(No Model.) 4 Sheets—Sheet 1.

# C. CLARK.

## Plaiting Machine.

**No. 238,350.** **Patented March 1, 1881.**

*Fig. 1.*

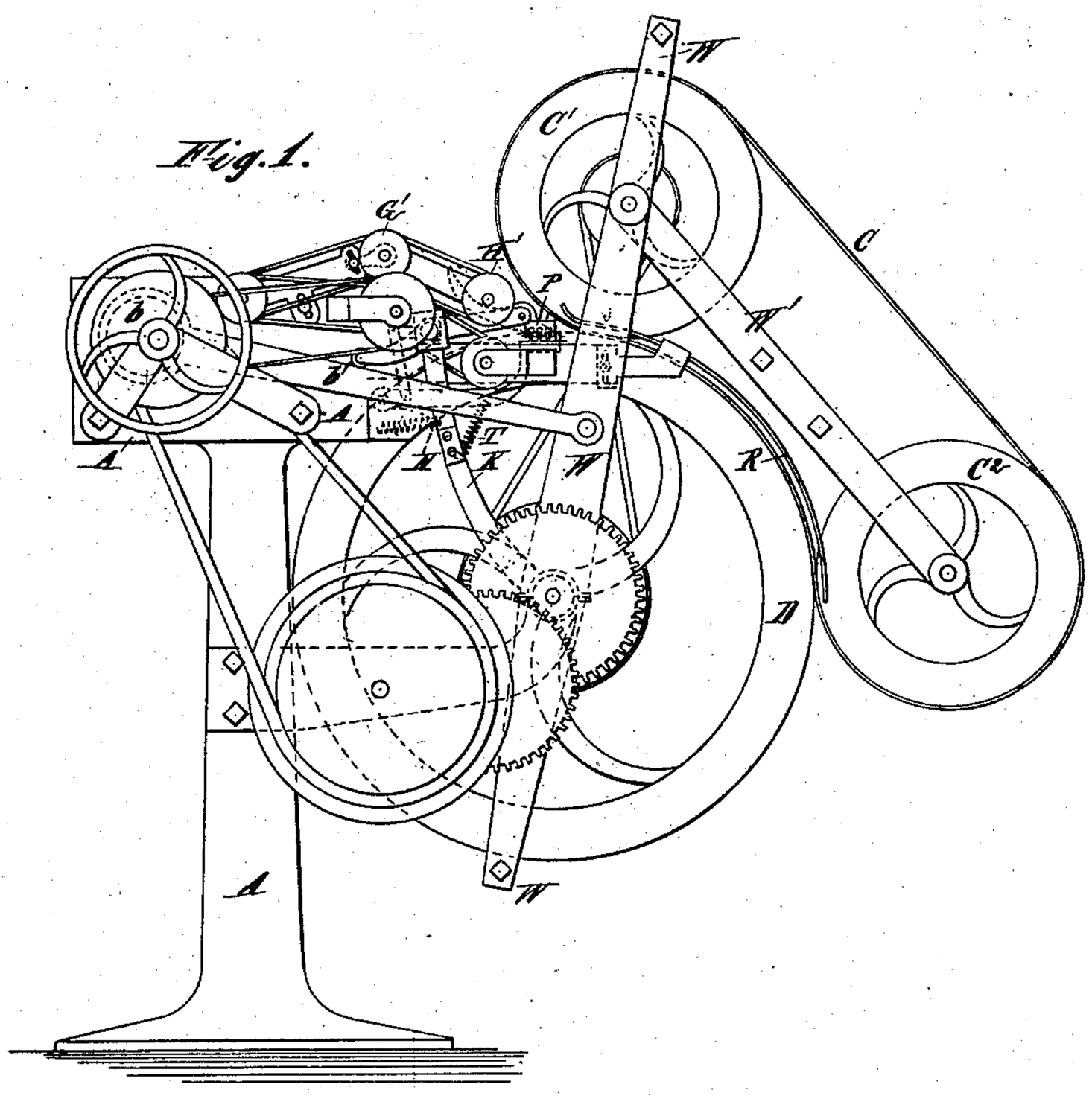
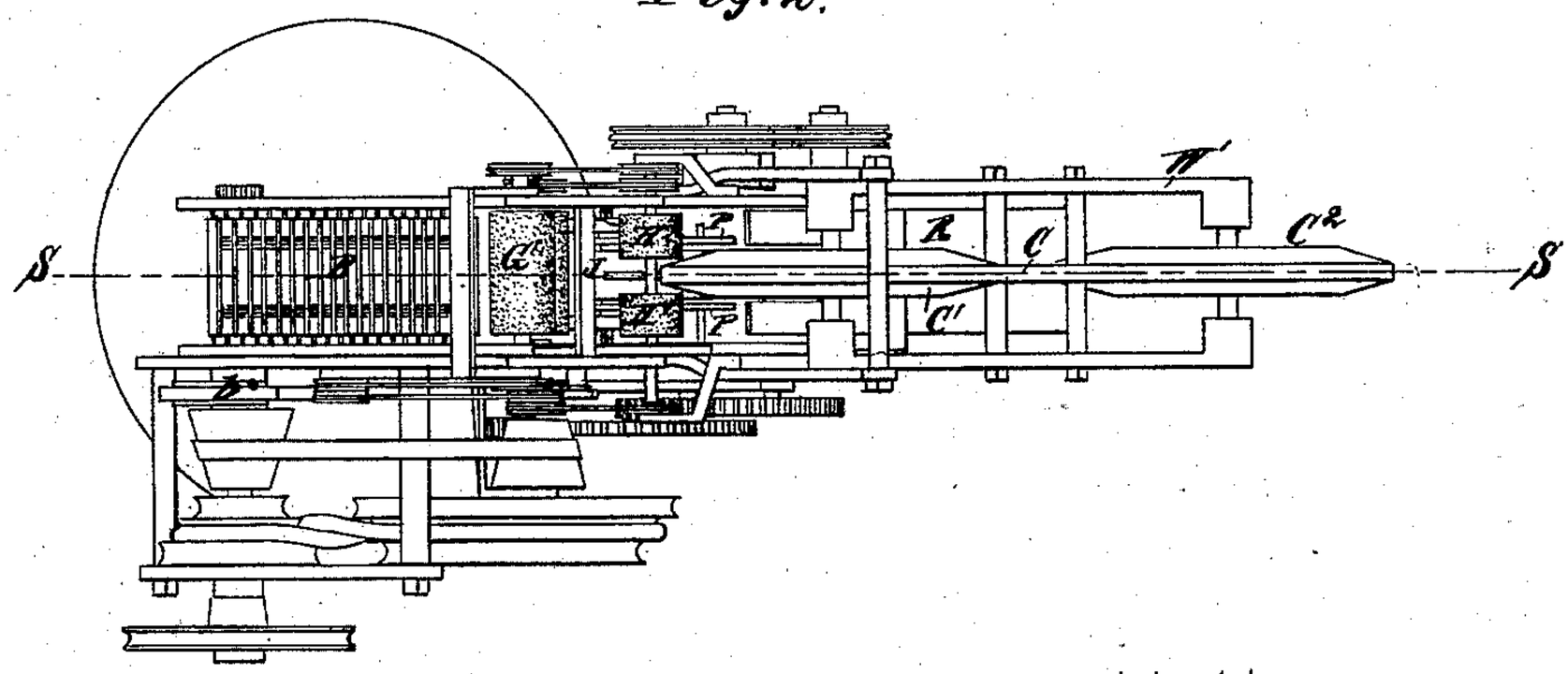



