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AUTOMATIC CIRCUIT BREAKER FOR DRYING MACHINES AND THE LIKE

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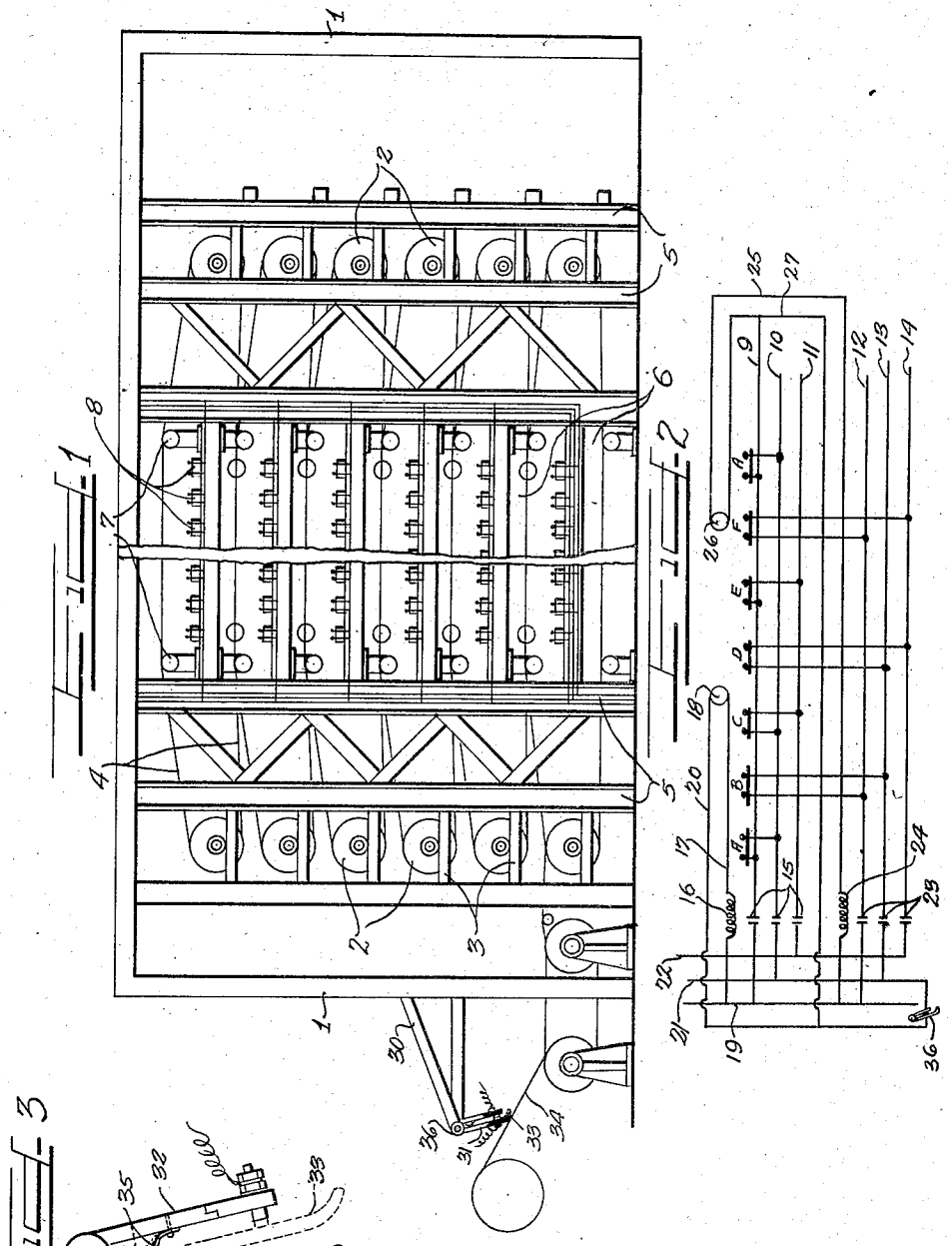

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AUTOMATIC CIRCUIT BREAKER FOR DRYING MACHINES AND THE LIKE.

Original application filed May 15, 1924, Serial No. 713,637. Divided and this application filed September 2, 1925. Serial No. 53,979.

This invention relates to a fabric or paper making machine drier unit and more particularly to an electrically heated drier wherein automatic means are provided for breaking the electric heating circuit when a break occurs in the fabric or paper feeding to the drier.

This application is a division of our copending application Serial No. 713,637, filed May 15, 1924, to which reference may be had.

It is an object of this invention to provide automatic means in an electrically heated drier unit for rendering the heating elements ineffective upon the occurrence of a break in the material feeding to the drier.

Other and further important objects of this invention will be apparent from the disclosures in the specification and accompanying drawings.

This invention (in a preferred form) is illustrated in the drawings and hereinafter more fully described.

On the drawings:

Figure 1 is a broken side elevation of a paper drying machine with one side removed, illustrating our invention;

Figure 2 is a wiring diagram covering a portion of a single pass of the machine, and

Figure 3 is an enlarged view of our device showing the operation of the same.

