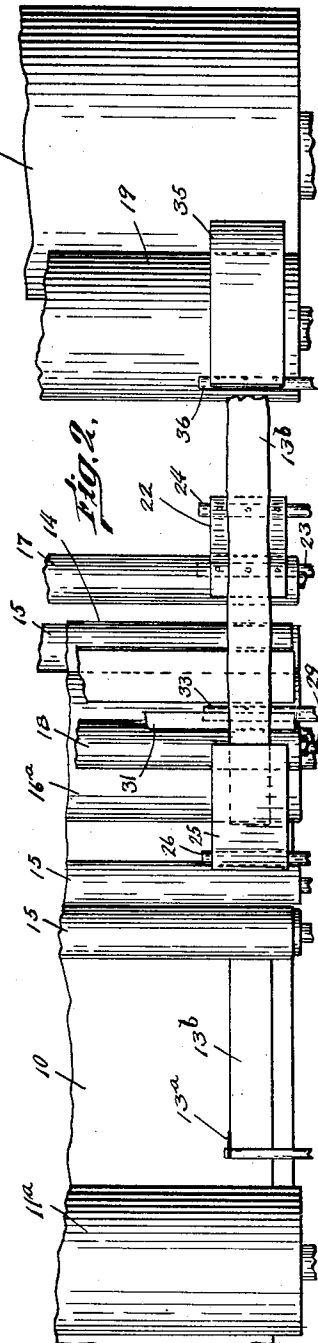
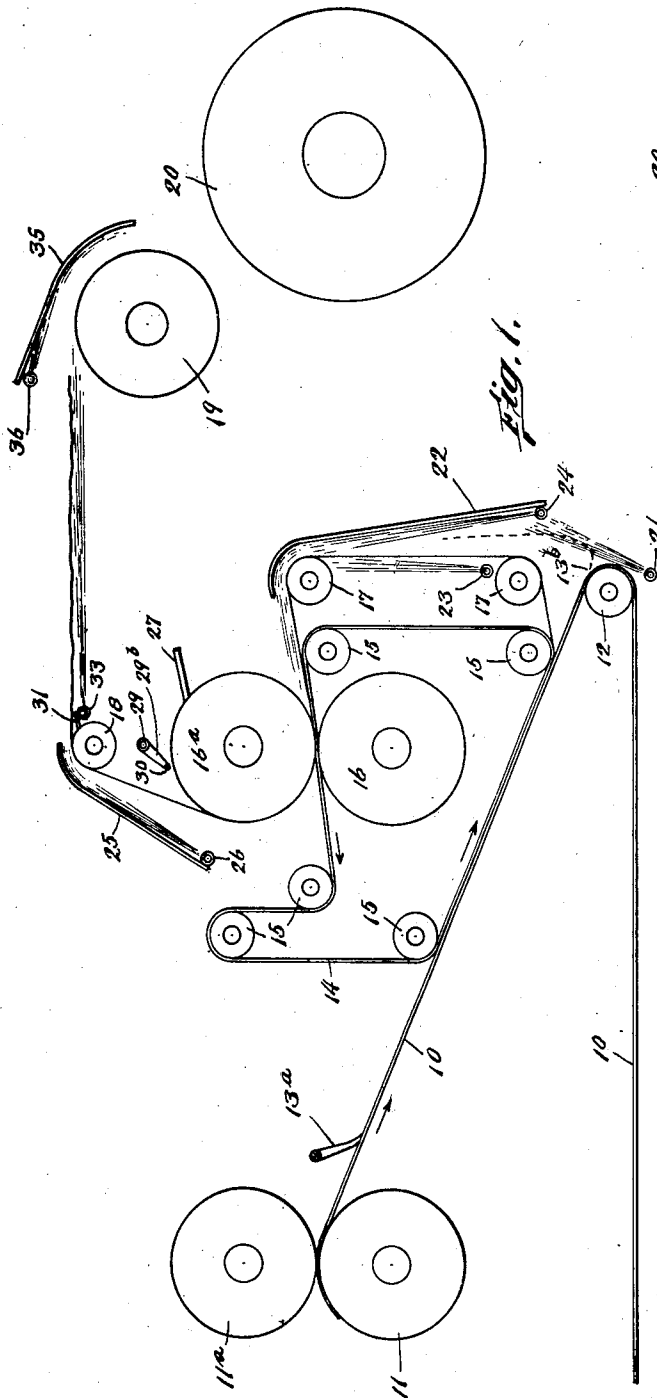


