

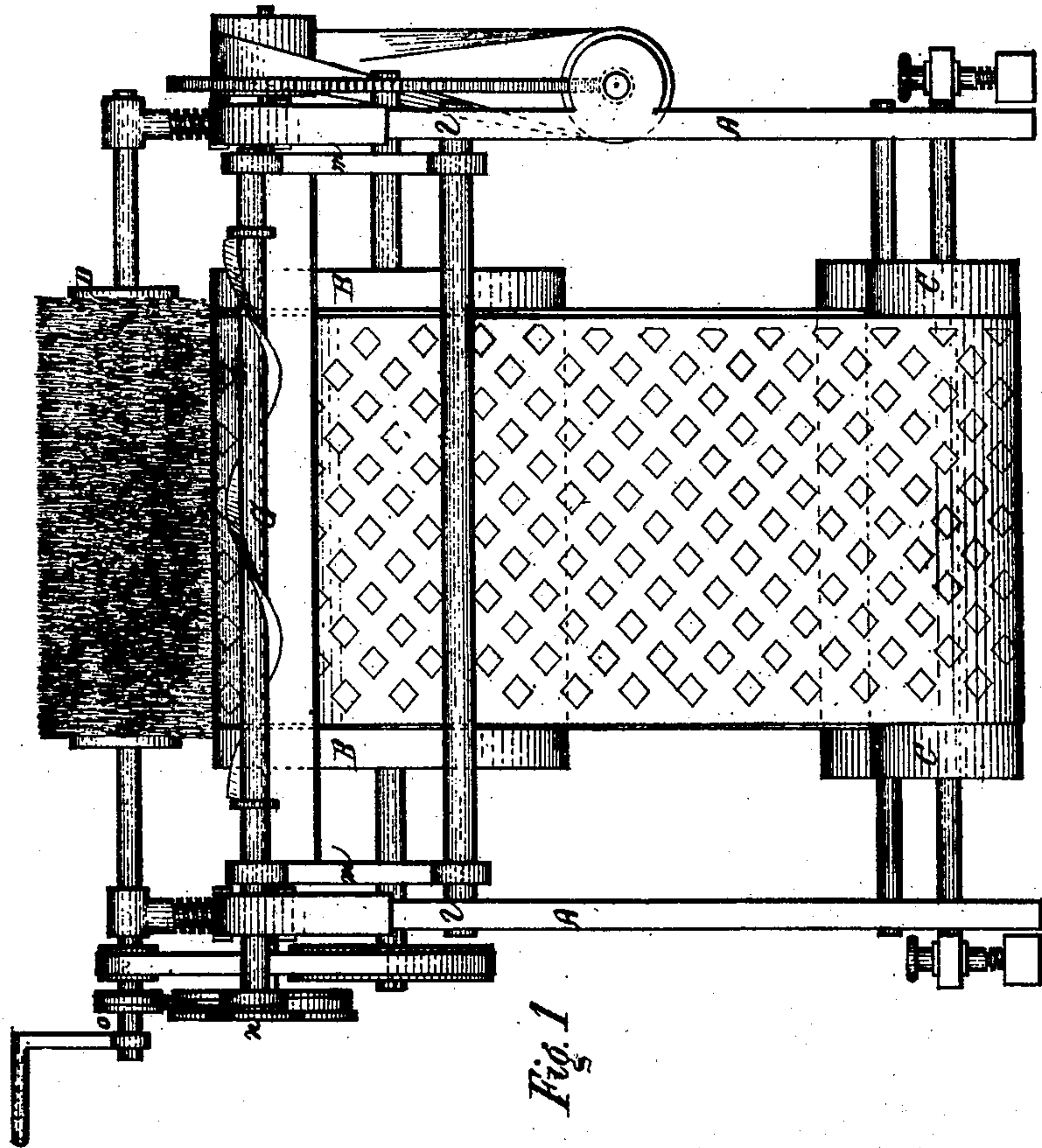
*J. Earnshaw,*

*4, Sheets, Sheet 1.*

*Finishing Cloth.*

*No. 84,483.*

*Patented Dec. 1. 1868.*



