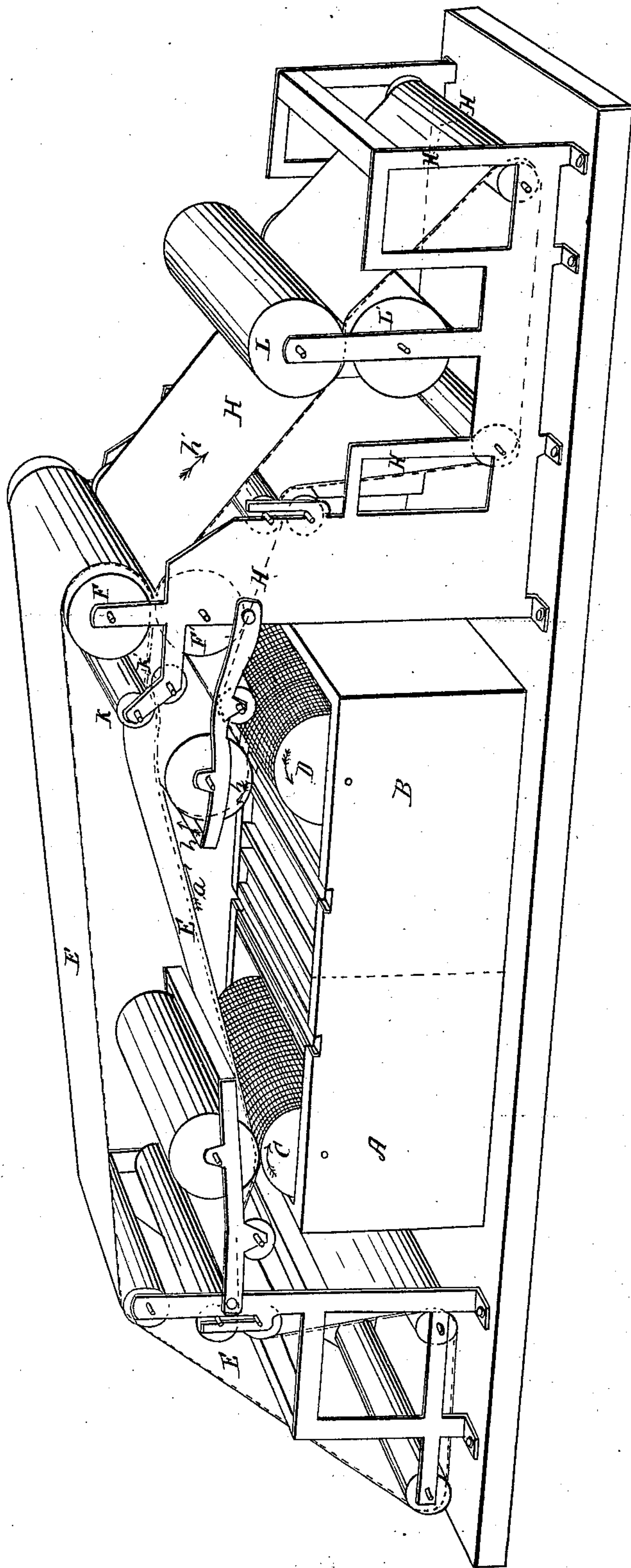


S.G. Lewis.
Paper Mach.

N^o 10,519. Patented Feb. 14, 1854.



UNITED STATES PATENT OFFICE.

SAML. G. LEVIS, OF DELAWARE COUNTY, PENNSYLVANIA.

MAKING THICK PAPER.

Specification forming part of Letters Patent No. 10,519, dated February 14, 1854; Reissued October 22, 1867, No. 2,789.

To all whom it may concern:

Be it known that I, SAMUEL G. LEVIS, of the county of Delaware and State of Pennsylvania, have invented a new and useful
5 Improvement in the Construction of Machinery for Making Paper; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being
10 had to the annexed drawing, which represents a perspective view of my improvement.

In the ordinary manufacture of paper the paper is made in a continuous sheet of a single uniform thickness in the following
15 manner. A cylinder of fine wire cloth rotates partially immersed in a vat of prepared pulp—this cylinder rotates in contact above with an endless felt passing around a roller; and on to the felt the paper is formed by the
20 rotating cylinder of wire cloth pressing the pulp which it has taken up from the vat. The paper thus formed is carried upon the endless felt between two metallic squeeze rollers and the water partially squeezed out.
25 The paper then leaves the felt and is passed between a second pair of squeeze rollers and then around a series of calenders or drying rollers. This is the ordinary method of making paper by cylinder machines; and the
30 paper so made is of one thickness and uniform texture throughout. The thickness which can be given to paper so made, consistently with the preservation of strength and uniformity of appearance, is limited:
35 for the meshes of the wire cloth cylinder can only screen a given quantity of water through and if the thickness of the layer of pulp be increased beyond a certain extent, the paper would be soft and be crushed be-
40 tween the squeeze-rollers. Thus its texture would be weakened, and the uniformity of its appearance would be destroyed.

