(No Model.)

A. A. SIMONDS.

MACHINE FOR DRYING PAPER.

No. 366,892. Patented July 19, 1887.

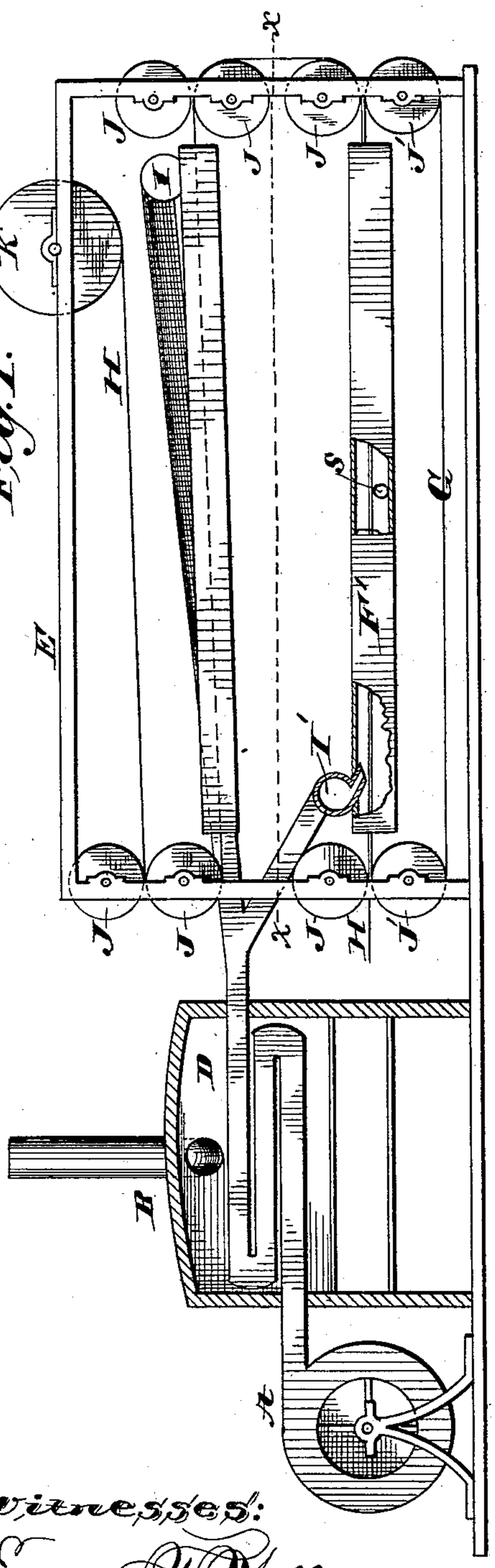

Fig. 1.

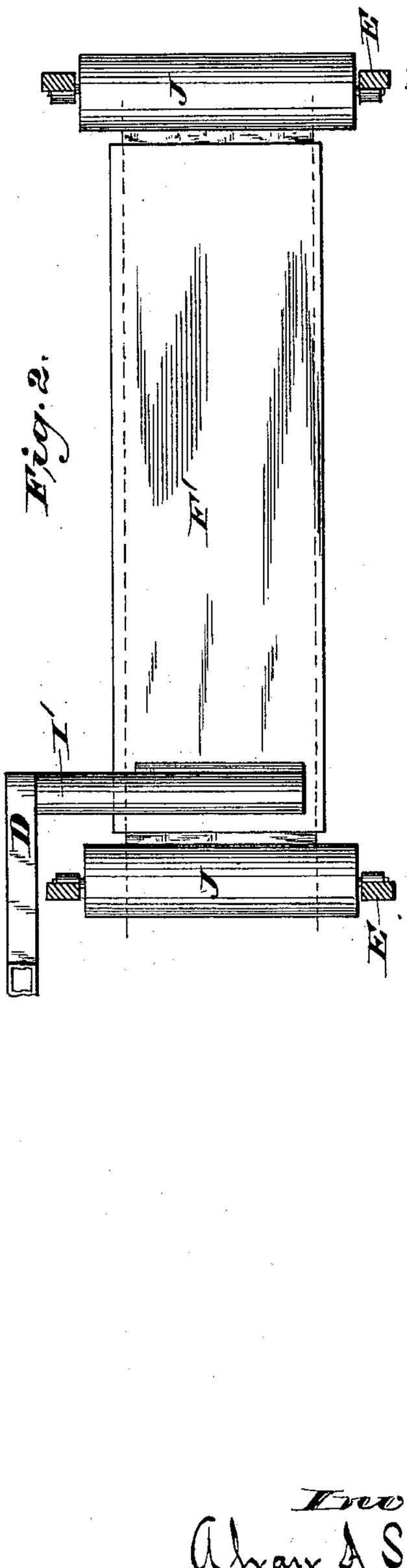

Fig. 2.

