No. 759,862. PATENTED MAY 17, 1904.

R. S. CASE.

PAPER MACHINE.

APPLICATION FILED MAY 20, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 3.

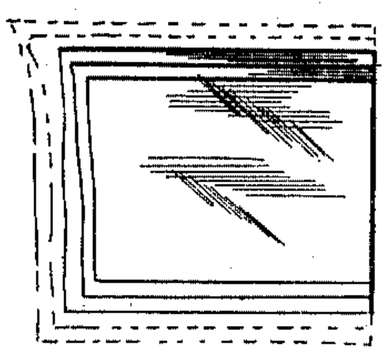


Fig. 2.

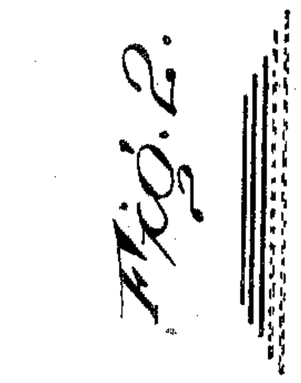


Fig. 1.

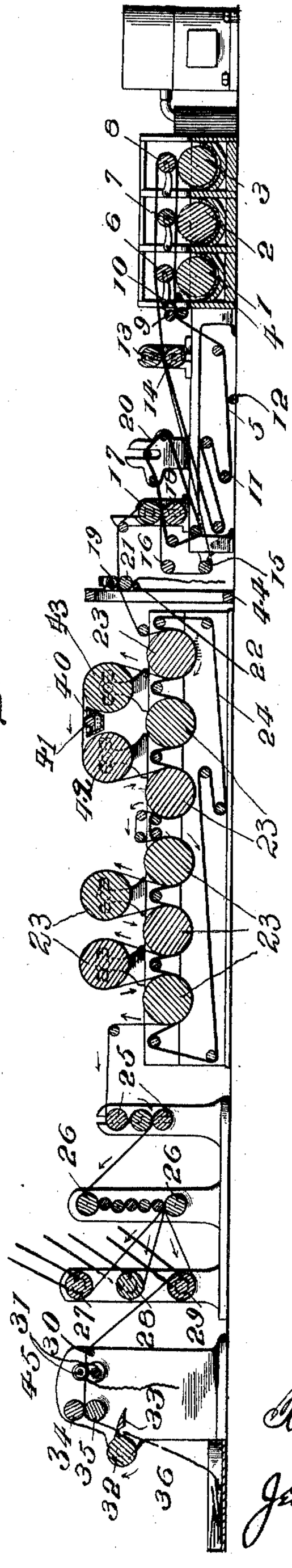
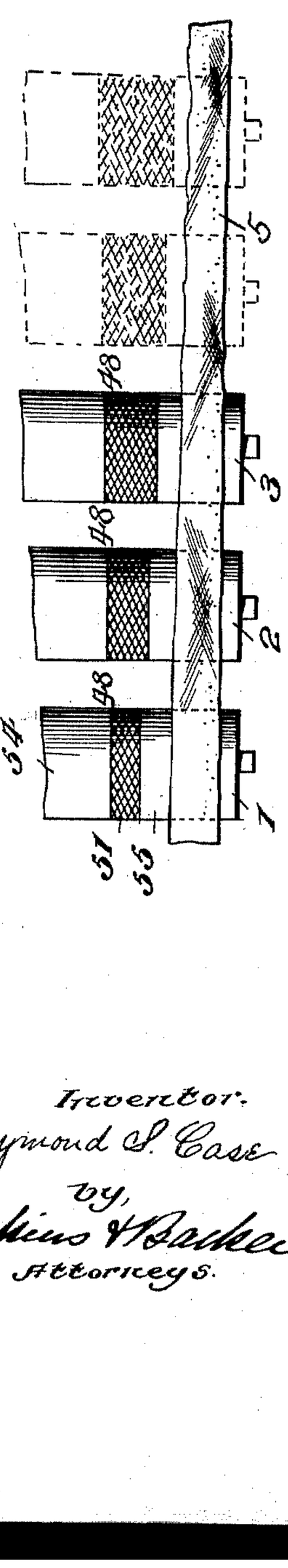


Fig. 4.