It has been long desirable in the art of paper making to form paper of considerable
45 thickness, of perfect texture and of strength proportioned to such increased thickness. To attain this object, several attempts have been made. Thus, the paper after being formed on the felt and passed through the
50 two pairs of squeeze rollers has been wound upon a reel before passing over the heated calenders. The undried paper so reeled has been passed a second time between the forming cylinder and the felt and a second thick-
55 ness of pulp or paper formed upon the first

sheet. It was then passed again through the two successive pairs of squeeze rollers as before and over the drying rolls or calenders. The first sheet in this case being compacted and squeezed partially dry before the second
60 sheet of pulp was formed on to it, the two sheets were imperfectly combined and were liable to separate. The process was troublesome and tedious also. Another method attempted was to employ two wire cloth forming
65 cylinders and immediately after the pulp a paper had been formed on to the felt by the first of the cylinders, a second sheet of pulp or paper was formed upon the first sheet by the second forming cylinder. This
70 process required a single felt, the ordinary squeeze rollers and an additional forming cylinder turning in the same vat and in the same direction as the former cylinder. It answered very well for thin paper; but when
75 the thickness of the paper was increased, the second forming cylinder would crush the first formed sheet and thus destroy its uniformity of strength and texture in the same way as described above upon the ordinary
80 cylinder process.

The nature of my improvement consists in an arrangement and combination of machinery for simultaneously forming two distinct fabrics of paper, and uniting them into
85 one compound sheet by continuous operation and so that these component fabrics shall be inseparably united; by this improvement also, the thickness of the paper may be increased and the strength and uni-
90 formity of the sheet of paper be preserved.

To enable others skilled in the art to make and use my improvement, I proceed to describe the construction arrangement and
95 operation of my improvement.

In my improved arrangement I employ two separate pulp vats A and B (see figure). In each vat a forming cylinder of wire cloth of the ordinary description is placed. These
100 are shown at C and D. Each cylinder is furnished with a separate and distinct endless felt or blanket. The cylinder C forms its pulp or paper on to the felt E shown in red line on the drawing. The sheet of pulp passes on the lower side of the felt E
105 in the direction of the arrow *a*, toward the pair of squeeze rollers F F'. The second forming cylinder D rotates in the pulp vat B, in the direction indicated by the arrow thereon, and forms a sheet of pulp on to
110

the endless felt or blanket H shown in blue line. This pulp or paper thus formed upon the felt H passes upon that felt toward the squeeze rollers F, F' as indicated by the
5 arrows *h*, *h*. The two endless felts with their respective sheets of pulp pass together over the guide roller K' and under the guide roller K; and then between the squeeze rollers F F'—the two sheets of paper being
10 in contact while the felts pass between the squeeze rollers are effectually united together and a portion of the water is squeezed out. The squeeze rollers F F' perform no other function than to press these two sheets
15 together and the force by which they are kept together is to be adjusted thereto. The compound sheet of paper resulting from the union of the two separate sheets as above passes down along with the
20 felt H as indicated by the arrow *h'*, and through the squeeze rollers L L' which perform to it the same function as the first pair of squeeze rollers in ordinary paper machines. The paper then passes through
25 a second pair of squeeze rollers and on to the heated calenders in the same manner as in ordinary machines. It will thus be seen, that I make use of a second forming cylinder, a second endless felt and an additional
30 pair of squeeze rollers.

The advantage of this improved arrangement is such that paper of any desired thickness, and of proportionately increased strength composed of two layers may be
35 formed at one operation. This arrange-

ment of machinery and method of manufacturing can be applied to all descriptions of papers, and is particularly applicable to hardware paper, card paper, paste boards, &c. This manufacture may be carried on
40 without any interruption or delay and at a less cost than the other methods hereinbefore described. Moreover, as the cylinders C & D rotate in separate and distinct vats, paper may be formed in the same manner
45 which shall be of different colors or different textures on the two sides—or of both different colors and textures on these sides. This will be found of advantage in the manufacture of bonnet boards, plate paper, fancy paper, &c.
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Having thus described my improvement in paper machinery I do not desire to claim generally the employment of two forming
55 cylinders for the purpose of making paper of increased thickness as cylinders have been thus used before; but what I claim as new in my invention and desire to secure by Letters Patent is—

The combination of the two forming cylinders C & D, the two endless felts E and H, and the two squeeze rollers F F' arranged and operating in the manner and for the purpose substantially as hereinbefore described.
60

SAMUEL G. LEVIS.

Witnesses:

GEORGE HARDING,
CHARLES D. FREEMAN.