

No. 768,422.

PATENTED AUG. 23, 1904.

R. S. CASE.  
PROCESS OF MAKING PAPER.  
APPLICATION FILED JULY 23, 1902.

NO MODEL.

FIG. 1.

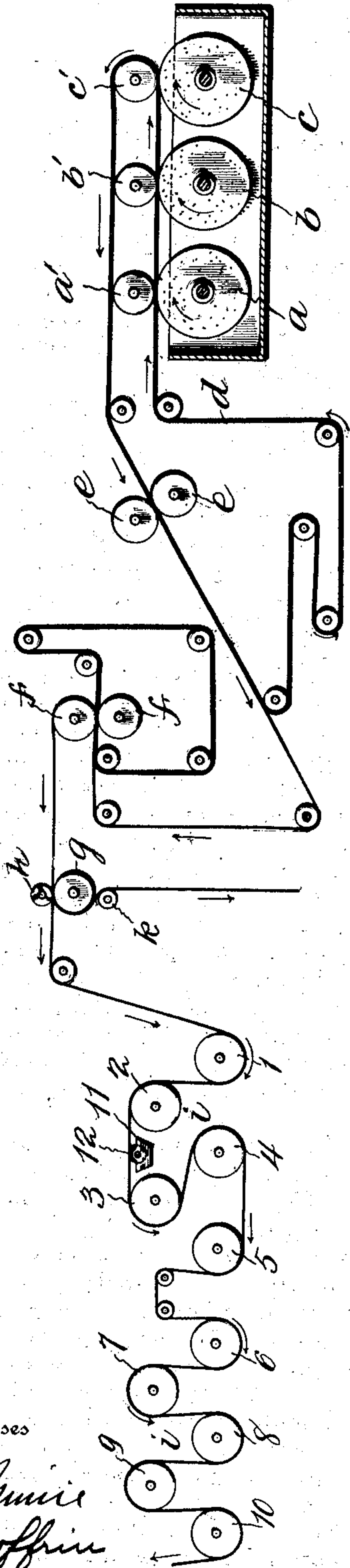


FIG. 3.

