Feb. 12, 1957 H. V. DEARDEN 2,780,967

PAPER-MAKING MACHINES

Filed June 3, 1953 3 Sheets-Sheet 1

FIG. 1.

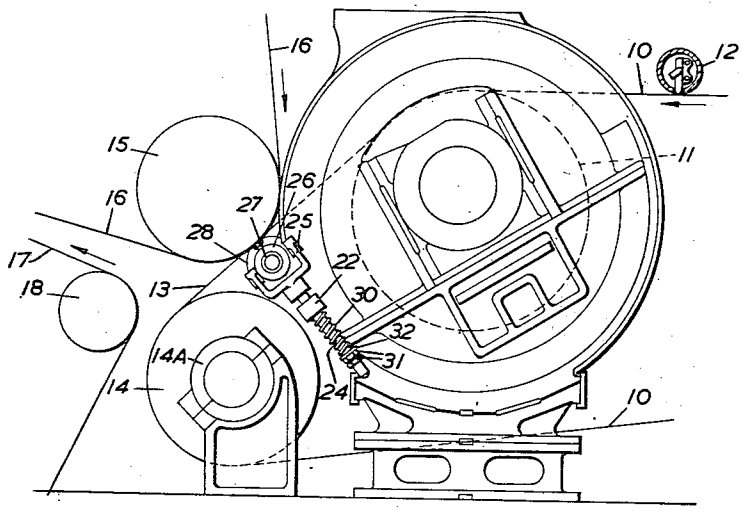
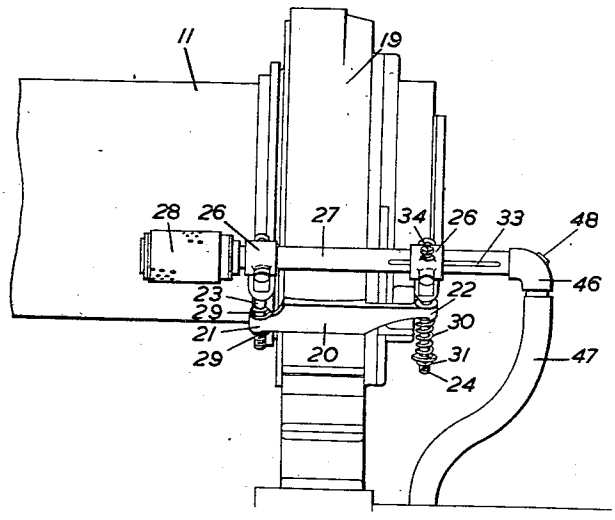


FIG. 2.



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FIG. 3.