Witnesses.

Jno. Dennis

Geo. B. Pitts.

Inventor.

Raymond S. Case

by,

Jenkins & Parker.

Attorneys.

No. 759,862. PATENTED MAY 17, 1904.

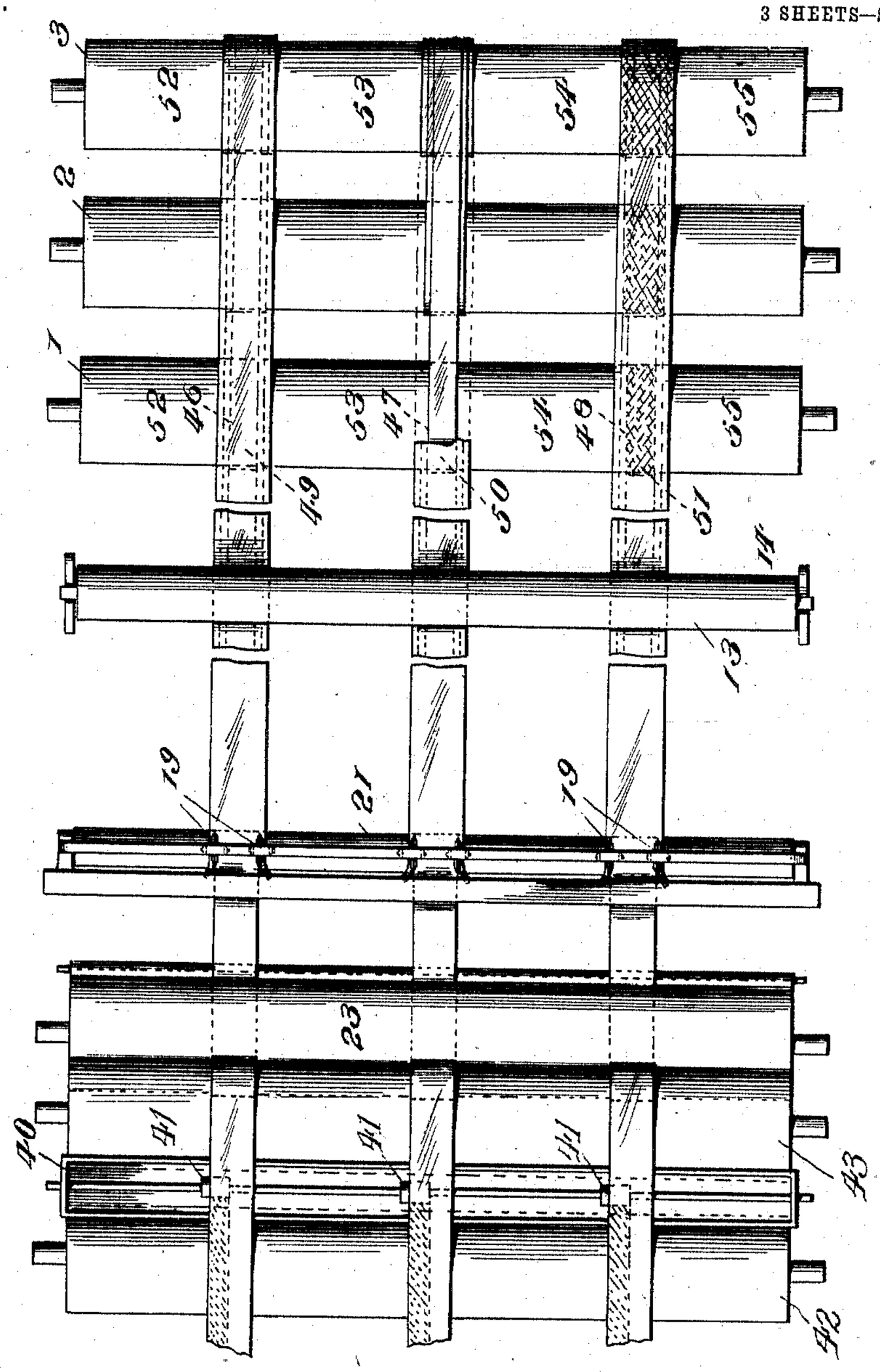
R. S. CASE.