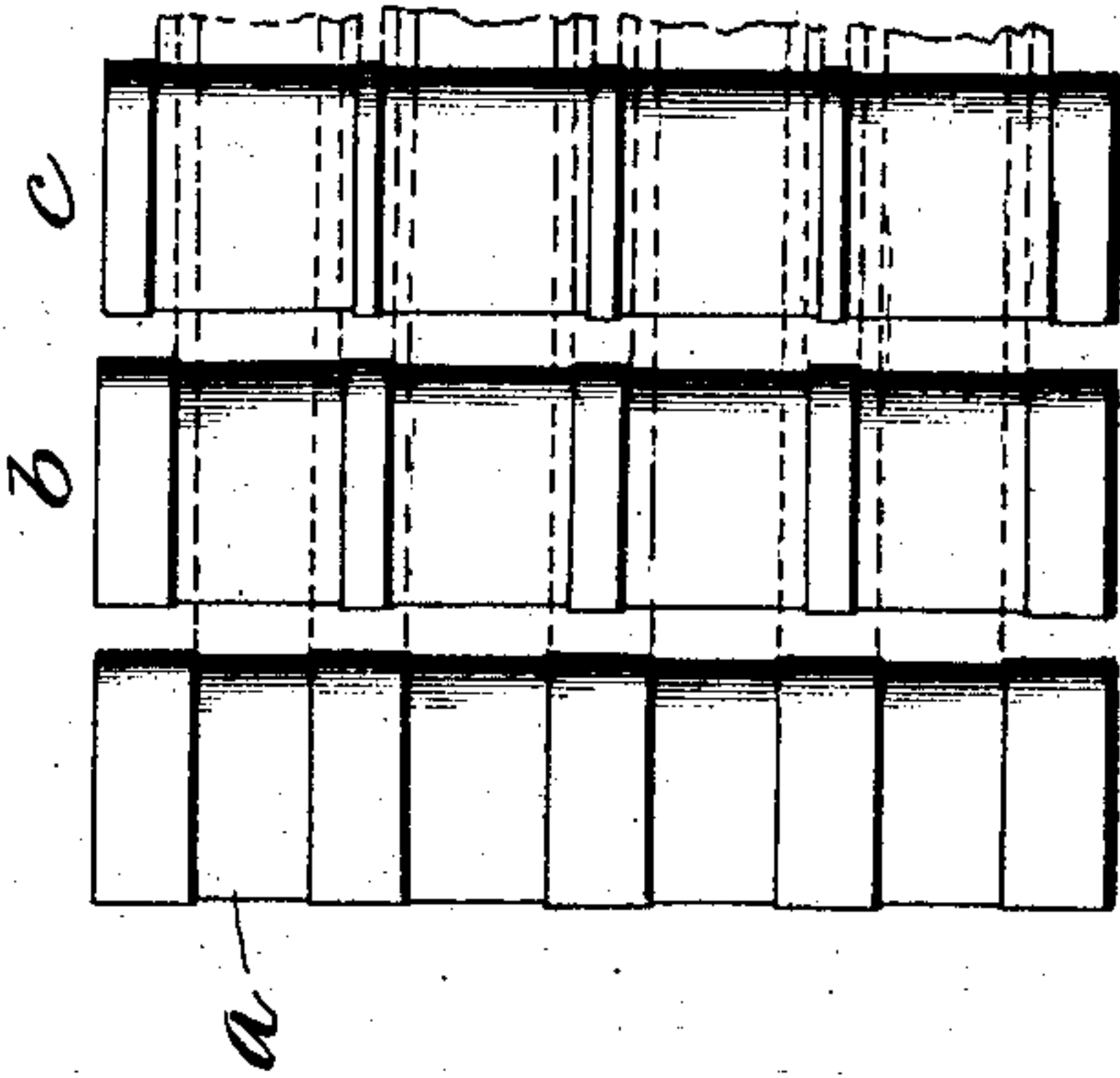
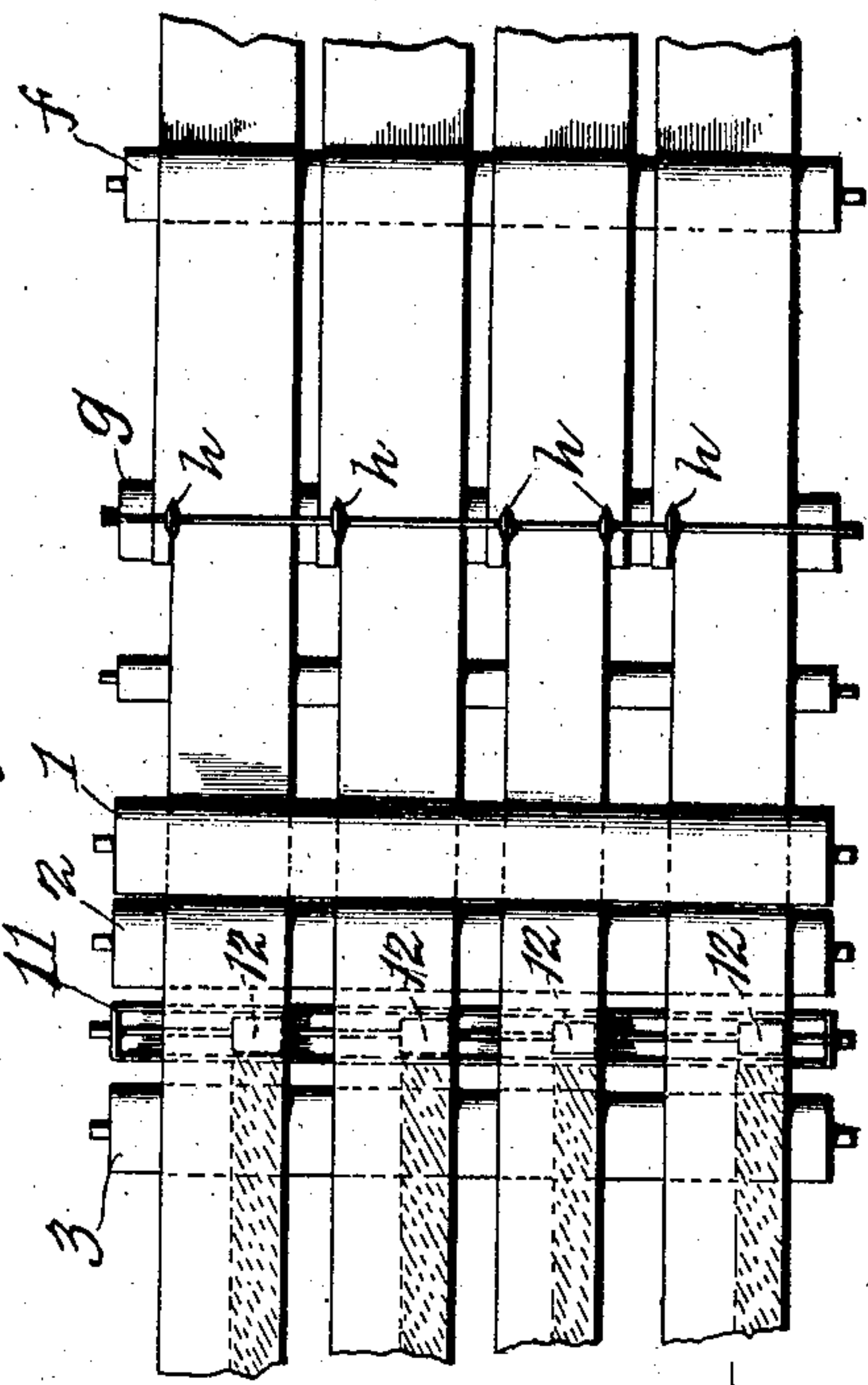


