(No Model.) 2 Sheets—Sheet 1.

G. KAISER.

APPARATUS FOR DRYING PASTEBOARD, &c.

No. 442,229. Patented Dec. 9, 1890.

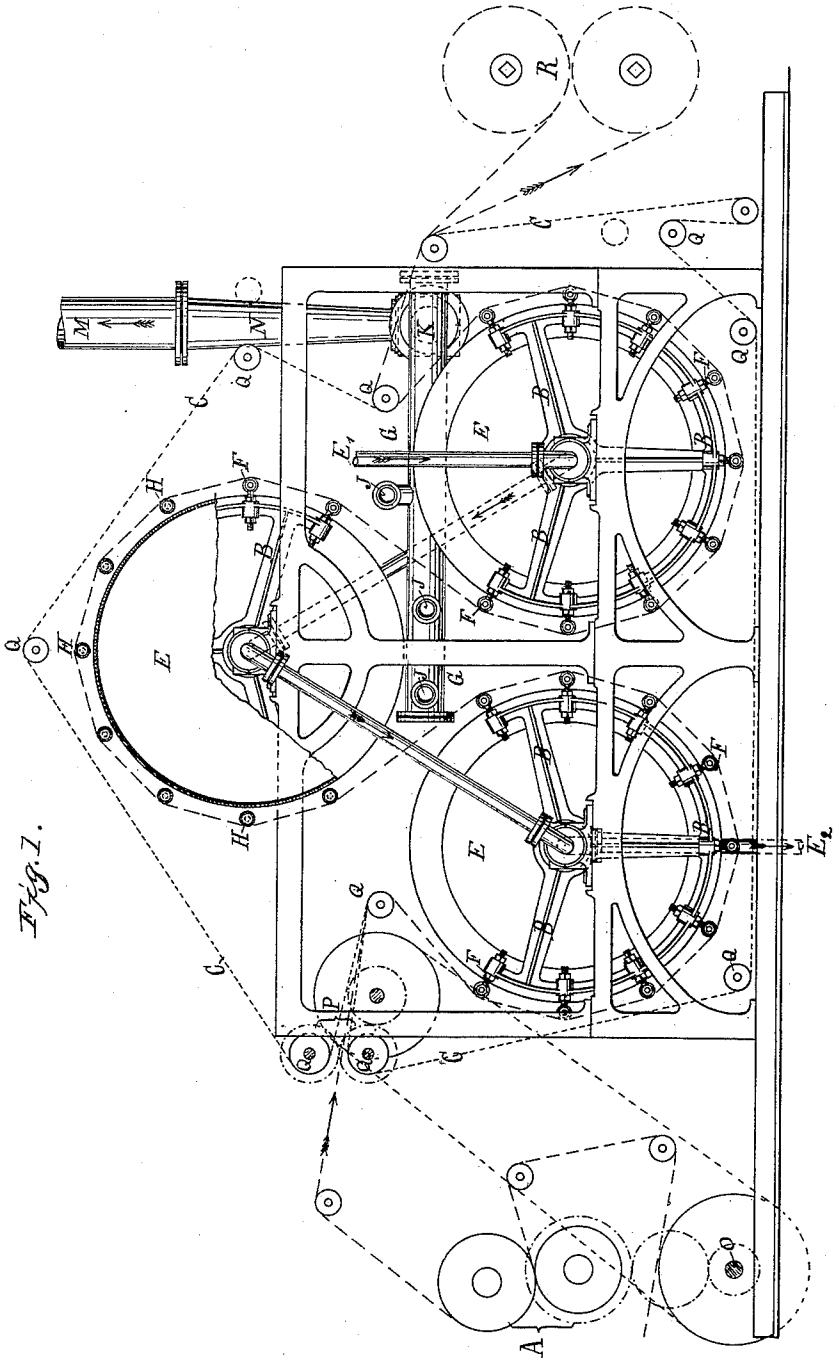


Fig. 1.

