May 24, 1927. 1,629,681

H. G. CRAM

PAPER MAKING APPARATUS

Filed Jan. 15, 1926

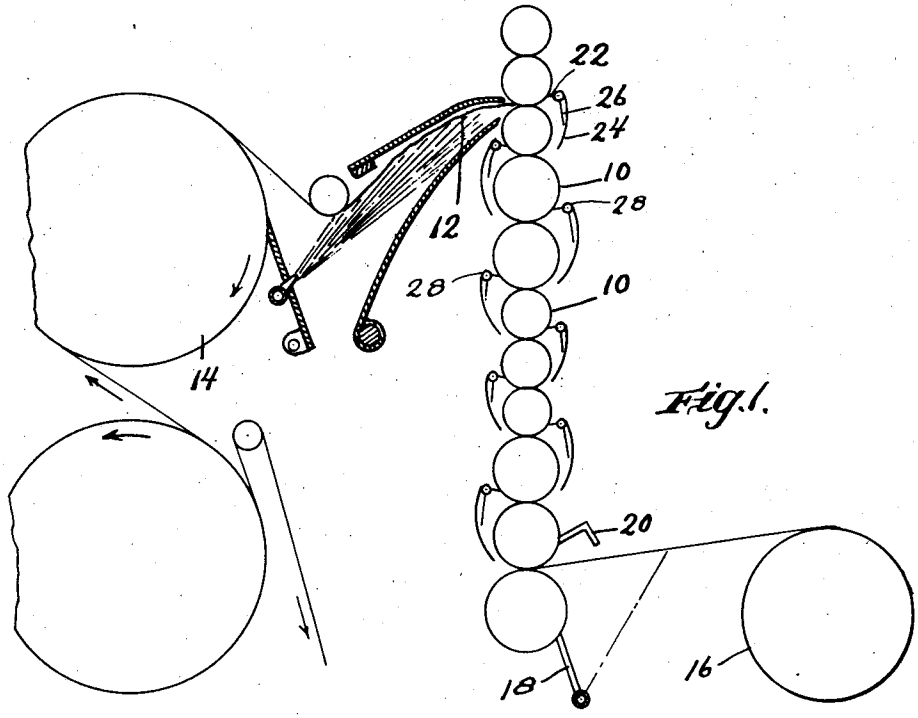


Fig. 1.

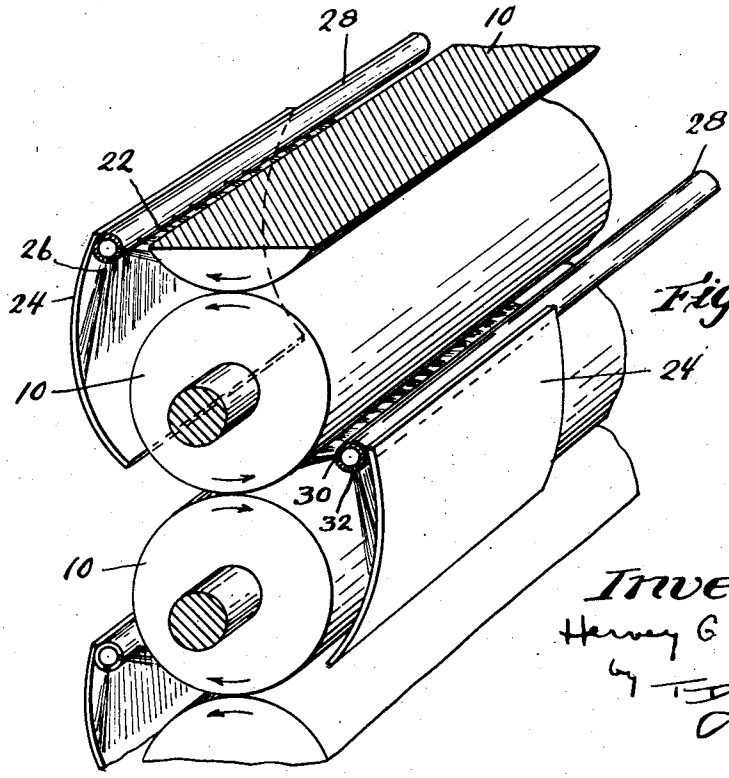


Fig. 2.