*Fig. 2.*




WITNESSES

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Charles C. Stetson

INVENTOR

Cornelius Clark
by his attorneys
C. C. Stetson & Co.

(No Model.) 4 Sheets—Sheet 2.

# C. CLARK.

## Plaiting Machine.

**No. 238,350.** **Patented March 1, 1881.**

*Fig. 3.*

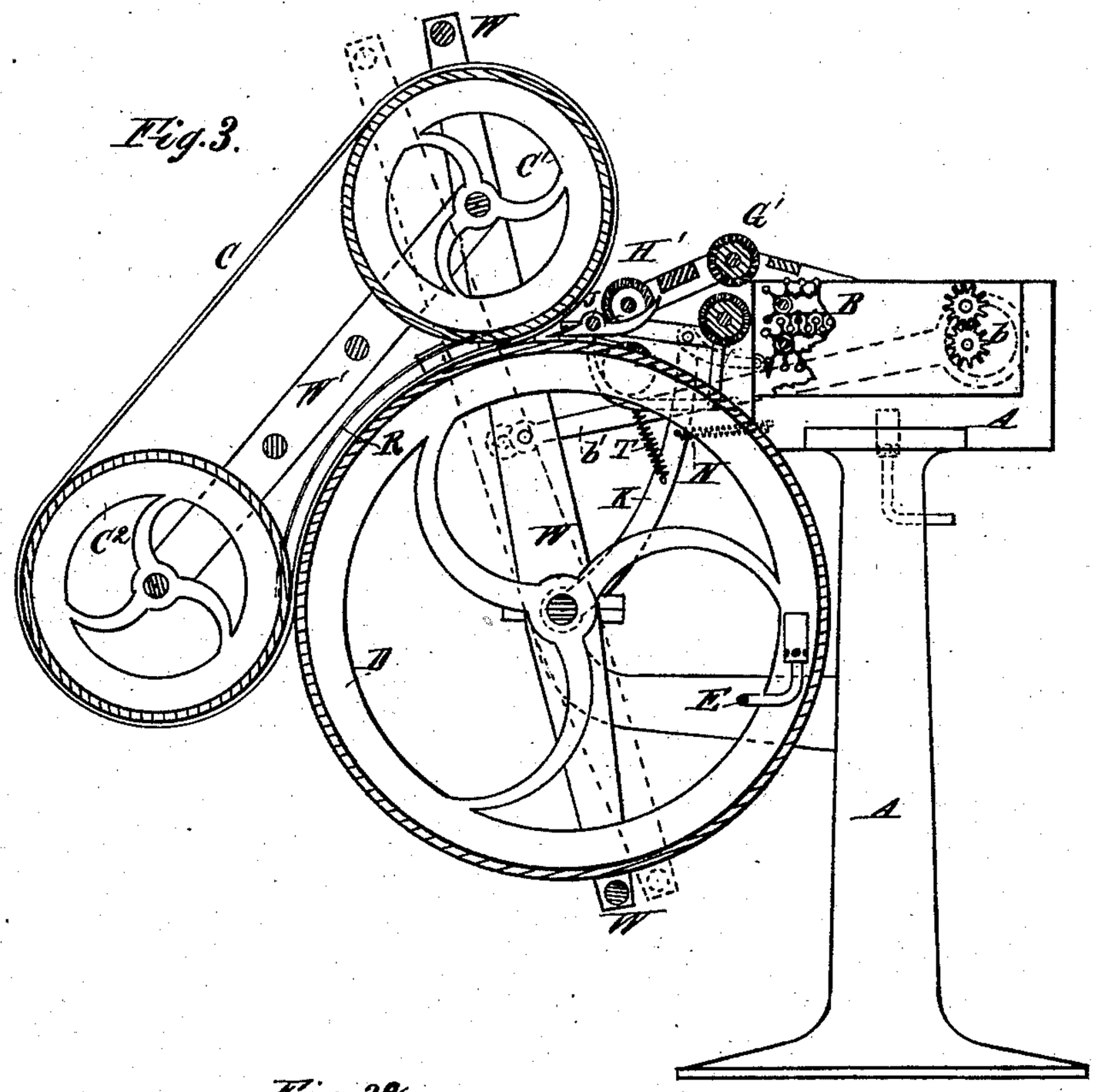



