Dec. 10, 1940. A. H. STANDLEY 2,224,803

APPARATUS FOR DRYING PAPER

Filed Sept. 30, 1937 2 Sheets-Sheet 1

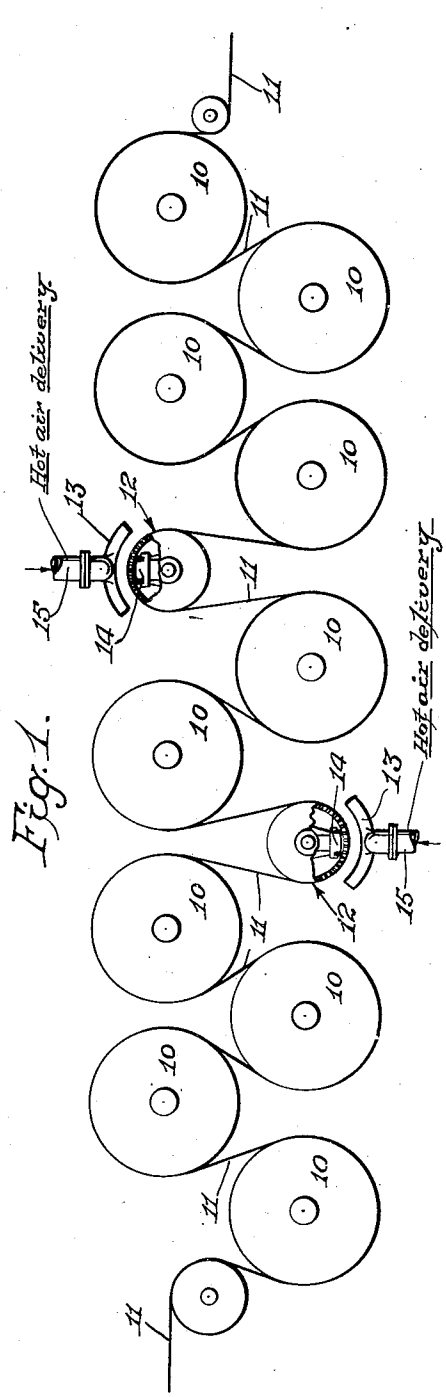

Fig. 1.

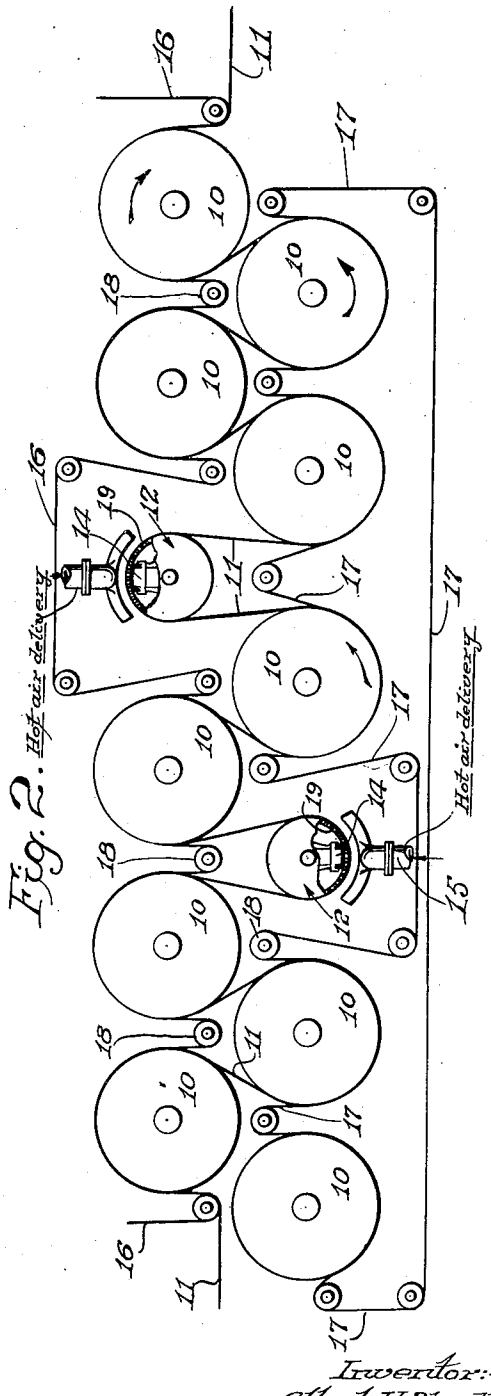

Fig. 2.