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THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

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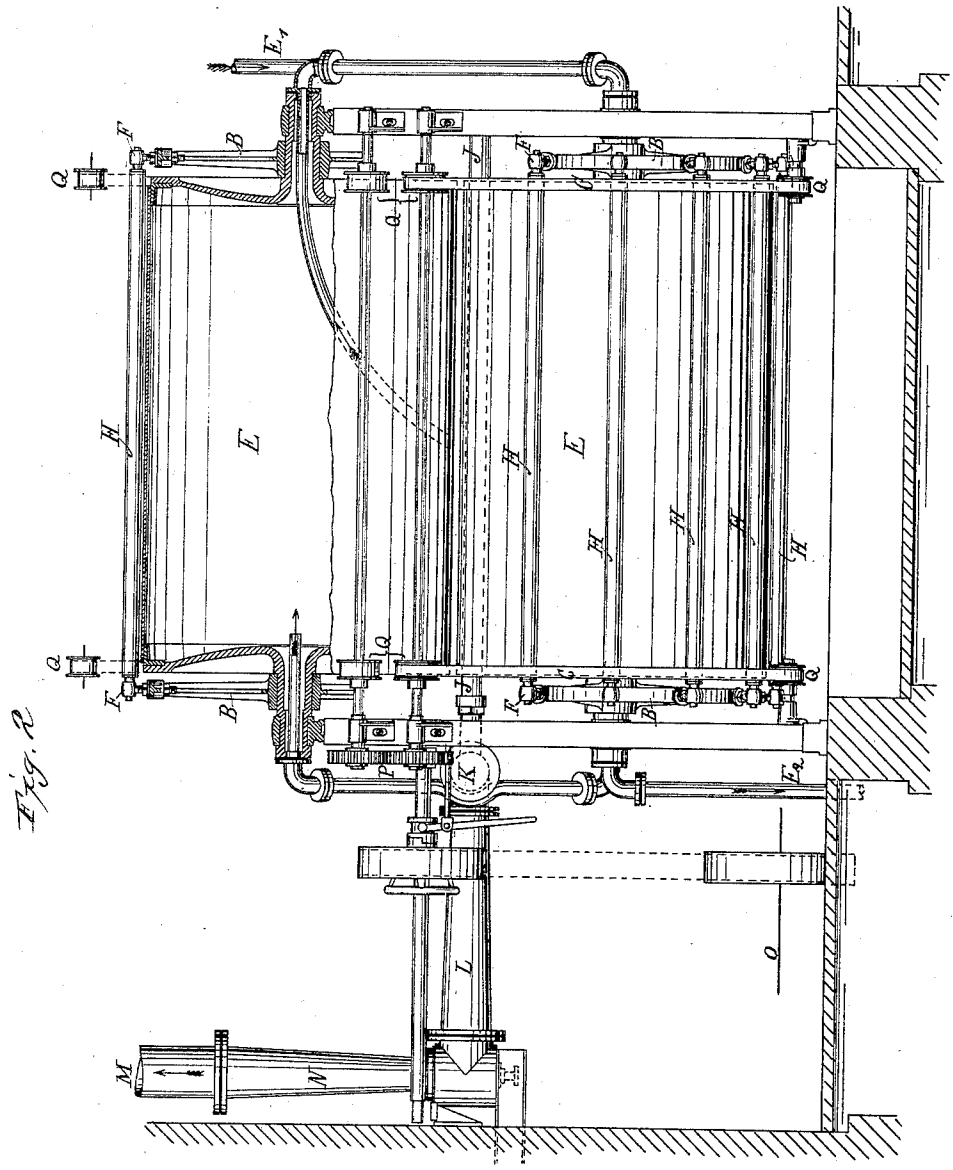


Fig. 2.

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UNITED STATES PATENT OFFICE

GUSTAV KAISER, OF CHEMNITZ, GERMANY.

APPARATUS FOR DRYING PASTEBOARD, &c.

SPECIFICATION forming part of Letters Patent No. 442,229, dated December 9, 1890.

Application filed April 11, 1890. Serial No. 347,490. (No model.) Patented in Germany August 5, 1886, No. 39,262, and in Austria-Hungary November 4, 1886, No. 30,906 and No. 55,701.

To all whom it may concern:

Be it known that I, GUSTAV KAISER, engineer, of Chemnitz, Saxony, in the Empire of Germany, have invented certain new and useful Improvements in or relating to Apparatus for Drying Paper, Pasteboard, Fabrics, and other Materials, (for which I have obtained patents of Germany, No. 39,262, dated August 5, 1886; Additional Patent No. 48,410, dated March 17, 1889; application for second additional patent of December 27, 1889, and in Austria-Hungary, No. 30,906 and No. 55,701, dated November 4, 1886,) of which the following is a specification.

This invention has for its object to dry by means of hot air the paper, pasteboard, &c., as it comes from the hydro-extractor of a paper-machine.