PAPER MACHINE.

APPLICATION FILED MAY 20, 1903.

NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.



Witnesses.
Geo. B. Pitts.

Inventor.
Raymond S. Case
by,
Jenkins & Baker
Attorneys.

No. 759,862. PATENTED MAY 17, 1904.

R. S. CASE.

PAPER MACHINE.

APPLICATION FILED MAY 20, 1903.

NO MODEL. 3 SHEETS—SHEET 3.

Fig. 6.

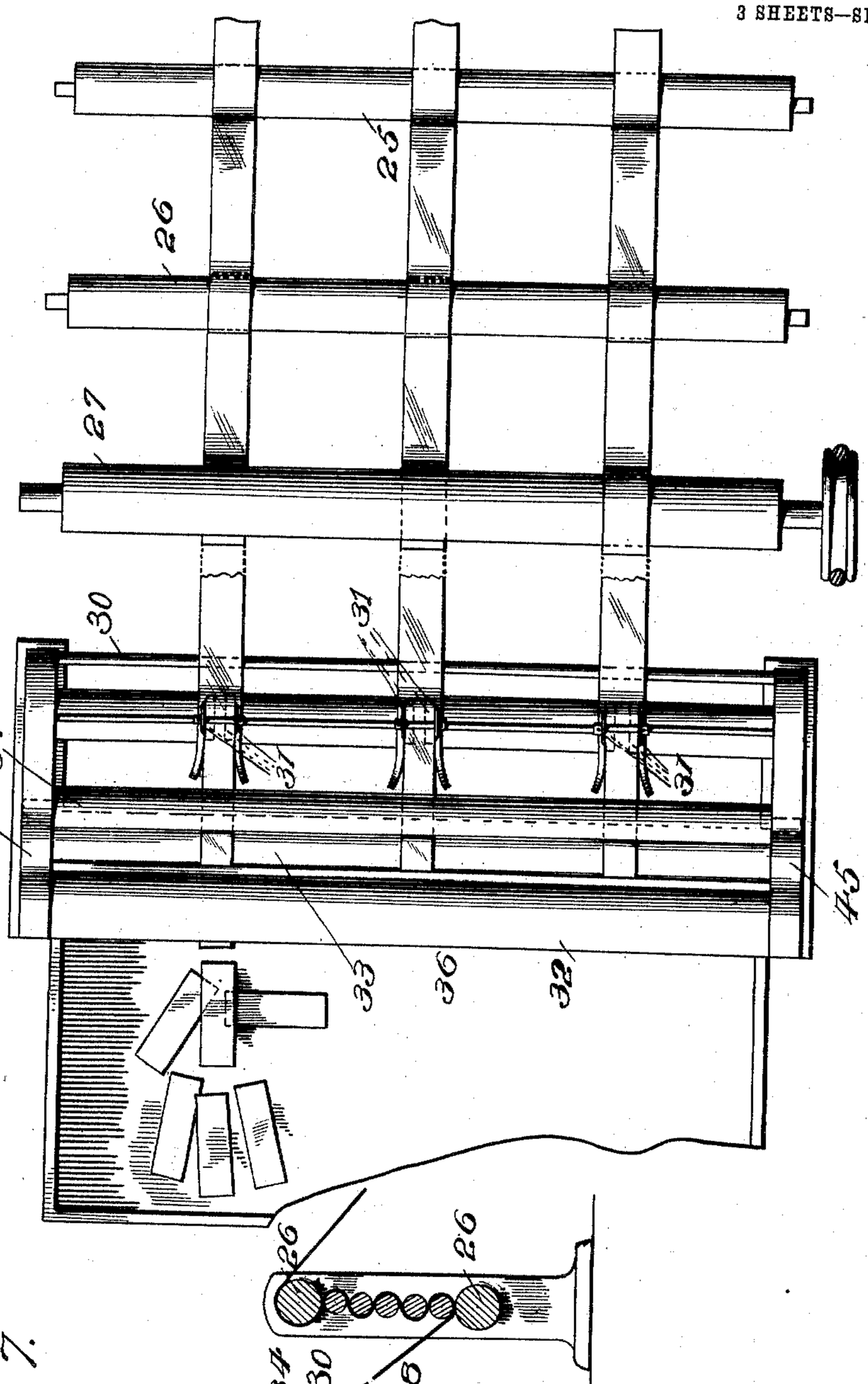
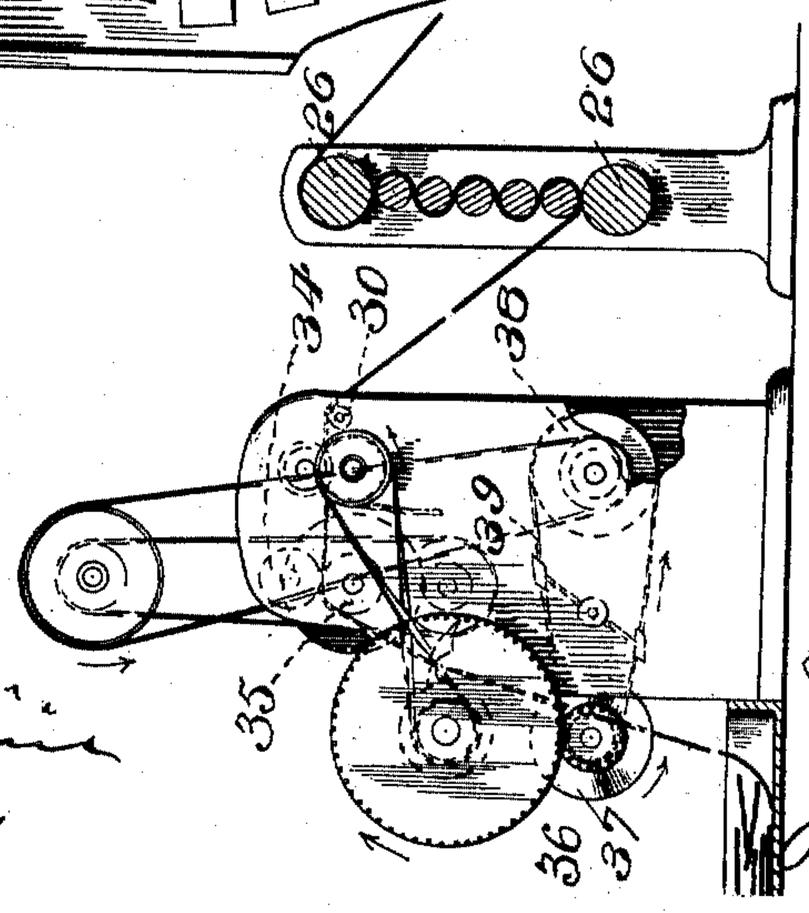


Fig. 7.



Witnesses.
Geo. B. Pitts.

Inventor.
Raymond S. Case
by,
Jenkins & Barker
Attorneys.

No. 759,862. Patented May 17, 1904.

UNITED STATES PATENT OFFICE.

RAYMOND S. CASE, OF UNIONVILLE, CONNECTICUT.