*Fig. 3a*

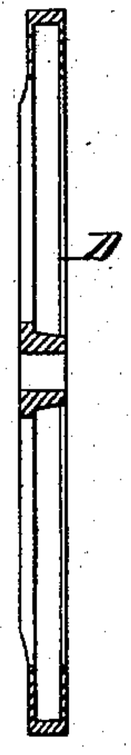
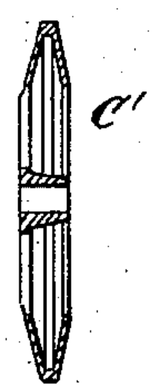



*Fig. 3b*




WITNESSES

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(No Model.) 4 Sheets—Sheet 3.

# C. CLARK.

## Plaiting Machine.

No. 238,350. Patented March 1, 1881.

Fig. 4.

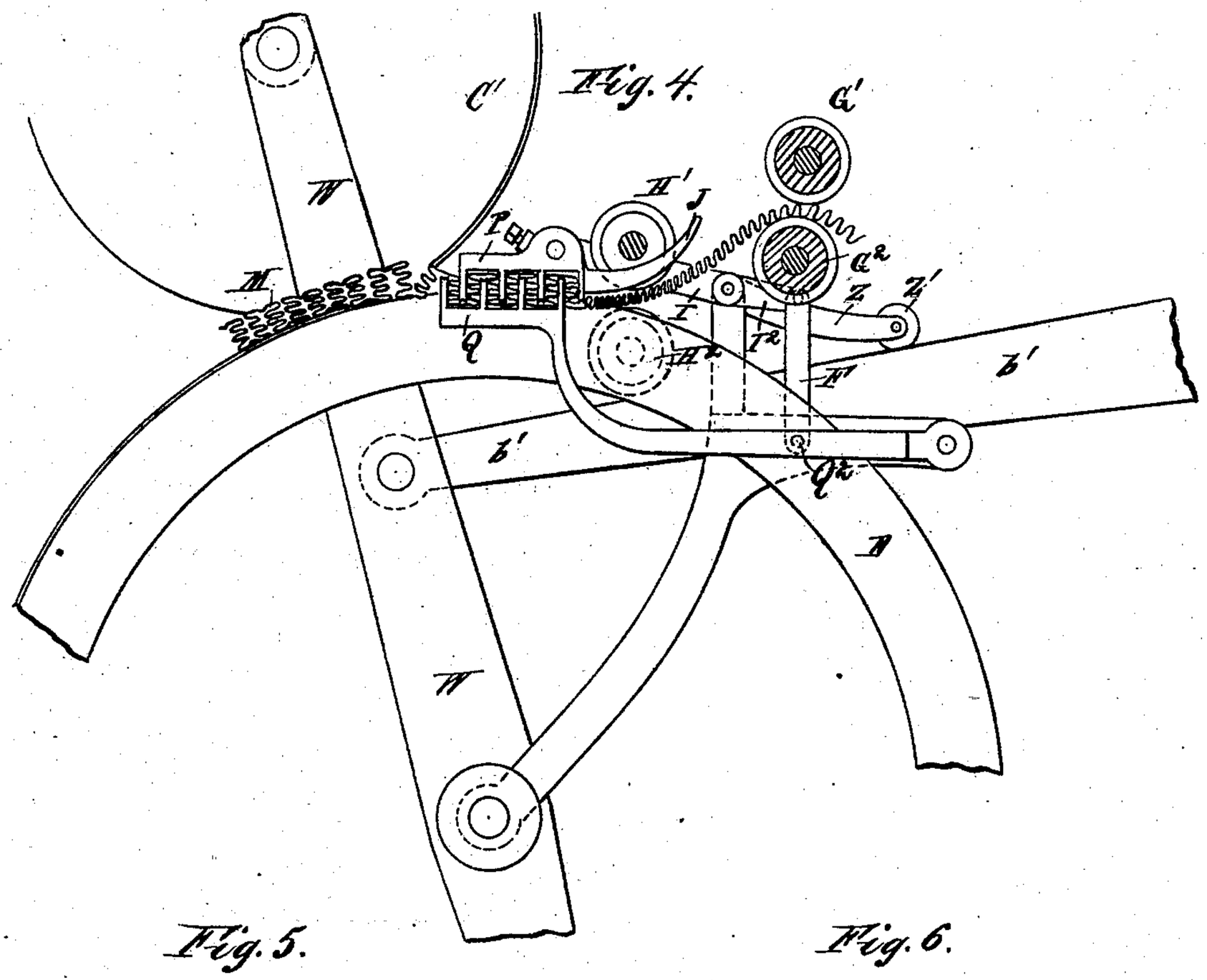



Fig. 5.