Inventor.
Harvey G Cram
by T. Greenwood
atty

Patented May 24, 1927. 1,629,681

UNITED STATES PATENT OFFICE.

HERVEY G. CRAM, OF MILLINOCKET, MAINE, ASSIGNOR TO GREAT NORTHERN PAPER COMPANY, OF MILLINOCKET, MAINE, A CORPORATION OF MAINE.

PAPER-MAKING APPARATUS.

Application filed January 15, 1926. Serial No. 81,533.

This invention relates to paper making and has particular reference to means for guiding the paper through the calenders of machines running at moderate paper speed, although not necessarily restricted to such type of machine.

On fast running machines, the general practice now is to carry the paper through the calenders by means of the invention patented by Charles E. Pope, No. 1,326,615, dated December 30, 1919.

The Pope invention consists of the use of air blasts in combination with doctors for scraping the paper from an upper calender and carrying it to the next lower calender. When it is possible to avoid the use of doctors it is desirable to do so as they involve substantial initial expense and material expenditure of power. For these and other reasons the present practice is to carry the paper through the calenders by hand on slow running machines although the practice is very dangerous to the fingers and arms of the operative.

It is an object of this invention to provide means to pass the paper through the calenders which obviates the necessity for doctors; and the combination of air blasts and guides of the construction and arrangement which comprises a further object of this invention is suitable for many machines.

In paper making, the paper may come through the calenders in folded masses after a break or at the start and must be given an unobstructed downward passage so as to prevent clogging; and the paper must be stripped from each upper calender and made to pass around the next lower calender. In practicing my invention I provide air blasts to remove the paper from the upper calenders and guides which receive and control air blasts so that the paper is led downwardly and about the lower calenders. The guides are relatively widely spaced from the calenders so that there is an unobstructed downward passage for any large folded masses of the paper which may pass through the calenders or collect between guides and calenders, and I provide air blasts to force the paper to move downward through the guides.

A further object of this invention is generally to improve the art of paper making.

Fig. 1 is a diagrammatic side elevation of the calender stack and the end driers of a paper making machine embodying the invention.

Fig. 2 is an enlarged perspective detail of a portion of the calender rolls and illustrating more clearly the manner of applying the air blasts and guides.

My invention is here shown as applied to the vertical stack of calender rolls 10 of a paper making machine. The dry paper sheet 12 is adapted to pass from the drier rolls 14 into the bight of two superimposed calender rolls at the upper end of the stack and thence is passed downwardly successively between the lower rolls by means of my invention; and the calendered paper sheet passes from the lower end of the stack to a reel 16. The usual doctors 18 and 20, as shown in the above Pope patent, may be disposed at the lowermost and the next upper calender to scrape off the paper, should it adhere thereto, and assist it in passing to the reel.

At the start of paper making a narrow paper-strip, called a lead strip, is first threaded through the machine and, when the lead strip is passing through in a satisfactory manner the strip is broadened out to the full width of the paper sheet.

In accordance with this invention, I provide an air blast 22 to strip the lead strip from an upper roll and deflect it downwardly and I provide guiding means including a guide plate 24 to cause the strip to pass downwardly about the lower roll and into the bight between said roll and the next lower roll. The lead strip may come through the calenders in large folded masses and must be permitted unrestricted movement downward through the guide plates and the calender rolls to prevent clogging, which will seriously interfere with the operation of the machine. Consequently, I provide air blasts 26 which are directed downwardly to force the paper downward through the passages between the guide plate and the calenders; and these latter air blasts also serve in cooperation with the plates 24 to guide the paper to pass into the bight of the calenders.

