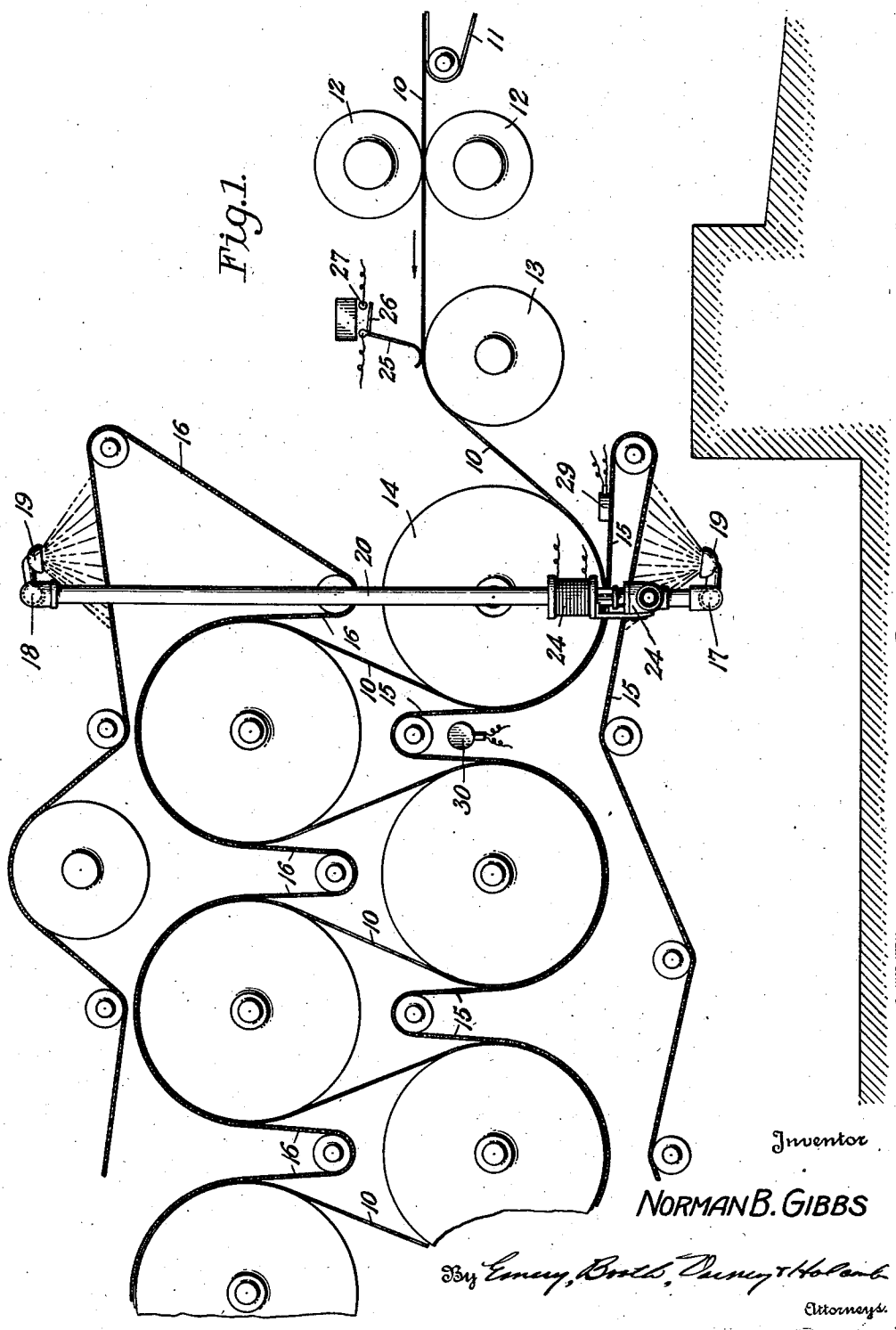
Nov. 5, 1935. N. B. GIBBS 2,020,056

AUTOMATIC CONTROL FOR PAPER MACHINE DRIERS

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Fig. 1.



Inventor

NORMAN B. GIBBS

By Emery, Booth, Vaney & Holcombe

Attorneys.

