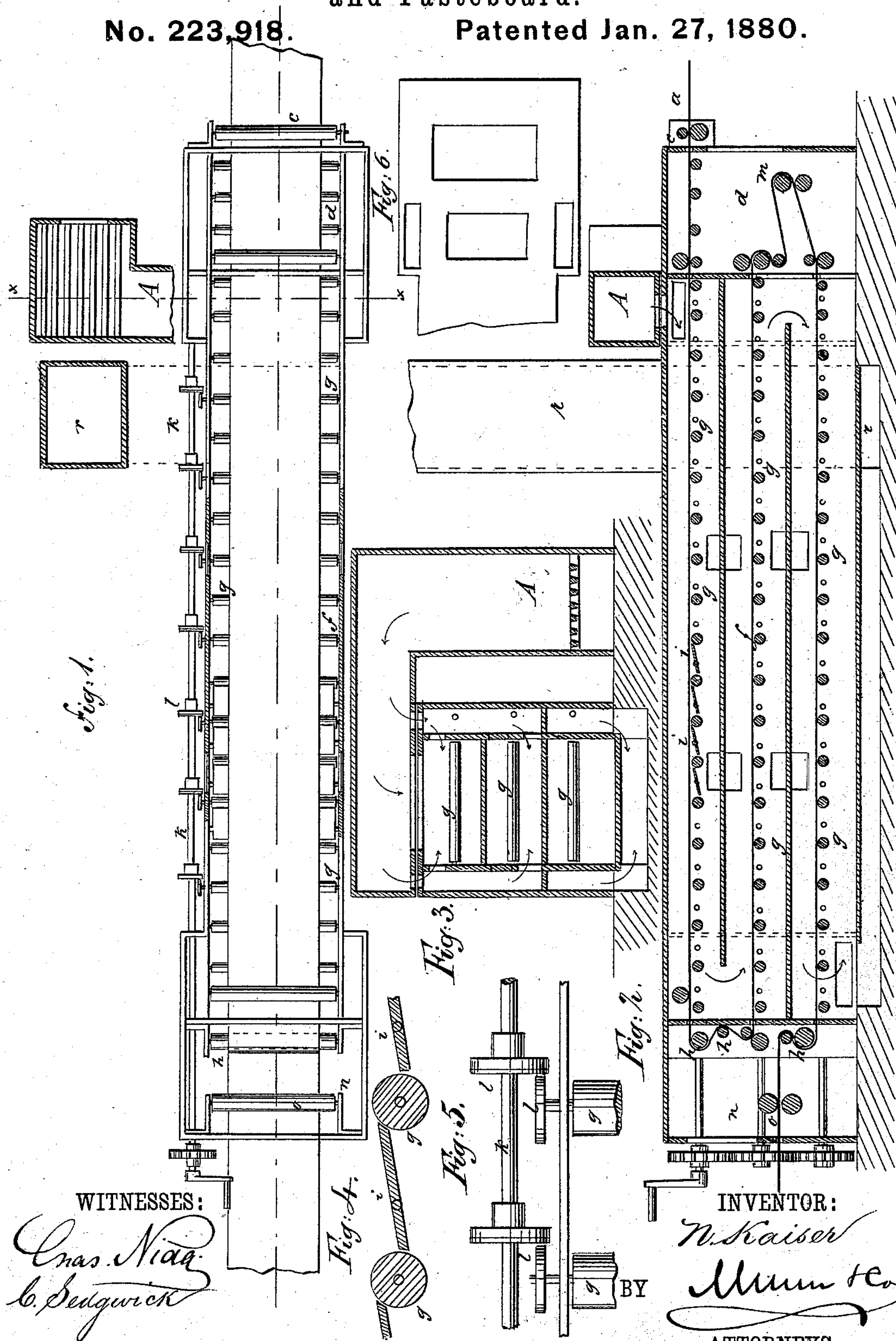


N. KAISER.
Method and Apparatus for Manufacturing Paper
and Pasteboard.

No. 223,918.

Patented Jan. 27, 1880.



WITNESSES:

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UNITED STATES PATENT OFFICE.

NIKOLAUS KAISER, OF GRELLINGEN, SWITZERLAND, ASSIGNOR TO SOCIETY
FOR THE MANUFACTURE OF WOOD PULP AT GRELLINGEN.

METHOD AND APPARATUS FOR MANUFACTURING PAPER AND PASTEBOARD.

SPECIFICATION forming part of Letters Patent No. 223,918, dated January 27, 1880.

Application filed October 30, 1879.

To all whom it may concern:

Be it known that I, NIKOLAUS KAISER, of Grellingen, Switzerland, have invented a new and useful Improvement in the Method of and
5 in Apparatus for Manufacturing Paper and Pasteboard, of which the following is a specification.

The present invention relates to an improved mode of drying paper and pasteboard
10 in continuous strips, and in the apparatus employed for that purpose.

