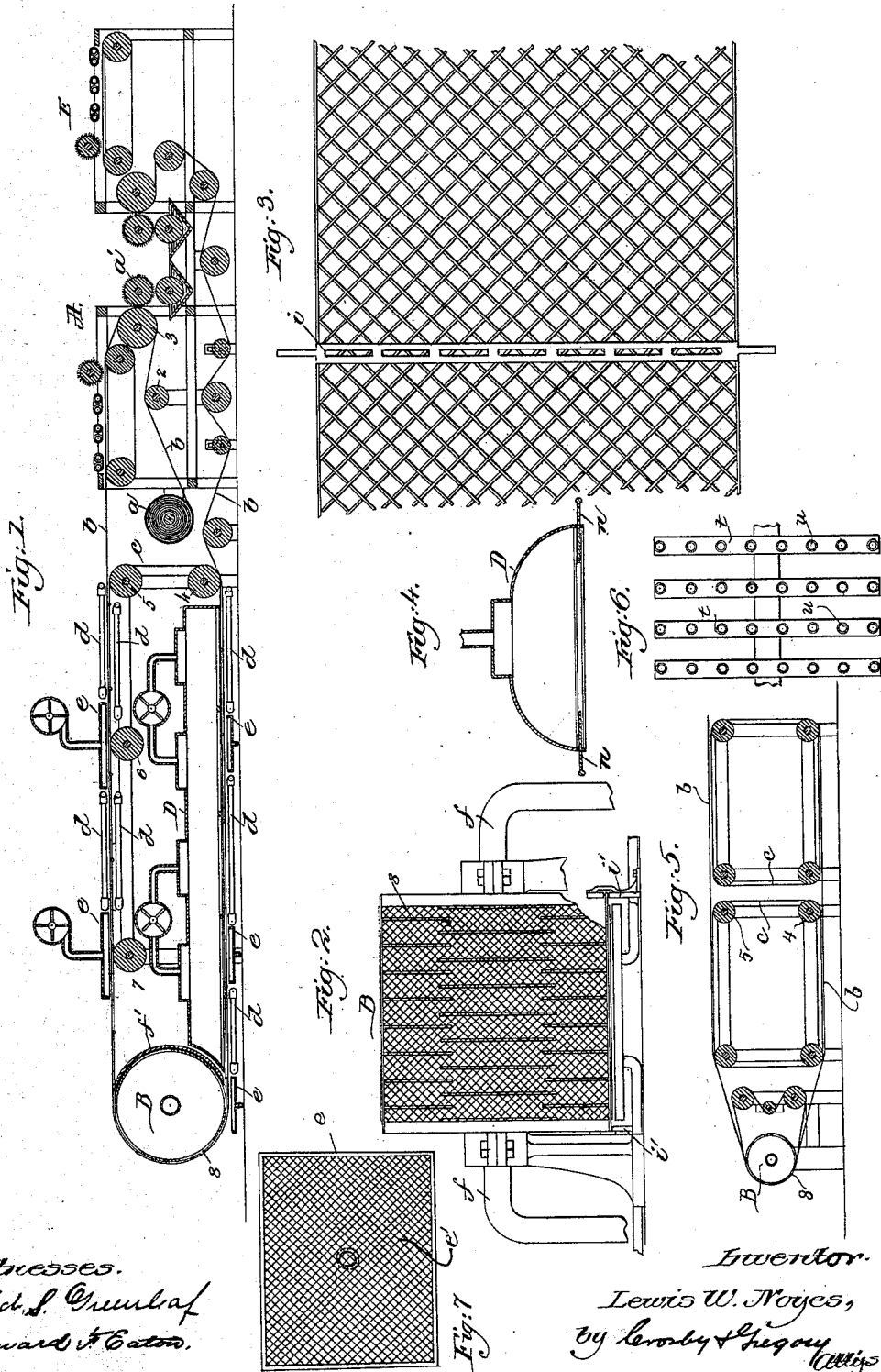


(No Model.)

L. W. NOYES.
MACHINE FOR DRYING PAPER.

No. 413,728.

Patented Oct. 29, 1889.



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UNITED STATES PATENT OFFICE.

LEWIS W. NOYES, OF EAST PEPPERELL, MASSACHUSETTS.

MACHINE FOR DRYING PAPER.

SPECIFICATION forming part of Letters Patent No. 413,728, dated October 29, 1889.

Application filed February 8, 1889. Serial No. 299,154. (No model.)

To all whom it may concern:

Be it known that I, LEWIS W. NOYES, of East Pepperell, county of Middlesex, State of Massachusetts, have invented an Improvement in Machines for Drying Paper, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

The drying apparatus herein to be described and forming part of this invention comprises drying-pipes or hot-air chambers arranged to deliver currents of air, or both, arranged in succession, and a conveyer—preferably an endless belt or band—arranged to carry the paper as it is delivered from the coating-machine coated on one side along adjacent to the said pipes or chambers to be desiccated. The drying-pipes and hot-air chambers may be variously arranged, and in some instances cold air may be supplied in lieu of hot air. A current or currents of air are employed for keeping the paper on the conveyer at such points as it might naturally leave it.

My invention consists, essentially, in the combination, in a paper-drying apparatus, of a paper-conveyer and the exhaust or suction box or device with heating or drying pipes and hot-air boxes or chambers, all substantially as described.

Other features of my invention will be hereinafter pointed out in the specification and claims.

Figure 1 shows in longitudinal section a drying-machine, together with two coating-machines; Fig. 2, an end view of the returning-cylinder at one end of the drying-machine; Fig. 3, a plan view of a portion of the endless conveyer; Fig. 4, a cross-section of the exhaust or suction box to be referred to, and Figs. 5 and 6 modifications to be referred to. Fig. 7 is an under side view of one of the boxes or chambers, showing one form of perforated bottom.

