Sept. 25, 1923. 1,469,048

C. NELSON

PAPER DRYING MACHINE

Filed June 3, 1921

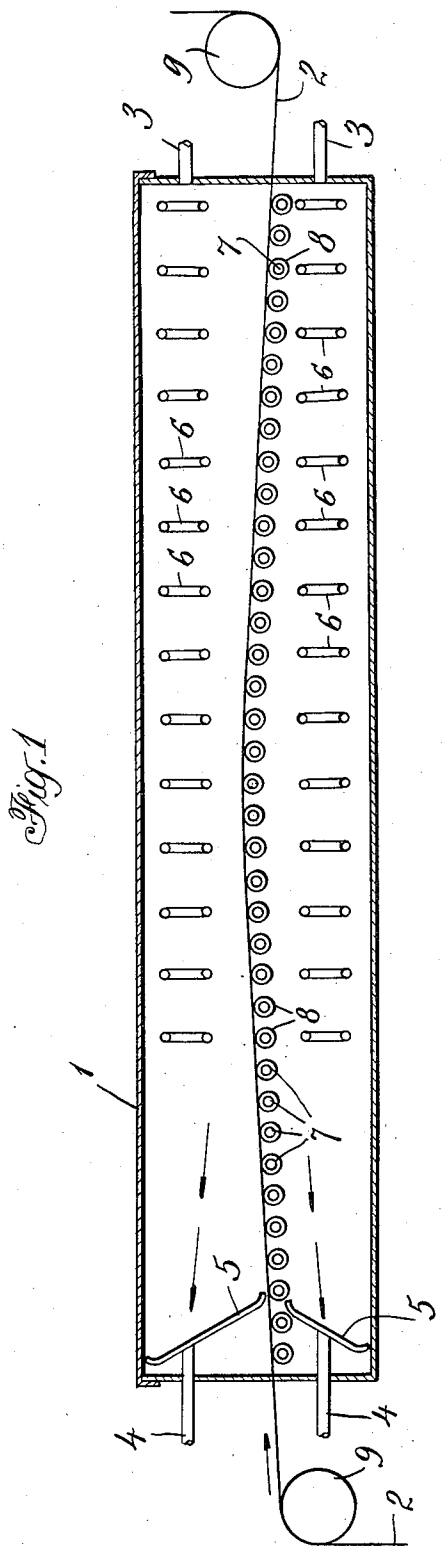


Fig. 1

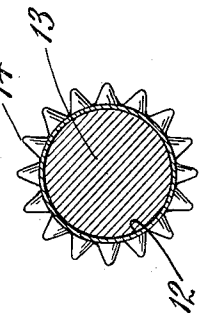


Fig. 3.

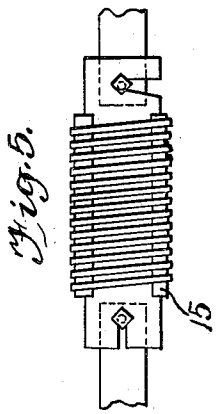


Fig. 5.

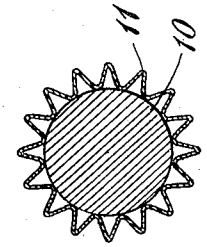


Fig. 2.

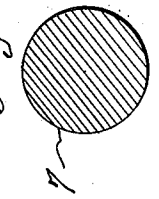


Fig. 4.

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UNITED STATES PATENT OFFICE.

CLARE NELSON, OF BROOKLYN, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO CHARLES C. ORCUTT, OF NEW YORK, N. Y.

PAPER-DRYING MACHINE.

Application filed June 3, 1921. Serial No. 474,655.

To all whom it may concern:

Be it known that I, CLARE NELSON, a citizen of the United States, residing at Brooklyn, in the county of Kings, State of New York, have invented certain new and useful Improvements in Paper-Drying Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention is an improvement in machines for drying paper, and the like, of the character shown in applications, Serial No. 456,857, filed March 30, 1921, and Serial No. 434,231, filed December 31, 1920, and relates particularly to a new and improved form of support for heavy webs, as for instance cardboard, felt, and like thick material. In machines of the character in question, the web is passed through a series of dryer units, and hot air, heated in the unit, is directed against one or both faces of the web. In order that the heated air may have free access to the under side of the web, it is essential that the support for the web, during its passage through the unit, be of a foraminous nature, presenting the least impediment to the free circulation of air consistent with sufficient support to prevent buckling, bending and warping of the web. In addition, the support should be of such character, that it may be arranged to cause the web to assume an arched formation in the direction of its travel, whereby to exert an ironing action upon the web as it travels through the unit.

In the constructions forming the subject-matter of the applications above mentioned, the web is supported by endless belts moving with the web, and engaging the web over close set restricted areas. Such belts provide a support presenting a minimum of impediment to the free circulation of the hot air, with a maximum of support for the web, but each engaging surface of the belts contacts with the same portion of the web throughout the travel of the web in the unit. With heavy webs, as for instance, cardboard, felt and the like, a supporting means with engaging areas so restricted and so close set is not essential, nor does it conduce to the most efficient drying of such webs, that the supporting means engage the same portions of the web throughout its travel in the unit.

