

W. Campbell. Sheet 1. 3 Sheets.
Paper Machine.

Nº 92,161.

Patented Jul. 6, 1869.

Fig. 1.

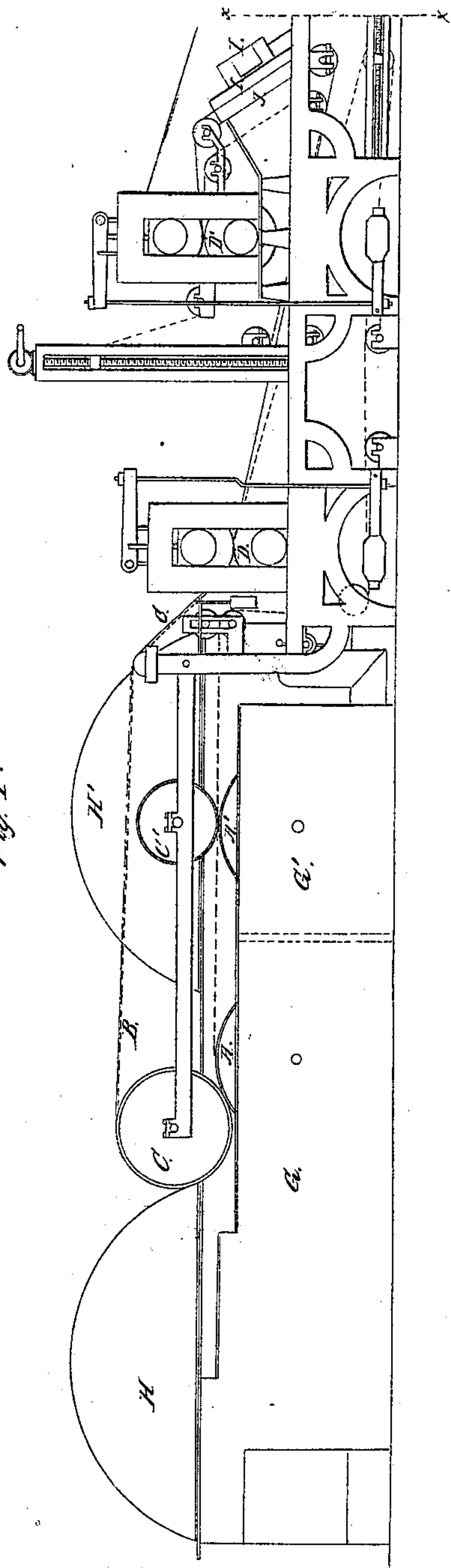
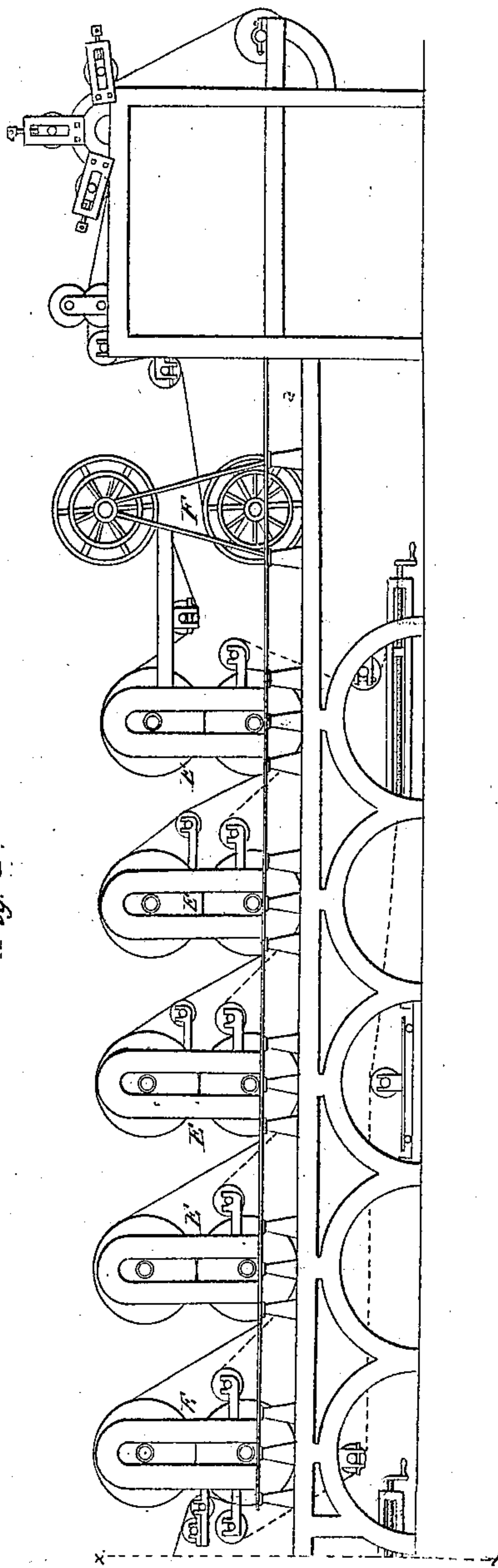


