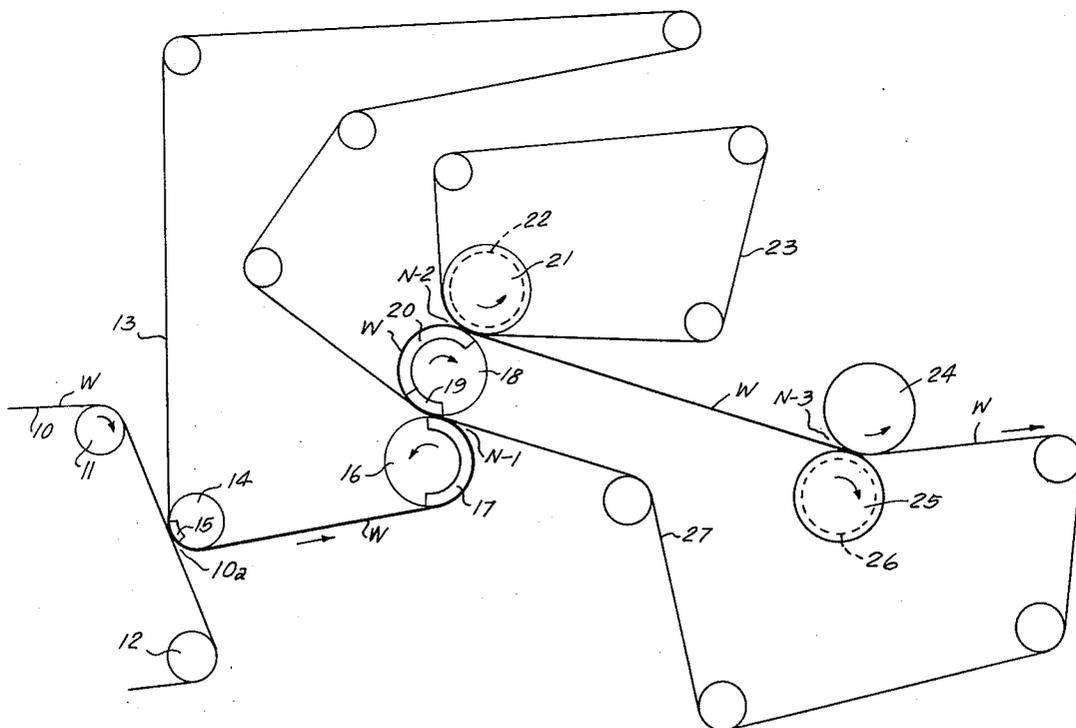
293,520	1/1914	Germany	162/360
699,107	12/1964	Canada	162/360

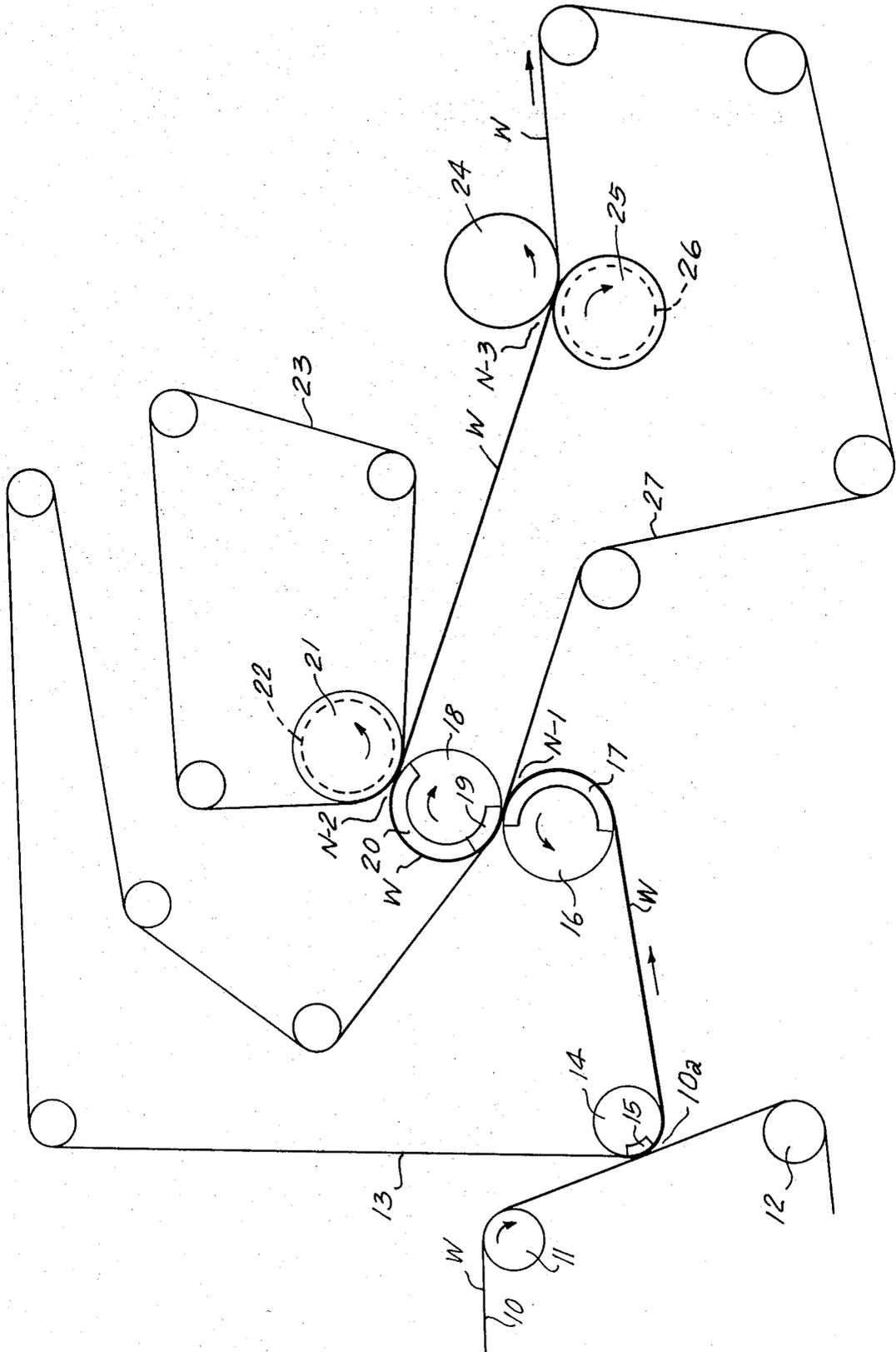
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[57] ABSTRACT