The object of the present invention is to provide a supporting means, which while permitting a free circulation of hot air, will present a sufficient support to prevent bending, buckling and warping of the web, and which while moving with the web, will engage the web over areas constantly changing, so that no portion of the web surface will be for long in contact with any portion of the supporting means, and which support may if desired, be arranged to present an arched formation, in the direction of travel of the web.

In the drawings;

Figure 1 is a longitudinal section of a dryer unit, provided with the improved web support,

Figures 2, 3 and 4 are end views of modified forms of supporting rollers.

Figure 5 is a front view of a part of an electrical heating unit.

The present embodiment of the invention is shown in connection with a dryer unit of the character shown and described in application Serial No. 456,857, above mentioned, the said unit comprising a casing 1 having at its opposite ends passages for permitting the entrance and exit of the web indicated at 2. The web passes through the casing at about the center of the same, and means is provided within the casing for circulating air through the casing, at both faces of the web, and in the opposite direction to the travel of the web, together with other means for heating the air as it enters the casing. The means for circulating air through the casing comprises inlet pipes 3 at that end of the casing through which the web emerges, and outlet pipes 4 at the opposite end. An inlet and an outlet pipe is arranged at each face of the web, and each of the outlet pipes has a nozzle 5 connected therewith. Air may be heated by any suitable means, as for instance steam coils, or as in the present instance by means of electrically controlled units, which are indicated at 6, and may be of any usual or desired construction. Preferably the heating means are grouped near that end of the casing where the air enters.

The support for the web in the present

instance comprises a series of rollers, of relatively small diameter, journaled transversely of the casing, loosely, so that they will rotate as the web moves over them. The rollers are spaced slightly apart, to permit a free circulation of the hot air between the same, and preferably they are arranged in arched formation, in the direction of travel of the web, so that an ironing action is exerted on the web as it travels over the support, to smooth the same, and to prevent warping and buckling. The rollers are of such size and are arranged closely enough, so that they provide sufficient support for the web, and they are spaced apart far enough to permit the circulation of air. The rollers may be solid rollers, or they may be as shown, wherein each consists of a central shaft or rod 7, and a shell 8 journaled on the rod. It will be evident that as the web passes over the support, the rollers will be rotated, so that no part of the web remains for any length of time in contact with any portion of a roller, the rollers engaging the surface of the web with areas which are constantly changing. Outside the casing of the unit, the web may be supported in any suitable manner, as for instance by the rollers 9.

In Figure 2 there is shown a construction of roller, comprising a shaft 10, and a shell 11 rotatably mounted on the shaft. The shell is corrugated longitudinally as shown, so that only relatively small portions of the periphery thereof engage the web any one time. In Figure 3 the shell 12 which is journaled loosely on the shaft 13 has spurs or lugs 14, which engage the web with their points. With this arrangement the areas of the portions of the roller which actually engage the web are very restricted, but such portions are close set, so that the web is well supported, while at the same time no portion of the roller is in engagement with the web for any length of time, and such portions are constantly changing. In the construction of either Figure 2 or 3, it will be evident that the shells might be rigid with the shafts if desired, or the corrugations of Figure 2 or the points of Figure 3 might be arranged directly on the shaft. In such case, the shaft would be journaled, so that it would be rotated by the moving web. The heating unit 15 illustrated in Fig. 5 is of well-known construction and consists of a resistance coil suitably mounted on an insulating base.

I claim.

1. In a drying machine for webs of paper and the like, a plurality of rollers journaled on parallel axes and arranged close alongside each other and free to turn with the moving web, whereby to support the web with a close succession of constantly changing engaging surfaces, said rollers being arranged to arch the web in the direction of its travel.

2. In a drying machine for webs of paper and the like, a support for the web of paper or the like to be dried, comprising a plurality of parallel rollers, arranged alongside each other, and free to turn with the moving web, each roller comprising a shaft or rod, and a shell fitting the shaft or rod and rotatable thereon.

3. In a drying machine for webs of paper and the like a support for the web of paper or the like to be dried, comprising a plurality of parallel rollers, arranged alongside each other, and free to turn with the moving web, the rollers being arranged to arch the web in the direction of its travel, each roller comprising a shaft or rod, and a shell fitting the shaft or rod and rotatable thereon.

4. In a drying machine, a dryer unit, and means for supporting a web of paper or the like to be dried as it passes through the unit, said means comprising a plurality of parallel rollers arranged alongside each other, and free to turn with the web, each roller comprising a shaft or rod supported by the unit, and a shell fitting the shaft or rod and rotatable thereon.

5. In a drying machine for webs of paper and the like, a dryer unit comprising a casing having passages at its ends for the entrance and exit of the web, heating means arranged above and below the web, means for circulating air through the casing at the opposite faces of the web to be heated by the heating means, and a support for the web comprising a series of rollers arranged alongside each other and free to turn with the web.

6. In a drying machine for webs of paper and the like, a dryer unit comprising a casing having passages at its ends for the entrance and exit of the web, heating means arranged above and below the web, means for circulating air through the casing at the opposite faces of the web to be heated by the heating means, and a support for the web comprising a series of rollers arranged alongside each other and free to turn with the web, said support being arched longitudinally of the casing for the purpose specified.

7. In a drying machine for webs of paper and the like, a plurality of parallel rollers arranged alongside each other for supporting the moving web and free to turn therewith, each roller presenting a plurality of radial projections for engaging the web over restricted areas relatively close set.

In testimony whereof I affix my signature.

CLARE NELSON.