Nov. 5, 1929. R. E. READ 1,734,879

PAPER MAKING MACHINE

Filed Aug. 17, 1927 2 Sheets-Sheet 1

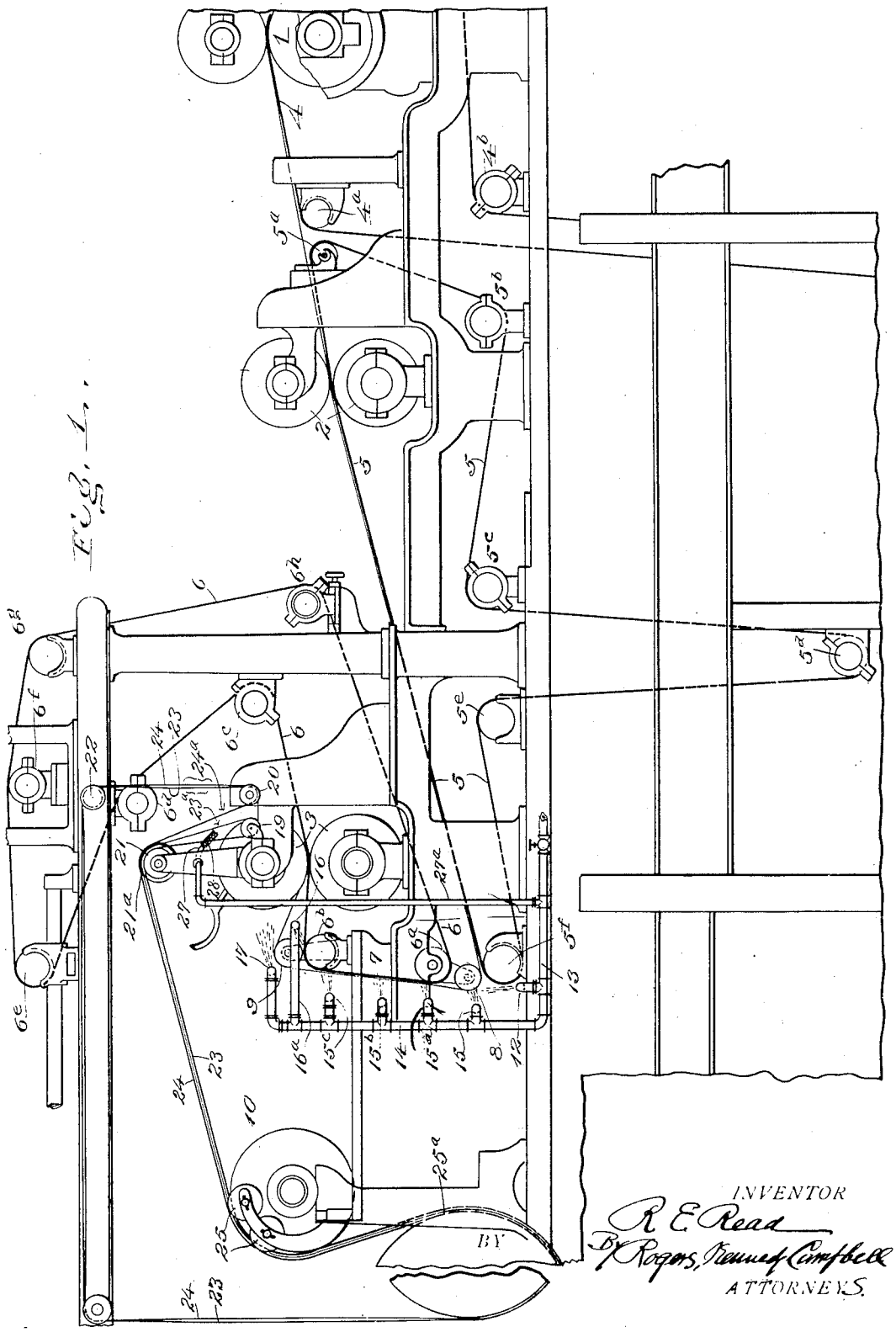


Fig. 1.

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Fig. 3.