The coating-machine (represented at A) is of usual construction, it comprising the reel *a*, paper-carrying rolls 2 3, brush *a'*, &c. The web of paper *b* delivered from the coating-machine A is fed forward upon a conveyer, shown in Fig. 1 as an endless band *c* passed over the rollers 4 5 6 7 and also around the return-

ing-cylinder B. Systems or coils of steam or other warming pipes *d* are arranged some just above and others just below the conveyer *c* at the upper part of the apparatus, so as to heat and thereby dry the paper as it is fed along adjacent to said pipes. Boxes or chambers *e*, preferably having perforated bottoms, which may be of wire-netting or like material, as shown at *e'* in Fig. 7, are placed above the conveyer *c*, they being connected by pipes with any suitable source or supply of hot air, which will be forced or blown there-through by means of ordinary blowers, the current of air issuing from the boxes or chambers in direct contact with the paper assisting in holding the same down firmly upon the conveyer, thus preventing the edges from curling up, as well as assisting in the drying operation.

If desired, cold air may be used in lieu of hot air, and the several boxes or chambers which are herein shown as arranged alternately with relation to the heating-pipes may be otherwise arranged, and, if desired, connected with a single source of supply.

The returning-cylinder B consists of a drum having closed ends, the barrel of the drum or cylinder having slits, as 8. (See Fig. 2.) Suitable pipes, as *f*, lead from the drum, through which the air is exhausted from the drum, so that as the paper passes around the drum on the conveyer it will be held down firmly thereon. A shield *f'* incloses a portion of the drum, as best shown in Fig. 1, so that by exhausting the air from the drum it will be most effective upon the side or face opposite the shield.

The box or chamber D, having the perforated bottom, which is similar to that shown in Fig. 7, is located just above the paper-conveyer *c* at the lower part of the apparatus, said box or chamber having pipes or conduits leading from it, through which the air of the box or chamber is withdrawn to produce a sufficient suction to cause the paper to cling to the conveyer while upon the under side thereof. The air may be withdrawn from the box or chamber D in any suitable manner; so I do not desire to limit my invention to any particular means for producing this result.

On the under side of the conveyer *c*, at the lower part of the apparatus, systems or coils

of heating or drying pipes, as *d*, are arranged, and also boxes or chambers, as *e*, from which may issue currents of hot or cold air. The web of paper *b*, carried forward by the conveyer *c* in proximity to the heating or drying pipes and the hot-air boxes or chambers around the returning-cylinder B, returns to the second coating-machine, as E, or it may be to another set of coating devices, to be coated, sized, or colored upon the opposite side.

The endless band which I prefer to employ consists of a reticulated band having cross-bars, as *i*, (see Fig. 3,) the ends of which extend beyond the edge of the band and which co-operate with or bear upon suitable guides or tracks *i'*, arranged at the lower part of the apparatus, to thereby prevent the band from sagging.

The web *b* of paper varies in width, and hence I provide the suction box or chamber D with suitable slides, as *n*, (see Fig. 4,) which may be moved, as desired, to vary the width of the opening at the bottom of the box to correspond with the width of the paper.

In Fig. 5 I have shown a series of independent endless bands or conveyers, which may be used in lieu of the single or continuous endless band shown in Fig. 1.

By the means or apparatus herein shown it will be seen that the web of paper coated, sized, or colored upon one side may be dried sufficiently to be immediately coated, sized, or colored upon the opposite side.

In lieu of the suction box or chamber D, arranged as shown, currents of air may be blown against the under side of the paper to hold the same in place upon the conveyer, and, furthermore, a series of pipes *t*, having openings *u* therein, as shown in Fig. 6, may be used instead of the box D, said pipes being arranged so that the suction may act on the paper at different points.

I claim—

1. In a paper-drying apparatus, the paper-conveyer and the exhaust or suction box, chamber, or device, combined with heating or drying pipes and hot-air boxes or chambers, all substantially as and for the purposes set forth.

2. In a paper-drying apparatus, a paper-

conveyer, combined with an exhaust or suction box, chamber, or device for holding the paper in contact with the conveyer, and a system of heating or drying pipes or conduits in proximity to which the conveyer moves, substantially as described.

3. In a paper-drying apparatus, the endless reticulated paper-conveyer and means, substantially as described, for holding the paper on the conveyer on its upper side by a current of air, combined with the returning-cylinder, around a portion of which the conveyer is passed, and means, substantially as described, for continuously exhausting the air therefrom, as and for the purposes set forth.

4. In a paper-drying apparatus, the paper-conveyer, combined with the exhaust or suction chamber or chambers having a perforated bottom adjacent to which said conveyer passes and slides to vary the width of opening of said bottom, as and for the purposes set forth.

5. In a paper-drying apparatus, the reticulated paper-conveyer, combined with the hollow cylinder B, having closed ends and slits in its barrel, and around a portion of which said conveyer passes, the shield *f'*, closely encircling a portion of the cylinder opposite to that encircled by the conveyer, and means, substantially as described, for exhausting the air from the cylinder through its axis, whereby the paper will be held firmly upon the outer side of the conveyer as it passes around the cylinder opposite said shield, substantially as described.

6. In a paper-drying apparatus, the conveyer having cross-bars *i* and continuously-rotated rollers for moving the conveyer, and the guides for the cross-bars, combined with means, substantially as described, arranged above the conveyer at the lower part of the apparatus for holding the paper by suction, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS W. NOYES.

Witnesses:

BERNICE J. NOYES,
A. S. WIEGAND.