

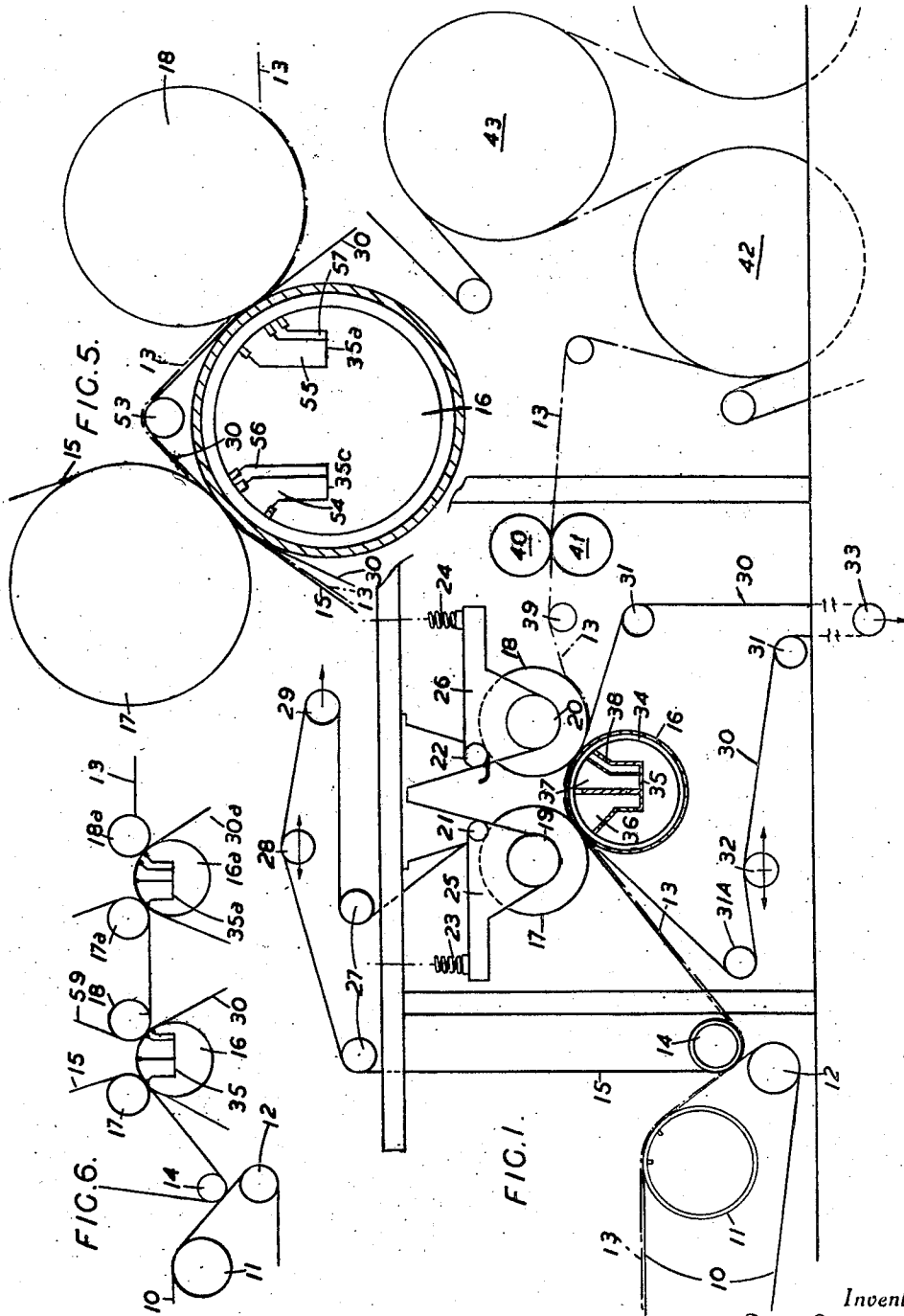
Nov. 18, 1952

R. C. HEYS
PAPERMAKING MACHINE

2,618,205

Filed March 8, 1948

2 SHEETS—SHEET 1



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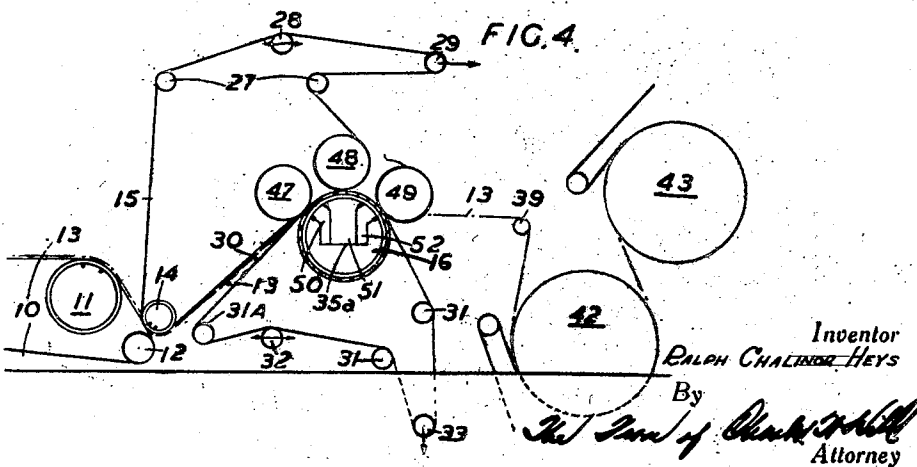
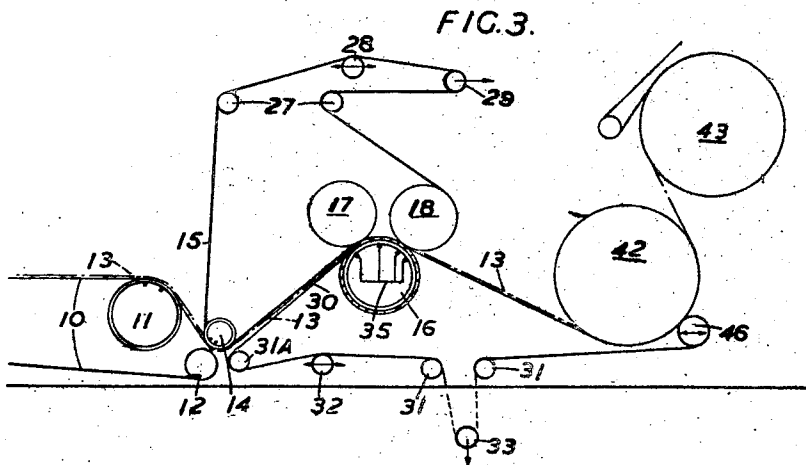
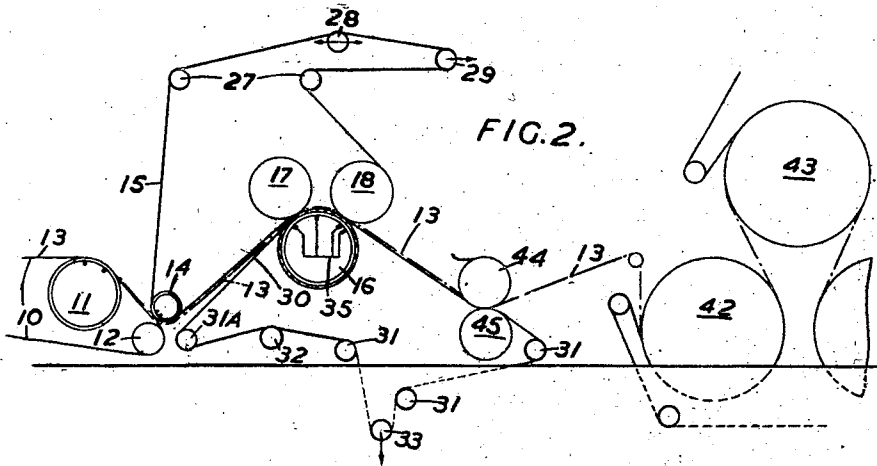
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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE

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PAPERMAKING MACHINE

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2 Claims. (Cl. 92-49)

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This invention relates to paper-making machines and particularly to the press sections of such machines.