*Witnesses:*

*Benjamin Arnold*  
*William D Arnold*

*Inventor.*  
*John Earnshaw*

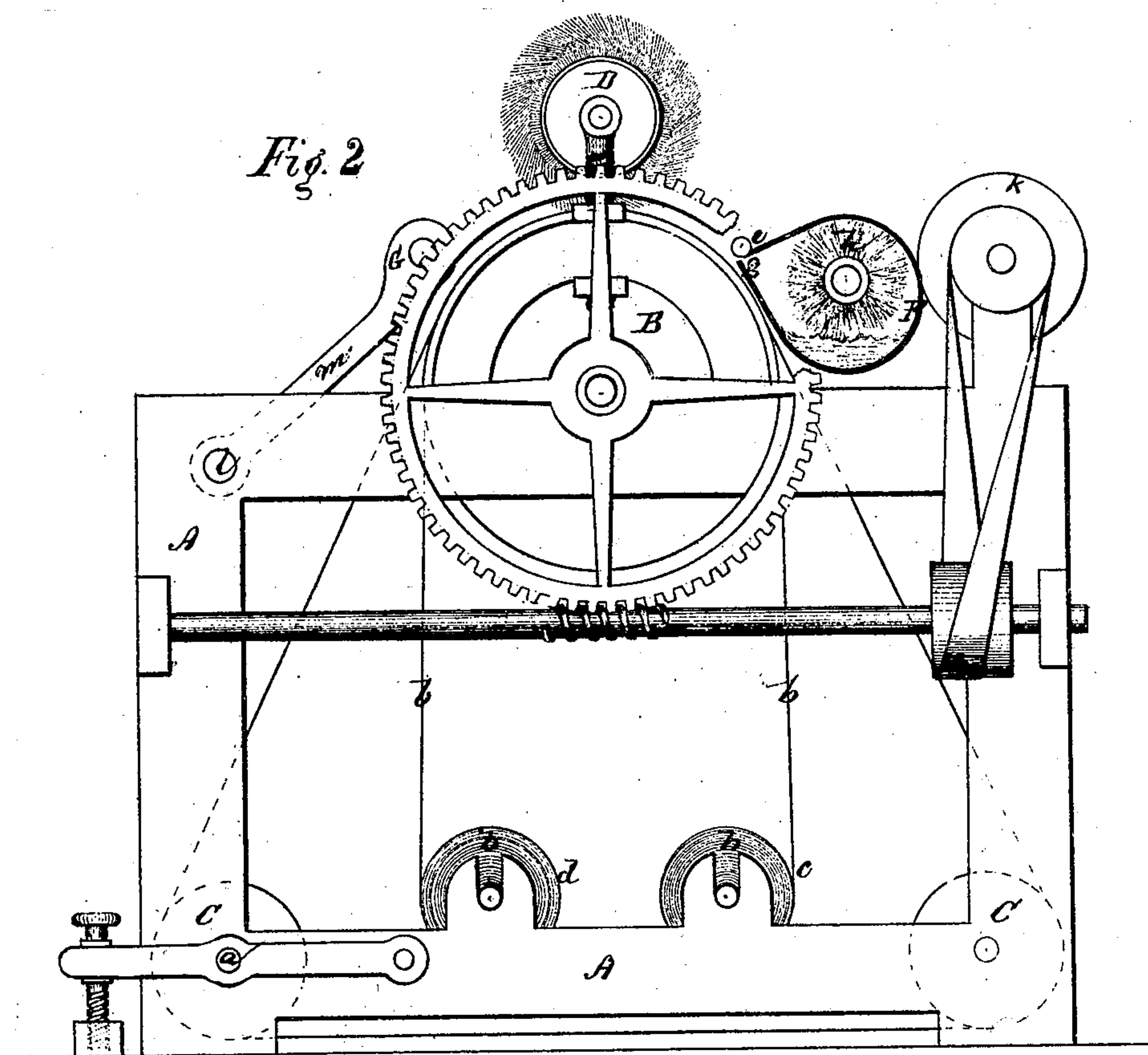