C. E. POPE.
PAPER MAKING.
APPLICATION FILED OCT. 25, 1918.

1,338,094.

Patented Apr. 27, 1920.
3 SHEETS—SHEET 1.

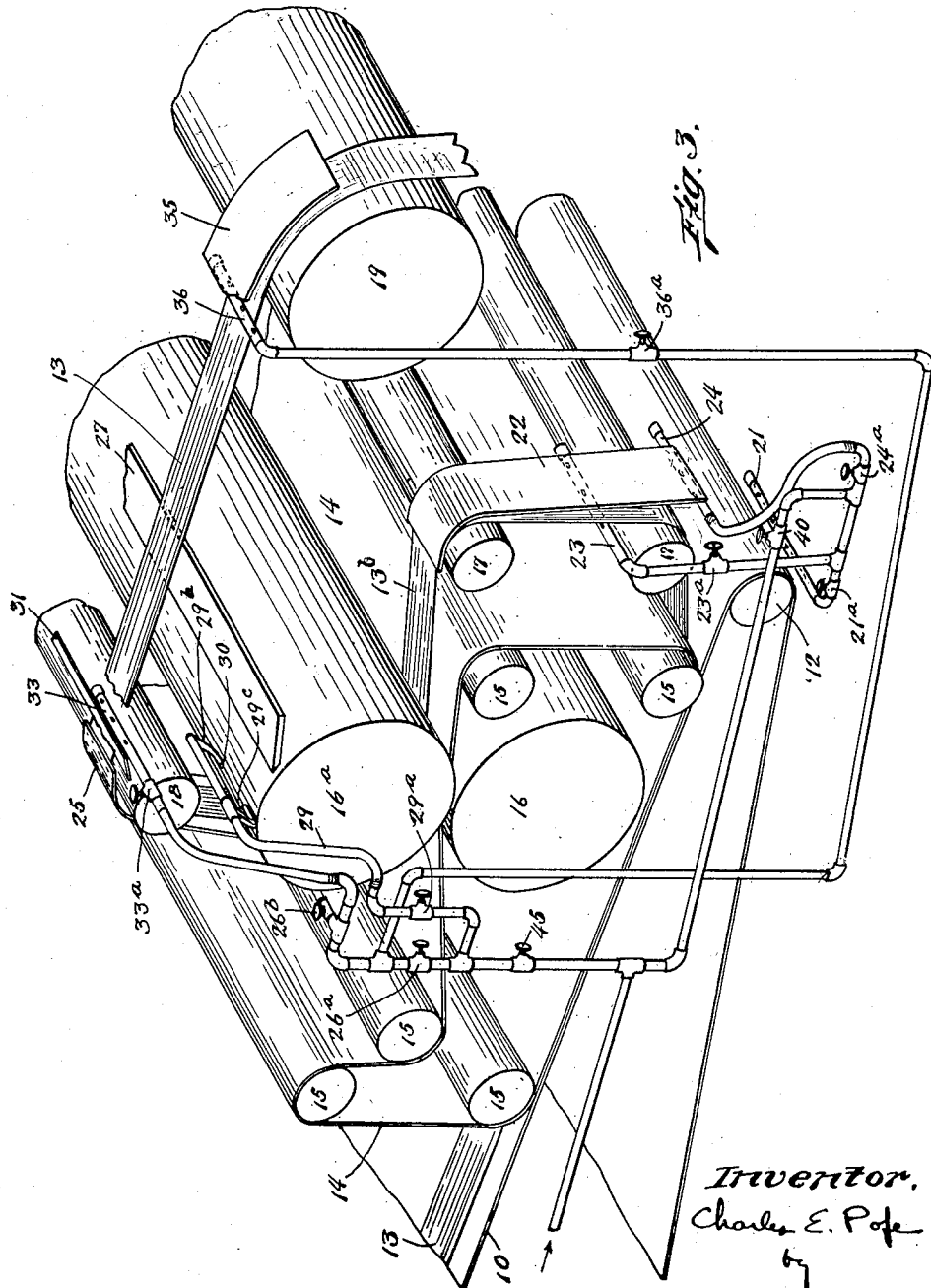


Inventor,
Charles E. Pope
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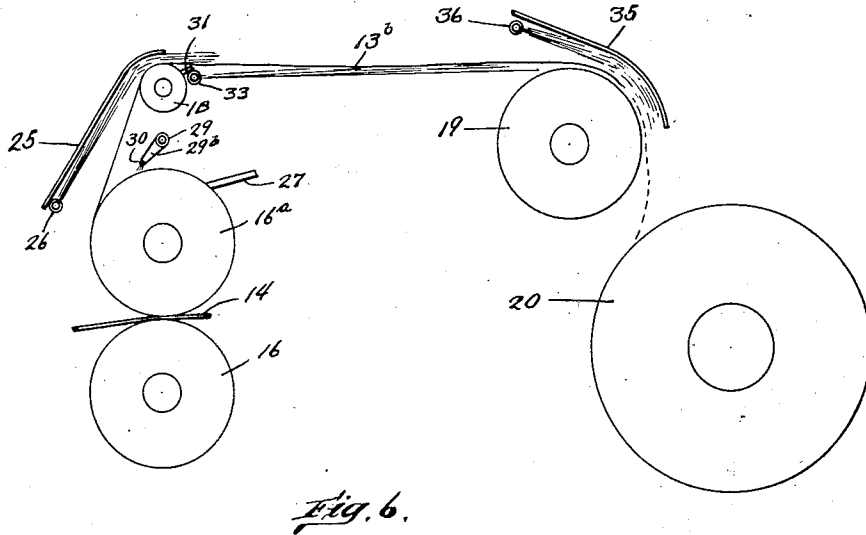
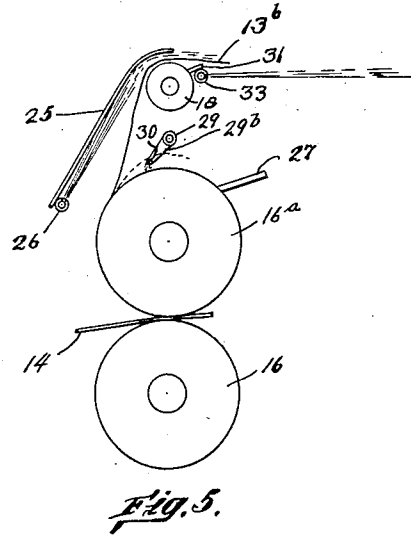
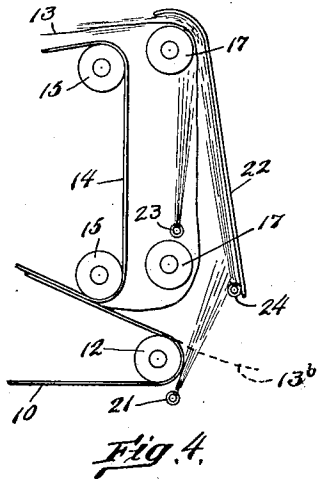


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by
B. J. Noyes *att'y*

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3 SHEETS—SHEET 3.



Inventor
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B. J. Noyes atty

UNITED STATES PATENT OFFICE.

CHARLES E. POPE, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO GREAT NORTHERN PAPER COMPANY, OF MILLINOCKET, MAINE, A CORPORATION OF MAINE.

PAPER-MAKING.

1,338,094.

Specification of Letters Patent.

Patented Apr. 27, 1920.