According to the present invention the sheet transferred from the forming wire is led to a suction roll operating with at least two press rolls, resting on the suction roll and exerting pressure by their weight, the suction roll being provided with a suction compartment for each press roll, and at least the first of the press rolls being provided with means to prevent adherence of the wet sheet.

A felt passes over the suction roll and the sheet is thus drawn by suction onto this felt between the press rolls, being taken from the first roll by the next press roll. The avoidance of sticking to the press roll prevents stretching of the sheet and consequent elongation that would interfere with the subsequent passage of the sheet through the bite of the next roll and make the machine unworkable.

Adherence of the wet sheet to the first press roll may be prevented by the use of an endless felt carried between the bite of the roll and the suction roll and led away from the bite e. g. by being carried round the press roll itself. Conveniently the felt is used to carry the sheet from the transfer point to the bite of the press roll. Alternatively the felt may pass from the bite of the first press roll to the bite of the next press roll or rolls, or even further to the first bottom drier roll, which will serve to take the sheet off the felt.

The suction compartments of the suction roll are preferably contiguous and combined in one casting, the latter multiple arrangement enabling a vacuum pump of less power to be used because the holes in the suction roll between the bites of the two press rolls are maintained evacuated without any free access to the atmosphere. The suction compartments may be provided with means for drawing or blowing water from the holes in the suction roll by the use of a higher suction or by high velocity air. Such means, in the case of the use of higher suction, may be combined with one of the suction compartments or with a multiple suction box.

A combination of two or more top press rolls with a single suction roll presents a very compact machine with consequent economy in cost and space. It also requires less power to drive. The disposition of the rolls is generally horizontal, with the weight of the press rolls providing the pressure at the bites. This pressure may be re-

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inforced or adjusted by suitable mechanical, hy-

draulic, or other means. All the rolls may be driven, but preferably only the suction roll is driven.

The top press rolls may also be provided with suction boxes and/or with provision for drawing or blowing water from their perforations as described in British Patent No. 457,858. The suction roll or the suction press rolls may have the usual perforated rubber cover.

The paper sheet may be transferred from the forming wire to the press suction in any desired manner, e. g. by hand feeding a transfer felt, or automatically by suction as described in British Patent No. 458,758.

Several embodiments of the invention will now be described by way of example, with reference to the accompanying drawings in which:

Figure 1 is a side elevational view of one construction of the press section of a paper-making machine according to the invention, the suction roll being shown in vertical section;

Figures 2, 3 and 4 are diagrammatic side elevations of further constructions;

Figure 5 is a diagrammatic elevation of a modification and

Figure 6 shows a modification of Figure 1.

In Figure 1 a forming wire 10 is trained around a usual suction couch roll 11 and a return roll 12, the paper sheet 13 being taken from the wire between the couch roll and the return roll by a suction transfer roll 14 and an endless pick-up felt 15 passing between the transfer roll and the forming wire.

The endless felt 15 leads from the transfer roll 14 to a single suction roll 16 provided with two press rolls 17, 18 resting on the suction roll. The press rolls may exert pressure on the suction roll by virtue of their weight only, being supported in mountings 19, 20 pivoted about bearings 21, 22, but, as shown, springs 23, 24 acting on arms 25, 26 of the mountings extending beyond the pivots 21, 22 may be compressed to reinforce the pressure of the press rolls.

The felt 15 leads from the transfer roll 14 directly to the bite of the first press roll 17 on the suction roll and then passes round this press roll and returns to the transfer roll 14 around felt rolls 27, guide roll 28 and stretch roll 29.