Said air blasts are provided by air pipes 28 which are arranged in spaced relation and approximately parallel with the calenders adjacent the bights thereof and on

the side of paper emergence from between the bights, or on alternate sides of the track. Since the lead strip only is to be conducted through the calenders the guide-plates and the air blasts need not extend across the entire length of the calenders but only for a distance preferably somewhat greater than the width of the lead strip; and the air blasts and guide-plates are located at that end of the calender stack traversed by the lead strip.

Said air pipes 28 are provided with a lineal series of passages or orifices 30 through which air flows under suitable pressure to form the air blasts 22. Said orifices are disposed to direct said air blasts approximately horizontally against the lower portion of the calenders in a direction opposed to the motion of the calenders and against and under the edge of the lead strip should it adhere to an upper calender after having passed through the bight, whereby to detach the lead strip from the calender and direct it downwardly. the inclination of the air blasts and the surface of the calender at the point of impingement being such as to effect such directional movement. The paper is thus caused to pass downwardly in the passage formed between the guide-plate 24 and the calendar roll.

The guide-plates may be suitably supported in the position shown in any suitable manner as by being attached at their upper ends to the air pipes 28. The guide plates are disposed opposite the bights of superimposed calender rolls and extend downwardly about the lower rolls. The plates preferably are curved, as illustrated, whereby to guide the paper sheet downwardly in a most effective manner, and terminate adjacent and somewhat above the bights. Said plates are relatively widely spaced from the calender rolls, so that relatively wide passages are formed through which any large folded masses of paper that may form may pass readily downward without clogging the passages. The lower ends of said plates are curved about the calender rolls and approach said rolls more closely than the upper portions of the plates whereby, in cooperation with the air from the pipes 26, to guide the end of the lead strip effectively to enter the bights of the adjacent lower rolls. Preferably said plates are flexible to yield under pressure of large masses of paper passing downwardly between them and the rolls, whereby to widen the passages and permit the paper to move freely downwardly therethrough.

Said air blasts 26 issue from a second set of passages or orifices 32 formed in the walls of the air pipes 28 and said air blasts are directed approximately horizontally downward in the passages between the calender rolls and the guide plates and at acute angles against the inner faces of the plates, and between the end of the lead strip and the plates. The curve of the lower ends of the plates is such as to guide the air blasts to carry the lead strip into the bight of the calender rolls.

If large folded masses of paper come through the calender rolls and enter the passages, said air blasts 26 act on the mass positively to force it downward through the passages between the guide plates and calenders and into the lower bights, thereby preventing clogging of the calenders.

I claim:

1. The combination of the calenders of a paper making machine, means to provide an air blast to detach the paper from an upper roll to which it may be adherent, a guide plate to guide the paper to move downwardly about a lower roll, and means to provide an air blast to move the paper forcibly through said guiding means.

2. The combination of the calenders of a paper making machine, means to guide the paper downwardly between successive rolls including a guide-plate disposed in front of a roll and spaced therefrom to provide a passage between it and the roll through which the paper is adapted to move downward, and means to direct an air blast downwardly in said passage and against said guide plate.

3. The combination of the calenders of a paper making machine, means to guide the paper downwardly between successive rolls including a guide-plate disposed in front of a roll and extended from a point above the top of the roll to a point somewhat above the bottom of the roll, and spaced about the roll to provide a wide passage between it and the roll through which the paper is adapted to pass, and means to direct an air blast against an upper roll to detach therefrom the paper sheet which may be adherent thereto and cause it to enter said passage.

4. The combination of the calenders of a paper making machine, means to guide the paper downwardly between successive rolls including a guide-plate disposed in front of a roll and extended from a point above the top of the roll to a point somewhat above the bottom of the roll, and spaced about the roll to provide a wide passage between it and the roll through which the paper is adapted to pass, means to direct an air blast against an upper roll to detach therefrom the paper sheet which may be adherent thereto and cause it to enter said passage, and means to direct an air blast downwardly in said passage.