Application filed October 25, 1918. Serial No. 259,618.

To all whom it may concern:

Be it known that I, CHARLES E. POPE, a citizen of the United States, residing at Springfield, in the county of Hampden and State of Massachusetts, have invented an Improvement in Paper-Making, of which the following is a specification.

This invention is an improvement in paper machines and consists in improved mechanism for removing the moving web of paper from one press roll felt to another and thence to the driers. This arrangement is applicable in its entirety only to machines in which the paper sheet is reversed in passing from one press roll felt to another; that is to say, to machines which present one face of the paper sheet to the felt during the passage of the sheet through say a second pair of press rolls and the other side in passing through the third pair of press rolls. Such machines are common, owing to the theory that to get a uniform surface of the paper such reversal is desirable. My invention can be applied to many, if not all, such existing machines, at slight expense, and obviously to new machines operating on the above-described principle.

Briefly my invention consists in apparatus and means to direct air blasts upon the paper web to direct and support it in its passage between the press and guide rolls and to the driers.

Figure 1 is a diagrammatic side elevation of a paper making machine in which my invention is embodied.

Fig. 2 is a partial plan view of Fig. 1.

Fig. 3 is a perspective view of a paper making machine embodying my invention.

Fig. 4 is a diagrammatic view of means for passing the web from the main press roll felt to the guide rolls.

Fig. 5 is a diagrammatic view of means for passing the web from the top press roll to the top roller.

Fig. 6 is a diagrammatic view of means for passing the web from the roller of the press rolls to the driers.

As here shown, the press roll felt 10 of the paper making machine is represented as passing from an intermediate set of press rolls 11 and 11^a around the guide roll 12 and carrying upon it the paper web 13. Above this portion of the press roll felt is a second press roll felt 14, running around

guide rolls 15, and between the end pair of press rolls 16 and 16^a.

It is the present practice to transfer the moving paper web 13 from the press roll felt 10 to the press roll felt 14 by passing it by hand over the guide rolls 17 and thence to the moving felt 14 at a point just before said felt 14 passes between the press rolls 16 and 16^a. In this way it will be observed that the paper is reversed with relation to the press roll felts, the surface of the paper sheet in contact with the press roll felt 10 being uppermost, while the surface not in contact with the press roll felt 10 is underneath and in contact with the press roll felt 14. The moving web of paper then passes in contact with the upper press roll 16^a, and according to the present practice is removed from the same by hand and run over a roller 18, and thence is carried by hand to the so-called baby drier 19, and thence to the first large drying roll 20. Different machines are arranged with various differences, but the principle hereinbefore stated applies to nearly all such machines.

This invention relates to mechanism and means for transferring or carrying the paper through the end press rolls and over to the driers on such machines without human handling.

For directing the paper web from the press roll felt 10 from the roll 12 upward to the guide rolls 17, I arrange an air pipe 21 perforated to admit an air blast to pass from it at a point where the air blast can be directed against the moving paper web 13, or preferably a lead strip 13^b thereof of any convenient width, say ten inches, carried by the felt 10. The lead strip may be formed from the web by any suitable means and in Fig. 1 a paper splitter or knife 13^a is provided to slit the web between the second press rolls 11 and 11^a and the third or end press rolls 16 and 16^a to form the lead strip although it is obvious that the lead strip may be formed at any convenient point, and in point of fact I prefer to form the lead strip on the paper making wire by a squirt in the usual way and carry the lead strip all the way from the couch rolls to the driers before passing the full sheet along. In case the knife 13^a is used, it is rotatable, so that it may be out of engagement with the paper

web except when the lead strip is being formed and is movable horizontally across the machine, so that the lead strip may be extended in width until the entire width of the web is merged in the lead strip, according to the usual practice, when the lead strip is running as desired. In case the entire width of the paper sheet has been passed through the earlier press rolls, then the main body 13^c of the paper sheet will pass through the floor or otherwise to waste, while the lead strip 13^b is being handled, but as before stated, I prefer to form the lead strip 13^b at the paper making wire, in which case the knife 13^a is unnecessary. In the drawings, the perforated pipe 21 is shown near the felt 10 below the point where it passes around roll 12 for its return traverse but it may be otherwise placed, provided its blast is so directed as to strike the moving lead strip 13^b and direct it upward toward the guide plate or deflector 22 and between said plate and the guide rolls 17.