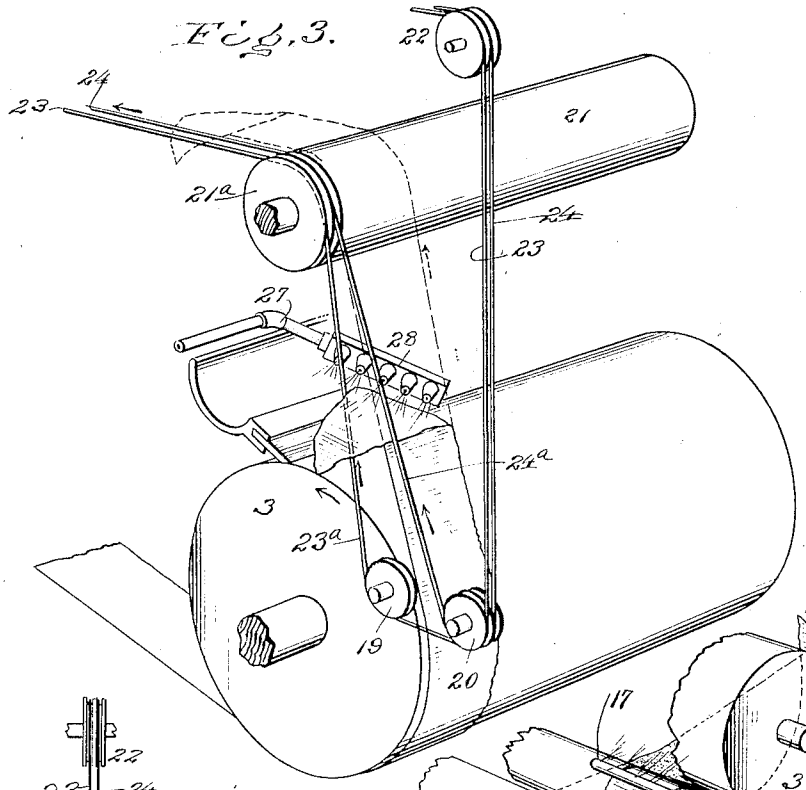
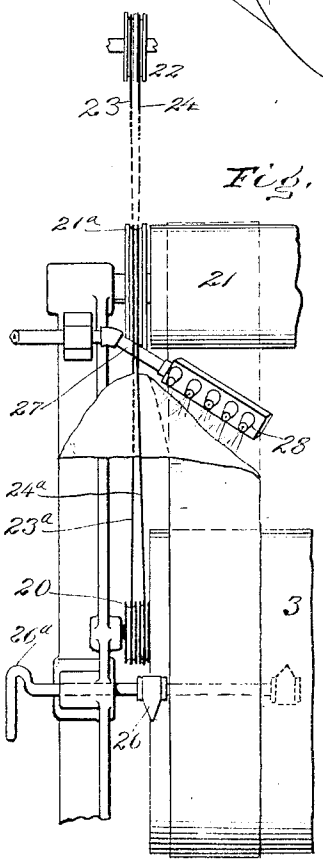


Fig. 4.