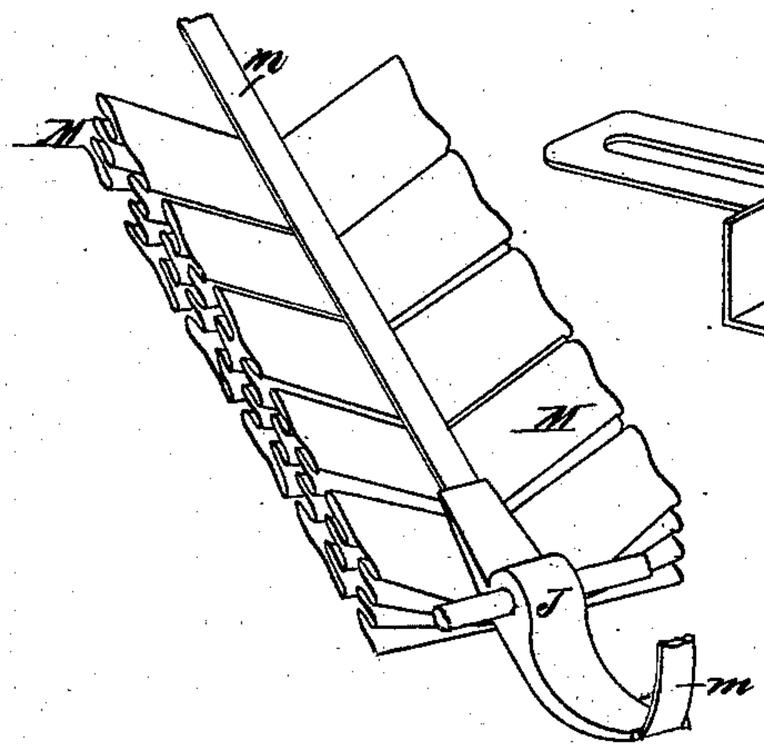
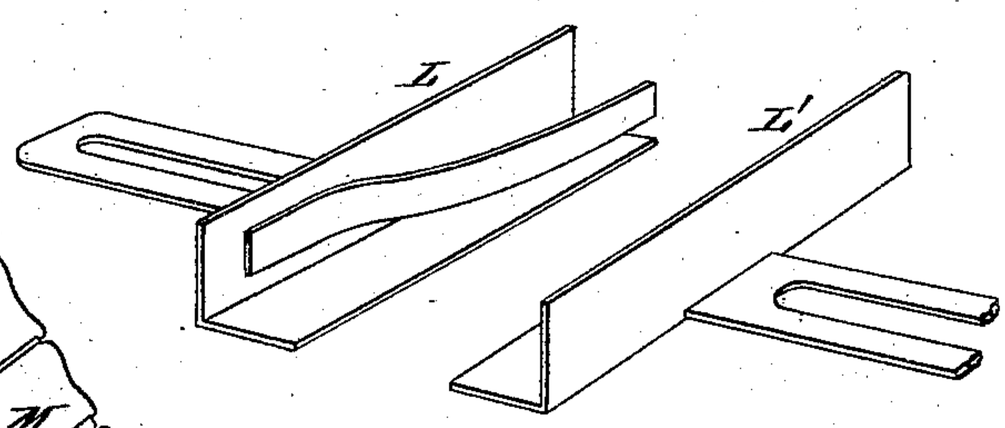



Fig. 6.




WITNESSES

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(No Model.) 4 Sheets—Sheet 4.

# C. CLARK.

## Plaiting Machine.

No. 238,350. Patented March 1, 1881.

Fig. 7.