Fig. 2.



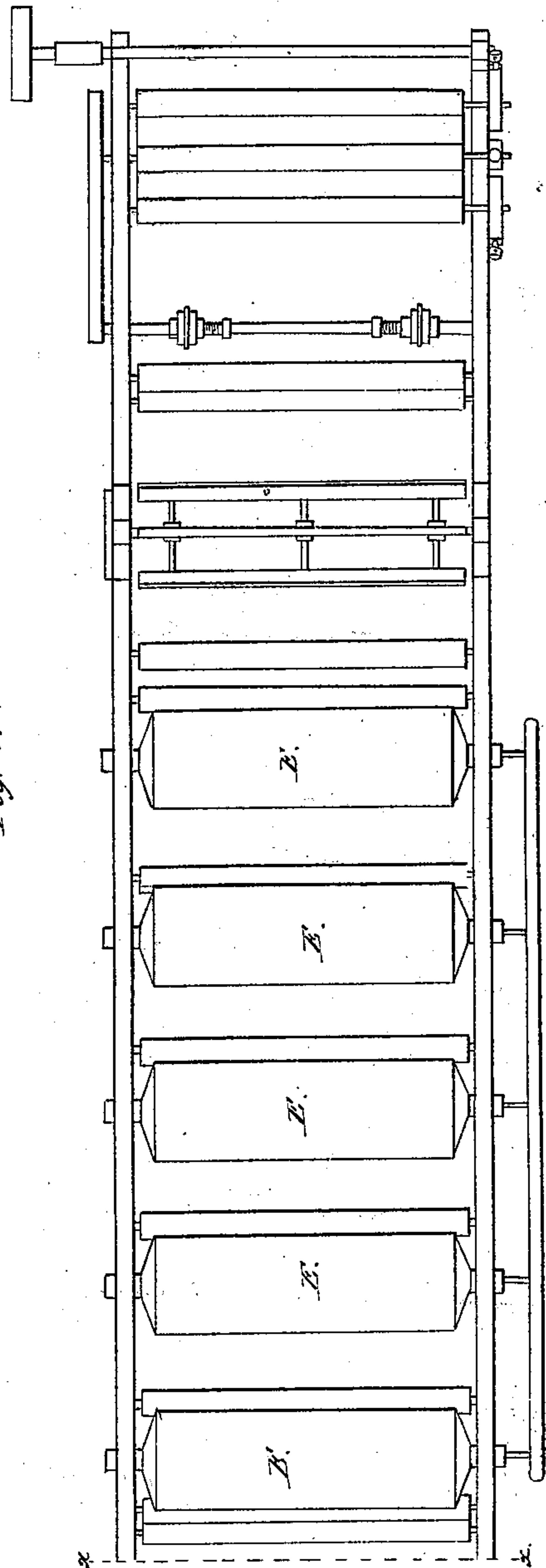
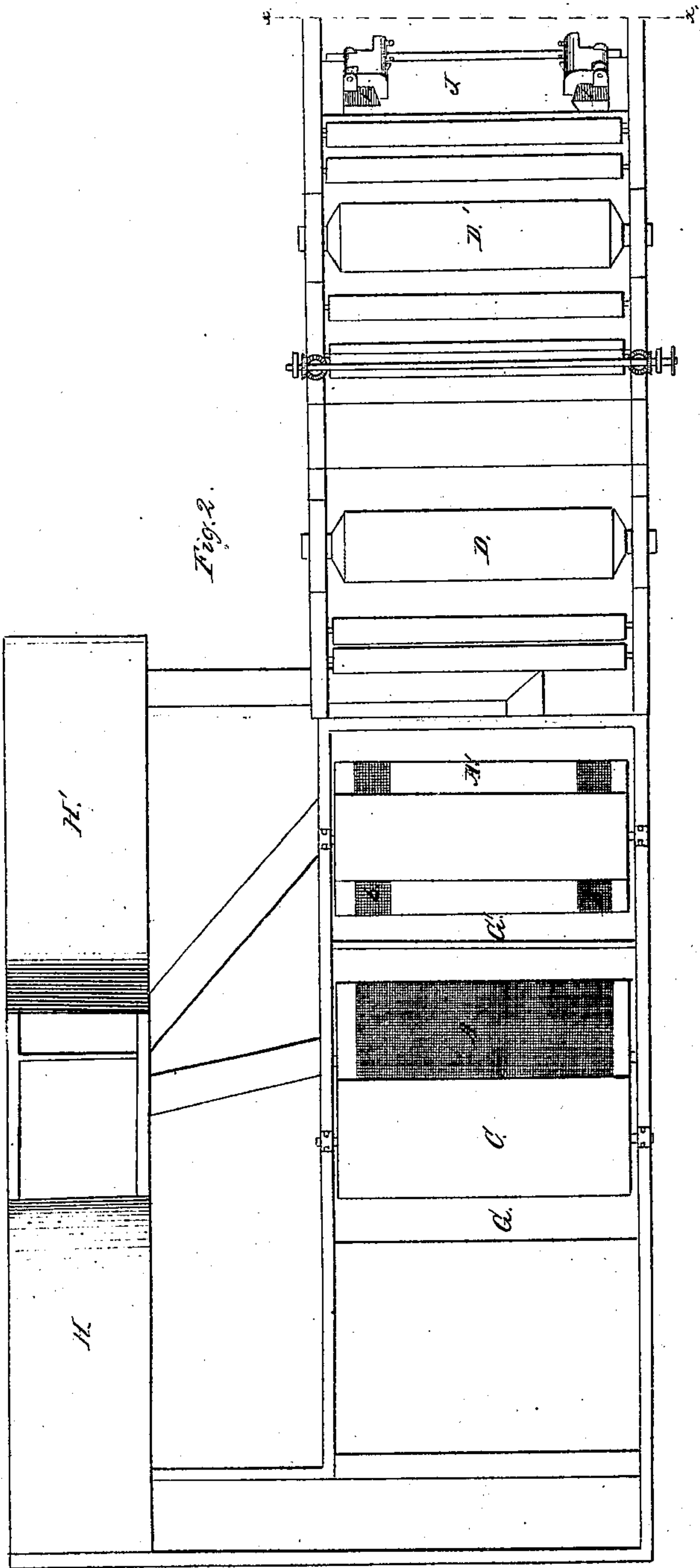
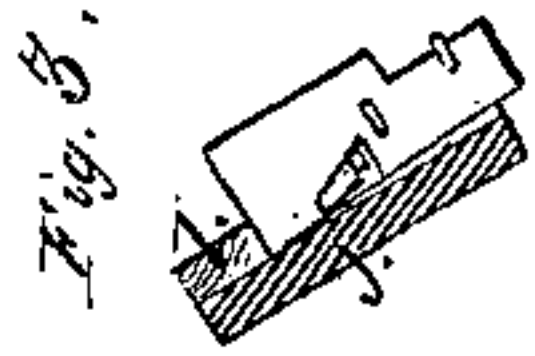
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W. Campbell. Sheet 2. of 3 Sheets.
Paper Machine.

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W. Campbell. Sheet 3 of 3 Sheets.
Paper Machine.

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Fig. 4.