An endless press felt 30 passes round the suction roll 16 between the bites of the two press rolls 17, 18, the loop of the felt passing round felt rolls 31, guide roll 32 and stretch roll 33, and the felt roll 31A being so mounted that the press felt converges onto the wet sheet 13 being led

to the bite of the first press roll 17 on the pick-up felt 15.

The suction roll 16 comprises a perforated plain bronze or rubber-covered shell 34 provided internally with a stationary multiple suction box 35 having three compartments 36, 37, 38, the compartments 36, 37 co-operating respectively with the bites of the first and second press rolls 17, 18 and the third compartment 38 being arranged at the outlet side at the bite of the second roll whereby water, carried through the second bite in the perforations of the suction roll, is drawn or blown from the perforations by a high velocity air blast drawn from or blown into the compartment 38 by means of a suitable exhaustor or fan.

In the operation of the assembly shown in Figure 1, the wet sheet 13 taken from the forming wire 10 is conveyed by the felt 15 to the bite between the first press roll 17 and the suction roll 16 where it meets the press felt 30, the two felts with the interposed wet sheet of paper then passing through the bite. The paper sheet is subjected to pressure treatment, and the water thus pressed from the sheet is removed by the suction compartment 36, or carried away in the holes of the roll. The suction also pulls the sheet, as it passes through the bite, from the transfer felt 15 onto the press felt 30 which carries the sheet to the bite of the second press roll 18 where more water is pressed from the sheet and removed by the suction compartment 37. After passing through the bite, the sheet is taken from the press felt by the second plain press roll 18 and is then carried over a paper roll 39 and between a pair of smoothing rolls 40, 41 from which it passes to driers 42, 43.

In Figure 2, the transfer felt 15 passes from the bite of the first press roll 17 over the suction roll 16 and through the bite of the second press roll 18, round which it is lapped before passing around the felt rolls 27, guide rolls 28 and stretch roll 29. The press felt 30 passes from the bite of the second press roll down through the bite of two smoothing rolls 44, 45 around the lower one 45 of which it is lapped before passing around the felt rolls 31, guide rolls 32 and stretch roll 33.

The wet sheet is carried by the transfer felt 15 to the bite of the first press roll 17 where it is trapped between the transfer felt and the press felt 30 and carried over the suction roll to the bite of the second press roll 18, the sheet being dewatered by the suction compartments 36, 37 (as described with reference to Figure 1) during its passage between the two bites. From the second bite, the sheet is taken on the press felt to the bite of the smoothing rolls 44, 45 after passing through which it is taken off the press felt by the upper smoothing roll 44 and then passes over the paper roll 39 to the driers 42, 43.

In Figure 3, the transfer felt 15 passes over the suction roll and through the bite of the second press roll 18, as in Figure 2. The press felt 30, however, from the bite of the second press roll 18, passes down directly to the first bottom drier 42 around which it is lapped for a short distance before returning over a presser roll 46 and around the felt, guide and stretch rolls 31, 32, and 33.

The paper sheet is carried on the press felt 30 from the bite of the second press roll 18 to the bottom drier 42, and is taken from the felt by the drier at the presser roll 46.

In Figure 4, the suction roll 16 operates with three press rolls 47, 48, 49 disposed as shown with the centre roll 48 more or less directly over the

axis of the suction roll and the other rolls 47, 49 resting on the suction roll at each side of it. The transfer felt 15 passes from the bite of the first press roll 47 over the suction roll and through the bite of the second press roll 48, round which it is lapped before passing to the felt, guide, and stretch rolls 27, 28, 29. The press felt 30 passes over the suction roll 16 between the bites of the first and third press rolls 47, 49 passing directly from the third bite to the felt, guide, and stretch rolls 31, 32, 33.

The wet sheet is carried by the transfer felt 15 to the bite of the first press roll 47, where it is trapped between the transfer felt and the press felt 30 and carried over the suction roll between the first and second bites. After passing through the second bite it is taken from the transfer felt by the press felt, and it is then carried on the press felt through the bite of the third plain press roll 49, when it is taken from the press felt by the plain press roll and carried over the paper roll 39 to the driers 42, 43. The suction roll is provided with a suction box 35a having compartments 50, 51, 52 co-operating with the three press rolls respectively, to dewater the sheet as it passes between the first and third bites.