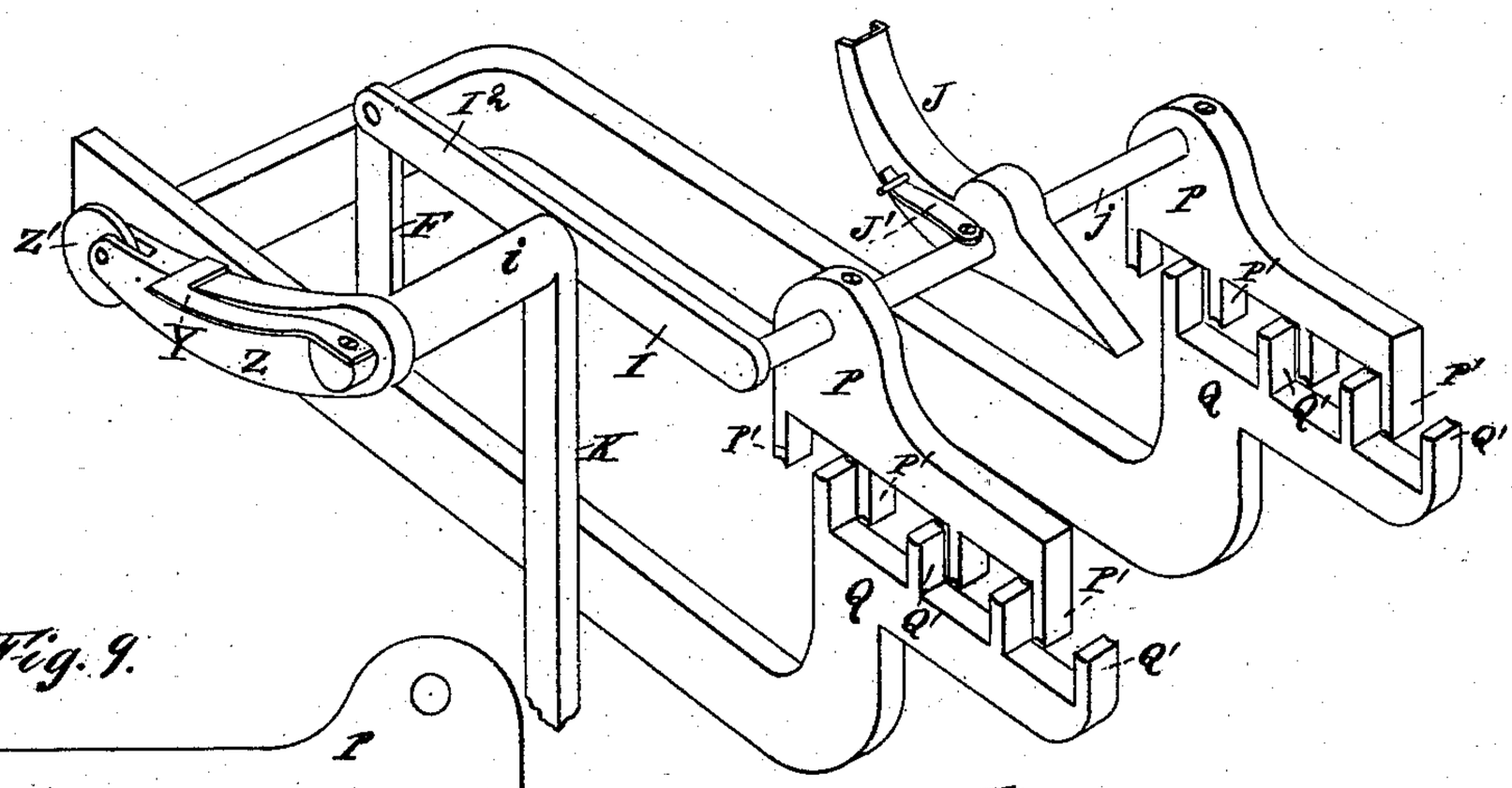



Fig. 9.

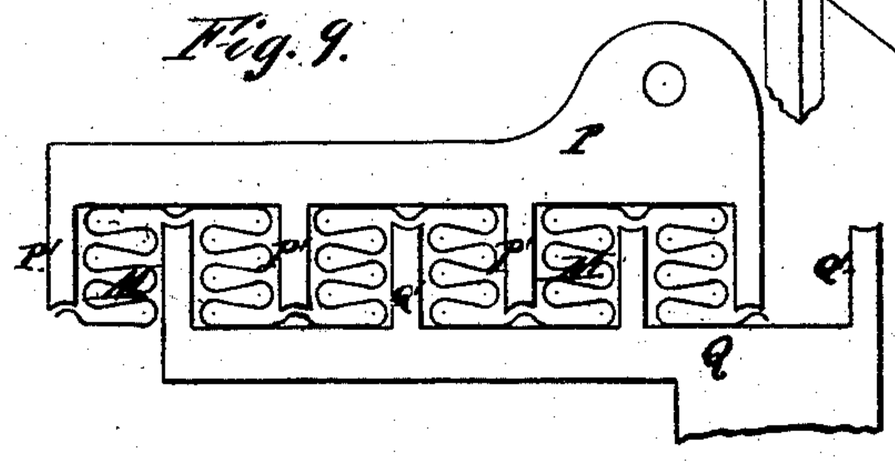



Fig. 10.

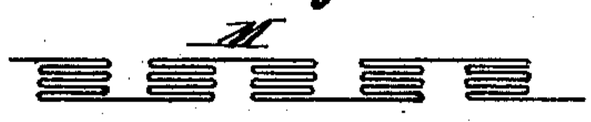
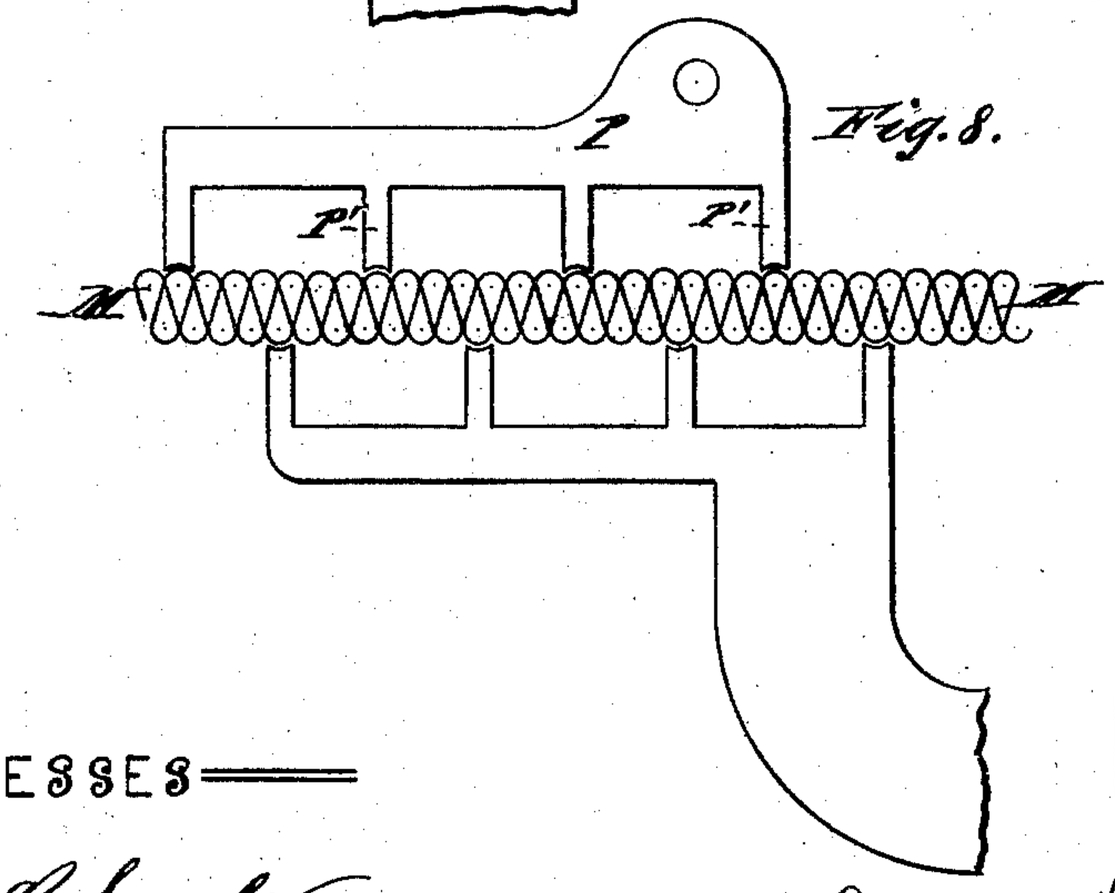