Said guide 22 has its lower end spaced from the lower roll 17 a sufficient distance to allow plenty of space for the passage of the moving sheet 13^b upward between the lower roll 17 and the lower portion of the guide. Said guide extends upward toward the upper roll 17 and is directed partially around said upper roll to direct the paper sheet to the felt 14. The guide is preferably formed of galvanized iron plate although it is obvious that any suitable material or construction may be employed and is preferably wider than the lead strip 13^b, say about eighteen inches wide, and its upper end is preferably closer to the upper guide roll 17 than is its lower end to the lower guide roll.

Perforated pipes for air blasts 23 and 24 are arranged so that the air blasts will be directed to support the paper sheet and assist it in its upward movement. The pipe 23 is placed above the lower roll 17 and is directed approximately tangentially to the upper roll 17, so as to pass between said roll 17 and the iron plate or guide 22 while the blast from the pipe 24 is directed along the iron plate to prevent any adherence of the paper to the guide, and also assist in the upward movement of the paper, the paper in such upward movement, being supported between the two air blasts from the pipes 23 and 24. The moving lead strip 13^b, with this assistance, passes upwardly between the upper roll 17 and the guide and turns about the roll 17 and passes to the felt 14 and between the press rolls and is carried around the upper press roll 16^a in accordance with the present practice in such machines. In practice I find that although the air blast in the pipe 21 blows the paper directly toward the guide 22, that the blast from the pipe 24 maintains a sheet of air between

the lead strip and the guide 22, so that the lead strip does not touch the guide 22 even in making the turn. With fast moving paper the momentum of the paper and the effect of the blast from the pipe 21 is such that no air blast whatever is needed from the pipe 23, but I prefer to maintain the pipe 23 as a precautionary measure, particularly in the case of machines not running at high speed. In like manner the blast from the pipe 24 is not always necessary as a sufficient blast of air from the pipe 21 will strike the guide 22 and do the work but in practice I find it much better to use the blast 24.

To remove the paper from the upper press roll 16^a, and carry it to the driers, I arrange pipes for directing opposed air blasts to raise the paper from the upper press roll and cause it to pass upward between the roller 18 and another galvanized iron plate forming a guide 25, assisted by the air from the pipe 26.

These opposed air blasts are arranged and operated in substantial accordance with my co-pending application Serial No. 222,467, filed March 14, 1918.

The lead strip passing through the press rolls 16 and 16^a adheres to the upper press roll until removed and is carried against a doctor 27 until the machine tender is ready to carry the paper over to the driers. To remove the strip 13^b from the upper press roll and to cause it to pass to the driers, I arrange a compressed air pipe 29 governed by a valve 29^a in proximity to the upper press roll 16^a, preferably near the top of said press roll, to remove the paper from the roll 16^a. The lead strip, when sticking to the upper press roll, will pass between said pipe 29 and the press roll 16^a. To this pipe I attach two branches 29^b and 29^c, having nozzles, 30 and 30^a, directed toward each other and toward the lead strip passing between them and so arranged that when air is directed through the pipe 29 it will pass through both nozzles and between the lead strip 13^b and the roll and deflect the lead strip from the roll in the desired direction. The direction of the nozzles is determined by the requirement of passing the stream of air between the lead strip and the press roll in opposed relation, which result can best be obtained by directing the stream of air from the nozzles in a line slightly toward the roll and away from a direct line between the two nozzles. When the lead strip 13^b is passing around the press roll 16^a and between the nozzles, and the air blast has been turned on, the paper will rise directly upward between the roller 18 and the galvanized iron plate or guide 25, as above stated. The guide 25 is made similar to the guide 22 heretofore referred to and is properly placed to catch the paper web 13^b

as it leaves the upper press roll felt 16^a and passes around the roll 18 and between it and said guide 25.