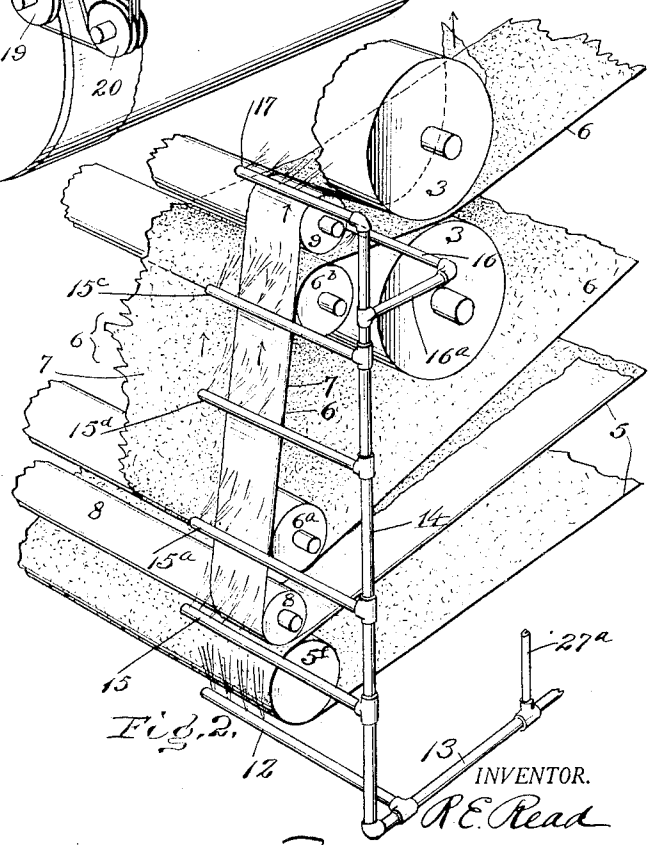


Fig. 2.

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UNITED STATES PATENT OFFICE

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PAPER-MAKING MACHINE

Application filed August 17, 1927. Serial No. 213,500.

This invention relates to paper making machines and has for its object the establishment of the travel of the paper web through the machine in the event of the breaking of the web, or in starting up the machine. It is the practice in the operation of paper making machines, when the web parts, to reestablish the travel through the machine by forming a lead strip on the web beginning where the break occurs by incising the web longitudinally near one edge, and to start this lead strip on its travel in the machine, and when the travel of the strip has been fully established, the longitudinal incision is continued laterally throughout the width of the web so as to separate the portion of the web which had been passing down to waste from the main body portion.

The present invention has to do particularly with the guide and transfer of the lead strip from the felt of the second press rolls to the third press rolls where the web is caused to enter between the rolls of the third press in reverse position, so that the side of the web which in the second press was in contact with and supported by the traveling felt, will contact with and be acted on by the roll of the third press; whereby the paper will be treated and finished in like manner on both sides.

The invention consists of an improved form and arrangement of guides for the lead strip, characterized by the use of air blasts and guiding rollers so positioned and related to each other and to the delivery felt of the second press and to the felt of the third press, as to act on the strip as it leaves the second felt and transfer it to the third press.

The invention consists also of an improved means characterized by the employment of endless carrying cords for transferring the lead strip adhering to and being carried by the upper roll of the third press, to the drying cylinders.

The invention embodying the above characteristics will be described in detail in the specification to follow, and the novel features thereof will be pointed out in the appended claims.

In the accompanying drawings:

Fig. 1 is a side elevation partly in section of such parts of a paper making machine as will be necessary for an understanding of my invention;

Fig. 2 is a perspective view showing how the lead strip is held by the air blasts against the upwardly traveling felt of the third press; and

Fig. 3 is a perspective view of the upper press roll of the third press and the endless carrying cords associated therewith, showing how the lead strip is carried by said cords from said roll to the drying cylinder.

Fig. 4 is a front elevation of the same.

Referring to the drawings:

Referring particularly to Fig. 1, 1, 2 and 3 designate respectively the rolls of the first, second and third presses, which presses have associated respectively with them as usual endless press felts 4, 5 and 6 which pass between the upper and lower rolls of the presses and by the rotation of the latter are driven continuously as will be understood by those skilled in the art. The felt 4 of press 1 passes around guide rollers 4^a and 4^b and other guide rollers not shown; the felt 5 passes around guide rollers 5^a, 5^b, 5^c, 5^d, 5^e and 5^f; and the felt 6 passes around guide rollers 6^a, 6^b, 6^c, 6^d, 6^e, 6^f, 6^g and 6^h, the felt 6 passing upwardly as at 7 from the guide roller 6^a to the guide roller 6^b, all as usual in machines of this type.