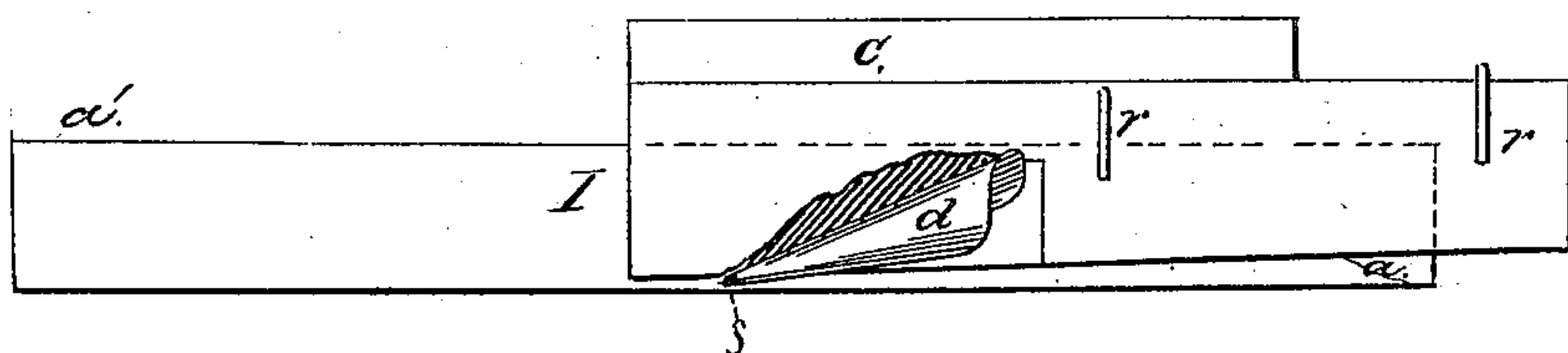


Fig. 5.