FIG. 2.



Witnesses

J. P. Coffin  
J. P. Coffin

Inventor  
Raymond S. Case.  
By Jenkins & Barker.  
Attorneys



# UNITED STATES PATENT OFFICE.

RAYMOND S. CASE, OF UNIONVILLE, CONNECTICUT.

## PROCESS OF MAKING PAPER.

SPECIFICATION forming part of Letters Patent No. 768,422, dated August 23, 1904.

Application filed July 23, 1902. Serial No. 116,600. (No specimens.)

*To all whom it may concern:*

Be it known that I, RAYMOND S. CASE, a citizen of the United States, and a resident of Unionville, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Processes of Making Paper, of which the following is a specification.

The invention relates to processes of manufacturing paper, and more particularly to improvements in such processes embodying methods of forming a plurality of continuous webs of paper made up of several plies.

The object of the invention is to produce simultaneously a number of webs of paper of uniform character and width in continuous lengths, each web having its edges graduated and thinner than the body of the web.

A further object of the invention is to provide, in connection with the process of forming a plurality of webs of paper having several plies, means for cutting one or both edges of said webs to predetermined widths and subsequently subjecting said webs to a drying process.

A still further object of the invention is to provide, in connection with the method of forming a plural number of webs and trimming the same, a process of coloring or dyeing a portion of the webs simultaneously during the process of its manufacture.

Referring to the drawings, Figure 1 is a diagrammatic view illustrating the method of carrying out the improved process. Fig. 2 is a detail diagrammatic plan view showing the method of applying the die or color to said webs. Fig. 3 is a plan view of a series of cylinder-molds.

In manufacturing paper for certain purposes—as, for instance, paper to be used in the manufacture of tubes—it has been the practice to form said paper in a single web extending across the width of the mold or wire and in some instances forming said web of a series of plies with thick and thin portions extending lengthwise of the web. Such webs have after being passed through a drying process been trimmed or cut into longitudinal strips and subsequently cut into sheets of the required size to form a tube. It has also been

the practice to form a single web of paper the entire width of the machine having plied portions giving, in effect, strips of thick and thin paper and slitting this wide sheet at the thin points to provide continuous webs of paper having graduated edges.