The upper stretch of the felt 5 extends in line with the upper stretch of the felt 4 so as to receive the paper web after the latter passes between the rolls of the first press, and the web supported by said felt 5 passes between the rolls of the second press, whence the web, still carried by the felt 5, passes around a horizontal web guiding roller 8 arranged between the rollers 5^f and 6^a and then upwardly and around a second horizontal web guiding roller 9 arranged above the guide roller 6^b with its axis in vertical alignment with the roller 6^b, and from the roller 9 the web passes onto the felt 6 between the two rolls of the third press. The paper web then enters between the rolls of the third press in reverse position, to the end that the upper roll of the press will act on that side of the web

which before had been in contact with the felts 4 and 5; whereby both sides of the web will be subjected to the pressing and finishing actions of the press rolls. The paper web in passing between the rolls of the third press will adhere to and be carried upwardly by the upper press roll and from this roll it is transferred to the baby drier 10 and then passes to the main drying cylinders 11, one only of which is shown. The two web guiding rollers 8 and 9 are so disposed in relation to the upward traveling stretch 7 of the felt 6 that in the operation of the machine with the paper web traveling normally and under tension, said web will be guided by said rollers spaced a slight distance from the felt as shown in Fig. 1.

The present invention is concerned with the automatic transfer of the lead strip which is formed by the attendant at one edge of the paper web when the latter breaks and the travel of the web through the machine is to be reestablished, from the delivery end of the second felt to the upwardly traveling stretch of the third felt, so that the lead strip will be carried upwardly thereby; and the invention is also concerned with the automatic transfer of said lead strip from the upper roll of the third press to the baby drier, and I will now describe in detail the improved form, construction, and arrangement of parts by which these objects are accomplished without the strip being handled by the attendant.

Arranged at the delivery end of the second felt 5 below the guiding roller 5^f is an air blast pipe 12 which extends inwardly from a horizontal air supply pipe 13 supplied with air under pressure from a suitable source and provided with a vertical branch supply pipe 14 for the purpose presently to be described. The air blast pipe 12 is arranged to direct its air blast upwardly tangentially to the outer side of the guiding roller 5^f so as to lift the end of the lead strip from the felt 5 as the latter passes down and around the guiding roller 5^f, and direct it upwardly around the outer side of the web guiding roller 8 and toward the upwardly traveling stretch 7 of the felt 6. The lead strip is held against the outer side of the guiding roller 8 and against the upwardly traveling stretch of the felt so as to be carried upwardly thereby, by means of a number of horizontally directed air blasts issuing from air discharge holes in a number of short pipes 15, 15^a, 15^b and 15^c communicating at intervals with the branch air supply pipe 14, the said short pipes being arranged so as to deliver their air blasts horizontally against the guiding roller 8, and against the lead strip at intervals in the length of the upwardly traveling stretch 7 of the felt 6. The horizontally directed air blasts disposed as described will act to press and hold the lead strip against the upwardly traveling stretch 7 of the felt, whereby the lead strip will be carried upwardly with certainty by the felt.

The end of the lead strip held against the stretch 7 of the felt tends to pass with said felt around the guiding roller 6^b and thence directly between the rolls of the third press. To prevent such tendency and to cause the end of the strip to pass upwardly around the web guiding roller 9 before it enters between the third press rolls, which is the proper path of travel which the paper web pursues in the normal operation of the machine, I provide a short air blast pipe 16 which is disposed inwardly of the guiding rollers 9 and 6^b and is supported by an air supply pipe 16^a extending outwardly at the outer side of the press frame and is connected at its outer end with the branch air pipe 14. The air blast pipe 16 is provided with a row of air discharge holes arranged to direct the air downwardly onto the felt 6 where it passes around the upper side of the guiding roller 6^b, and at an inclination opposed to the direction of travel of the felt, the effect of which blast will be to lift the end of the lead strip from the felt and blow it outwardly from between the rollers 6^b and 9, and by the continued upward travel of the strip its end will be caused to pass upwardly onto the web guiding roller 9. An air blast pipe 17 provided with a row of air discharge holes and connected with the pipe 14, is supported just above the roller 9 at the outer side of the same, and is arranged to direct its air blast horizontally toward the third press rolls, so as to strike the upwardly moving end of the lead strip, the effect of which horizontally directed air blast will be to blow the end of the lead strip inwardly and downwardly onto the horizontal stretch of the felt traveling toward the press rolls; whereby the end of the lead strip will be caused to enter the bight of said rolls.