A press section for a paper making machine includes a first felt receiving a web from a fourdrinier and passing through a first nip formed between first and second press rolls with a second felt passing through the first nip and wrapping the second roll while passing through a second nip formed between a third and the second press roll with the web being carried by the second felt through a third press nip formed between additional press rolls.

9 Claims, 1 Drawing Figure





PAPER MACHINE PRESS ARRANGEMENT WITH STACKED PRESS ROLLS

BACKGROUND OF THE INVENTION

The present invention relates to improvements in paper making machines and more particularly to an improved press section for forming an improved web which press section is particularly adapted to dewatering paper having an absence of two sidedness such as is formed on twin wire paper making machines.

In the formation of paper webs of many types including newsprint and other papers, there is a necessity of avoiding two-sidedness. A paper web which has uniform physical characteristics on both sides is superior for all types of paper to receive printing. Twin wire forming sections have increased the uniformity of paper and it is essential that the other parts of the paper making machine keep pace and not disturb or destroy the uniform characteristics of the two surfaces by adverse dewatering effects.

In a press section where substantial amounts of water are removed from the web, severe dewatering in either direction can adversely affect the uniformity of the web. Uniform treatment of both sides of the paper from a dewatering standpoint is also important from the aspect of increasing the amount of water removed and thereby reducing the amount of heat energy needed to be put into the dryer section for dewatering in that section of the machine.

It is also important in modern high-speed paper making machines to provide press sections which are compact and short as possible to reduce the necessary length of the machine and reduce the handling which the paper web must receive. If the press nips can be placed very close together in succession, the amount of handling the web requires will be reduced. It is also advantageous to reduce open draws or transfers along the machine, or control of the web may be lost requiring a shut-down of the paper making machine. Such shut-downs are expensive and highly disadvantageous on a high-speed machine.

It is accordingly an object of the present invention to provide an improved press section which obtains an improved product and which contributes to the uniformity of both sides of the web.

A further object of the invention is to provide an improved paper machine press section which is complementary to a twin wire machine and which obtains optimum dewatering of the web with substantial uniformity from both directions.

A still further object of the invention is to provide an improved paper making machine which has a press section that is very compact and avoids open draws along runs so that control of the web is not lost.

Other objects, advantages, as well as equivalent structures which are intended to be covered herein, will become more apparent with the teaching of the principles of the present invention in connection with the disclosure of the preferred embodiment in the specification, claims and drawings, in which:

DESCRIPTION OF THE DRAWINGS

The FIGURE of the drawing is a somewhat schematic side elevational view showing a press section of a paper making machine constructed and operating in accordance with the principles of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

A paper web is formed and carried on the surface of a traveling fourdrinier 10. In many instances the fourdrinier section of the machine will be a twin wire section so that the finished web will be substantially uniform on both sides. The web is carried through a machine and its position is indicated at W. The fourdrinier wire travels over a couch roll 11 and a turning roll 12, and in a downrunning section of the wire 10a, the web is picked off the surface of a first felt 13. The felt is formed in a loop and travels over a number of supporting guide rolls which are not numbered. For picking the web off the wire 10, the felt 13 passes over a pick-up roll 14 having a suction gland 15 therein.

The web then travels on the lower surface of the felt to pass through a first press nip at N-1. The first nip is a double felted nip with the web being carried between the first felt 13 and a second felt 27. The first nip is formed between first and second press rolls 16 and 18 respectively.