PAPER-MACHINE.

SPECIFICATION forming part of Letters Patent No. 759,862, dated May 17, 1904.

Application filed May 20, 1903. Serial No. 157,888. (No model.)

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 Paper-Machines, of which the following is a specification.

The invention relates to improvements in paper-machines, and more particularly to machines particularly adapted for making paper designed to be used in the manufacture of rolled paper tubes, the specific purpose of the paper being for cartridge use.

The objects of the invention are to so construct a paper-making machine that a plurality of strips of paper having beveled edges or margins may be simultaneously produced at comparatively small cost, at the same time maintaining the individuality of the simultaneously-formed sheets and carrying them independent of one another throughout the entire process of their manufacture.

A further object of the invention is to produce a single machine that will produce a plurality of paper strips having beveled edges or margins, which strips are simultaneously though independently formed and are maintained as separate and independent strips from the beginning to the end of the process of their manufacture and are trimmed as to their edges and colored as to a portion of their width simultaneously and while maintained in independent relation.

The machine embodying the invention comprises a series or plurality of pulp-forming cylinders so arranged and constructed that the series or plurality of independent and separate pulp layers or films gradually increasing in width are formed on the several cylinders. The narrowest is formed upon the first cylinder, the layer or film of next width upon the next, and a still wider film or layer upon the third, and so on through the whole series of pulp-forming cylinders. A traveling blanket is used in connection with the pulp-forming cylinders, and the several cylinders each apply its film or web to the blanket to form a plurality of separate and independent strips each consisting and built up of layers or films superimposed one on the other and of gradually-increasing width. Combined with the above-designated parts are means for trimming one or both edges of each of the independent strips, means for drying said strips, means for coloring a portion or the whole of the strips, and means for collectively or independently winding the several formed strips.

In the accompanying drawings, Figure 1 represents a side elevation of the improved paper-making machine, parts of the same being shown in a vertical section and parts being somewhat diagrammatically represented. Fig. 2 represents a cross-sectional view of one of the independent strips simultaneously formed by the machine. It is understood that the layers are represented by a line separated to show the different layers. Fig. 3 is a plan view of a portion of one of the strips shown in Fig. 2, illustrating the different widths of the layers of films, three layers being shown in full lines and successive layers in dotted lines. Fig. 4 is a plan view of portions of the pulp-gathering cylinders, illustrating the increasing width of the pulp-gathering portions on the successive cylinders, three cylinders being shown in full lines and further cylinders, if used, illustrated in dotted lines. Fig. 5 is a detail view, somewhat in diagram, of the pulp-gathering cylinders, the trimmers for cutting the individual webs, and drying-rolls arranged in advance of the cutters or trimmers. Fig. 6 is a diagrammatic view in plan of the calendering-rolls, winding-roll, and trimmers, and the latter may be used to trim the strips after they are dried. There is also illustrated a cutter for cutting the continuous strips into sheets. Fig. 7 illustrates a modified arrangement by which the strips may be cut without being wound into rolls, being passed directly from the calenders to the sheet-cutting mechanism.

Referring to the drawings, 1, 2, and 3 represent gathering-rolls rotarily mounted to work through the pulp material held in a suitable receptacle 4 with relation thereto. These rolls are immersed in the pulp, and above them is mounted a traveling apron 5, supported on suitable guide and stretch rolls and adapted to contact as to its lower reach with the upper peripheral surfaces of the rolls 1