The lead strip as before explained is only formed on the paper web when starting up the machine or in the event of the parting or breakage of the web in the operation of the machine, and the strip is formed by incising the web longitudinally a short distance from one edge, say twelve inches more or less. The slit may be formed by a knife or similar tool held in the hands of the attendant, or by means of a knife carried on the end of a rod mounted slidably and rotatable in the frame of the machine so that it may be engaged with the broken paper web when occasion arises, or the slit may be started by a squirt on the forming wire. All of these different ways of forming the lead strip are now well known in this art, and for the purpose of the present invention it is assumed that the web will be incised at the delivery end of the forming wire, for instance by hand as with a water squirt, but it will be

understood that the incision may be formed at other points in the machine and by other means.

The several short blast pipes hereinbefore described as delivering horizontal air blasts against the lead strip correspond in length, or substantially so, to the width of the lead strip, and are arranged at one side of the machine to act on the lead strip on the edge of the web; and it will be understood that the air supply pipe will be provided with a suitable controlling valve so that the air may be turned on when the travel of the lead strip is to be established, and may be turned off after this has been accomplished and the paper web is running normally through the machine.

The advancing end of the lead strip will, in accordance with the present invention, be acted on by the several air blasts referred to, and the strip will be caused thereby to pass upwardly from the delivery end of the second felt to the third press felt adjacent the point where the latter passes between the press rolls, the main portion of the web in the meantime passing down to waste at the delivery end of the forming wire. After the travel of the lead strip has been fully established through the machine, the longitudinal slit in the web is continued laterally throughout the width of the same, thereby widening the lead strip to the full width of the web and at the same time separating the waste length from the main web.

The end of the lead strip after passing between the third press rolls, will adhere to and be carried upwardly by the upper roll, and the strip must be transferred through the considerable space that exists between the third press and the baby drier 10, and this action is effected automatically without the aid of the attendant as far as any manual handling of the strip is concerned, by means of the following instrumentalities.

Rotatably mounted on the press frame in close proximity to the end of the upper roll of the third press are two guide sheaves 19 and 20, and rotatably mounted on the press frame vertically over the upper press roll is a web guiding roller 21 having fixed to its end a guide sheave 21^a, and similarly mounted in said frame vertically over the sheave 20 is a guide sheave 22, which several guide sheaves are disposed in a common vertical plane. Two endless carrier ropes or cords 23 and 24 pass around these sheaves and around sheaves 25 rotatably mounted at the end of the baby drier, and sheaves 25^a on the end of the first drier cylinder by which means the cords are driven in the direction of the arrow shown in Fig. 3. Both cords pass together over the sheaves 20, 21^a and 22, but between the sheave 21^a on the one hand and the sheaves 19 and 20 on the other hand, the cords are separated from each other, a stretch 24^a of the cord 24 passing directly from sheave 20 to sheave 21^a, and a stretch 23^a of the cord 23 passing from sheave 20 first around the sheave 19 and thence around sheave 21^a and intersecting the stretch 24^a on that sheave. As a result of this arrangement and guiding of the cords, the two stretches 23^a and 24^a will converge toward each other from the respective sheaves 19 and 20 and will meet and come together on the sheave 21^a, thereby forming a traveling grip adapted to take hold of the end of the lead strip and carry the same along in the manner now to be described.

In order to cause the end of the lead strip to enter betwen the converging stretches of the two traveling cords that it may be gripped and carried along thereby, means are provided for lifting the end of the lead strip adhering to the press roll and deflecting the same laterally so that it will extend between said stretches of the carrier cords. In the present instance this is effected by a lead strip severer and blast mechanism such as is disclosed in my Patent No. 1,687,847, granted Oct. 16, 1928. As embodied in the present invention said mechanism comprises a strip severer 26 carried by a handle 26^a mounted to slide and rotate in the side of the press frame adjacent the upper roll of the third press so that the severer can be pushed inwardly beyond to the inner edge of the adhering lead strip, then turned to engage the roller and finally drawn outwardly in the direction of the axis of the roller, and due to the continued travel of the lead strip thereby sever the lead strip on a diagonal line. In this action of the severer, the continued movement of the traveling strip against the severer will lift the severed edge of the strip and separate it slightly from the surface of the press roll. An air blast pipe 27 connected by means of a supply pipe 27^a with the air supply pipe 13 is supported just above the point where the severer acts and is provided with air discharge nozzles 28 arranged to direct their blasts against the roller in a direction radially, or substantially thereof, the said pipe 27 being set at an inclination to the direction of travel of the strip as shown in Fig. 4. The air blasts from the nozzles rebounding from the surface of the roller will act beneath the slightly lifted end of the lead strip and will peel the same from the roller, at the same time and owing to the inclined disposition of the blast pipe, the lifted end of the strip will be blown laterally into the space between the converging stretches 24^a of the carrier cords.