As shown on the drawings:

The paper drier unit comprises a housing 1 having supported therein a plurality of rollers 2 supported on cross bars 3. Engaged on the rollers 2 are a plurality of endless wire mesh or fabric belts 4 positioned in superimposed relation.

Rigidly mounted within the housing 1 on vertical uprights 5 are a plurality of horizontal members or bars 6. Guide rolls 7 are supported on the horizontal bars 6 and are arranged to permit the belts 4 to pass thereover as illustrated.

Mounted upon each horizontal pair of the bars 6 are a plurality of electric heaters 8 which are supported transversely or lengthwise in the housing. With this arrangement one horizontal set of electric heaters 8 is positioned between the upper and lower laps of each belt 4 and out of contact therewith.

The electric heaters 8 in each pass or at each level are connected in groups of three with adjacent heaters in different groups and connected to different circuits. The heaters A, C and E of one group are connected in different combinations to a three phase circuit, that is the heater A is connected to the wires 9 and 10; the heater C is connected to the wires 10 and 11; and the heater E is connected to the wires 9 and 11. The next group of heaters in the same pass comprises the alternate heaters B, D and F which are connected in different combinations to the wires 12, 13 and 14 of another three phase circuit. The heater B is connected with the wires 12 and 13; the heater D is connected with the wires 13 and 14; and the heater F is connected with the wires 12 and 14. Connected in each of the wires 9, 10 and 11 is a magnetic contactor 15. The three magnetic contactors 15 connected in the wires 9, 10 and 11 are positioned to be controlled by an operating coil 16 connected in a wire 17 leading to one terminal of a thermostat 18. The wire 17 is also connected at its other end to a line wire or bus bar 19. Another wire 20 connects the thermostat 18 with a second line wire or bus bar 21. As shown in Figure 2 the wire 9 is connected to the bus bar 19. The wire 10 is connected with the second bus bar 21 and the wire 11 is connected to a third bus bar 22. There are three magnetic contactors 23 connected in the wires 12, 13 and 14 and said contactors are positioned to be controlled by an operating coil 24 connected in a wire 25 leading to one terminal of a thermostat 26. The wire 25 is also connected at its other end to the line wire or bus bar 19. Another wire 27 connects the thermostat 26 with the second line wire or bus bar 21. As illustrated in Figure 2 the wire 12 is connected to the bus bar 19. The wire 13 is connected with the second bus bar 21, and the wire 14 is connected to the third bus bar 22. A multiple three phase circuit arrangement is thus provided for each pass of the drying machine affording a plurality of independently controlled circuits providing a balanced arrangement with each phase or bus bar having connected thereto a substantially equal load. In this arrangement the thermostats 18 and 26 for each group of circuits will cause the

several heaters to be energized and de-energized at frequent intervals so that the mean temperature will be equal to that at which the thermostats are set. Inasmuch as each thermostat can be adjusted or set for a different temperature, the temperatures throughout the housing 1 can be graduated in a manner to produce the best results.

In each pass of the drier unit adjacent heaters 8 are connected to different supply circuits controlled by different contactors consequently the heaters in a given pass are not all turned off or on at the same time as would be the case if they were all connected to one supply circuit. A gradient temperature may thus be readily maintained in the drier unit with the highest temperature where the wet web enters the drier unit and with a lower temperature where the web leaves the drier unit or any desired temperature relations may be maintained.

There is provided for use with the above a device 36 which is adapted to operate to disconnect the supply of energy to the electrical heating elements when the web breaks. Said device 36 comprises an insulated support 30, having mounted thereon a pivoted contact member 31 and an adjacent stationary contact member 32 insulated from said member 31 at their adjacent ends. The member 31 is supported in such a way that its curved end 33 normally rests on a web 34 as said web feeds into the drier. The drag of said member 31 on said web tends to keep said member 31 in contact with said member 32 against the force of a spring 35, as shown in dotted lines in Figure 3. When the web 34 breaks, however, the spring 35 forces said member 31 away and contact is broken; thus shutting off the current of electricity in the heating elements. This is desirable because of the time lag in the functioning of the thermostats under such conditions.

We are aware that many changes may be made, and numerous details of construction may be varied through a wide range without departing from the principles of this invention, and we therefore do not purpose limiting the patent granted hereon, otherwise than necessitated by the prior art.

We claim as our invention:—

1. A drier unit comprising web conveying means, electrical heating means adjacent said conveying means and control means for disconnecting said heating means upon breakage of the web.

2. A drier unit comprising web conveying means, electrical heating means for drying the web and means contacting the web for disconnecting said heating means upon pronounced change in the normal movement of the web.

3. The combination with web conveying means of a heated drier housing through which the web is conveyed and means contacting the web in advance of the housing for shutting off the heat when the web breaks.

4. The combination with web conveying means of a heated drier housing through which the web is conveyed and means outside the drier housing for shutting off the heat when the web breaks.

5. A drier unit comprising web conveying means, electrical heating means for drying the web, and a pivotally mounted member contacting the web and adapted to shut off the supply of energy to the heating means upon breakage of the web.

In testimony whereof we have hereunto subscribed our names.

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