Nov. 5, 1935. N. B. GIBBS 2,020,056

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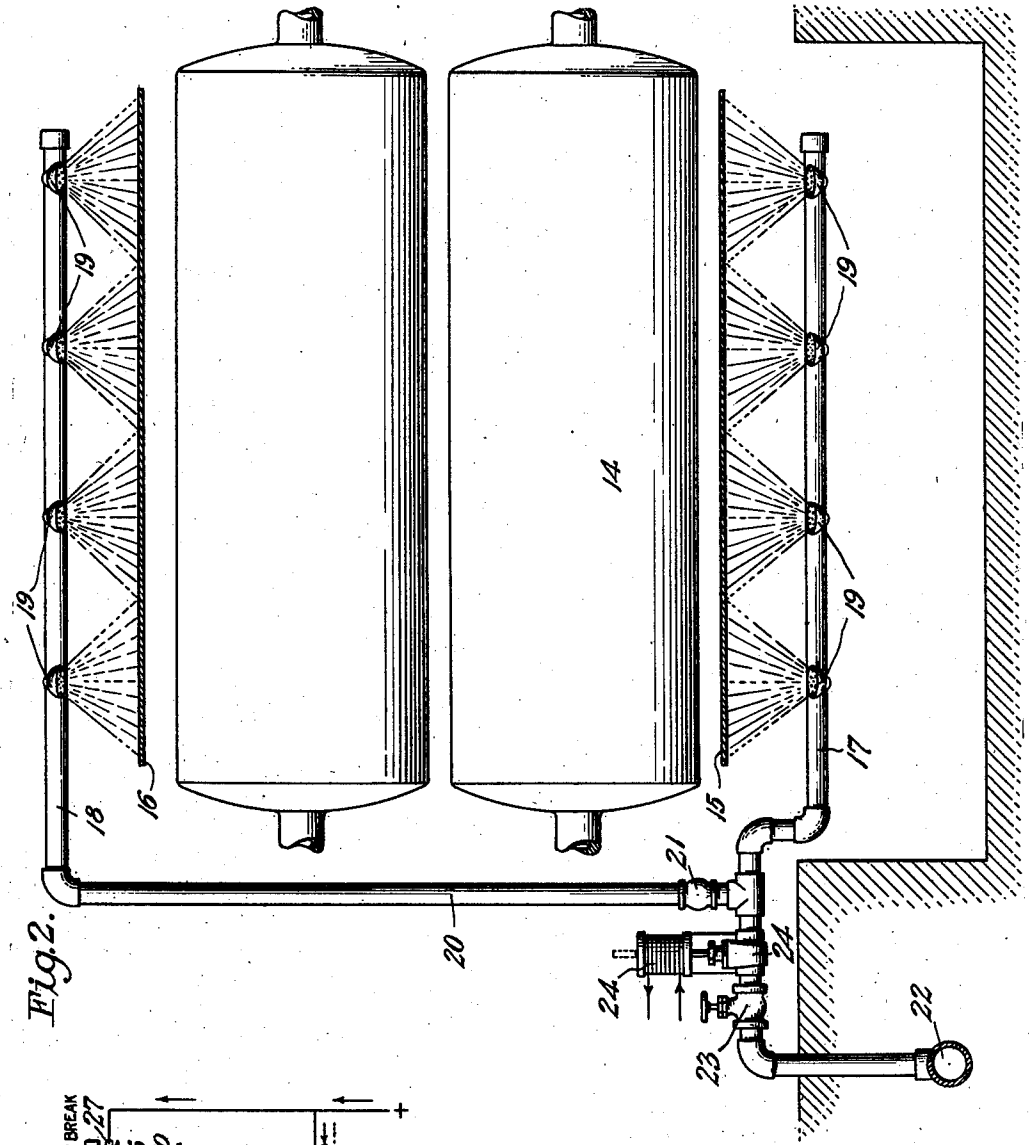


Fig. 2.

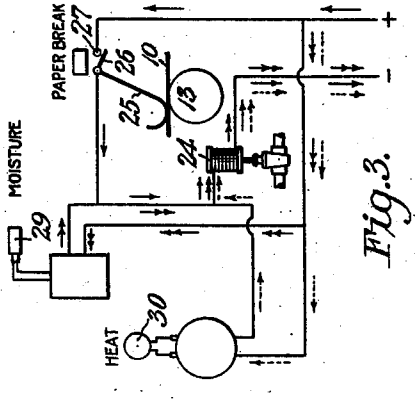


Fig. 3.