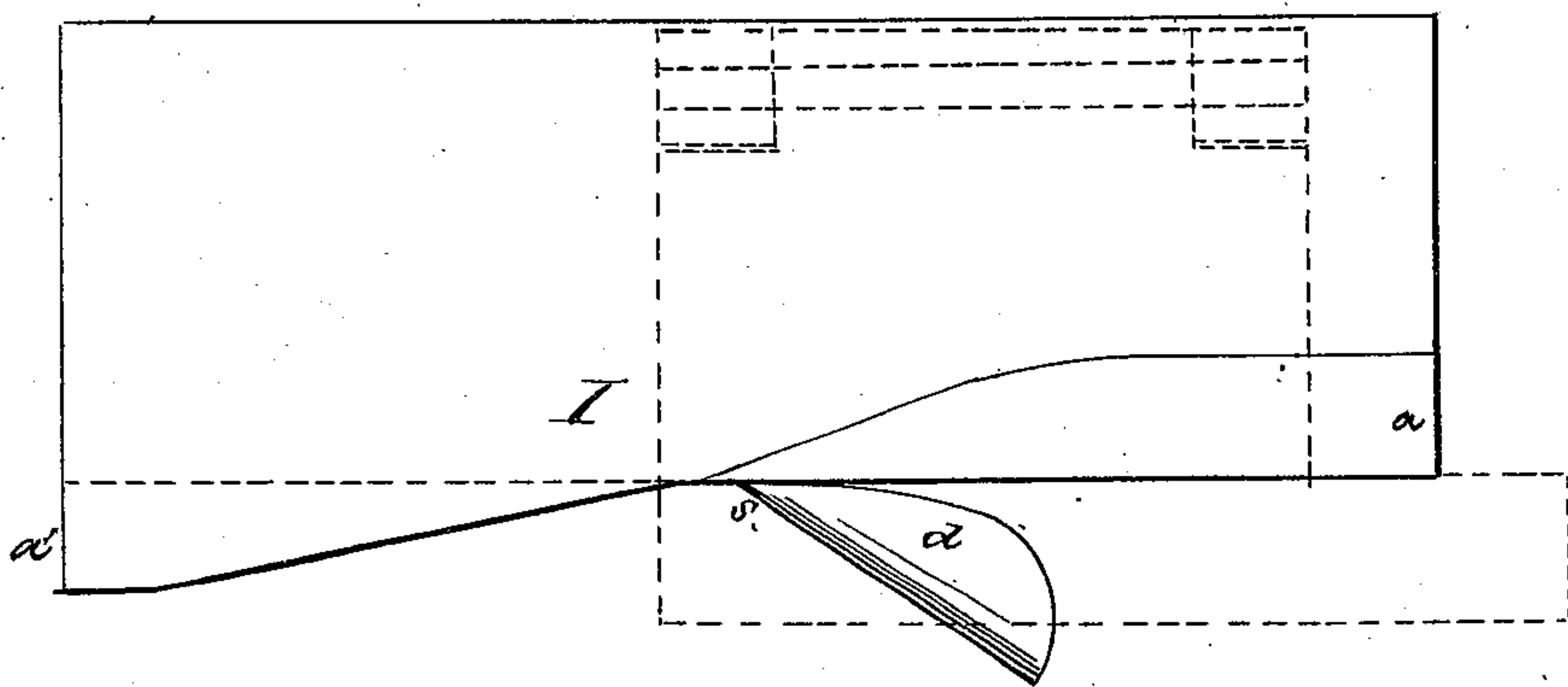


Fig. 6.