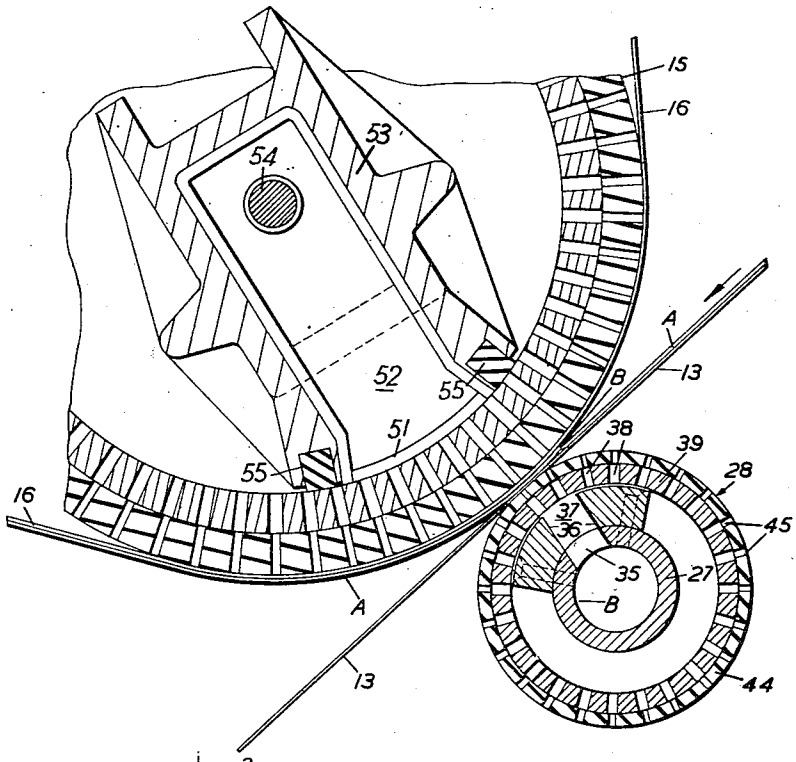
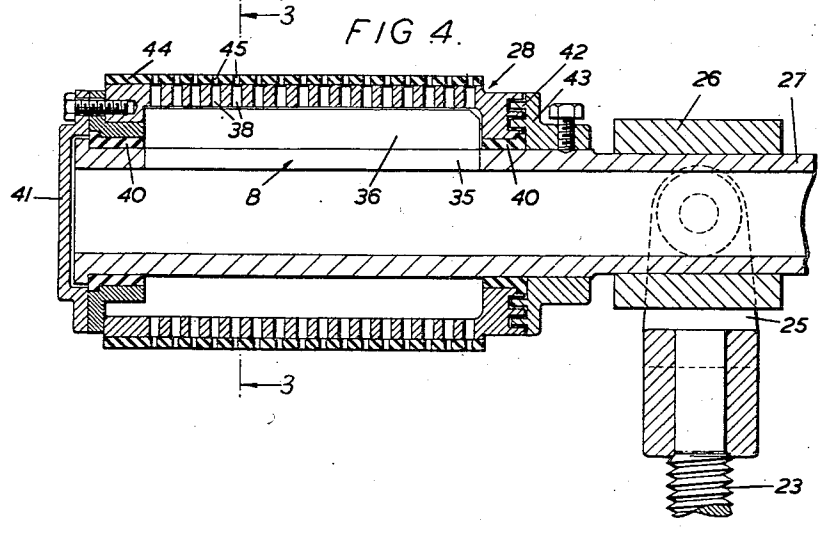


FIG 4.



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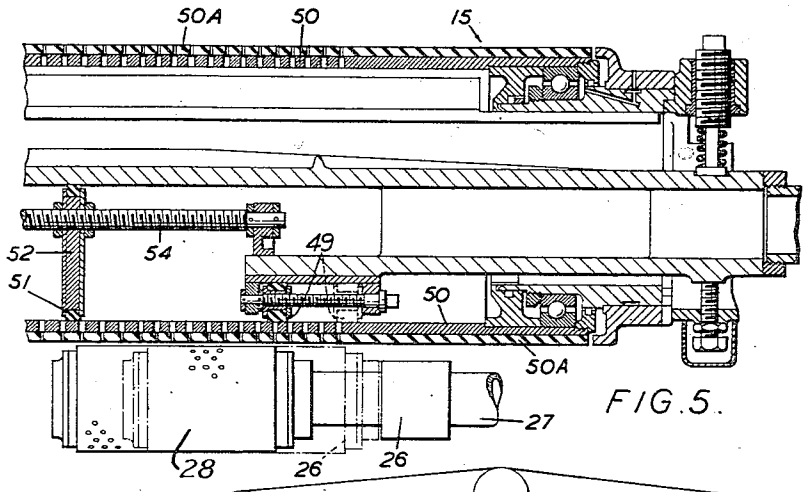
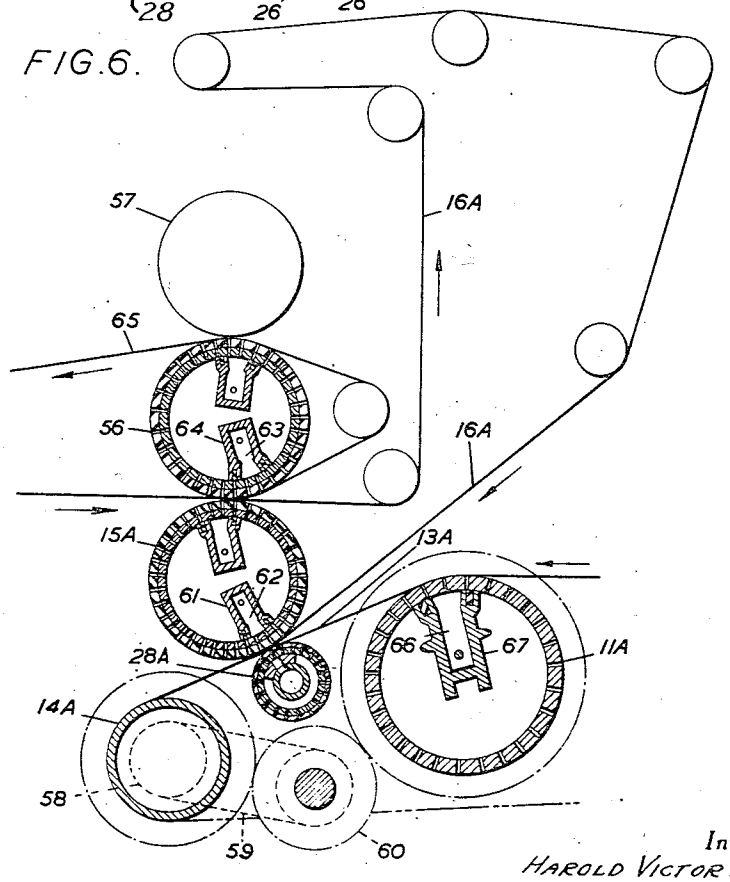