Fig. 8.




WITNESSES

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# UNITED STATES PATENT OFFICE.

CORNELIUS CLARK, OF BROOKLYN, ASSIGNOR TO HIMSELF AND CLINTON H. SMITH, OF NEW YORK, N. Y.

## PLAITING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 238,350, dated March 1, 1881.

Application filed May 8, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, CORNELIUS CLARK, a citizen of the United States, residing in Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Machines for Making Fluted or Ruffled Fabrics, of which the following is a specification.

The machine is intended more especially for use in the manufacture of the articles known as "ruches," and I will so describe it.

The machine first throws the material into a series of uniform corrugations extending across, and compresses the fluted or corrugated stuff along a narrow line, which may be in the middle of its breadth or nearer either edge, effecting this by a series of intermittent compressions by a device which moves with the goods while exerting a pressure. This tends to produce a flattened and smoothly-finished surface along a narrow line. Its action is followed by a strong pressure of a wheel rolled backward and forward along the same path. This is followed by a continued gentle pressure of the goods on the same narrow line. The machine thus carries the goods forward, subjecting the richly-fluted material on each side of such path first to a gentle dampening by steam and subsequently to a continuous dry heat sufficient to nearly or quite dry it. Provisions being made for introducing a thin tape or one or more small cords to be pressed down and adhere to the ruche along the flattened line, the result is a very perfect ruche, which may be made with great rapidity.

In the more complete form of the machine I employ additional devices, which serve to gather the corrugations or flutes into gracefully-arranged groups, so that the subsequent compression, instead of treating on simple uniformly-corrugated stuff, treats the stuff which has been first uniformly corrugated and then peculiarly gathered into groups. The result of this mode of operation is to produce ruches with what I term "multiplied plaits." The details will appear farther on.

The accompanying drawings form a part of this specification, and represent what I consider the best means of carrying out the invention.

Figure 1 is a general side elevation, showing all the principal parts in simple form. Fig. 2 is a plan view of the same. Fig. 3 is a section on the line *s s* in Fig. 2. Figs. $3^a$ and $3^b$ are sections, in detail, of the horn or carrier and presser-wheels. The remaining figures show certain parts on a larger scale, which are added to constitute the complete machine, and adapted to produce multiplied plaits. Fig. 4 is a section and elevation of a portion of the machine corresponding to Fig. 3. Fig. 5 is a perspective view, showing the oscillating presser and the manner of applying the tape to the goods. Fig. 6 is a perspective view of the gages. Fig. 7 is a perspective view of the molds and adjacent parts. Fig. 8 is a section of the fluted material with single plaits in the position about to be formed into what I term "multiplied plaits." Fig. 9 is an elevation of the molds, showing the operation of arranging the multiplied plaits. Fig. 10 is a section along a line nearer the center of the piece of goods.

Similar letters of reference indicate corresponding parts in all the figures.

A is the fixed frame-work of the machine.

B is a long approved fluting-chain. It is traversed slowly, and the material, which we will assume to be a strip of crêpe lisse of uniform width and of indefinite length, is taken in rapidly on the entering side in a plane condition, and is delivered at the other side slowly and properly formed in graceful curves or plaits extending uniformly across.

$G'$ $G^2$ $H'$ $H^2$ are wide wheels or rolls, presenting each a rough exterior. They are slowly revolved in the positions represented. The corrugated material on being delivered from the fluting chain or device B is raised a little and drawn delicately through the space between the rollers $G'$ $G^2$. From thence it is delivered, aided by gravity, into the bite of the rollers $H'$ $H^2$, which do not extend uniformly across, but are each divided into two separate wheels with a little space between them. In the space between the two parts of each roller $H'$ $H^2$ is performed the important function of commencing to flatten a portion of the ruche to form the pressed line—a flattened and practically plane portion of the goods—by which it may be sewed or otherwise secured to any plane material or surface.