2 3. The upper portion of this blanket is carried over rolls 6 7 8, which press the lower reach of the blanket into contact with the surface of the rolls 1 2 3. Suitable rolls, as 9 10, squeeze the moisture from the traveling apron before it passes into contact with the pulp-gathering rolls, and a stretch-roll 11 and guide-roll 12 are arranged to adjust the tension and guide the traveling apron in its movement. The traveling apron, with the films of material laid thereon, passes through press-rolls 13 14, whereupon the webs of material are led away from the apron about guide-rolls 15 16 and through press-rolls 17 18 to trimmers or cutters 19. A traveling apron 20, suitably mounted upon rolls, also passes through the press-rolls 17 18 with the strips of material. The trimming device comprises a series of cutters 19, coöperating with a roll 21, and may be arranged to trim one or both edges of the strips of material as they pass from the traveling apron toward the drying apparatus. Operatively arranged with relation to the roll 21 is a roll or series of rolls 22, which insure the removal of the shavings which are clipped or trimmed from the edges of the strips. The shavings pass about the roll 21 and are guided off by the roll 22. After passing through the trimmers the several webs are carried about the drying-rolls 23, which may be arranged in any desired manner and heated by any suitable medium. Supported below these rolls is a traveling apron 24, which holds the webs of material in contact with the peripheral surfaces of the rolls. From the drying-cylinder the webs of material pass about calender-rolls 25 26 and from them to the reel or reels of the winder. All three or whatever number of webs of material are made simultaneously may be wound upon a single reel, though they are preferably wound on independent reels or rolls 27 28 29, suitably belted or geared to be driven at a speed which will insure proper tension in the winding of each of the individual and independently-formed webs of material. From the winding-rolls 27 28 29 the webs (if not previously trimmed as to their edges) may be carried over a roll 30, through coöperating trimmers 31, which may be arranged to trim either one or both edges of each of the independent strips or webs. If desired, the webs may then be carried forward through feeding-drums 34 35 and cut into sheets of predetermined length by a cutting mechanism 36. As shown herein, the cutting mechanism comprises a rotary cutter 32, coöperating with a stationary blade 33, although it is obvious that any form of cutter known in the art might be used to take the place of this described arrangement. In fact, the cutter may be wholly dispensed with and the several independent webs of material may be wound into rolls ready to be shipped, and it is not at all essential that the material be first wound upon the winding-drums 27 28 29 and then subjected to the sheet-cutting mechanism. By arranging the feeding-drums 34 35 so that they will have a peripheral speed equal to the peripheral speed of the calender-rolls and the movement of the webs of material the several webs may be passed directly from the calender-rolls to the sheet-cutting mechanism 36, and of course a differential-speed mechanism, such as illustrated in Fig. 7, may be used for varying the relative speed of the cutting mechanism 36 and feed-drums 34 35, whereby the webs of material may be cut into sheets of any desired length. Any form of differential-speed mechanism may be used—as, for instance, a pair of cones 37 38, with a shiftable connecting-belt 39—the position of which may be varied to vary the relative speeds of the feeding-drums and cutting mechanism 36. Of course it is understood that all of the several parts of the mechanism, including the several series of rolls, are mounted in suitable bearings carried upon suitable frames.

The numeral 40 denotes a color-box, and 41 rolls for applying color to the several individually-formed strips or webs of material. This color-applying mechanism is preferably located between two of the dry-rolls 42 43, whereby the several webs of paper are partially dried before the color is applied. There is an advantage in so placing the color-box; but it is obvious that the color might be applied at any time during the process of forming the several independent webs of material. There is, however, a special advantage in placing the trimming rolls or cutters in such position that the edges of the several independently-formed webs will be trimmed before the webs pass through the drying mechanism, inasmuch as the trimmed material may be utilized more readily for forming new pulp and the several webs may be trimmed to varying widths, which will insure their proper and identical shrinkage and uniformity of width when subsequently dried. It is apparent that the cutting or trimming mechanism may be located, as at 44, if the material is to be cut before it is dried, or at 45, provided it is to be trimmed after being dried and calendered.