FIG. 5.

FIG. 6.



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2,780,967

PAPER-MAKING MACHINES

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Application June 3, 1953, Serial No. 359,360

Claims priority, application Great Britain June 23, 1952

6 Claims. (Cl. 92—44)

This invention relates to paper-making machines, and is particularly concerned with machines having automatic vacuum transfer of the paper web from the forming wire to the press felt.

The automatic transfer is effected by means of a suction pick-up roll disposed to bring the press felt into contact with the paper web on the forming wire leaving the couch roll, so that the paper web is taken from the wire by the suction applied through the felt from the roll. The pick-up roll may be the bottom roll of a "stacked press," when the paper web is carried with the felt through the bite formed by the pick-up roll and the press-roll superimposed on it; or the pick-up roll may be a mere transfer roll, the paper web then being carried by the felt to a separate press section. The contact made by the pick-up roll is frequently in a run of the forming wire extending beyond the couch roll to a forward drive roll.

The present invention similarly uses a suction pick-up roll making contact (through a press felt) with the run of the wire between the couch roll and the forward drive roll, the pick-up roll either being the bottom roll of a press or an independent roll from which the transferred web is carried by the felt to a press. The principal object of the invention is to facilitate the starting-up of the machine by the method involving severance of a narrow strip (a "tail") at one side of the main width, and passing this tail through the remainder of the machine before progressively increasing it to the full width of the main strip.

According to the present invention, an automatic vacuum transfer mechanism for paper-making machines comprises a suction pick-up roll mounted to bring a felt passing round the roll into web-transferring contact with the forming wire in a run extending from the forming run of the wire beyond the couch roll to a forward drive roll, and a short blow-roll mounted near one edge of the wire and on the opposite side of the wire to the pick-up roll, the blow-roll having a perforated shell in rotatable contact with the wire, and an internal chamber having a communicating passage directed towards at least the front of the nip formed by the pick-up roll and the blow-roll.

It is convenient for the tail to be formed at the front side of the machine, and accordingly the blow-roll should be mounted near the edge of the wire at that side of the machine.

Both the pick-up roll and the blow-roll rotating at peripheral speeds equal to the linear speed of the wire with which they make contact, the blow-roll shell continually presents perforations to the nip, which perforations receive pressure air supplied to the internal chamber and directed through the communicating passage. The paper web on the width of the wire that passes over the blow-roll thus receives pressure air through the wire and is thereby slightly lifted from the wire into firmer contact with the press felt round the pick-up roll. The vacuum applied by the pick-up roll is thus assisted in the removal of that width of web from the wire and its transfer to the felt. The blowing assists in detaching a web that has been pulled into the wire interstices by previously-applied

vacuum, and its action is advantageous with tissue or other low-strength papers.