The first felt is wrapped over the first press roll 16. The first press roll is a suction roll with a gland 17 to aid in the extraction of water from the web and transfer to the felt 13.

The second press roll 18 is wrapped by the second felt 27. The web in passing through the first nip N-1 follows the second felt 27 and is transferred to the felt as aided by the first suction gland 19 positioned at the outgoing side of the first nip N-1.

The web is carried on the outer surface of the second felt 27 to pass through a second nip N-2.

To aid in carrying the web on the outer surface of the felt 27 while it is wrapping over the second roll 18, a suction gland 20 is positioned opposite the felt. The second nip is formed between the second roll 18 and a third press roll 21. The third press roll has grooves 22 on its outer surface to aid in the transfer of water to a third felt 23 which also passes through the second nip N-2. The second nip is also a double-felted nip.

Suitable guide rolls for the second felt 27 and the third felt 23 are provided which need not be described in detail. Suitable felt dewatering means will be provided along the felt loop for removing water therefrom after the felt leaves the nip and before it returns to the nip.

Following the second nip N-2, the web is carried on the upper surface of the second felt 27 to a third nip N-3. It will be noted that the first and third press rolls 16 and 21 are substantially 180° apart relative to the intermediate second press roll 18. The nip forces due to the first and third rolls are diametrically opposed and balance each other to reduce the tendency of the intermediate roll 18 to bend, thereby making it possible to use a suction roll and yet obtaining relatively high nip pressures.

It will also be noted that the first and second nips N-1 and N-2 are relatively close together and that the web is completely controlled by being held to the second felt 27 in the run between the two nips. Following the second nip the web is on the upper surface of the second felt 27 with it passing downwardly so that there is no possibility of the web coming off the felt or getting out of control.

The third nip is formed between a roll couple including an upper press roll 24 and a lower press roll 26. The

lower press roll is grooved shown at 25 to aid in the water being transferred from the web, which is on the upper surface of the felt 27, to the felt.

Following the press section, the web will be carried by suitable felts, not shown in detail, to the dryer section of the machine, after which it will travel through a calender and then be wound on a roll.

I claim as my invention:

1. In a paper making machine, the combination including:

- a forming section;
- a perforate first press roll immediately following said forming section;
- a perforate second press roll forming a first nip with the first roll on the upper side of said first roll;
- a third press roll forming a second nip with the second roll substantially opposite said first nip relative to the axis of said second roll;
- a first felt for carrying a paper web extending horizontally from the forming section and engaging the bottom of the first roll, wrapping substantially 180° and threaded through said first nip with the web carrying side facing the second roll;
- a suction gland within the first roll opposite the wrap of the first felt;
- a second felt threaded through said first nip and wrapping the second roll continuously between said first and second nip and passing through the second nip with the web carried on the outer surface of the second felt between the first and second nip;
- a suction gland within the second press roll opposite the second felt;
- a roll couple forming a third press nip;
- said second felt extending from the second nip to the third nip and carrying the web through the third nip.

2. In a paper making machine constructed in accordance with claim 1, the combination: including a third felt threaded through said second nip so that the second nip is a double-felted nip.

3. A press section for a paper making machine constructed in accordance with claim 1: wherein the roll of said roll couple supporting said second felt is a grooved roll.

4. A press section for a paper making machine comprising in combination: a perforate first press roll; a perforate second press roll shell forming a first nip

- with the first roll;
- a third press roll forming a second nip with the second roll shell positioned after the first nip located substantially opposite the first nip relative to the axis of the second roll;
- a first felt for receiving and carrying a paper web on a web carrying surface thereof through the first nip with the web carrying surface facing the second roll; said first felt extending substantially horizontally to the first roll and wrapping the first roll for substantially 180°;
- a suction gland within the first roll opposite the first felt;
- and a second felt also threaded through said first nip with the web between the first and second felts in said first nip;
- a suction gland within the second roll shell extending over the portion wrapped by the second felt;
- said second felt wrapping the second roll continuously between nips and passing through the second nip with the web carried on the outer surface of the second felt between the first and second nip.

5. A press section for a paper making machine constructed in accordance with claim 4:

and including a fourdrinier forming section ahead of the press section with said first felt arranged in pick-up relation with the fourdrinier forming wire to receive the web therefrom.

6. A press section for a paper making machine constructed in accordance with claim 4: wherein third press roll has a plurality of grooves formed in the outer surface thereof.

7. A press section for a paper making machine constructed in accordance with claim 4: and including a short separate suction gland positioned on the offrunning side of the first nip for insuring the transfer of the web from the first to the second felt.

8. A press section for a paper making machine constructed in accordance with claim 4: and including a third felt passing through said second nip with the web passing between said first and second felts so that the second nip is a double felted nip.

9. A press section for a paper making machine constructed in accordance with claim 8: including means for causing the web to follow the second felt after the second nip.

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