5. The combination of the calenders of a paper making machine, means to guide the paper downwardly between successive rolls including a guide-plate disposed in front of a roll and extended from a point above the

top of the roll to a point somewhat above the bottom of the roll, and spaced about the roll to provide a wide passage between it and the roll through which the paper is adapted to pass, means to direct an air blast against an upper roll to detach therefrom the paper sheet which may be adherent thereto and cause it to enter said passage, and means to direct an air blast downwardly in said passage and against said guide plate.

6. The combination of the calenders of a paper making machine, means to guide the paper downwardly between successive rolls including a curved guide-plate disposed in front of and relatively widely spaced from the roll and extending downwardly about the roll from a point above the top of the roll to a point adjacent the bottom thereof, whereby to provide a passage between it and said roll and means disposed at the upper end of said guide plate arranged to direct a blast of air in a direction to remove the paper from an upper roll and cause it to enter the upper end of the passage, and also to direct a second blast of air downwardly in said passage and against the guide plate.

7. The combination of the calenders of a paper making machine and means to guide the paper downwardly between successive rolls, including a guide plate located in front of a roll and opposite the bight between it and the next upper roll, and extended downwardly about the roll and terminated somewhat above and adjacent the bight between the roll and the next lower roll, and providing a passage between the plate and the roll which is wider at the top than at the bottom, means to direct an air blast against the lower portion of the upper roll in a direction to detach the paper which may be adherent to that roll and cause it to enter the upper end of said passage, and means to direct a second air blast downwardly in said passage.

8. The combination of the calenders of a paper making machine and means to guide the paper downwardly between successive rolls, including a guide plate located in front of a roll and opposite the bight between it and the next upper roll, and extended downwardly about the roll and terminated somewhat above and adjacent the bight between the roll and the next lower roll, and providing a passage between the plate and the roll which is wider at the top than at the bottom, means to direct an air blast against the lower portion of the upper roll in a direction to detach the paper which may be adherent to that roll and cause it to enter the upper end of said passage, and means to direct a second air blast downwardly in said passage and against the inner face of said guide plate.

9. The combination of the calenders of a paper making machine and means to pass the paper downwardly between successive rolls including an air pipe disposed in front of an upper roll having means to direct an air blast onto the lower portion of that roll in a direction opposed to the movement of the roll, and also having means to direct a second air blast downwardly in front of the next lower roll, and a guide-plate disposed in front of the lower roll and the second air blast.

10. The combination of the calenders of a paper making machine and means to pass the paper downwardly between successive rolls including an air pipe disposed in front of an upper roll having means to direct an air blast onto the lower portion of that roll in a direction opposed to the movement of the roll, and also having means to direct a second air blast downwardly in front of the next lower roll, and a guide plate attached to said air pipe and depending in front of the lower roll and the second air blast.

11. The combination of the calenders of a paper making machine, and means to pass the paper downwardly between successive rolls including an air pipe disposed in front of an upper roll having means to direct an air blast onto the lower portion of that roll in a direction opposed to the movement of the roll, and also having means to direct a second air blast downwardly in front of the next lower roll, and a guide plate attached to said air pipe and depending in front of the lower roll and the second air blast and curved about the lower roll to provide a passage down which the paper is guided to the next lower roll.

12. The combination of the calenders of a paper making machine, of means to pass the paper downwardly between the successive rolls including a yielding guide-plate disposed in front of and adjacent a calender roll and means to direct an air blast downwardly in the passage formed between said guide-plate and the roll.

13. In a paper making machine, guiding means for the paper including means to provide two divergent blasts of air from approximately a common center disposed to strike the moving paper, one of said jets moving in a direction opposed to the movement of the paper, and impinging against the upper roll and adapted to detach the paper therefrom and press it against the lower roll and the other moving at approximately a right angle to said first mentioned blast and in the direction along which it is desired to pass the paper and between the paper and the guide plate.

In testimony whereof, I have signed my name to this specification.

HERVEY G. CRAM.