*J. Earnshaw,*

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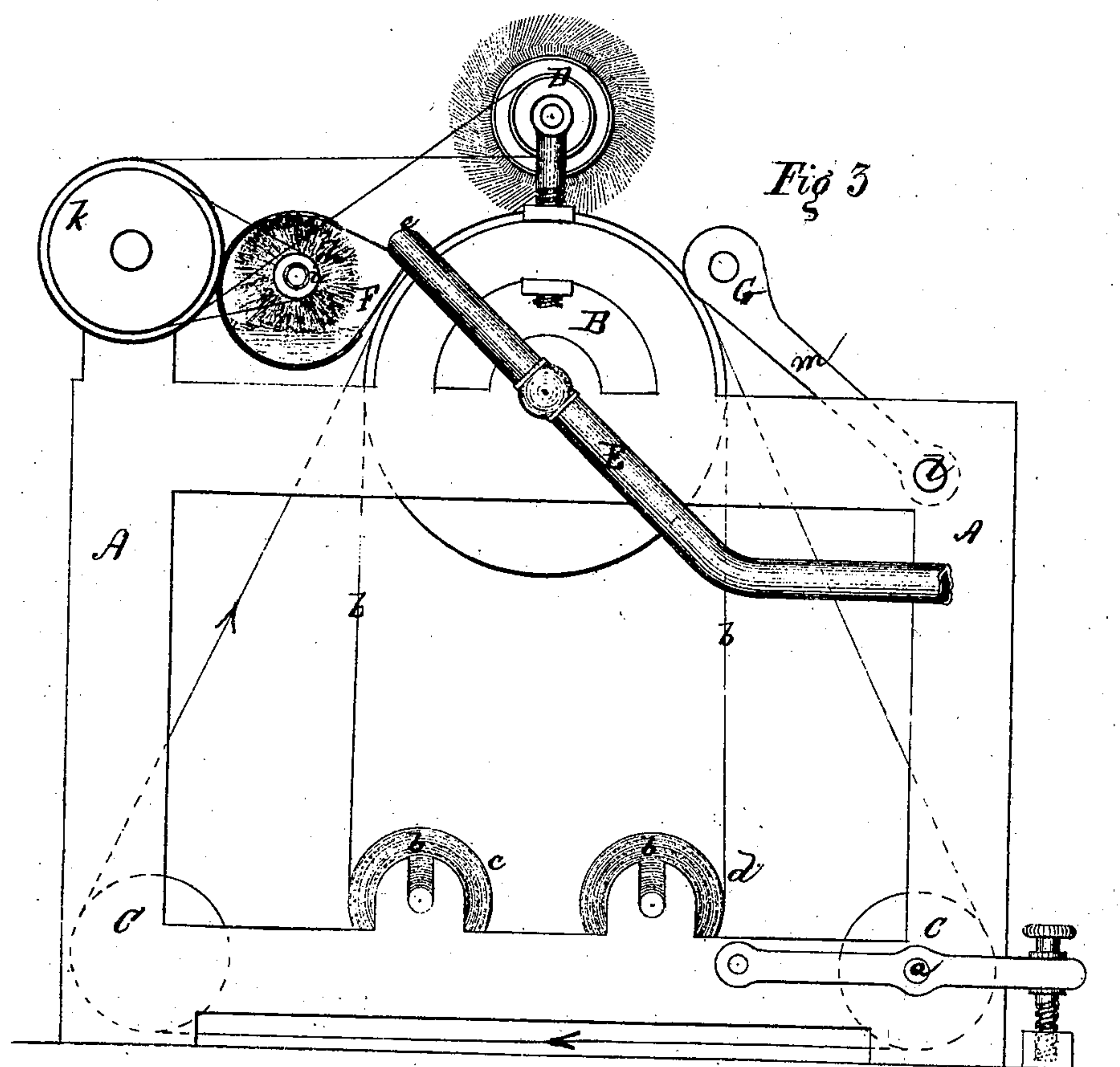
*J. Earnshaw,*