Inventor

NORMAN B. GIBBS

By Emery, Booth, Vaney & Howard

Attorneys.

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AUTOMATIC CONTROL FOR PAPER MACHINE DRIERS

Norman B. Gibbs, Port Angeles, Wash.

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11 Claims. (Cl. 34—48)

The present invention relates to driers for paper making machines and the like employing felts to move the paper, or other sheet material, into close intimate contact with the drying rolls and aims generally to improve existing driers by providing means for automatically preventing burning the felts in the event of abnormal condition of the machine such as breakage in the paper sheet fed to the drier, extreme dryness of the felt, or extreme temperature in the drying rolls or felts.

In the manufacture of paper and like material, the sheet is delivered from the Fourdrinier or other sheeting machine to a drier which usually comprises a series of heated drying rolls arranged in staggered relation with upper and lower felts to guide and hold the sheet material in close contact with the rolls whereby it may be dried. It is highly desirable to maintain the drier felts in proper condition to prevent them from becoming scorched and made brittle, which materially reduces the working life of the felts and unless this is adequately guarded against, the drying felts require frequent replacement at considerable expense. Accordingly it is a primary purpose of the present invention, in the case of abnormal operation of the machine, such as breakage of the sheet material fed to the drier, extreme dryness of the felts or paper sheet, or extreme temperature of the drier, to spray a cooling liquid, such as water, directly upon the drier felts so as to prevent them from being burned or becoming scorched and rendered too brittle for satisfactory operation.

Other subordinate aims and advantages of the invention will be apparent in the accompanying description, reference being had to the accompanying drawings as illustrating one preferred embodiment thereof, and wherein

Fig. 1 is a side elevational view showing a portion of the drying machine and felts and adjacent end of a paper making machine with the present invention embodied therein;

Fig. 2 is an end elevation of the drying machine; and

Fig. 3 is a wiring diagram illustrating the manner of controlling the apparatus according to the present invention.

Referring to the illustrated embodiment of the invention shown in the drawings, the web 10 of paper or other material, leaving the forming or Fourdrinier machine 11, passes through smoothing or couch rolls 12 and over a baby drier 13 and passes into the lower and foremost roll 14 of a drier. The sheet 10 enters the drier between the forward roll 14 and a lower felt 15 which holds the web 10 in intimate contact with the roll as is well understood. The web 10 is then conveyed to an upper roll and is held in intimate contact therewith by an upper felt 16 and according to the usual practice the web is transferred alternately from the lower to the upper rolls under the two felts 15 and 16, the felts being endless and serving to hold the sheet in intimate contact with the drying rolls to carry the web through the drier.

In the event of abnormal operation of the machine, such as breakage of the web 10, it is apparent that the felts 15 and 16 will be spaced in such intimate contact with the heating rolls as to be unduly burned or scorched and to prevent this, it is desirable to maintain a desired amount of moisture in the felts so as to prevent burning or scorching thereof. Accordingly I arrange spraying devices comprising lower and upper headers 17 and 18, respectively, extending across and positioned, respectively, below and above the felts 15 and 16. These headers carry a series of spraying devices 19 arranged to direct a spray of fluid onto the surface of the drier felt and the headers are advantageouly connected together by a standpipe 20 having a check valve 21 therein at the lower end thereof adjacent the header 17. The header and standpipe may advantageously be connected to a suitable source of liquid under pressure, such as a water pipe 22 and the flow of liquid from the pipe 22 to the sprays may be manually regulated by a valve 23.

Admission of water under pressure to the headers and spray device in the event of abnormal operation of the machine may be effected by means of an automatically operated valve, as for example, a solenoid valve 24 arranged so that as the solenoid is energized, the valve may be opened to admit liquid under pressure to the headers 17 and standpipe 20. As the solenoid is deenergized, the valve is closed, shutting off the supply of liquid to the felts, and the check valve 21 in the standpipe 20 prevents water or liquid in the standpipe and upper header from returning and flowing through the spray devices 19 of the lower header 17 so that spray of the upper and lower felts may be maintained uniform.