D is a member of the mechanism which corresponds in its uses in the machine to the lower belt correspondingly lettered in the invention

set forth in my patent of April 20, 1880, No. 226,719. It is revolved at a rate corresponding to the motion of the fluted material, and is heated at one or more points to maintain the proper temperature. I term this device D a revolving "horn" or "carrier." This horn or carrier is narrow.

C is a corresponding narrow belt, of brass or other suitable material. It is strained over pulleys C′ C², mounted in a yielding frame, W′, pivoted loosely on a lever W. The belt C is traversed at a rate corresponding with the motion of the horn or carrier D.

J is what I term my "vibrating presser." It is narrow. It may correspond nearly or exactly with the width of the horn or carrier D, but is preferably much narrower. It rocks on a pin, *j*, which is carried on a lever, I, rocking on a center, *i*, which is peculiarly mounted on a free lever, K, as will be explained farther on. This lever I is rocked so that the presser J is rapidly vibrated up and down. At each depression the presser and the goods under it are carried forward by the friction induced on the horn or carrier D. At each lift it liberates itself and is brought back to its starting-point by means of a spring, and by the continued motion of the horn or carrier D a fresh supply is introduced to be flattened down at the next descent. This effectually flattens the corrugations or formed goods along the narrow line on which it acts when the presser J is down on the goods.

W is a lever oscillating on an axis coincident with the axis of the horn or carrier D. The center of the wheel C′ is pivoted on this lever W at the point of junction, its axis coinciding with and forming the center of junction for the framing W′, before described. This lever W is rocked or oscillated regularly. It follows that the frame W′ and the connected pulleys C′ C² are oscillated forward and backward relatively to the horn or carrier D and to the ruche which is traversed thereon.

E is a gas-pipe, terminating in a suitable jet or series of jets, which, being ignited and the flow of gas properly adjusted, maintain the proper temperature of the horn or carrier D.

It will be observed that while the shafts of the rollers G′, H′, and G² may extend continuously across the machine, the shaft of the wheels H′ must be divided to allow the horn or carrier D to turn freely between the parts of the wheel H′. This will not require a separate drawing. It is sufficient to mount each of the two short rollers or wheels H′ in separate bearings, with provisions for communicating the proper rotary motion thereto. The first pair of rough rollers, G′ G², being placed as shown, so that the freshly-fluted material is carried upward on one side of the lower roller, H², and allowed to descend again on the other side of the same roller, insures, by the great surface in contact, so strong an adhesion of the goods to the roller that they are certain to be controlled by the speed thereof. The pinch due to the upper roller, G′, is necessarily slight and irregular; but the friction of each corrugation against the lower roughened roll, G², is sufficient to insure that the fluted material is properly drawn out from the fluting device B, and also to insure that it shall not be fed forward to the second set of rollers, H′ H², and consequently under the presser J too fast in any case.

Instead of a tape, *m*, of greater or less breadth, laid along the flattened surface and pressed down thereon, I can use two cords or more. It is sufficient that there be a piece of reliable material extending in a direct line along the flattened surface, so that any slight tension to which the ruche is exposed in handling previous to sewing it to any garment will be received and borne by the cord or tape or other longitudinal piece.

Fig. 7 shows the vibrating presser J, considerably grooved at the back to receive and guide a tape which is represented as being introduced from above. The groove should be gradually lessened in depth as it extends forward, so that the slight thickness of the tape will be impressed into the goods and the finished article will be plane on its upper surface. Two or any other number of cords may be correspondingly employed, being received through any suitable guides. (Not represented.)

L L′ are gages set at a proper distance apart to allow the strip of the material to move freely between them. To allow for the material varying slightly in breadth, one gage, L, is itself elastic or has a spring attached, so that it can spring to allow for varying width of goods.

It will be understood that steam is thrown upon the fluted fabric from each side at or near the points of its emergence from under the vibrating presser J, the devices for this purpose being the same as shown in my patent of April 20, 1880, above referred to.

R is a covering-plate, which is mounted at a little distance from the curved path described by the fluting in the act of being steamed and dried on the horn or carrier D. This curved plate R corresponds to the similarly-marked part in my patent of April 20, 1880, above referred to.

Any ordinary or suitable provisions are made for imparting heat to the fluting device B. Heat may be applied, by gas-jets or otherwise, to the wheels C′ C², or either of them.

The machine, in the condition so far described, can be used to produce plain ruching. The flattened stripe produced by the vibrating presser J and afterward perfected by the damping and drying of the whole in position may be produced exactly in the middle of the breadth of the ruche, or at any distance toward either side. This may be determined by the position of the gages L L′. The ruche thus finished, with the narrow strip of flattened surface extending along its central line, may be used in that condition by sewing

or otherwise attaching to any garment, in which case the frills will extend both ways from that line; or the double ruche thus produced may be folded along the central line, so that both frilled edges will be presented in the same direction, and it may be attached to any garment or article in that position, or the two may be cut apart by any suitable cutting-instrument, the line of cut extending along the center of the flattened surface. To better prepare the material for this latter treatment there should be two or four cords, *m*, run in.

The means which I employ for aggregating the fluted or formed material in graceful convolutions and for pressing down a line along the middle or at other parts of the breadth will now be described. They are shown in Figs. 8 and 9.

I wish to accomplish the apparently difficult matter of causing the previously-fluted material to be itself fluted or formed in cross-corrugations of such size that each of these large corrugations or cross-flutes, webs, or whatever they may be termed, contain eight or some other exact number of the previously-formed small flutes. The beauty of the product depends largely on the regularity with which this compounding of the fluting is accomplished.