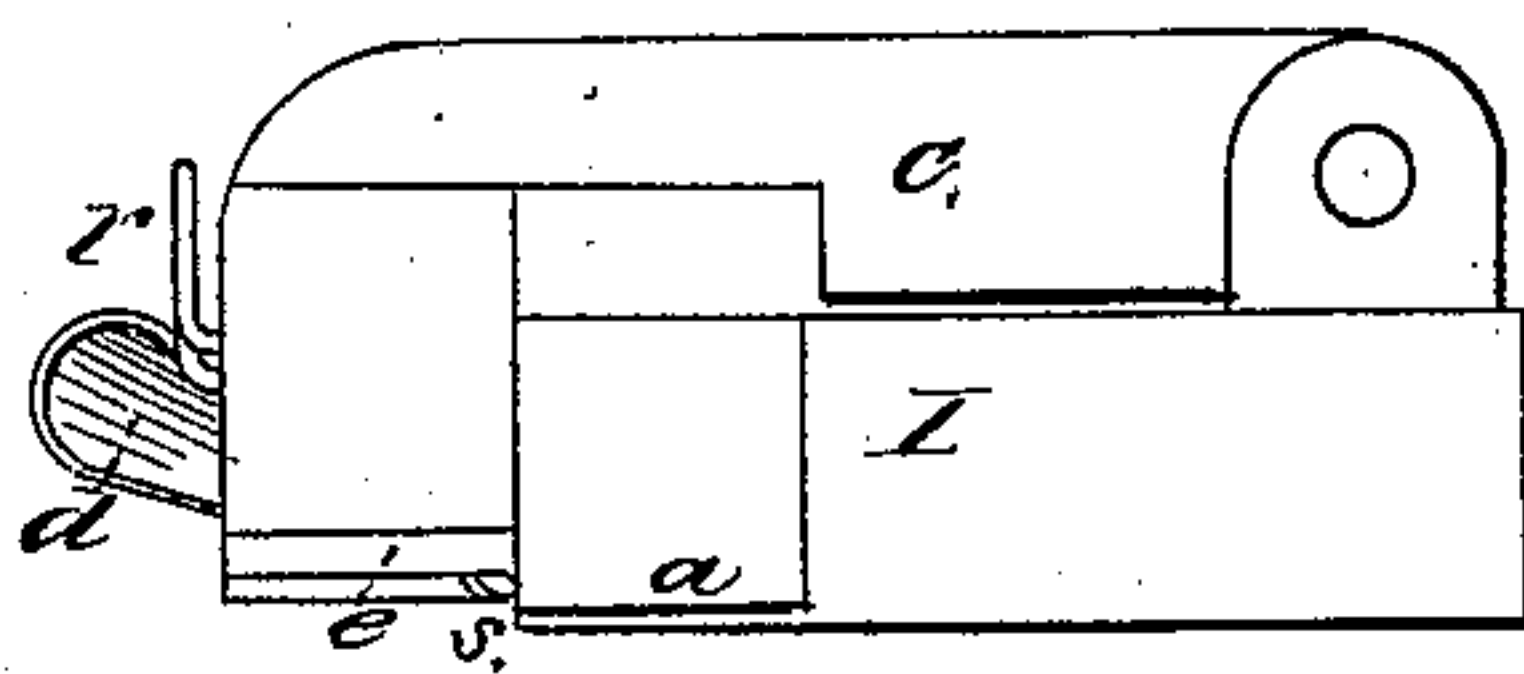
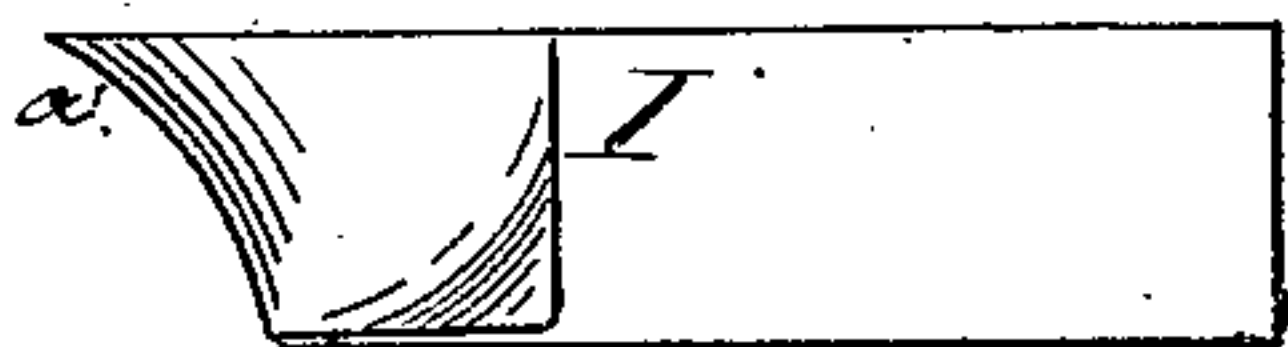