With the main web severed to form a starting "tail" of a width approximating to the length of the blow-roll, the application of pressure in the blow-roll during starting-up facilitates the removal of the tail from the wire, leaving the remaining width of the web to continue with the wire and run temporarily to waste.

Provision may be made for the introduction of water with the air stream to assist in the transfer of the tail.

The effective width or zone of operation of the short blow-roll may be adjusted by moving it endwise. Advantageously, the blow-roll is "cantilever" mounted, i. e., carried in a bearing or bearings at the side of the machine, and is adjustable endwise relatively to its bearing or bearings.

The blow-roll shell is preferably freely mounted so as to be driven by its contact with the underside of the wire. Its pressure on the wire may be adjusted by having its bearing or bearings adjustable towards and away from the plane of the wire. Thus, the bearings may be carried on stems, one or both of which may be fitted with an adjustable compression spring.

The blow-roll may, however, be positively driven, if desired.

The blow-roll is preferably rubber-covered, with perforations registering with perforations in a metal shell to which the rubber covering is secured. Advantageously, the co-operating pick-up roll is also rubber-covered.

One form of automatic transfer mechanism with a short blow-roll will now be described in greater detail with reference to the accompanying drawings, in which:

Figure 1 is a diagrammatic side elevation of the invention used in conjunction with a suction transfer roll;

Figure 2 is an elevation of the left-hand side of Figure 1, with parts omitted for clarity;

Figure 3 is a fragmentary section to an enlarged scale of part of Figure 1, part being taken on the line 3—3 of Figure 4;

Figure 4 is a longitudinal section to the scale of Figure 3 of the blow-roll as seen in Figure 2;

Figure 5 is a longitudinal section of part of the pick-up roll, showing also the blow-roll; and

Figure 6 is a diagrammatic side elevation of the invention used in conjunction with a stack press.

In Figure 1, the forming wire **10** reaches the top of a suction couch roll **11** soon after passing a jet cutter **12**, and continues in a downwardly sloping run **13** to a forward drive roll **14** in fixed bearings **14A**. A suction pick-up roll **15** is so mounted in height as to guide a top transfer press felt **16** into contact with the upper side of the wire run **13**, and the felt **16** carries on its underside the paper web A transferred from the wire. A bottom felt **17**, guided by a roll **18**, proceeds with the felt **16** to a press section (not shown).

The housing **19** for the couch roll **11** at one side of the machine has a rib **20** (Figure 2) extending towards the forward drive roll **14**, the rib being drilled at its ends **21**, **22** to receive two bearing stems **23**, **24** lying normally to the wire run **13**. Each stem carries at its upper end a yoke **25** in which pivot trunnions **26** extending parallel to the wire run **13** form bearings for a tubular shaft **27** on which a blow-roll **28** is mounted. The stem **23** nearer the wire is fitted with nuts **29** for adjustment with respect to the end **21** of the rib **20**; the other stem **24** carries a compression spring **30** below the end **22** of the rib, and is screwed for adjustment of the spring by nuts **31** and a washer **32**. Because of the cantilever mounting of the blow-roll **28** beyond the bearings **26**, increased compression of the spring **30** urges the blow-roll more strongly against the underside of the wire run **13**, directly op-

posite the pick-up roll 15, so that the blow-roll 28 will be in nip-defining relation thereto.

The tubular shaft 27 has a keyway 33 to receive the end of a lock screw 34 carried by the outer bearing 26, to enable the shaft to be slid to and locked in any position transversely of the wire in accordance with the position to be occupied by the blow-roll 28. The screw 34 also holds the tubular shaft 27 in correct angular position with respect to its axis.

Beyond the inner bearing 26 (Figure 4), the tubular shaft 27 is slotted at 35 on the side facing the wire run 13, and at each side of the slot lengthwise pads 36 are secured outside the shaft to form between them a communicating passage 37 from the bore of the shaft to the inner ends of the perforations 38 of the metal shell 39 of the blow-roll. The shell rotates on bearing sleeves 40 on the shaft. The outer end of the shell has a cover 41, which also blanks off the open end of the shaft. The inner end of the shell makes a labyrinth seal 42 with a collar 43 secured outside the shaft. The shell carries a rubber cover 44 with perforations 45 registering with (but slightly smaller than) the perforations 38 in the metal shell 39. The blow-roll 28 is driven at peripheral speed equal to that of the wire by contact of the rubber cover 44 with the wire.