Breakage of the web 10 usually occurs between the Fourdrinier machine and the entering roll of the drier and for the purpose of actuating the spraying device in the event of breakage of the web, I advantageously provide a suitable feeler 25 pivotally mounted above the path of travel of the web 10 and having an arm 26 arranged to en-

gage a terminal 27 of a switch in circuit with the solenoid valve 24. As shown in Fig. 1, the feeler 25, when in engagement with the web 10, is so positioned that the arm 26 is out of contact with the terminal 27 of the switch and obviously, in the event of breakage of the web 10, the feeler will fall to a perpendicular position so that the arm 26 will contact with the terminal 27 and close the circuit to the solenoid valve 24.

It is also apparent that should the drier felts become about dry, they will be subject to scorching and burning and my invention contemplates the actuation of the spraying devices by means of a device 29 responsive to the moisture content of the drier felts arranged to actuate the solenoid valve 24. This device 29 may be any suitable moisture responsive electrical control such as a verigraph moisture control apparatus for indicating the moisture content of the drier felts. Obviously such a moisture control may be used directly on the paper web in conjunction with or in place of the feeler switch 25—27 in which case it will actuate the spraying devices in the event of breakage of the paper web or in the event of extreme dryness of the paper web.

Another abnormal condition of operation of the drier as contemplated by my invention is excessive heat of the drying rolls and drying felts and for the purpose of maintaining the adequate and desired degrees of moisture of the drying felts with relation to the heat thereof, I may advantageously locate thermostats or thermocouples 30 at desired places to be responsive to the heat of the rolls and which are connected in circuit to the solenoid valve for the purpose of actuating the spraying devices in event of excessive heat of the drier.

As shown in Fig. 3, should the feeler switch 25, moisture control apparatus 29, or temperature control apparatus 30 be operated because of abnormal conditions to which they are responsive, the circuit to the solenoid valve will be closed effective to energize the solenoid and raise the valve and admit liquid under pressure from the pipe 22 to the headers 17 and 18 and direct a spray of liquid directly upon the lower and upper drier felts 15 and 16.

Advantages of my invention reside in the simplicity of the apparatus and the accuracy of control and provision for maintaining an adequate degree of moisture within the drier felts to prevent the burning and scorching thereof in the event of abnormal conditions of operation.

I claim:

1. In combination with a drying machine having heating rolls and conveying felts for conveying the material to be dried into intimate contact with the rolls, of means for applying moisture to the felts and means controlled by a break in the sheet to be dried passing through the machine for actuating said moisture applying means.

2. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts, and means controlled by a break in the sheet to be dried passing through the machine for actuating said spraying means.

3. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for applying a liquid directly upon the felts, and means controlled by a break in the sheet to be dried passing through the machine for actuating said applying means.

4. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts, including spray heads located above and below said felts arranged to apply a liquid upon substantially the interior surface of the felt, and electrically operated means controlled by a break in the sheet to be dried passing through the machine for actuating said spraying means.

5. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts, and means operative upon a break in the sheet to be dried for actuating the spraying means.

6. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts, and means positioned in the path of the sheet in advance of the drier and operative upon a break in the sheet to be dried for actuating the spraying means.

7. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts, and means operative by excessive dryness of the conveying felts for actuating the spraying means.

8. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts, and means responsive to the moisture content of the felts and operative by excessive dryness of the conveying felts for actuating the spraying means.

9. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts and means operative upon excessive heating of the conveying felts for actuating the spraying means.

10. In combination with a paper machine drier having heating rolls and conveying felts for conveying the sheet successively into intimate contact with the rolls, of means for spraying a liquid directly upon the felts, and temperature controlled means operative upon excessive heating of the conveying felts for actuating the spraying means.

11. In combination with a drying machine having heating rolls and conveying felts for conveying the material to be dried into intimate contact with the rolls, or means for spraying liquid directly upon the felts, of means for actuating the spraying means including feeler mechanism operative upon a break in the material to be dried, moisture responsive means operative upon excessive dryness of the conveying felts and temperature controlled means operative upon excessive heating of the felts.

NORMAN B. GIBBS.