In the continued rotation of the press rollers, the lead strip now with its end entered between the carrier cords and held there by the air blasts, will travel upwardly, and as it passes around the guiding roller 21, said end will be gripped tightly between the two stretches of the carrier cords as they meet on the sheave 21^a and by said cords in their

travel together toward the drying cylinders, the lead strip will be carried along positively and led first around the baby drier and thence to and through the drying cylinders, and the travel of the strip thus established through the machine.

It will be seen therefore that by the action of the improved mechanism as described, the lead strip is automatically transferred from the second press felt to the third press felt and in such transfer is reversed in position, and from the third press the strip is automatically transferred to and through the drying cylinders and this without the attendant handling the strip to guide or direct it in its travel. In the foregoing operation the attendant first actuates the cutter at a point ahead of the third press to form the lead strip, and then turns on the air blasts, and after the travel of the strip has been established, the blasts are cut off and the cutter is operated to widen the strip to the full width of the web.

It may not be necessary to sever the lead strip on the roll of the third press by the severer 26 as described, since the inclined disposition of the blast at that point may alone be sufficient to lift the advancing end of the lead strip from the roll and blow it laterally between the converging stretches of the carrier cords; but there is an advantage in employing the lead strip severer at this point in that it will act to lift the severed end of the strip from the roll and thereby enable the blast to act with certainty and effectiveness in blowing the lifted end of the strip between the carrier cords.

Having thus described my invention, what I claim is:

1. In a paper making machine, the combination of two traveling felts adapted to support and carry the paper web, an air blast in position to direct a lead strip on the paper web from one felt toward the other felt, and a second air blast in position to act on the lead strip and press it against the last mentioned felt.

2. In a paper making machine, the combination of two travelings felts adapted to support and carry the paper web, an air blast in position to direct a lead strip on the paper web from one felt toward the other felt, and a plurality of air blasts acting at intervals in the length of the last mentioned felt transversely of the travel of the same to press said lead strip against said felt.

3. In a paper making machine, the combination of two sets of rotary press rolls, two traveling felts associated therewith, an air blast in position to direct a lead strip on the paper web supported by one felt toward the other felt, and a second air blast in position to act on the lead strip and hold it against said other felt.

4. In a paper making machine, the combination of two sets of rotary press rolls, two traveling felts associated therewith, an air blast in position to direct a lead strip on one felt toward the other, and a second air blast acting in a direction transversely of the travel of the latter felt and operating to hold the lead strip against the same.

5. In a paper making machine, the combination of two sets of rotary press rolls, two traveling felts associated therewith, an air blast in position to direct a lead strip on the paper web from one felt toward the other, and a plurality of air blasts acting at intervals in the length of the latter felt to hold the lead strip thereagainst.

6. In a paper making machine, the combination of two sets of rotary press rolls, two traveling felts associated therewith, an air blast in position to direct a lead strip on the paper web from one felt toward the other, and a plurality of air blasts acting at intervals in the length of the latter felt and transversely of the travel thereof and operating to hold the lead strip against said felt.

7. In a paper making machine, the combination of two sets of rotary press rolls, two traveling felts associated therewith, one of said felts leading upwardly to its press rolls from the other felt, an air blast in position to direct a lead strip on the paper web from the last named felt toward said upwardly traveling portion of the felt, and a plurality of air blasts in position to direct their blasts at intervals in the length of the upwardly traveling portion of the felt and in a direction transversely of said travel.