In the manufacture of tubes and rolls it is almost imperative that the edges of the sheet which is wound into a roll be gradually thinned down, so that as the tube or roll is formed a smooth and even joint shall be formed at the beginning and end of the roll. It is also imperative in certain classes of tubes—as, for instance, those used for shot-shells or cartridges—to secure absolute uniformity in the width and characteristic of the paper used, as well as the graduated edges. Such tubes must of course conform practically to fine gage in order that they will not bend in use. It is to provide a process for making paper of this sort that the present invention is directed, and as the several webs of material are formed simultaneously and are distinct webs and as these webs are trimmed as to one or both edges before being subjected to a drying process very even and uniform webs of paper are formed. The paper-webs being of absolute uniformity and width when rolled into tubes produce a most perfect product and obviate all necessity of varying the tube-winding machines to compensate for variations in the paper-sheets which are rolled thereon.

Referring to the drawings, *a*, *b*, and *c* denote cylinder-molds which coöperate with press or coucher rolls *a'*, *b'*, and *c'* and a wet apron or felt *d* to lay and form the several webs of paper. This apron *d* takes up the stock which is laid thereon by the cylinder-molds *a*, *b*, and *c*, and the several webs which are thus simultaneously formed are carried along the apron and passed between primary press-rolls *e*, where the stock is compacted. These webs are subsequently passed through secondary press-rolls *f*, which still more compact the material of the several rolls. After leaving the second press-rolls the several webs which have been formed are passed over a roll *g*, and above this roll are located cutters *h*, which may be adjustable and are designed to trim either one or both



edges of the partially-finished webs of paper to any desired and predetermined width.

The main portion of the web after being subjected to the action of the trimmers or cutters 5 *h* is passed forward and subjected to the action of driers *i*, which in the present instance are designated as "drier-rolls," although the form of drying apparatus is entirely immaterial. As shown herein, however, the drying apparatus consists of a series of rolls 1, 2, 3, 4, 5, 10 6, 7, 8, 9, and 10, and intermediate the rolls 2 and 3 there is arranged a color-box 11, provided with color-rolls, as 12, which contact with the lower or under surface of the webs 15 of paper which are in a partially-finished condition and lay thereon the dye or coloring. The clipped portions of the web are carried about the roll *g* and between it and a small guide-roll *k*, which carries away the clippings. 20 Of course it is to be understood that all of the mechanism is suitably connected with driving means by which it is properly actuated.

In manufacturing the paper to be subsequently used in the manufacture of tubes it is 25 not essential and under some conditions not desirable that both edges of the web of paper from which the tube is to be formed shall be trimmed. If the edge which appears at the outside of the tube is trimmed, it is all suffi- 30 cient, and the inner edge may be left as it comes from the machine—a deckle edge. This arrangement provides a very smooth lap at the inside of the tube and a slightly and smooth connection at the outside.

To simultaneously produce a plural number 35 of webs, each composed of one or more plies, the several plies are individually formed and are of different widths, so that the finished web formed by uniting the several plies has at 40 each edge graduated edges varying in thickness from one to several plies, while the body of the web is of course of a thickness equal to the aggregate number of plies.

To produce such webs, a series of cylinder- 45 molds are used, and these molds are provided with a peculiar arrangement of deckles, whereby each mold produces a series of individual webs of various widths.

As illustrated in Fig. 3, the roll *a* produces 50 the narrowest webs, which as they reach the roll *b* are united with webs of a still greater width and passing on united with said webs are merged into the webs formed upon the cylinder-mold *c*, which latter are of course of a 55 greater width than either of the others. From the mold *c* the series of webs composed of several plies pass on in continuous lengths through pressing, trimming, and coloring processes. It is to be noted that the several 60 webs are simultaneously formed and that the series of plies are also simultaneously formed and yet each ply is made up individually and varies in width as compared with succeeding plies. The result in the finished webs is ob- 65 vious, as the greater portion of the web will

be comparatively thick, while its edges are stepped down to a degree dependent upon the thickness of the widest ply.