The pipe 26 is arranged at the lower part 5 of the guide 25 and has orifices therein to direct a blast of air upward along said guide to carry the lead strip upward and around the roll 18. In practice the paper seldom or never touches the guide 25. Said guide 10 25 is bent, at its upper end, about the roll 18 and therefore turns the air blast from the pipe 26 which in turn directs the lead strip over the roll 18 from the upper press roll 16^a.

15 As the moving paper sheet passes around the roll 18, I may arrange to have it removed therefrom by a doctor 31, but ordinarily it has no adherence thereto and will pass, by its own momentum and the air 20 blasts from the pipe 26 toward the baby drier 9.

In order to support the lead strip and prevent it from dropping below the level of the baby drier 9, I place a perforated 25 pipe 33 adjacent the roll 18 and so as to direct an air blast in the desired direction toward the driers and tangential to the upper face of the baby drier 19. The supporting effect of this air blast is such that 30 although the traverse from the roll 18 to the baby drier 19 is about 6 feet, the paper goes across without difficulty. To guide the paper around the baby drier 19 and to the drier 20, I arrange a third guide 35, 35 above the baby drier 19 and partially around and spaced from the same, and another perforated air pipe 36 with jets directed in the line of said guide 35.

After the lead strip has been passed to 40 the driers the strip may be broadened to the full sheet as is common practice.

The spacing of all the parts above referred to depends, of course, upon the speed of the machine, the weight of the paper and 45 the spacing of the parts to which my invention is applied. The above invention can be made to fit substantially any arrangement of press rolls which is practicable in paper making machines of the 50 general type above described by anyone skilled in the art. For use on fast running news machines, I have found that $\frac{1}{2}$ " pipes, having three $\frac{1}{4}$ " holes, occupying a space of about a foot, and operating under a 55 pressure of about 4 pounds, will do the work required on the pipes 21, 23, 24, 26, 33, and 36.

I prefer to insert valves in all of the pipes having discharge orifices, such as 60 valves 21^a, 23^a, 24^a, 26^a, 26^b, 29^a, 33^a and 36^a which are inserted in the corresponding pipes 21, 23, 24, 26, 29, 33 and 36, whereby the discharge pressure may be regulated to obtain the best results from any particu- 65 lar air blast, it being realized that a

stronger air blast, and consequently a greater air pressure, may be necessary for blasts located at some parts of the machine than for blasts located at other parts of the machine, and furthermore a saving of air 70 may be effected by such pressure adjustment.

There are certain groups of pipes or orifices, the air blasts from which operate conjointly upon the paper sheet to direct 75 it in a desired direction and I prefer to control these groups from a single valve and therefore I employ a valve 40 to simultaneously control the air blasts from the pipes 21, 23, and 24, and valve 45 to simul- 80 taneously control the blasts from pipes 26, 29, 33 and 36, the separate valves in the pipes being employed for this purpose of regulating the air pressure at the discharge orifices thereof. 85

In lieu of the various valves for controlling the air pressure and flow through the orifices, the air may be admitted simultaneously to all of the pipes and the variation 90 in the separate air blasts may be obtained by suitably proportioning the pipes and discharge orifices.

I claim:

1. In a high speed paper making machine, the combination with a plurality of 95 web supporting devices separated by a substantial distance, of means for utilizing the momentum of the web of paper to transfer a lead strip thereof from one of said devices to the other, comprising apparatus 100 having means for directing currents of air along the path of travel which it is desired to have said lead strip take to reduce the air resistance to the movement of and support said strip, and additional means for 105 directing currents of air against said supported strip to deflect it and thereby cause it to follow a curved path of travel.

2. In a paper making machine, the combination with a plurality of devices separated 110 by a substantial distance and operative to support a web of paper, of means for automatically transferring a lead strip of said web from one of said devices to the other comprising apparatus for directing a blast 115 of air substantially across the space between said devices to support said strip against the influence of gravity and to guide it across said space, and deflecting means for said air blast operative to cause the cur- 120 rent of air to guide and support said strip in a curved path of movement.