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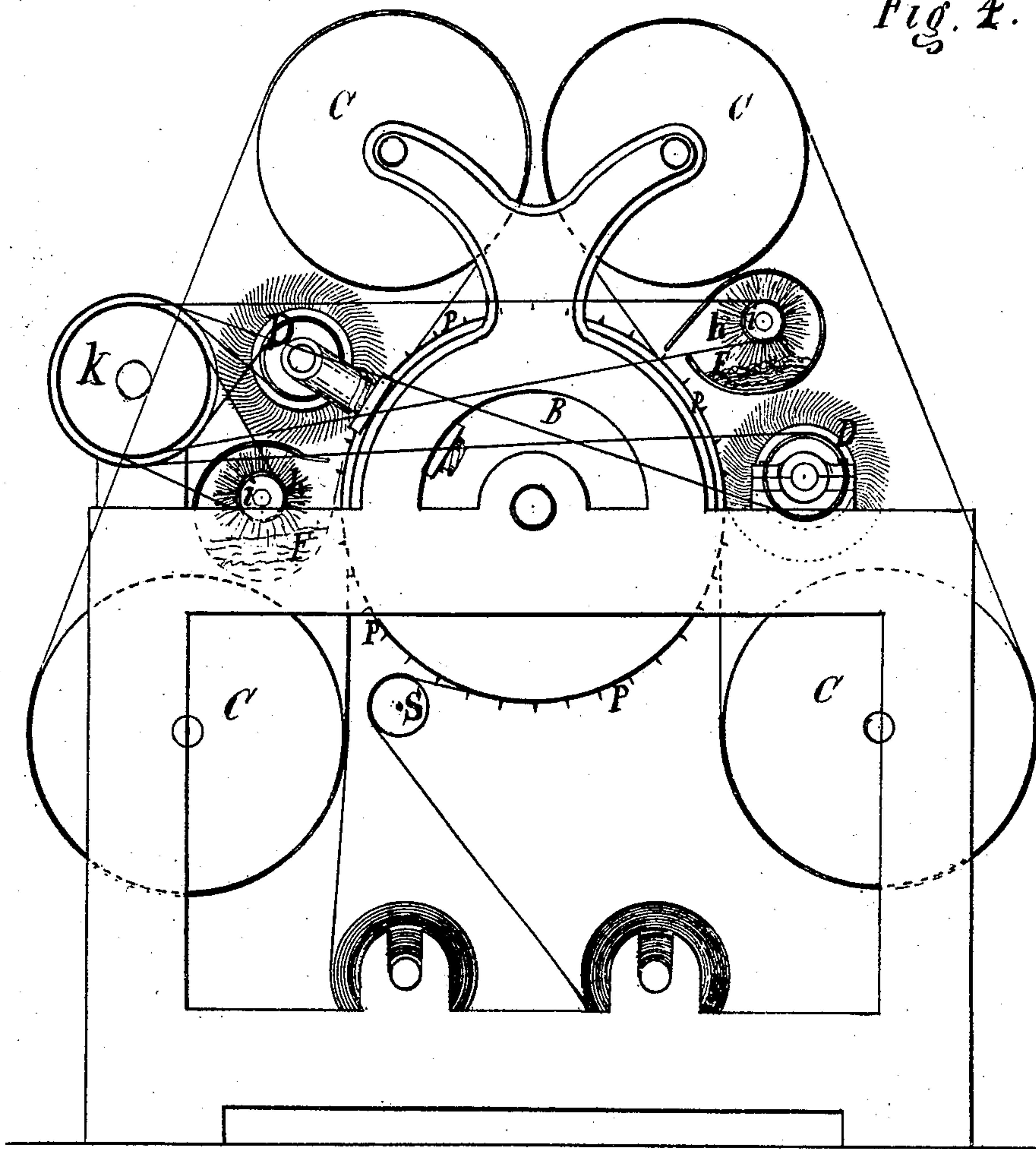
*4, Sheets, Sheet 4.*