Fig. 7.



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WELLINGTON CAMPBELL, OF MILLBURN, NEW JERSEY.

Letters Patent No. 92,161, dated July 6, 1869.

IMPROVED MACHINERY FOR MANUFACTURING COMPOSITE PAPER.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, WELLINGTON CAMPBELL, of Millburn, in the county of Essex, and State of New Jersey, have made an invention of certain new and useful Improvements in Machinery for Manufacturing Paper; and that the following is a full, clear, and exact description and specification of my said invention.

The object of my invention is to manufacture composite paper, such as is described in the Letters Patent granted to me, the 25th day of May, A. D. 1869, with rapidity and economy. To this end,

The first part of my invention consists of the combination of the moving pervious surface, upon which the sheet of paper-pulp is formed, of the required width, with a separate narrow moving pervious surface, upon which a strip or ribbon of paper-pulp is formed, and with pressing-rollers, by means of which the sheet and strip of paper-pulp are pressed together, so as to constitute one sheet of composite paper.

The object of the second part of my invention is to enable the sheet of paper-pulp and the strip or ribbon of paper-pulp (which are combined to form a composite paper) to be formed of different qualities of pulp. To this end, this part of my invention consists of the combination of the said moving pervious surface on which the sheet of paper-pulp is formed, the separate narrow moving pervious surface upon which the ribbon or strip of paper-pulp is formed, and the pressing-rollers, with two independent pulp supplying vats, the one for the supply of pulp to the pervious surface upon which the sheet is formed, and the other for the supply of pulp to the narrow pervious surface upon which the ribbon of pulp is formed.

The object of the third part of my invention is to turn over the border of a sheet of paper-pulp upon the body of the sheet, so as to form a sheet doubled at the edge by folding it. This part of my invention consists of the combination of the rollers for pressing and moving the sheet of paper forward, with a folding-guide for turning a narrow portion of the edge of the sheet over upon the residue, so that the sheet and folded portion are pressed together by the passage between the pressing-rollers.

The fourth part of my invention consists of the combination of the said rollers and folding-guide with the moving pervious surface upon which the sheet of paper-pulp is formed, so that the formation, folding, and pressing of the sheet are effected by one continuous operation.

The object of the fifth part of the invention is to enable a thread or cord to be combined with a sheet of paper; and it consists of the combination of the rollers for pressing and moving the sheet of paper forward with a guide for directing a thread, cord, or ribbon of textile material to the place at which it is

to be combined with the sheet of paper, so that the subsequent passage of the paper and textile material between the pressing-rollers causes the two to be pressed together.