The outer end of the shaft 27 carries an elbow 46, to which is connected a flexible pipe 47 for the supply of pressure air. A water connection 48 is also provided in the elbow, through which water may be introduced into the air stream, where it is atomized, the water assisting in the transfer of certain types of paper, e. g., papers with excessive porosity, or with excessive tendency to cling to the wire.

Figure 5 shows the blow-roll 28 occupying a position lengthwise of the pick-up roll 15 such that one end is opposite an adjustable seal 49 inside the perforated shell 50 of the roll 15 and its other end is opposite a second seal 51 carried by a travelling deckle 52, the roll 15 having a perforated rubber cover 50A. The deckle 52 is movable lengthwise of a suction box 53 inside the roll 15 by means of a screwed shaft 54. The mouth of the suction box 53 (Figure 3) is sealed along its edges by strips 55, and the mouth is so positioned that suction is applied over an arc from just in advance of the first contact of the paper web A to a position after the web has been transferred from the wire run 13. With the seal 49 adjusted to the position of one edge of the paper web to be formed, and the seal 51 initially spaced from the seal 49 by the width of a starting tail cut by operation of the jet cutter 12, the suction width of the roll 15 is limited to the width of the tail, and the blow-roll 28 applies pressure air through the wire run 13 to the underside of the web A over the width of the tail. The pressure air leaves the perforations 38, 45 at the nip of the wire, felt, and paper web with the pick-up roll 15 at a sufficient velocity to lift the web from the wire slightly from a point just in advance of the closest approach of the nip, as indicated at B (Figure 3). The communicating passage 36 is for this purpose located by the keyway 33 and the lock screw 34 to direct air to perforations slightly in advance of this closest approach of the nip. As indicated above, water may be introduced into the air stream, if required. The couch roll 11 may be provided with a travelling deckle, such as described with reference to Figure 6 below.

When the tail has been transferred and carried by the felt through the press part of the machine (the remainder of the web meanwhile running beyond the forward drive roll 14 for doctoring off the wire 10 into the usual pit below the couch roll) the jet cutter 12 forming the tail is travelled across the wire and the travelling deckle 52 in the pick-up roll 15 is brought to full width by rotation of the screwed shaft 54, when the air supply to the blow-roll 28 is cut off by an air control valve (not shown), the application of suction by the pick-up roll over the whole

width of the paper then ensuring effective continuous transfer.

If there is no travelling deckle in the pick-up roll, the blow-roll transfers the tail to the underside of the top felt, with no vacuum applied by the pick-up roll, and the tail is carried between the top felt 16 and the bottom felt 17 to the press part. When the tail is through the machine, vacuum is applied to the pick-up roll 15 and the jet cutter 12 is travelled across the wire to bring the sheet to full width, the air to the blow-roll being cut off. Alternatively, vacuum may be applied to the pick-up roll 15 throughout the starting-up, with the roll held clear of the web and wire until the tail is through the machine, when transfer of the tail to the pick-up roll results primarily from the application of pressure air (assisted if required by atomized water) by the blow-roll 28. The pick-up roll 15 is brought into contact with the full width of the web when the starting-up has proceeded satisfactorily.

In Figure 6, the suction pick-up roll 15A is the bottom roll of a stacked press having superimposed rolls 56, 57 through the bites of which the paper web is carried. The blow-roll 28A is mounted on the underside of the wire run 13A between the couch roll 11A and the forward drive roll 14A. Since it is not generally practicable to have the bottom roll 15A of the stacked press adjustable as to height, the roll 14A is not carried in fixed bearings (as is the roll 14 in Figure 1), but it is carried in bearings 58 in arms 59 adjustable about the axis of the intermediate driving gear 60 for the rolls 11A, 14A. In this way, the contact pressure of the felt 16A with the paper web on the wire 13A may be controlled by adjusting the height of the roll 14A with respect to the roll 15A, and by adjusting the height of the blow-roll 28A.