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*3. 84,483.*

*Patented Dec. 1. 1868.*

*Fig. 4.*



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JOHN EARNSHAW, OF EAST GREENWICH, RHODE ISLAND.

Letters Patent No. 84,483, dated December 1, 1868.

IMPROVEMENT IN MACHINE FOR FINISHING CLOTH.

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, JOHN EARNSHAW, of the town of East Greenwich, county of Kent, and State of Rhode Island, have invented certain new and useful Improvements in Cloth-Finishing Machines; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention, sufficient for those skilled in the art to practise it.

My invention consists in a novel means of automatically raising or turning the nap of fabrics, in such a manner as to form varied designs of raised figures upon their surface, and making said figures permanent; also, in coloring, felting, and napping or shearing said portions, as will be hereinafter more fully set forth.

In carrying out this invention, I use a machine which will also be fully described, and which is represented by drawings accompanying this specification, in which—

Figure 1 is a front view;

Figure 2, a right-hand end view;

Figure 3, a left-hand end view; and

Figure 4, an end view of a modification of my invention, and in which two stencil-plates are shown.

A frame, A, is provided with suitable journals for the shafts of carrying-cylinder B and the guide-rollers C, over which an endless stencil-belt passes. This stencil is formed of any suitable thin metal, and has any suitable device, design, or pattern cut out of its body, as in ordinary stencil-plates. It passes over the cylinder B, carrying under it, and upon the convex surface of the cylinder, the fabric to be operated upon, and by suitable tension produced by adjustable or movable journals, a, placed within it, causes the fabric to be uniformly fed forward with it.

The fabric, b, passes from the feed or holding-roller c, over the cylinder B, and after being treated or finished as will be described, it is wound upon the roller d. Any suitable means of introducing the fabric under the stencil, and over the carrying-cylinder or supporting-bed B, and disposing of it after its surface is treated, may be used.

Supported in proper journals rising from the frame A, is a roller or cylinder D, provided with card-teeth, which act upon the stencil-belt, stretched or covering the convex surface of the carrying-cylinder or supporting-bed B, and raises or turns the nap off all portions of the fabric, except that part or portions protected by the unremoved parts of the stencil-plate.

It is obvious that, by perforating the stencil-plate in various designs and figures, the same will be reproduced in form on the surface of the fabric, as hereinbefore set forth.

I may here remark that in making clear striped patterns, the stencil may be cut in strips, and have guides to guide them in their proper place on the bed B.

The carrying-cylinder B is enclosed at its ends, and has connected to it a steam-pipe, E, which supplies it

with steam as a heating-medium, which also extends upwards, and connects with another steam-pipe, e, (which may be a continuation of pipe M,) which extends across the face of the cylinder B, and in a plane parallel with it, and which is provided with small perforations along its entire length, for the purpose of throwing small jets of steam on the exposed portions of the fabric.

It may be remarked that the supply of steam to this pipe may be shut off by a valve located at a point above the induction-passage to cylinder E.

On one side of the carrying-cylinder, and arranged in a plane parallel with its periphery, is a cylinder, F, one side of which is extended towards the surface of the cylinder B, carrying stencil-plate and fabric, and has an opening or slot extending along its entire length at this point, as shown at g, fig. 2. This cylinder or box F is made to contain a suitable coloring-fluid for treating the fabric, to which it is applied in the following manner:

Within the cylinder F is a circular brush, h, rotated by means of a pulley, k, which communicates motion, through the pulley i, to its shaft.