A great saving is effected in the manufacture of paper to be used for tubes by coloring 70 only a portion—say half the width—of the web. Obviously as a sheet of paper is rolled into shape to form a tube the outside of the roll is all that it is necessary to cover, and thus by dyeing half the web a great sav- 75 ing is effected.

This process of coloring gives a finer product than the process in which an overlaid edge having different characteristics as to color is 80 used. When the overlaid edge is applied and formed practically integral with the web, deckles must be relied upon to bring the two different substances into intimate relation, and it is impossible to make the deckles so 85 that the material of different character will meet the material of the body portion of the sheet. As a result there is a thickened portion at the union of the two substances, which 90 when rolled into a shell or tube for shells and compressed and burnished gives an uneven and very disagreeable appearance to the tube. 95

While the process has been described herein and illustrated in connection with a cylinder-machine, it is apparent that numerous 100 changes in details of machine used might be made without departing from the spirit of the invention, which contemplates the simultaneous formation of two or more independent webs of paper composed of a series of plies, 105 which plies are individually formed and all of different widths, so that the independent finished webs have their edges graduated in thickness, the several plies of narrowest width being first formed side by side upon the same cylinder-mold and applied to a blanket and the 110 succeeding plies being simultaneously formed side by side upon independent molds and applied to the blanket over the next preceding series of plies.

The invention further contemplates combining 115 with the above means for trimming one or both edges of the ply and, if desired, coloring a portion of the web.

One of the very material features in the within-described process resides in the great 120 saving which is effected by trimming these webs of paper while in an unfinished and wet condition, for it is a fact that by trimming them in the manner described it is possible to form the deckle edges of less width and trim 125 less stock from the web. Where a web of paper is first dried and then cut or trimmed, the weaving and wandering of the web through the drying mechanism necessitates making a trim of greater width than in the method here- 130 in described, and to allow for the variations which are caused by the weaving and wandering of the web during the ordinary process of manufacture a wider deckle edge has to be used. Furthermore, after the web has been passed



through the drying process and then trimmed it is much more expensive to rework the trimmings, for it is apparent that the trimmed edges which are removed from the wet webs being in an unfinished condition may be very readily worked over, and this with a great saving in cost. A further material feature of the improved process resides in the capacity for producing a series of webs of paper each having graduated edges and maintaining an absolute uniformity of width in the finished product and at the same time preserving a uniform characteristic as to strength, thickness, gage, and every other quality of similarity.

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

1. In the art of paper-making, the process of simultaneously forming side by side upon the molds of a single machine a plurality of independent, complete webs of paper composed of a series of plies of different widths, each series of plies being individually and simultaneously formed side by side upon the same cylinder-mold, and each series of plies being successively laid one upon the other, whereby a series of plied webs are simultaneously produced, each independent of the other and each having its edge graduated in thickness, said plied webs being subjected to identically the same conditions during manufacture.

2. In the art of paper-making, the process of simultaneously forming side by side in the same machine a plurality of disconnected and separate bevel-edged webs of paper of uniform character, consisting in the gathering of the pulp from the pulp-vat and simultaneously forming it into a plurality of independent webs or plies, gathering the pulp from the pulp-vat and simultaneously forming it into a second series of webs or plies of a width different from the width of the first-formed plies, and laying the first-formed plies and the second-formed plies one upon the other and continuing this series of overlaid webs or plies to the desired extent to form a plurality of independent, bevel-edged webs of paper subjected to identical treatment, substantially as set forth.

3. In the art of paper-making, the process of simultaneously forming side by side upon a traveling apron a series of independent, disconnected, bevel-edged webs of paper of uniform character, consisting in gathering the pulp from the pulp-vat and simultaneously forming it into a plurality of independent plies or webs, which plies or webs are laid side by side upon a blanket, gathering the pulp from the pulp-vat and simultaneously forming it into another series of plies or webs, each of a greater width than those of the first-formed webs and laying them side by side upon the blanket, the second-formed series of webs overlying the first-formed series and con-

tinuing the series of formations, gradually increasing in width to the desired extent to form a series of bevel-edged strips of paper of uniform character, subjected to identical conditions, substantially as described.