The pulp-receptacle 4, as above stated, is designed to contain paper-pulp in a fluid or plastic state, and of course it is apparent that it may be so arranged that the pulp adjacent to each of the forming-rolls 1 2 3 may be of the same quality or color, or pulps of different qualities or colors may be arranged adjacent to each of said rolls. The rolls 1 2 3 and if more rolls are used each have their peripheries divided into annular pulp-gathering sections 46 47 48, arranged to gather the fluid pulp in which they are immersed and to deposit said pulp in films or layers upon the traveling blanket or apron 5. The formation of the rolls is such that the periphery of the several rolls has annular portions consisting of

screens of wire-cloth or other foraminated material, as 49 50 51, and the rolls are preferably provided as to their entire periphery with foraminated material, portions of which are covered in any suitable manner, as with "deckles" 52 53 54 55, which prevent the formation of the film or web except on the open portion of the rolls 49, 50, and 51. The gathering-surface of each of the rolls is comparatively narrow; but the width of the gathering-surface upon each succeding roll of the series is wider than the next preceding, whereby a comparatively narrow web or film is formed on the roll 1, a wider film on the roll 2, a still wider film on the roll 3, and so on through the whole series of rolls which may be used. Each of these strips or films is deposited upon the traveling apron or blanket 5, one overlying the other and with their edges successively extending beyond the preceding strip and contacting with the surface of the blanket. The movement of the blanket then carries the series of simultaneously-formed strips having a number of plies forward, where they are subjected to the action of the press-rolls, trimmers, and drying mechanism, &c., as above described. It will thus be seen that a plurality of independent and separate compound or plied structures or strips have been formed, each comprising a plurality of layers or films of pulp applied in regular series and of increasing width. The narrowest strips rest upon the face of the blanket or traveling apron 5 and the widest films are uppermost. As the several strips are absolutely independent, although carried upon the same traveling apron or blanket, any mechanical, chemical, or other changes which affect the material as it is formed occur independently although simultaneously in each of the several formed strips, and of course the several strips are simultaneously operated upon, and an unusual uniformity and excellence in the finished product is secured.

The advantages of such a machine are apparent, as by forming the several webs of material simultaneously and in a succession of groups of independent layers of different widths to form a series of compound and absolutely independent structures these independent structures may be simultaneously subjected to the mechanism in such manner that should there be any chemical or mechanical changes in changing the pulp into paper there is no liability of a reaction upon either of the particular strips affecting any of the other strips. Most perfect bevel-edged strips are thus obtained without seriously diminishing the capacity of the machine, and these bevel-edged strips when cut into sheets may be rolled into tubes the walls of which are symmetrical and of equal thickness throughout without having projections.

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

1. A paper-machine comprising a series of rotarily-mounted pulp-gathering rolls, means for holding pulp about said rolls, each roll having a plurality of independent and separated annular pulp-gathering sections, said pulp-gathering sections increasing in width on each succeeding roll, and a traveling blanket upon which the series of pulp layers from the several rolls are deposited one over the other each wider layer upon the corresponding narrower layer of the preceding roll, to form a series of disconnected and bevel-edged strips maintained in independent relation by the traveling blanket.

2. A paper-machine comprising a series of pulp-tanks, pulp-gathering rolls mounted to work in said tanks having each a plurality of independent and separated annular pulp-gathering sections registering those on one roll with the corresponding ones on the other rolls, and increasing in width on the successive rolls—the narrowest sections being on the first roll and so on—and a traveling blanket upon which the series of pulp layers from the several rolls are deposited in superposition, each wider layer from the rolls in advance upon the corresponding narrower layer from the preceeding roll, to form a series of disconnected and separate bevel-edged strips maintained in their independent relation by the blanket, substantially as hereinbefore set forth.

3. A paper-machine comprising a series of pulp-tanks, pulp-gathering rolls mounted to work in said tanks, having each a plurality of independent and separate sections, registering those on one roll with the corresponding ones on the other rolls and increasing in width on the successive rolls—the narrowest sections being on the first roll and so on; a traveling blanket upon which the series of pulp layers from the several rolls are deposited in superposition, each wider layer from the roll in advance upon the corresponding narrower layer from the preceding rolls, to form a series of disconnected and separate bevel-edged strips maintained in their independent relation by the blanket; a drier; and means for delivering said strips in independent condition from the blanket to the drier substantially as hereinbefore set forth.