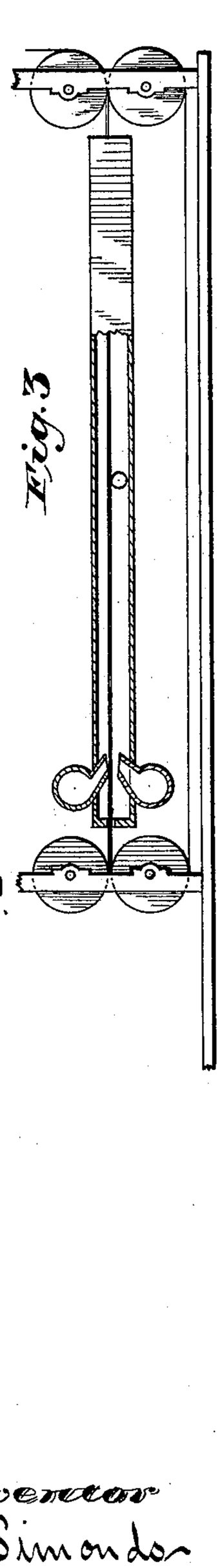

Fig. 3

Witnesses:
Edward S. Walker.
L. B. Whitaker.

Inventor
Abram A Simonds
By his attys
Whitaker & Prevost.

UNITED STATES PATENT OFFICE.

ALVAN A. SIMONDS, OF DAYTON, OHIO.

MACHINE FOR DRYING PAPER.

SPECIFICATION forming part of Letters Patent No. 366,892, dated July 19, 1887.

Application filed May 13, 1886. Serial No. 202,119. (No model.)

To all whom it may concern:

Be it known that I, ALVAN A. SIMONDS, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have invented a certain new and useful Improvement in Machines for Drying Paper; and I do hereby declare that the following is a full, clear, and exact description of the invention which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to machines for drying paper with hot air; and it consists of a certain construction of parts, fully described in this specification, and more particularly pointed out in the claims.

In the manufacture of paper, as soon as the web of the paper has been formed and compressed into a sheet of the required thickness it passes to a drier. The driers in ordinary use are those which employ steam heated rollers with endless belt carriers of felt. The paper as it leaves this drier is slightly calendered, which leaves it in the condition of the paper of an ordinary newspaper. If the paper is to be made into writing-paper, after leaving the drier the web is passed through a sizing-tub, is again rolled to remove a surplus of size, and is then divided into sheets and taken to a drying-loft, where it is exposed to a moderately-high temperature for from thirty-six to forty-eight hours. This is rendered necessary because it has been found that the roller-driers employed in the first drying of the web when used to dry sized paper destroy the sizing, and a fine quality of writing-paper cannot therefore be made by using such driers.

My object is to produce a drier which will dry sized paper without injuring the sizing, and which can also be used in the first drying of the web.

I am aware that paper-driers have been made consisting of large structures with rollers and belts for carrying the paper web through the same in a tortuous course, the structure being provided with a hot-air supply.

I am also aware that a patent has been granted to Clark, December 7, 1885, No. 170,712, in which it is proposed to pass the paper web through boxes of considerable depth each of such boxes being provided with air-forcing devices or fans at the top and bottom near one end for supplying a blast of air to the paper on both sides; and I am aware that in this patent it is stated that a "hot blast" is used. My invention differs from these constructions in that I provide a tube or box of such dimensions that but little space is given on each side of the paper web, and such tube or box is provided with an air-inlet at one end on one or both sides of the paper, and I connect such inlet or inlets by a pipe with an air-heating and air-forcing device, whereby heated air is delivered against the paper without being cooled or moistened by contact with the air of the room in which the operation takes place. By employing this construction I have found that I can dry a paper web much more rapidly and cheaply, and can dry sized paper without injuring the size, and can thus cheapen the cost of the paper to which it is applied.