Up to the present time the drying of paper, &c., was effected in cylinders heated by steam. This method of drying, however, is attended by a great variety of drawbacks, of which I will only mention the following principal ones: First, the quality of the paper is damaged in consequence of the too rapid drying, and the product is not only stiff and brittle, but even its sizing is found to be less satisfactory than that of air-dried paper made of the same materials; second, in the case of cellular materials the fiber partly loses its natural elasticity and suppleness, and when dissolved again produces a brittle substance. Besides, the bleaching of it is detrimental to its quality. By drying these materials by means of hot air these inconveniences are obviated, and the paper acquires a greater firmness and extensibility, as neither in the direction of its length nor width is the shrinking of the paper counteracted during the drying process, whereas in drying the paper by means of steam-heated cylinders and through the medium of felt not only is its shrinking prevented, but the paper is stretched in the direction of its length, and thus rendered less compact and strong. The object of this arrangement therefore is to carry the paper it is desired to dry toward a hot current of air the temperature of which is comparatively low at first, but gradually increases as the drying proceeds. In this arrangement the paper is carried round the cylinder heated with steam, but at a certain distance from the same, and the volume of air between the cylinder and the paper which is being dried is greater and uniformly increased. An arrangement answering this purpose is represented in the accompanying drawings, of which—

Figure 1 is a side elevation partly in section; and Fig. 2, a front view, also partly in section.

It consists of a series of stationary cylindrical heating-bodies E, connected with each other. The heating medium is admitted at E′ and escapes at E^2, after having passed through the system. To the stationary heating-body E are secured the segments B, to which are attached the radial removable carriers or supports F, forming the bearings of the shafts or rollers H. A series of carrying-bands C are arranged round the rollers H and all the heating-bodies whereby the rotary motion is imparted to the rollers beyond the edges of the paper, while at the same time the paper is thus automatically guided over the rollers during its passage through the drying plant. The path of the paper is thus by means of the rotary grinding-rollers made to extend at a certain distance from the heating-body, and the sheet or film of paper coming from the felt roller-press or equivalent A is first carried round the cylinder, receiving the heating medium last, and therefore giving off the least amount of heat, whereupon it passes to the remaining cylinders in succession. The paper is thus passed over heated surfaces the temperature of which increases as the drying draws nearer to its close, so that it moves from the drying apparatus in a direction opposite to that pursued by the heating medium.

The carrier-bands C are set in motion by means of a shaft O through the medium of a pair of pulleys suitably connected with straps, and of the gearing P, in connection with a number of rollers or pulleys Q, as shown in the drawings. The material as it is dried is wound upon suitable rollers R.

In drying apparatus operating like the one here described, in which the material to be dried is submitted to the action of hot air in such manner that the air sweeping, as it were, over the material as it moves along becomes saturated with moisture, the change of air—

that is, the removal of the air thus saturated with water—greatly influences the evaporation, so that the arrangement employed for this latter process becomes highly important, as the final result of the working of the whole machine depends on the efficacy of the same.

In the drying apparatus described above a number of slotted or perforated tubes J are arranged to extend transversely through the spaces G between the moving web of paper and connected to the collecting-pipe K. This pipe K is connected, through a discharge-pipe L, with a steam-jet ventilator N, or with a suitable fan or equivalent apparatus operated mechanically and discharging air through the pipe M. By means of such a steam-jet or air suction arrangement the air existing between the paper bands and the heating-cylinders, being saturated with water, is continually drawn off and discharged into the atmosphere, while in the same proportion fresh air is admitted from the sides of the machine into the spaces G.

I claim—

1. In an apparatus for drying paper, pasteboard, and similar materials, the combination, with the series of heated cylinders around which the material passes, and means, substantially as set forth, for holding the same out of contact with the cylinders, of a heated medium supply communicating with the cylinder around which the material last passes, a pipe passing from said cylinder to the next cylinder, from around which the paper passes, and from the latter to the next, and so on throughout the series, whereby the heat is gradually reduced toward the end where the material enters, substantially as described.

2. In an apparatus for drying paper, pasteboard, and similar webs, the combination, with a stationary heated cylinder, of a series of independent driven rollers arranged around its periphery and in proximity thereto, and over which the material is carried out of contact with the cylinder, substantially as described.

3. In an apparatus for drying paper, pasteboard, and similar webs, the combination, with the heated cylinders having the series of guide-rollers arranged around their peripheries, over which the paper passes out of contact with the cylinders, of the perforated pipes arranged in proximity to the cylinders, in communication with the exhaust apparatus, for withdrawing the vapor-laden air from the space between the web and cylinders, substantially as described.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

GUSTAV KAISER.

Witnesses:
R. E. JAHN,
H. DE SOTO.