4. A paper-machine comprising a series of pulp-tanks, pulp-gathering rolls mounted to work in said tank, having each a plurality of independent and separate annular pulp-gathering sections, registering those on one roll with the corresponding ones on the other rolls, and increasing in width on the successive rolls—the narrowest sections being on the first roll and so on; a traveling blanket upon which the series of pulp layers from the several rolls are deposited in superposition, each wider layer from the roll in advance upon

the corresponding narrower layer from the preceding roll, to form a series of disconnected and separate bevel-edged strips maintained in their independent relation by the blanket; a drier; and means for delivering said strips in independent condition from the blanket to the drier; and an independent winder for each strip, substantially as hereinbefore set forth.

5. A paper-machine comprising a series of pulp-tanks; pulp-gathering rolls mounted to work in said tanks, having each a plurality of independent and separate pulp-gathering sections, registering those on one roll with the corresponding ones on the other rolls, and increasing in width on the successive rolls—the narrowest section being on the first roll and so on; a traveling blanket upon which the series of pulp layers from the several rolls are deposited in superposition, each wider layer from the roll in advance upon the corresponding narrower layer from the preceding roll, to form a series of disconnected and separate bevel-edged strips maintained in their independent relation by the blanket, a drier; and means for delivering said strips in independent condition from the blanket to the drier, and devices for independently trimming and winding the several strips, substantially as hereinbefore set forth.

6. A paper-making machine comprising a series of pulp-gathering rolls rotarily mounted with relation to pulp-holding means, each of said rolls having a plurality of independent and separated annular pulp-gathering sections, those on one roll registering with the corresponding ones on the other rolls and increasing in width on the successive rolls, a traveling blanket upon which the series of pulp layers from the several rolls are deposited in superposition, trimmers for trimming one or both edges of the several webs, and means for simultaneously drying the several trimmed webs.

7. A paper-machine comprising a series of pulp-gathering rolls rotarily mounted in suitable pulp-receptacle, each roll having independent and separated annular pulp-gathering sections registering one with another in succession and progressively varying in width, a traveling blanket upon which the series of pulp layers from the series of rolls are deposited in superposition, each wider layer from the roll in advance upon the corresponding narrower layer from the preceding roll to form a series of disconnected and separate bevel-edged strips maintained in independent relation by the traveling blanket, and means for applying color to said strips simultaneously in the manufacture of the several independently-formed strips.

8. A paper-machine comprising a series of rotarily-mounted pulp-rolls, means for holding pulp about said rolls, each roll having a plurality of independent and separated annular pulp-gathering sections, said pulp-gathering sections gradually varying in width on the several rolls, and a traveling blanket upon which the series of pulp layers from the several rolls are deposited one upon the other to form simultaneously a series of disconnected and bevel-edged strips maintained in absolutely independent relation upon the traveling blanket, and means for finishing said independent webs including drying and calendering mechanism.

9. A paper-machine comprising a series of pulp-gathering rolls rotarily mounted with relation to a pulp-holding means, each of said rolls having a plurality of independent and separated annular pulp-gathering sections, gradually varying in width on the several rolls, a traveling blanket upon which the series of pulp layers formed upon each of the cylinders are successively laid one upon the other whereby a plurality of independent, bevel-edged strips of paper are formed simultaneously and maintained in independent relation upon the blanket, driers for simultaneously drying said strips, and a color-box and means for applying the color to the independent strips, said color-box arranged intermediate the drying-cylinders whereby said strips are partially dried before being subjected to the action of the color.

RAYMOND S. CASE.

Witnesses:
WM. H. BARKER,
J. S. BARKER.