Figure 5 shows a modification to the passage of the suction felt and paper sheet over the suction roll between the top press rolls, the modification being applicable to all the press assemblies above described. A small roller 53 lies just above the suction roll 16 between the press rolls 17, 18, the suction felt 30 and paper sheet 13 passing over the roller 53, as shown. The length of the suction felt and sheet, therefore, between the bites of the two press rolls is greater than the arc of circumference of the suction roll between the two bites, and the arrangement ensures that if the felt and sheet are sucked in by a particular hole of the suction roll at the first press roll, they cannot be sucked in by the same hole (or preferably any hole) at the second press roll. Deformation of the paper sheet due to its being sucked in by the same hole over the whole of the arc of the suction roll between the two bites is therefore voided. With this arrangement the suction compartments 54, 55 of the suction boxes 35c, 35d are restricted in area so as to act only at and about the two bites, each compartment having its own high velocity air compartments 56, 57.

In Figure 6, the roll set 16, 17, 18 of Figure 1 is duplicated at 16a, 17a, 18a, the roll 16a being provided with a suction box 35a and a press felt 30a. A transfer felt 59 passes around the rolls 18 and 17a to lead the paper 13 from the roll 16 to the roll 16a.

What I claim is:

1. In a paper making machine having a couch roll and a turning roll with a foraminous forming surface trained thereover to support a wet sheet, a press section for the wet sheet having a single suction roll including a perforated roll shell and a multi-compartment gland therein with adjacent successive first and second suction compartments and a third fluid blast compartment following the second suction compartment, each of said compartments acting through the top portion of the perforated roll shell in continuous succession, a first plain press roll in pressure relation with said perforated roll shell defining a pressure nip at the oncoming side of the first suction compartment, a looped transfer felt lapped around said first plain press roll, a transfer roll in the loop of

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said transfer felt guiding said felt against the wet sheet on the foraminous forming surface between said couch roll and said turning roll, a second plain press roll in pressure relation with said suction roll at the offgoing side of said second suction compartment, said first and second plain press rolls coacting with said perforated roll shell to define first and second pressure nips at the oncoming side of the first suction compartment and at the offgoing side of the second suction compartment respectively, said first and second suction compartments providing uninterrupted suction through and between the nips, a looped bottom felt lapped around said perforated roll shell over said first and second suction compartments, said fluid blast compartment acting through said roll shell beyond said second pressure nip and effective to transfer the sheet after passing through said second nip for following the second plain press roll, and a guide roll in the loop of said bottom felt directing the felt away from the sheet.

2. In a paper making machine including a foraminous forming surface for supporting a wet sheet, a press section in said machine including a suction roll with a perforated roll shell and a tri-compartmented gland in said shell having each compartment thereof communicating in continuous succession with the top portion of the shell, a first press roll coacting with said suction roll to define a first pressure nip at the oncoming side of the first compartment of said gland, a second pressure roll defining a second pressure nip at the offgoing side of said second compartment of said gland, a transfer felt trained from said foraminous forming surface through said first nip to carry the wet sheet from the foraminous surface through said first nip, a bottom felt trained through said

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first and second nips for supporting the sheet thereon, said transfer felt being lapped around said first press roll to cover the wet sheet on the bottom felt before it enters the second nip, means guiding said bottom felt off of said roll shell to transfer the sheet to the second press roll as the bottom felt and sheet emerge from the second nip, said first compartment defining a suction area extending in advance of the first nip to a point in advance of the second nip, said second compartment defining a suction area immediately following said first area and extending to the exit side of the second nip, said third compartment defining an area immediately beyond said second nip to remove water from the perforations of said roll shell, and means guiding said bottom felt onto said roll shell in advance of the oncoming side of the first suction area.

RALPH CHALINOR HEYS.

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