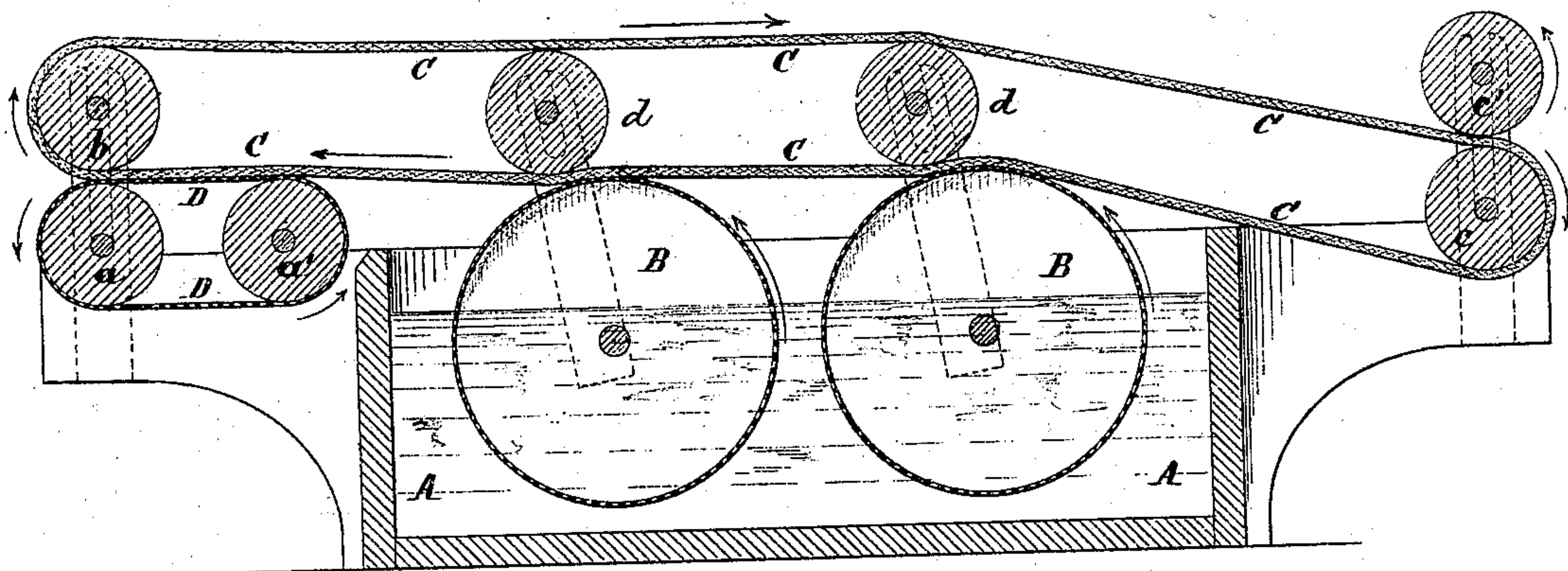


*L. Dodge,  
Paper Machine.*

*No. 104,281.*

*Patented June 14, 1870.*



Levi Dodge  
by his attorney  
*A. Poole*

**WITNESSES.**

*M. Bailey*  
*Wm. H. M. S. Kane*



# UNITED STATES PATENT OFFICE.

LEVI DODGE, OF WATERFORD, NEW YORK.

## IMPROVEMENT IN THE MANUFACTURE OF PAPER.

Specification forming part of Letters Patent No. **104,281**, dated June 14, 1870.

*To whom it may concern:*

Be it known that I, LEVI DODGE, of Waterford, in the county of Saratoga and State of New York, have invented certain new and useful Improvements in the Manufacture of Paper, of which the following is a specification:

My invention relates to the manufacture of heavy paper, such, for instance, as straw-board, Bristol, and other paper, on what is termed "cylinder-paper machinery."

Heretofore, in order to make heavy paper, it has been necessary to "run light web"—that is to say, it has been necessary to make the pulp which adheres to the cylinder at each revolution of the same very dilute, so that when taken up by the wet felt the layer of pulp may be thin enough to allow the moisture to be easily expressed therefrom as it passes between the compressing-rollers, to which it is fed by the felt apron. This it would be impossible to accomplish if the stock were thick, as in that case the pressure necessary to press the moisture through the gathered pulp and the felt would crush the fiber and make the paper useless. In order, therefore, to make a thick and heavy paper by this process, it is necessary to gather several layers of thin sheets, which, being successively pressed between the compressing-rollers, are accumulated or wound one upon the other on the upper compressing-roller until the desired thickness is attained, after which the cylinder of paper thus formed is cut open and detached. The machinery for this purpose heretofore employed consists, generally, of one making-cylinder, covered with wire-cloth, which revolves in the vat, gathering the pulp, and an endless felt band, which takes up the pulp from the wire-cloth cylinder and conveys it to the compressing-rollers.