4. In the art of paper-making, the process of simultaneously forming upon a single traveling apron a series of disconnected and bevel-edged webs of paper of uniform character, consisting in the gathering of pulp from the pulp-vat and simultaneously forming it into a plurality of independent webs or plies, which webs or plies are laid upon the blanket, gathering the pulp from the pulp-vat and simultaneously forming it into a second series of webs or plies of greater width than those of the first-formed webs and laying said second series of webs or plies upon the blanket overlying the first-formed series, and continuing the series of formations, gradually increasing in width to the desired extent to form a series of bevel-edged strips of paper, and the trimming or cutting of the edges of each plied web of bevel-edged paper after pressing it before it is subjected to the driers and subjecting said webs of paper simultaneously to the same drying action.

5. In the art of paper-making, the process of simultaneously forming upon a single traveling apron a series of disconnected and bevel-edged webs of paper of uniform character, consisting in the gathering of pulp from the pulp-vat and simultaneously forming it into a plurality of independent webs or plies, which webs or plies are laid upon the blanket, gathering the pulp from the pulp-vat and simultaneously forming it into a second series of webs or plies of greater width than those of the first-formed webs and laying said second series of webs or plies upon the blanket overlying the first-formed series, and continuing the series of formations, gradually increasing in width to the desired extent to form a series of bevel-edged strips of paper, and the trimming or cutting of the edges of each plied web of bevel-edged paper, partially drying said webs simultaneously and simultaneously applying color to said webs prior to completely drying them, whereby a series of uniform webs of paper with bevel edges are formed, substantially as described.

6. In a continuous process of making paper, the formation upon the same cylinder-machine of a plurality of independent and separate webs of paper side by side, each web consisting of a plurality of plies, each of the plies of the web being simultaneously formed upon a cylinder-mold and laid upon a single blanket and the several succeeding plies being formed side by side upon separate molds and laid successively over the plies formed upon the first-named mold of the series, the plied webs being thus simultaneously carried upon the single blanket and simultaneously subjected to the action of pressing devices and to the action of



driers whereby a plurality of webs of paper of uniform width and character may be simultaneously produced.

7. In the process of making paper, the simultaneous formation of a plurality of films or plies upon the surface of the same cylinder-mold, laying said plies upon a traveling apron or blanket, the successive formation of similar series of plies upon molds having making-surfaces registering with those of the next preceding roll whereby the successively-formed plies are laid upon a single blanket or apron one over the other and the subsection of the several plied webs thus simultaneously formed side by side upon the blanket to a drying process whereby a plurality of independent webs of paper of absolutely uniform character and of comparatively narrow widths are simultaneously produced.

8. As a new article of manufacture, paper formed in bevel-edged sheets that are of uniform character as to width, texture, finish and their bevel edges, the sheets, from their longitudinal centers to the commencement of their tapering or bevel-edged parts, being of uniform thickness, these characteristics being

secured by making a plurality of complete sheets simultaneously in a single machine, and each sheet being composed of a series of plies or layers of paper-stock of different widths superposed one on the other so as to form the bevel edges of the complete sheets.

9. As a new article of manufacture, paper formed in bevel-edged sheets that are of uniform character as to width, texture, finish, and their bevel edges, the sheets, from their longitudinal centers to the commencement of their tapering or bevel-edged parts, being of uniform thickness throughout, these characteristics being secured by making a plurality of complete sheets simultaneously in a single machine, each sheet being composed of a series of plies or layers of paper-stock of different widths superposed one on the other so as to form the bevel edges of the complete sheets, and a portion of each sheet along one edge being colored.

RAYMOND S. CASE.

Witnesses:

ARTHUR B. JENKINS,  
WM. H. BARKER.