The object of the sixth part of the invention is to enable the textile material to be inlaid in the folded edge of a sheet of paper; and consists of the combination of the pressing-rolls and thread-guide with the folding-guide for folding the border or rim of the sheet of paper over upon the residue.

The moving pervious surface upon which the sheet of paper-pulp is formed may be either the perforated surface of a cylinder or that of an endless belt; in the former case, the paper-machine to which my improvements are applied is a so-called "cylinder-machine," and in the latter case it is a so-called "Fourdrinier machine."

As the former machine is the simpler in construction, I will describe my invention, as embodied in such a machine—

Figures 1 and 1^a of the accompanying drawings representing a side view of the machine, divided into two parts at the line *x x*;

Figures 2 and 2^a representing a plan of the same;

Figure 3 representing a vertical section of the bed of the folding-guides, at the line *y y* of fig. 2; and

Figures 4 to 7, inclusive, representing views of one of the folding-guides, detached from the machine, and of half the working-dimensions.

The general arrangement of the machine represented in the drawings does not vary materially from that of the cylinder-machines in common use for making paper—

A being the pervious forming-cylinder, upon which the sheet of paper-pulp is formed;

B being the endless apron of felt, upon which the sheet of pulp is carried under the couch-roll C;

D being the first pair of press-rolls, and

D' being the second pair of press-rolls.

E E E E representing the drying-rolls, and

F the reel upon which the paper is wound before it is cut into sheets.

All of these instrumentalities, their appurtenances, and the mechanism by which they are caused to perform their respective functions, are the same as the corresponding parts of the cylinder-machines now in use.

The cylinder A, on whose pervious surface the sheet of paper-pulp is formed, revolves in the supply-vat G, into which the paper-pulp is delivered, together with the water which escapes into the interior of the cylinder, and is lifted by the wheel contained in the case H.

The surface of this pervious cylinder is constructed of wire cloth in the usual manner.

In order to form the ribbons or strips of paper-pulp which are to be combined with the sheet formed upon

the pervious surface of the cylinder A, a supplementary cylinder, A', is provided.

The cylindrical surface of this supplementary cylinder is solid, except at the places *b b*, where the strips are to be formed, at which places the surface is made pervious by constructing it of wire cloth of the same character as that of which the surface of the cylinder A is formed.

As the machine represented is arranged to manufacture composite curtain-paper, the supplementary cylinder A' is constructed with two belts, *b b* of wire cloth, forming narrow pervious surfaces, one for each strip of paper-pulp, which is to be applied to the borders of the main sheet formed by the cylinder A.

This supplementary cylinder is arranged to revolve in a supply-vat, G', to which paper-pulp and water are delivered in the usual manner; the water escaping into the interior of the cylinder being returned to the vat by means of a lifting-wheel contained in the casing H'.

In order that the strips produced by the supplementary cylinder may be formed of a different quality of pulp from that employed to form the main sheet, the supply-vat G', in which that cylinder revolves, is made separate from that, G, in which the main cylinder A revolves; and each vat is provided with its respective lifting-wheel.

The strips of paper-pulp formed by the supplementary cylinder A' adhere to the under surface of the felt apron B, which is pressed by the couch-roll C' towards that cylinder, and are carried by the apron to the cylinder A, where the sheet of paper-pulp from that cylinder is received upon the strips.

The compound sheet thus formed is carried by the apron B under the couch-roll C, and between the first press-rolls D, which press the compound sheet while its members are moist, and condense the fabric.

The fabric is then conveyed by the apron of felt, beneath the second pair of press-rolls D', to the side thereof which is farthest from the pervious forming-cylinders; whence it is carried upward and backward through the second pair of press-rolls D', by which the consolidation of the compound fabric is completed.

In order that the edges or borders of the fabric may be folded over upon the body of the sheet, two folding-guides, I I, are provided, and these are secured to a bed, J, which is secured in the machine, so as to operate upon the fabric as it passes from the first, D, to the second pair of press-rolls D', the bed J being inclined so as to correspond with the position of the fabric in its upward and backward movement previous to passing between the second press-rolls D.