As motion is communicated by the means aforesaid, the brush is caused to revolve rapidly, throwing the water or coloring-fluid through the opening or slot g, in a fine mist, upon the nap-raising device and the exposed portions of the fabric, previous to its passing under the nap-raising device, by which it is worked evenly among the fibres and into the fabric.

The amount of coloring-matter reaching the cloth is regulated by the opening or slot g, which may be provided with suitable means for closing or reducing its size, so that the amount of coloring-matter allowed to pass through may be greater or less, as is desired.

When moisture alone is required, and no coloring desired, water alone may be introduced into the cylinder F, which will, by the means described, be transferred to the fabric, in the form of a fine mist or vapor, or steam-jets from pipe e may be used, or a water-pipe may be connected with pipe e, so that water-jets may be used, or moisture may be applied from rollers arranged as are the inking-rollers of printing-presses. Either will accomplish the purpose, though one, in some cases, may be more desirable than the other.

As before remarked, steam is introduced, through the pipe E, into the carrying-cylinder B, for the purpose of heating the same.

The heated cylinder causes the water, which is applied to or upon the fabric, to be converted to a considerable extent into steam, which makes the action of the card or the teazle on roller D more effective in its operation upon the fabric, and also sets the coloring-matter in the fabric, as is well understood.

The heat of the cylinder acting in combination with the moisture, by being brought in close contact with the back of the fabric, gives a set or permanence to the



fibres of the fabric after they have been raised, making the fibres or the figures so raised much more durable and permanent than if dried in the usual way, without being subject to a high heat.

Heat may be applied to the fabric after it has left the machine, for the purpose of giving durability to the figures so raised, but such arrangement I do not consider desirable. Furthermore, the heat being applied to the fabric while it is being held firmly between the stencil-plate and bed B, gives a cleaner outline to the figures than if applied to the cloth after it has left the machine or bed B.

After the fabric has passed the napping-roller D, and its nap has been raised, (for some fabrics,) I cause its surface to be trimmed or sheared by a device shown at G, which consists of a ledger-blade and revolving knife, as in ordinary cloth-shearing machines. It is hinged to the frame at i, and may be swung away from contact with the fabric at pleasure, and may be adjusted, with reference to the surface of the cloth, by means of set-screws projecting through its supporting-arms m, and resting against the frame-work of the machine.

The shaft of the revolving knife is provided with a pulley, n, by which motion may be communicated to it from the pulley o of the main shaft, by means of a belt.

I have now explained the general arrangement of my machine with one stencil-belt. I will now show the arrangement for two.

Fig. 1 shows the arrangement so clearly that, when taken in connection with what has been previously said, but little explanation is necessary.

Each stencil-belt passes over the rollers C C, then over a portion of the fabric and cylinder, holding the fabric firmly in its place, on the bed B, during the time of said finishing-operations, as previously explained. Around the cylinder B, and near each end, are projections or pins, P P P P, equal distances apart. Near each edge or selvage of the stencil-belt are holes or large eyelets, corresponding in size and distance apart with the pins in cylinder B.

It will be seen that, when the stencils are passing on the cylinder, the pins will project into the holes or eyelets in the stencil-belts, thus guiding the stencils in their proper place on the fabric, and giving to each a proper and conjoint motion with the other. The necessity of this is manifest to produce the figures from each stencil in their proper place on the fabric.

The various finishing-devices, consisting of coloring, shearing, &c., may be used in combination with each stencil, if desirable.

I would here state that, by making the cylinder sufficiently large, more stencils may be used, if desirable, and that the cylinder should be sufficiently large to dry the fabric after leaving the first and before it passes under the second stencil, and, if not sufficiently dry after leaving the second stencil, it may be kept longer in contact with the hot cylinder, by means of a roller, S.