There are many objections to this mode of manufacturing heavy paper, the principal of which are as follows: First, the felt becomes dirty and its interstices become filled with lime, which clogs or stuffs the felt, and resists the discharge of the moisture from the pulp; second, the paper is necessarily of limited size or length, according to the size or diameter of the roller upon which it is wound, and it is impossible, therefore, to obtain it in a continuous sheet or in lengths, as may be desired; third, there is a loss of time, inasmuch as the

machine has a limited speed under all circumstances, and the cylinder and felt band must travel twice or thrice the distance in forming a sheet of paper from two or three accumulated layers of stock, and therefore must consume twice or thrice the time that they would were it necessary to pass the pulp but once through the compressing-rollers; fourth, an attendant is required to watch the progress of the work and to cut off the paper from the roll; fifth, irregularities in the thickness of the paper frequently occur, owing to accident, or to the carelessness of the attendant in omitting to remove the paper from the roll at the proper time.

My invention obviates all these objections, and has other great advantages over the old method and over any other that I am acquainted with; and it consists in the employment, in cylinder-paper machinery, with one or more cylinders for taking up the pulp from the vat and the usual wet felt, of an endless apron of wire-cloth passing over two or more rolls, in combination with one or more compressing-rollers, the wet felt being carried over the latter, under the arrangement substantially as herein described, so that the pulp shall be compressed while between the layer of felt above it and the wire-cloth underneath it. By this use of the compression-roller and wire-cloth apron in connection with the wet felt I am enabled to concentrate in a single layer all the stock needed to form the thick paper, and to deliver the paper in a continuous sheet of any desired length, shortening the time required for the manufacture, lessening the expense, and avoiding all danger of irregularities in the thickness or shape of the paper attendant upon the old method.

The manner in which my invention is or may be carried into effect will be fully understood by reference to the accompanying drawing, which represents a section at elevation of so much of a cylinder-paper machine as is needed in order to illustrate my invention.

A is the pulp-vat, in which are located one, two, or more wire-cloth making-cylinders, B, of ordinary suitable construction, for taking up the pulp and delivering it to the wet felt or endless felt band C, which, with the couch-rollers *d*, is arranged over the cylinder or cylinders in the usual manner. Under the wet



felt, and running parallel with and closely against it, there is an endless apron, D, of wire-cloth stretched over two or more rollers, *a a'*, the former of which—*i. e.*, the one most remote from the vat—is directly under the roller *b*, over which the felt is carried, so that the two rollers, acting in conjunction as compressing-rolls, may express from the pulp the moisture which it contains without the moisture passing through the felt.

This arrangement which I have just described is sufficient to accomplish the end I have in view; but it is obvious that many other arrangements for effecting the same result may be made, the principle of my invention consisting in subjecting the pulp as it is delivered from the making-cylinder to pressure between the wire-cloth apron and the wet felt, while the felt is above the wire-cloth underneath the pulp.

The apron may be of any length desired, and two or more sets of compressing-rollers similar to those shown at *a b* may be employed, if desired.

The pulp as it is gathered from the making-cylinders is carried along by the felt until it is brought between the felt and the apron, and is then pressed between the two, as above stated.

The endless wire-cloth apron is important, inasmuch as there is so much water in the pulp as it passes from the making-cylinders that it will wash from the felt when the water is expressed from it unless there be some means of holding it up. This is effected by means of the apron, which holds it up in place on the wet felt, while it allows free passage to the water through it.

The pulp, after leaving the apron, is carried up by the wet felt over the roller *b*, and is then conveyed to the compressing-rollers *c c'*, between which it passes.

Under the old method the thin layer was wound upon the roller *c'* until a cylinder of paper of the proper thickness had been ob-

tained, which was then cut open and removed therefrom. But by the use of the wire-cloth apron and rollers, in connection with the wet felt, I am enabled to concentrate in a single layer all the stock necessary to form paper of the desired thickness, so that, instead of being wound upon the cylinder *c'*, it can pass out from under the same in a continuous sheet, to be afterward cut up into any lengths desired.

The use of the wire-cloth apron, in connection with the wet felt and rollers, also enables me to use two or more making-cylinders, each of which in succession delivers an additional thickness of pulp to the felt before the same passes to the apron, where, owing to the two parallel wire-cloth and felt surfaces, between which the pulp is held, the moisture can be expressed quickly, thoroughly, and without injury to the fiber.

Having now described my invention and the manner in which the same is or may be carried into effect, what I claim, and desire to secure to secure by Letters Patent, is—

1. The use or employment in cylinder-paper machinery having one or more cylinders and the usual wet felt or endless felt band, of an apron of wire-cloth, or the equivalent thereof, passing over two or more rolls, in combination with one or more compressing-rollers, the wet felt being carried over one of the latter, under the arrangement substantially as herein described, so that the pulp shall be compressed while underneath it, substantially as herein set forth.

2. The arrangement of machinery for operation substantially as herein shown and set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

LEVI DODGE.

Witnesses:

A. POLLOK,  
WM. H. McCABE.