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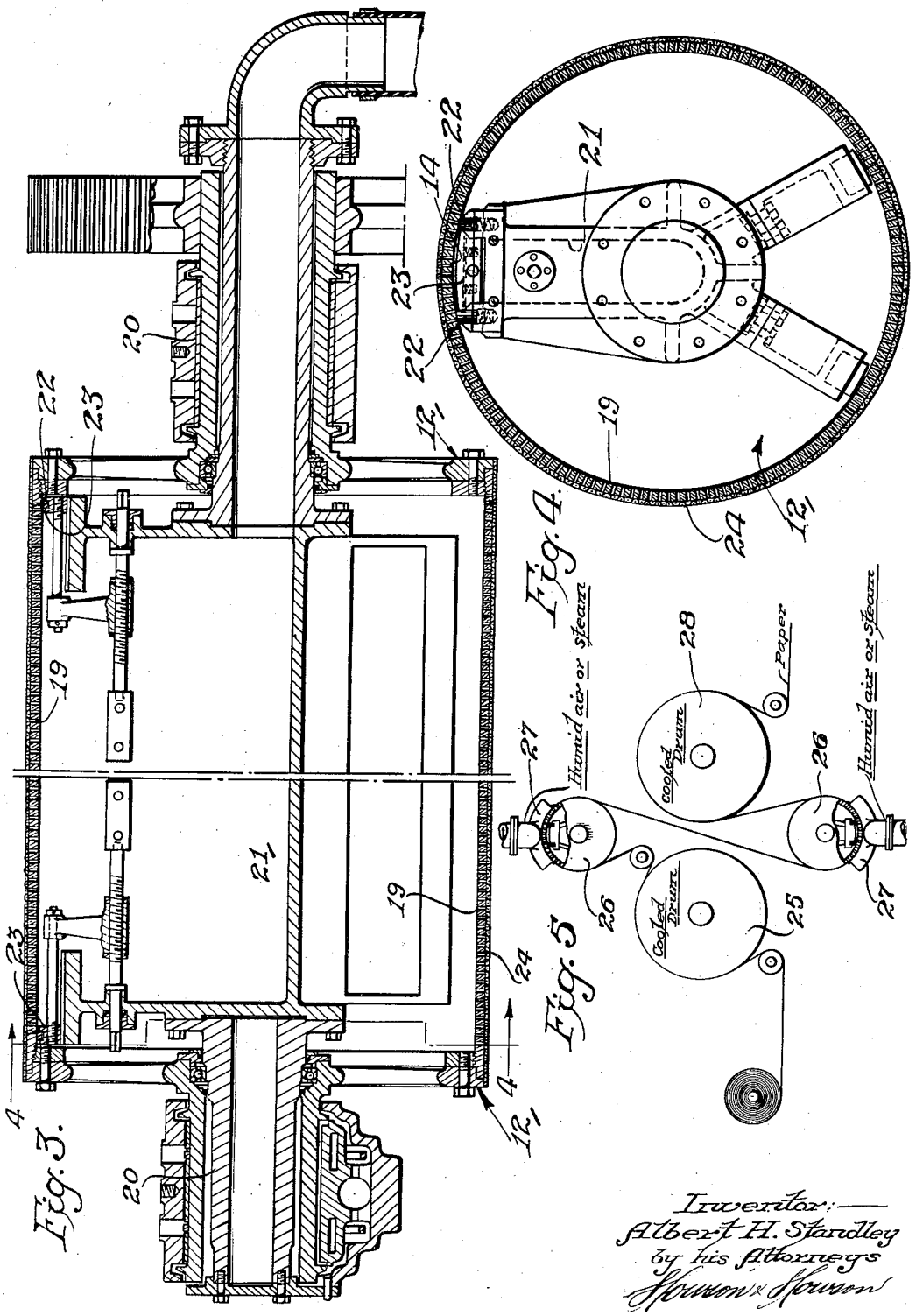

Fig. 3.

Fig. 4.

Fig. 5

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APPARATUS FOR DRYING PAPER

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Application September 30, 1937, Serial No. 166,656

1 Claim. (Cl. 34—48)

This invention relates to apparatus for controlling the moisture content of paper webs.

An important object of the invention is to provide means for more rapidly drying paper than that in present use.

The usual method of drying paper is to pass the same, with or without the accompaniment of a supporting endless carrier or carriers, over a series of drying drums, the drums being so arranged that the faces of the paper are alternately presented to the drums. The heating of the web vaporizes the water content of the sheet which is finally driven off to an extent such that final drying action and calendering can be resorted to.

In accordance with my method, the vapor formed is withdrawn from the sheet by means of suction applied through suitable suction boxes or rolls, the paper being first heated, then subjected to the action of suction, reheated and again subjected to the action of suction and finally dried. The suction action is preferably supplemented by the use of a dry heated gas applied at the opposite face of the sheet from that at which suction is applied so that it is drawn into the pores of the sheet to replace the withdrawn vapor. This action may be repeated as often as desired and will result in a much more rapid removal of liquid from the web than is possible by the ordinary means, which merely depends upon the dispersal of the vapor to the atmosphere.