Opposite the blow-roll 28A, the pick-up roll 15A has a suction box 61 with a travelling deckle 62. At its nip with the roll 15A, the middle press roll 56 may have a travelling deckle 63 in its suction box 64, to assist in the transfer of the paper tail from the felt 16A to the second felt 65. The couch roll 11A is shown with a travelling deckle 66 in its suction box 67.

The couch roll 11 of Figure 1 may be similarly provided with a travelling deckle suction box, and the suction roll of the press to which the felt 16 delivers the web A may be provided with a travelling deckle suction box, much as that of the roll 15.

The use of these travelling deckles to confine the suction initially to the width of the tail makes transfer of the tail more certain by confining the applied suction to the width of the tail.

If a suction pick-up roll is used to transfer the web from felt to felt at any subsequent point or points in the press section of the machine, a blow-roll may be used. Since the paper at such later stage is drier and more porous, the blowing is again of assistance to the pick-up suction in the transfer of the tail width of web during starting up.

What I claim is:

1. An automatic vacuum transfer mechanism for paper-making machines comprising a couch roll, a forward drive roll, a forming wire extending in a run from the couch roll to the forward drive roll, a suction pick-up roll adapted to bring a transfer felt into web-contacting position with the upper side of the wire run, a short blow-roll mounted near one edge of the wire run on the opposite side to the pick-up roll in nip defining relationship thereto, said blow-roll including a perforated shell in rotatable contact with the wire and an internal chamber, with a communicating passage directed towards the front of the nip formed by the pick-up roll and the blow-roll.

2. An automatic vacuum transfer mechanism for paper-making machines comprising a couch roll, a forward drive roll, a forming wire extending in a run from the couch roll to the forward drive roll, a suction pick-up roll adapted to bring a transfer felt into web-contacting

position with the upper side of the wire run, and a short blow-roll mounted near one edge of the wire run on the opposite side to the pick-up roll in nip defining relationship thereto, the blow-roll having a freely rotatable perforated shell in contact with the wire, and the blow-roll having an internal chamber, with a communicating passage directed toward the front of the nip formed by the pick-up roll and the blow-roll.

3. An automatic vacuum transfer mechanism for paper-making machines comprising a couch roll, a forward drive roll, a forming wire extending in a run from the couch roll to the forward drive roll, a suction pick-up roll adapted to bring a transfer felt into web-contacting position with the upper side of the wire run, a short blow-roll mounted near one edge of the wire run on the opposite side to the pick-up roll in nip defining relationship thereto, and adjustable endwise, and said blow-roll including a perforated rotatable shell in rotatable contact with the wire, the blow-roll having an internal chamber and a communicating passage from the chamber directed towards the front of the nip formed by the pick-up roll and the blow-roll.

4. An automatic vacuum transfer mechanism for paper-making machines comprising a couch roll, a forward drive roll, a forming wire extending in a run from the couch roll to the forward drive roll, a suction pick-up roll adapted to bring a transfer felt into web-contacting position with the upper side of the wire run, a tubular shaft, a short blow-roll mounted on the shaft near one edge of the wire run on the opposite side to the pick-up roll in nip defining relationship thereto, said blow-roll including a perforated shell in rotatable contact with the wire, the blow-roll having an internal chamber and a communicating passage from the chamber directed towards the front of the nip formed by the pick-up roll and the blow-roll, and means for adjusting the tubular shaft for adjustment of the pressure between the blow-roll and the wire.

5. Vacuum transfer mechanism as in claim 4, wherein the tubular shaft is provided with a water connection.

6. An automatic vacuum transfer mechanism for paper-making machines comprising a couch roll, a forward drive roll, a forming wire extending in a run from the couch roll to the forward drive roll, a suction pick-up roll adapted to bring a transfer felt into web-contacting position with the upper side of the wire run, and a short blow-roll mounted near one edge of the wire run on the opposite side to the pick-up roll in nip defining relationship thereto, the blow-roll having a perforated rubber-covered freely rotatable shell in contact with the wire, and the blow-roll having an internal chamber and a communicating passage from the chamber directed towards the front of the nip formed by the pick-up roll and the blow-roll.

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