Heretofore the paper coming from the pressing-machine, or other machines, was led over heated metal cylinders, which had the disadvantage that the paper became more or less brittle,
15 thus rendering impossible the use of mechanically-ground unboiled wood fiber without other admixture, and also that the cost of plant and working was considerably increased by the
20 necessary employment and working of the expensive metal cylinders required for the purpose.

The present invention has for its object to obviate these defects; and it consists, mainly,
25 in subjecting the paper or pasteboard coming from the long press-machine, or other machine, to the direct action of heated air, gases, or vapor in one or more chambers, instead of using heated cylinders for this purpose. The
30 paper produced by this means has increased strength and toughness, because during the drying process it is perfectly free to shrink to the full extent, both in the length and in the width, as it passes from the moist to the
35 dry condition, whereas with the use of heated metal drying-cylinders and felt guides, as heretofore, this shrinkage could not only not take place perfectly, but the paper was even stretched longitudinally, which can only be
40 done at the expense of its strength and toughness.

In addition to the above advantages the cost of plant is considerably reduced by doing away with the cylinders, and the working expenses are also less, as less fuel for heating is
45 required.

The operation is carried out in the following manner: The paper, coming in a more or less wet state from the wet long press or other machine, is conducted, by means of guide-rollers,
50 guiding-feeds, cloths, or wire-gauze, or the

like, in a horizontal or other direction through one or more closed chambers, where it is subjected to direct action of hot air, gas, or vapor until it has been sufficiently freed from moisture, whereupon it is led through a wet satin-
55 press, and is then again subjected to the action of heated air or gas in the same or other drying-chambers until it has attained a state of dryness corresponding to the atmosphere. 60
Lastly, the paper is passed through a calender onto the winding-reel. The same process can also be applied, *mutatis mutandis*, to pasteboard.

The process may be carried out by means
65 of apparatus such as is shown in the accompanying drawings and next described.

In the drawings, Figure 1 is a sectional plan view of the apparatus. Fig. 2 is a vertical longitudinal section. Fig. 3 is a vertical cross-
70 section on line *xx* of Fig. 1. Fig. 4 is a sectional detail view in larger size. Fig. 5 is a detail view, showing the driving mechanism in larger size. Fig. 6 is a partial plan view, showing the inlets for the hot air. 75

Similar letters of reference indicate corresponding parts.

The moist paper coming from the wet long press or other machine, of which only the end press, *a*, is shown, passes through the receiving-rollers *c* into the front chamber, *d*, which
80 is kept somewhat warm by the passage of heated air through the entrance and exit apertures for the paper.

From the front chamber the paper passes
85 into the drying-chamber proper, *f*, in which it is conducted backward and forward by suitable guides and transporting devices. These may consist, as shown in the drawings, of the rollers *g*, arranged in a horizontal plane at a certain distance apart, and fitted to revolve quicker
90 than the speed of the paper, and thus rather push than draw the paper forward. These rollers *g* are arranged in as many rows, one above the other, as desired, to cause the paper
95 to travel backward and forward in the chamber. At the end of each row of rollers the paper is led by means of two guide-rollers, *h*, on the row immediately below.

The spaces between the rollers *g* are filled
100 in by plates *i*, (shown most clearly in Fig. 4,) these plates being arranged so that they do

not prevent the rotation of the rollers, and they prevent the paper from sinking down between the rollers. The rollers are driven by friction-disks *l* from a shaft, *k*, running parallel with the longitudinal axis of the chamber. 5 There are as many shafts *k* as there are rows of rollers, and they will be driven by any suitable gearing.

After the first passage to and fro the paper 10 passes into the front chamber, *d*, and through the last wet-press, *m*, from whence it passes back again to the drying-chamber, and then into the back space, *n*, which is also somewhat heated, and is led over the guide-roller *h* to the 15 satin-press *o*, passing from the latter in an atmospherically-dry condition out of the apparatus.

The hot air coming from the calorifier (represented at A) is let from above, in the direction indicated by the arrows, above and below 20 the paper, and issues, saturated with moisture, through the exhaust-passage *r* to the external air. If gases or vapors be employed in place of heated air, the calorifier is replaced by suitable gas or generating apparatus. 25

The carrying-rollers *g* may be replaced by any suitable devices—as, for instance, an endless belt; and if it be desired to pass the heated

air in any other direction than that indicated, the calorifier or other apparatus would be arranged accordingly. 30

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The method of drying paper or paste-board in continuous sheets—that is, by the direct action of hot air, gases, or vapors, substantially as described. 35

2. The apparatus for drying paper or paste-board in continuous sheets, consisting of the drying-chamber fitted with rows of rollers or 40 carrying devices arranged in two or more lines, and with the inlet and outlet passages for heated air or gases, substantially as shown and described.

3. In apparatus for drying paper or paste-board in continuous sheets, the plates *i*, combined with the carrying-rollers *g*, substantially 45 as and for the purposes set forth.

In testimony that I claim the foregoing I 50 have hereunto set my hand this 2d day of September, 1879.

N. KAISER.

Witnesses:

H. HOCKENJOS,
G. FENNEY.