3. In a paper making machine, the combination with a plurality of web supporting devices separated by a substantial distance, of means for automatically transferring a lead strip of the web from one of 125 said devices to the other, against the influence of gravity, comprising apparatus for producing two adjacent substantially 130

parallel air blasts along the path of travel which is desired to have the lead strip take and between which said lead strip is passed, whereby said blasts will guide said strip in a definite path from one of said devices to the other.

4. In a paper making machine, the combination with a plurality of web supporting devices separated by a substantial distance, of means for automatically transferring a lead strip of the web from one of said devices to the other, against the influence of gravity, comprising apparatus for producing two adjacent substantially parallel air blasts between which said lead strip is passed, whereby said blasts will guide said strip in a definite path from one of said devices to the other, and means for producing an additional air blast serving to direct the lead strip between said adjacent air blasts.

5. In a paper making machine, the combination with a plurality of web supporting devices separated by a substantial distance, of means for automatically transferring a lead strip of the web from one of said devices to the other, against the influence of gravity, comprising apparatus for producing two adjacent substantially parallel air blasts between which said lead strip is passed, whereby said blasts will guide said strip in a definite path from one of said devices to the other, and a deflector against which said blasts are directed and which is curved to deflect the currents of air and thereby guide said strip in a curved path.

6. In a paper making machine, the combination with two sets of press rolls and their respective felts arranged to require an upward travel of the web of paper in passing from the first felt to the next, of means for automatically transferring a lead strip of paper from the first to the second felt, comprising means for directing currents of air against the lead strip to guide it upwardly and support it laterally in its movement across the space between said felts.

7. In a paper making machine, the combination with two sets of press rolls and their respective felts arranged to require an upward travel of the web of paper in passing from the first felt to the next, of means for automatically transferring a lead strip of paper from the first to the second felt, comprising air conductors arranged to direct currents of air against the lead strip to guide it upwardly across the space between said felts, and a deflector arranged to direct the air currents along the surface of the second felt to guide said strip into operative engagement with the latter felt and the second set of press rolls.

8. In a paper making machine, the combination with drying cylinders and two pairs of press rolls and their respective felts, said rolls being arranged to reverse the direction of movement of the paper in passing from one to the other of said pairs of rolls, of means for automatically transferring a lead strip of paper from the felt of the first pair of rolls through the second pair in reverse direction, removing the strip from the felt of the latter pair and carrying it in reverse direction to the drying cylinders, comprising a series of air conductors arranged to direct blasts of air against the lead strip to support and guide it in traveling from one of said sets of rolls to the other and from the latter rolls to said cylinders, and deflectors acting as guides for the air currents which perform said supporting and guiding functions.

9. In a paper making machine, the combination with drying cylinders, two pairs of press rolls and their respective felts arranged to reverse the direction of movement of the paper in passing from one to the other of said pairs of rolls, and rolls for guiding the paper as it passes from one of said felts to the other and from the latter felt to the drying cylinders, of means for automatically transferring a lead strip of paper from the first felt through the second pair of press rolls and from the latter pair of rolls to the cylinders, comprising deflectors arranged beside portions of the path along which it is desired to have the strip travel while making said transfer, and means for directing currents of air against said deflectors and said strip to guide the strip along said path.

10. In a paper making machine, the combination with means for engaging and advancing a strip of paper and a guide roll for said strip located above the point at which the strip leaves said advancing means, of means for automatically transferring said strip from said advancing means to said roll, comprising a deflector extending upwardly beside the path of travel of the paper and curved partially around said roll, and air conductors arranged to direct currents of air against said strip of paper and against said deflector to guide said strip upwardly from said transferring means to said roll and direct it partially around the peripheral surface of the roll.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

CHARLES E. POPE.

Witnesses:

WILLIAM H. SEAVER,
STELLA F. CIMPHER.