8. In a paper making machine, the combination of two sets of rotary press rolls, two traveling felts associated therewith and operative to carry the paper web from between the first set of press rolls in reverse position to and between the second set of rolls, web guiding devices associated with the felt of the second press and by which the paper web when running normally through the machine will be held out of contact with a stretch of the felt of the second press traveling toward said press, an air blast in position to direct a lead strip on the paper web from the felt of the first press toward said stretch of the felt of the second press, and an air blast in position to press the lead against said stretch of the felt; whereby the lead strip will be carried by said stretch of the felt toward the second press rolls.

9. In a paper making machine, the combination of a set of rotary press rolls, an endless traveling felt passing between said press rolls and adapted to support and carry the paper web, a felt guiding roller around which said felt passes upwardly toward the press rolls and thence horizontally between the same, a web guiding roller above said felt guiding roller around which the paper web passes before entering between the press rolls, an air blast in position to direct a lead strip

on the paper web toward the upwardly traveling portion of the felt, a plurality of air blasts in position to act on the lead strip and press it against said upwardly traveling portion of the felt, and an air blast in position to act above said web guiding roller and operating to direct said lead strip towards the horizontal portion of the felt.

10. In a paper making machine, the combination of rotary rolls between which the paper web passes, endless traveling carrier cords associated with one of said rolls and adapted to grasp a lead strip on the paper web and carry the same along, and an air blast associated with said roll and in position to blow the end of the lead strip therefrom within the grasp of the carrying cords.

11. In a paper making machine, the combination of upper and lower press rolls between which the paper web passes, endless traveling carrier cords associated with the upper press roll and adapted to grasp a lead strip on the paper web and carry the same along, and an air blast associated with said press roll and in position to blow the end of the lead strip therefrom and within the grasp of the carrying cords.

12. In a paper making machine, the combination of upper and lower press rolls, endless traveling carrier cords associated with the upper press roll and presenting converging stretches at one end of the roll adapted to grasp between them a lead strip on the paper web and carry the same along, and an air blast associated with said press roll and in position to blow the end of said lead strip from the roll and between said stretches of the carrier cords; whereby the lead strip end will be grasped by the carrier cords and pulled along thereby.

13. In a paper making machine, the combination of upper and lower press rolls, endless traveling carrier cords associated with the upper press roll and adapted to grasp the end of a lead strip on the paper web and carry the same along, a lead strip severer in position to sever a lead strip adhering to the upper press roll, and an air blast associated with said press roll and in position to act on the severed end of the lead strip and blow the same within the grasp of the carrier cords.

14. The method of guiding the paper web of a paper making machine from the press through the drier which consists in gripping the paper web at the press by a carrier member and moving said carrier member across the pass between the press and the drier with the paper web connected therewith and continuing the movement of the carrier member through the drier and around the drier rolls with the paper web connected therewith.

15. The method of carrying the paper web of a paper making machine between the press and the drier which consists in extending a pair of traveling carrier members between the press and the drier and guiding the paper web at the press into the bite between said carrier members.

16. The method of carrying the paper web of a paper making machine from the press to the drier which consists in extending a pair of parallel carrier ropes between the press and the drier, moving said ropes toward the drier, introducing the paper web at the press into the bite of said ropes to cause it to be gripped thereby and moving the ropes through the drier and about the drying rolls, thus to convey the paper web through the drier.

17. In a paper making machine, the combination of a press, a drier, and a pair of rope-passes extended between the press and the drier and arranged to engage the paper web at the press and take it over to the drier.

18. In a paper making machine, the combination with a press, a drier, a carrier device extended around and between the drying rolls of the drier to carry the paper web through the drier and also attended to the press to carry the paper web from the press, and means for introducing the paper web to the engagement of said carrier device including air blast producing means arranged to direct a blast of air onto the paper web in a direction to guide it to said carrier device.

19. In a paper making machine, a press having a press roll felt on which the paper web is carried, a pair of superposed press rolls, paper web reversing means disposed between the paper web and rolls to reverse the web and cause it to pass reversed between said press rolls, a drier adapted to receive the paper web from the press, a pair of cooperating carrier elements disposed adjacent the upper press roll and extended from the press to and through the drier and arranged to carry the paper web from the press to the drier and about the drying rolls thereof, and means to guide the paper web from said upper press roll into the engagement of said carrier elements.

In testimony whereof, I have affixed my signature hereto.

ROBERT E. READ.