The mechanism is illustrated in the accompanying drawings, in which—

Figure 1 is a side view of the blower, furnace, and drying-machine, with certain parts broken away to show the interior construction. Fig. 2 is a section of this drying-machine in the line *x x*, exhibiting the parts immediately beneath. Fig. 3 is a side elevation of Fig. 2, partly in section.

The same letters of reference indicate identical parts in each of the figures.

My improved drier consists of a frame, E, in which are mounted rollers J J J′ and reel K. Supported on said frame between said rollers are one or more flat tubes or boxes, F F′. These tubes or boxes are connected at one end by a pipe with air-heating and air-forcing devices, which are represented in this instance by the blower A and furnace B. These tubes or boxes at the end opposite the air-inlet are open substantially the full extent of each tube or box, and the other end is provided with an opening for the admission of the sheet of paper to be acted upon. This opening consists of a narrow slot in the center of the end wall, and is of sufficient width to admit of the paper web being passed easily and freely therethrough. This paper (designated in the drawings by the letter H) is curved over one of the rollers, J′, through the tube or box F′, and

when more than one such box is employed, then around a roller or rollers through tube or box F, and is guided thence to reel K. The paper is subjected to a strong current of hot air in the tubes or boxes F or F′, and is thereby thoroughly dried.

The heated air may be admitted to the tubes or boxes at both top and bottom, and directed against and made to act upon both sides of the paper.

I have shown an endless felt band or apron, G, upon rollers J′ J′ in this instance, and the moist paper received and supported thereupon when first introduced into the machine. When the tubes or boxes are of great length, supporting-rollers may be employed to keep the paper from dragging on the bottom of the box; but this is necessary only when the heated air is admitted solely to the upper side of the paper. When the air is admitted beneath the paper, the current of air will of itself keep the paper from dragging on the bottom of the tube or box.

It is well known that the more highly-heated air becomes the greater is its capacity for absorbing moisture. The air in this case is conducted from the heating device and discharged upon the paper in its most absorptive condition, and having only a narrow space on each side of the paper the passage of the air is rapid, a great amount of air is brought into contact with the paper in a given time and the moisture in the paper rapidly evaporated.

If the heat were applied to the air of the room, the air would have its temperature very much reduced and lose much of its absorptive power before it could be forced onto the paper. Were heated air forced into the room; the result would be the same. By the use of my device I direct the air when it is the most highly heated and capable of absorbing the greatest amount of moisture against the wet paper, and thus secure the rapid absorption of the moisture.

While my invention is of especial value in the manufacture of writing-paper, I propose to employ it in drying all other kinds of paper. I believe that it will be found to have special advantages in drying wall-papers, paper curtains, and the like paper articles.

What I claim, and desire to secure by Letters Patent, is—

1. The combination, with guiding and supporting rollers for a paper web and a narrow tube or box having an opening the full size of the same at one end, an opening for the passage of the paper web at the other, and an air-inlet near one end of said tube or box, of an air-heater connected with the said air-inlet, and an air-blast device for causing a current of air to pass through the air-heater and tube or box, substantially as described.

2. The combination, with a narrow tube or box having an opening at one end the full size of the same, an opening for the passage of a paper web at the other end, and air-inlets at the top and bottom of the said tube or box near one end of the same, of an air-heater connected with said inlets, an air-forcing device for causing a current of air to pass through the heater and tube, and guiding and supporting rollers for guiding and supporting a web of paper through the center of the tube or box, substantially as described.

3. The combination, with a narrow tube or box having an opening at one end the full size of the same and a narrow slot for the passage of a paper web at the other end, of hot-blast inlets at the top and bottom, guiding and supporting rollers for the paper, adjusted to carry the paper centrally through the tube or box, an air-heater connected to the hot-air inlets, and a forcing device for causing a current of air to pass through the air-heater and inlets into said tube, substantially as described.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

ALVAN A. SIMONDS.

Witnesses:
B. PICKERING,
C. A. WALTMIRE.