Where the paper web in its travel over the drying drums is accompanied by an endless carrier, or carriers, these are separated from the web during the application of suction, the suction being applied directly to the sheet. In order that the contained vapors of the carrier may not be transferred to the sheet when the sheet and carrier, or carriers, are rejoined, the carriers themselves are preferably subjected to suction action during the period when they are separated from the sheet.

A further object of the invention is to provide means for adding moisture to paper webs. In many instances, particularly in connection with news sheet, paper drawn from a roll has too small a moisture content and tends to elongate in the humid atmosphere of the press roll causing misalignment in operation and, in accordance with my invention, under such circumstances moisture is added to the sheet in governable quantities.

These and other objects I attain by the apparatus shown in the accompanying drawings wherein I have illustrated embodiments of my invention and wherein:

Fig. 1 is a diagrammatic view illustrating my invention as applied to a drier wherein the paper web passes through the drying section without accompaniment by an endless carrier;

Fig. 2 is a similar view showing the application of my invention to a drier section wherein endless carriers are employed;

Fig. 3 is a longitudinal sectional view through a suction drier constructed in accordance with my invention;

Fig. 4 is a transverse sectional view therethrough on line 4—4 of Fig. 3; and

Fig. 5 is a diagrammatic view illustrating treatment of paper to increase the moisture content thereof.

Referring now more particularly to the drawings, the numeral 10 indicates heated drying drums of any usual or ordinary construction, these drums being arranged in series about which a paper web 11 is passed so that opposite faces of the paper alternately engage adjacent drums, and 12, suction drier rolls about which the paper is likewise trained, such drier rolls being arranged in the series and in spaced-apart relation in the series; that is to say, having arranged between them two or more of the heated drier drums 10. The spacing is such that the suction rolls engage opposite faces of the web, since in many cases, particularly in board machines, the thickness of the web 11 is such that it is difficult to draw air through the web with any rapidity. Adjacent each suction roll is an air hood 13, this hood being of arcuate form and extending over that portion of the roll including the suction area generally designated at 14. Means are provided, as conduit 15, for delivering heated air to this hood which, in turn, directs the air against the opposite face of the paper web to which the suction is applied so that the pores of the web from which vapor has been withdrawn may be filled with dry hot air expediting the drying operation.

In Fig. 2 of the drawings, wherein the web 11 is accompanied during its passage through the drier by upper and lower felts 16 and 17, means are provided for maintaining these felts in separated relation to the web during the period of their passage over the suction rolls 12. These means comprise idler rolls 18, preferably of the suction type such as shown in my prior Patent No. 2,062,238, granted November 24, 1936, for Paper machinery, so that moisture in the web which has been transferred to the carriers during the heating operation and the vapor contained in the carriers themselves as a result of the heating opera-

tion is withdrawn. While I have in the present instance shown each idler as comprising a suction roll, obviously the number of rolls so employed may be reduced as desired and in many instances they may be completely substituted for by the ordinary idler roll.

While in each form of the invention illustrated it has been shown as applied to a two-deck drier, it may, obviously, be included in any drier arrangement with but slight modification thereof. The suction roll employed corresponds in its general construction to the ordinary suction roll employed in the wet end and press sections of the machine, comprising a rotating foraminous shell 19 supported on suitable trunnions 20 through one of which suction is applied to the usual suction box 21. The suction box is provided with the usual packings 22 and deckle 23. Due to the fact, however, that the roll itself does not have to withstand any great pressure it can be made comparatively light and, accordingly, may be driven or not, depending upon the kind and the condition of the paper or board web. The surface of the roll is preferably covered with screen cloth, as indicated at 24.

In Fig. 5, I have illustrated a conditioning apparatus for use in increasing the moisture content of the web. In this figure the paper is passed over a cooled drum 25, following which it is subjected to the action of humid air or steam simultaneously with the action of a suction roll 26, the steam or air being introduced through a hood 27 arranged at the opposite face of the paper from that at which suction is applied. If desired, suction may be applied from both surfaces of the sheet, this merely involving a duplication of the suction roll 26 and hood 27. Following its treatment, the paper is then led over a cooled drum, or drums, as indicated at 28.

Since both the method and apparatus are capable of considerable modification, I do not wish to be understood as limiting myself thereto except as hereinafter claimed.

I claim:

Apparatus for controlling the moisture content of paper sheets comprising a series of rolls about which the paper web is trained, said rolls including cooled rolls and an intermediate suction roll, and means to deliver a gas having a predetermined moisture content to the opposite face of the paper during its passage over the suction roll.

ALBERT H. STANDLEY.