Each folding-guide (as seen in figs. 4 to 7) is constructed with a spiral surface, *a a'*, in form somewhat similar to the mould-board of a plow, but greatly elongated, the cross-line of the surface corresponding, or thereabouts, with the plane of the bed J, at the point *a*, where the fabric meets the folding-guide, and thence gradually deviating from that plane until, at the end *a'* of the folding-guide, at which the fabric leaves it, the cross-line of the surface is doubled over the body of the sheet of fabric.

In order that the fabric may be compelled to travel in contact with the spiral surface of the guide, each folding-guide is surmounted by a cap, *c*, which is hinged to it, so as to be readily turned outward to permit the paper to be introduced, or for other purposes; and this cap approaches closely to the spiral surface of the folding-guide, at the place where it is vertical, or thereabouts, so that the lower corner *e* of the cap determines the line at which the fold is to be made.

In order that a thread may be introduced into the

fold of the paper, a tubular thread-guide, *d*, is applied to the cap *c* of the folding-guide.

This thread-guide is formed by bending a piece of sheet-metal so that it has the form of a cone with a slit in its side, and it is introduced into an opening in the cap *c*, in such position that its slit end or beak, *s*, corresponds with the lower inner corner *e* of the cap, so as to guide the thread to the line at which the paper is folded.

The cap *c* is fitted with two wires, *r r*, to conduct the thread to the mouth of the thread-guide; and the thread is drawn from a spool placed upon a wire standard at some convenient part of the machine.

The spiral surface of the folding-guide need not be turned sufficiently to turn the fold entirely down upon the body of the sheet, because the passage of the paper between the second press-rolls D' completes the fold and unites the surface of the folded portion with the residue; and as the thread is introduced into the fold before it is thus pressed and united, the thread becomes inlaid in the doubled edge of the sheet.

The composite paper, after leaving the second press-rolls, passes to the driers E, and is dried in the usual manner.

Having thus described a machine, embodying all parts of my invention, I declare that I do not restrict the same to such a machine, as some parts of my invention may be embodied without the residue; thus, for example, the supplementary pervious cylinder A', and its appurtenances, may be omitted, in which case the composite paper will be produced wholly by folding over the borders of the main sheet; or the supplementary cylinder A' may be retained, and the folding-guides may be omitted, in which case the composite paper will be produced wholly by the application of strips or ribbons of paper-pulp to the main sheet.

If the strips are to be formed of the same pulp as the main sheet, the second cylinder A' may be arranged to revolve in the same vat as the main cylinder A.

The form and arrangement of the folding-guides may be greatly varied without departing from the principle of my invention, and the thread-guides may be suppressed if thread is not to be inlaid in the paper.

If the sheet of paper-pulp is to be strengthened at more than two places by combining strips of pulp with it, the second cylinder must be provided with as many belts of wire cloth as the strips to be made; or these strips may, if preferred, be formed upon two or more cylinders.

If the thread is to be inlaid in the paper between the material of the body of the sheet and the strengthening-strip, the thread-guide must be arranged between the forming-cylinders, so as to guide the thread to the sheet of paper-pulp at or before the place where it meets with the strengthening-strip of pulp.

If the paper is to be strengthened at but one place, but one narrow pervious forming-surface is required; and if the sheet is to be folded at but one edge, but one folding-guide is required.

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

The combination of the moving pervious surface for forming the sheet of paper-pulp, the narrow moving pervious surface for forming the strips, and the pressing-rolls, the whole constructed to operate substantially as before set forth.

Also, the combination of the said moving pervious surface for forming the sheet of paper-pulp, the narrow moving pervious surface, the pressing-rolls, and the separate vats for the two pervious surfaces, the whole constructed to operate substantially as before set forth.

Also, the combination of the press-rolls and folding-guide, substantially as before set forth.

Also, the combination of the press-rolls, folding-guide, and moving pervious surface for forming the sheet, the whole constructed to operate substantially as before set forth.

Also, the combination of the press-rolls and thread-guide, substantially as before set forth.

Also, the combination of the press-rolls, the thread-

guide, and the folding-guide, the whole constructed to operate substantially as before set forth.

In test mony whereof, I have hereto set my hand, this 31st day of May, A. D. 1869.

WELLINGTON CAMPBELL.

Witnesses:

W. C. WITTER,

JOHN RATHBONE, Jr.