I have shown a means of producing tension upon the stencil-plate or belt. The same may be used where two stencils are used.

I do not confine myself to this means, as many others may be used to produce the same result.

A sufficient tension to cause the fabric to be held firmly upon the convex surface of the bed B, and between it and the stencil-belt, during the time that is subject to the various finishing-operations, is necessary to the proper working of my machine.

I have shown a means of heating the cylinder or bed B, by means of steam as a heating-medium, but do not confine myself to steam, as many other ways or means may be employed; but it is desirable, when using moisture, to use as steady and high heat as can practically be used for the purpose of drying the fabric, raising the figures, and giving them permanence, as previously explained.

A nap may be raised upon the fabric while dry, but moisture is necessary in raising a good velvet nap upon woollen goods. It is also desirable that the moisture should not spread beyond the figure or design cut in the stencil.

By my mode of applying the color or moisture in a vapor from the cylinder, it being deposited on the exposed portions of the fabric, and prevented from spreading by the tension or pressure of the stencil-plate upon the cloth, I am enabled to color the figures produced on the fabric with a clearness of outline not attained by other means.

I may arrange the color-cylinder F so that the brush will apply the color directly to the fabric by close contact therewith, though I do not regard such an arrangement desirable.

I may here remark that, in lieu of card-teeth on the cylinder D, I may use teazles or stiff brushes, as may be found desirable.

It is obvious that my machine may be used in finishing a great variety of fabrics in an almost endless number of patterns and styles; for instance, chinchillas, velvets, and other long-nap goods, may be finished with portions corresponding to the forms of the perforations in the stencil-plates sheared off, for after passing under the upraising-device, the shearing-device will trim up the nap so raised, or cut it off close to the surface of the cloth, if desirable; or, in lieu of the shearing-device, vibrating rollers, or any other felting-device, may be attached to the frame of the machine, which will lay the nap or fibres of the cloth in straight lines, giving to the figured surface of the fabric a chinchilla or felted surface. Also, by the use of two stencils working in harmony together, most all kinds of figures may be produced, for what cannot be cut on the first stencil (it being necessary that certain portions be left uncut to hold the plate together) can be cut in the second, and the two stencils operating together will produce complex figures of most any kind.

Felt or other plain-surfaced goods may have a velvet nap raised upon their surfaces, corresponding to the design in the first stencil, and the raised or napped surface may be colored to meet the fancy, producing in light fabrics a very pretty effect. It may also have the figures trimmed or felted by the various finishing-devices, in combination with the first stencil; and by the various finishing-devices, in combination with the second stencil, other figures of a different color and style of finish may be given to other portions of the same fabric.

Thus it will be seen that, by the variable combinations of my machine, it will finish fabrics in all the various designs and colors, and in new and original styles of finish.

What I claim as new and useful, and desire to secure by Letters Patent, is—

1. An endless flexible stencil-belt, in combination with a nap-raising device, substantially as and for the purpose set forth.

2. A nap-raising device, convex supporting-bed, and continuous stencil-plate, substantially as described, arranged for conjoint operation, as and for the purpose set forth.

3. The combination of a heated work-supporting surface, a stencil-plate, and a nap-raising mechanism, substantially as and for the purpose set forth.

4. The combination of a supporting-bed, a stencil-plate, and a shearing-device, substantially as herein described.

5. Devices, substantially as described, for applying moisture, in combination with a continuous stencil-plate, arranged and operating substantially as set forth.

6. Devices for applying coloring-matter to the cloth, in combination with mechanism for working and teazling the same, substantially as herein set forth.



7. The devices for applying the coloring-matter, combined with the device for steaming or moistening the same, as herein set forth.

8. The combination of the supporting-bed, stencil-plate, and nap-raising device, with the shearing-device, as herein described.

9. The adjustable tension-rollers, in combination with

the stencil-belt and the supporting-bed, substantially as described.

JOHN BARNSHAW.

Witnesses:

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