P P are two light skeleton-frames, which I term "molds," fixed on the arm I′ at a sufficient distance apart to allow the presser J and the revolving horn or carrier D to play freely between them. At each descent of the lever I the presser J rests on and flattens a narrow portion of the fluted material lying directly on the revolving horn or carrier D, while the molds P P stand at a little distance therefrom on each side. The lower face of each mold P is formed with webs P′, the spaces between which are carefully determined in width and depth.

Q Q′ Q Q′ are lower molds correspondingly formed in duplicate and similarly applied in the reverse position on each side of the revolving horn or carrier D. These lower molds are hung each directly under the corresponding upper molds, P; but the lower are longer. They turn on centers on the same lever farther from the working-point, which latter it will be understood is alongside of the working part of the presser J. The lever I, carrying the upper molds, has a short arm, $I^2$, extending rearward from the axis *i*, the rear arm, $I^2$, being connected, by a link, F, with the pin $Q^2$ on the lower mold, Q, causing the sinking of P to elevate Q, and thus to close the molds together. The webs Q′ are in the spaces between the webs P′. When the upper molds, P, sink and the lower molds, Q, rise the webs P′ and Q′, meshing together, perform the important function of acting on the material M, previously fluted uniformly by the device B, and throwing it into the peculiar corrugations which I have termed "multiplied plaits."

T is a spring which induces the separation of the molds.

The motions are obtained from the other mechanism by means of levers and links, as is plainly shown in Fig. 4.

Z is an arm mounted loosely on the rocking shaft *i*. Its outer end carries a roller, Z′, which presses on the eccentric-rod *b*′. The latter rod has, by virtue of its being moved by the eccentric *b*, a motion, not only endwise, but also upward and downward. The up-and-down motion is made to produce the desired vertical motions of the presser J, and also the required opening and closing of the molds P Q. The arrangement for attaining this end is very fully shown in Fig. 4.

It is important to allow some degree of elasticity to the several parts. The presser J is acted by a spring, J′, secured to the arm *j*, which tends to raise its front end and depress its rear end. This tendency being of moderate force is overcome, and the presser J matches fairly flatwise upon the corresponding surface of the ruche and effectually flattens it upon the horn or carrier D. When the arm *i* rises the presser J tilts on its center *j* in obedience to the force of the spring J′. It is important to restrain this tilting motion from going beyond a certain extent. I do not wish to keep the back end of the presser always on the goods. I avoid this by so proportioning the parts that the shaft of the roller H′ serves as a stop to arrest the tilting of the presser J. The action of this stop, by arresting the tilting, leaves the work entirely untouched by the presser, so that it can move forward freely.

The arm Z is attached to the lever I elastically by means of the spring Y. This allows the parts to be adjusted with considerable license. After the presser J has been brought into firm contact with the revolving horn or with the flattened goods lying thereon, and after the molds P Q have been fully closed the eccentric-rod *b*′ may rise still higher and may correspondingly lift the lever Z, because the spring Y, by its yielding, allows for this motion without inducing any fracture. The horn or carrier D revolves steadily. When the presser J is brought down firmly upon the goods resting on the horn, it takes hold of it with a clamping force, which causes the presser J and all its attachments to move along for the time being with the slow motion of the horn or carrier D. So soon as the presser J is lifted the parts return to their previous position by the action of the spring N. The molds P Q, being pivoted to the same loose lever K, partake of the same forward and backward motion.

In order to operate successfully with the molds P Q, so as to make the multiplied flutings with perfection, it is important that the several preliminary flutes produced by the device B shall be crowded together sufficiently close that their convolutions shall always be in fair contact each with the other. For plain work—I mean where the aggregations which I have termed "multiplied flutings" are not produced—the simple flutes produced in the

device B will allow of being held and flattened down in the finishing at various distances apart. Their distance depends on the velocity-ratio of the respective parts of my machinery. I can change this within wide limits by any of the ordinary devices—as cone-pulleys, changeable gears, and the like.

It is important that the relative speed of the parts of the machine may be varied as required.

It is of much advantage to form the plaits or flutes completely before the flattening is commenced, and to flatten by a distinct and separate operation. If the mechanisms are made to act on the same point simultaneously, they interfere with each other, unless the parts are confined to certain specific forms and modes of operation. My invention, as shown, allows any required variation in the means for forming the plaits and in the form and motions of the flattening device without interfering with each other.

I use the terms "rob" and "reef," as explained in my previous patent referred to, to designate the two acts—the first, the act of stretching the corrugations apart and putting less of the fabric M into a given length of the ruche, and the latter to indicate the act of crowding the flutings together, so as to put more material into a given length of the ruche. By properly adjusting the parts the result is the placing of the several corrugations or flutes in regular piles or bunches, as indicated in Fig. 5. Being pressed in this condition, the ruche retains that character.

The conditions of the corrugations may be varied within wide limits by varying the speed of the parts and the depth and distance apart of the webs P′ Q′ relatively to the size of the flutings, and the rate at which they are delivered from the fluting device B.

Modifications may be made in the details. I can place the pulleys C′ C² farther apart or nearer together, making the metallic band C to correspondingly hug the flattened part of the ruche longer or shorter upon the heated horn or carrier D. I believe my flattening means J to be so efficient that the machine may be worked with some success without the metallic band C, and with only the pulley C′ traversed back and forward on the flattened path after the presser J has done its work. The cover-plate R will in such case hold the ruche in shape while the drying is completed. I can dispense with the belt for driving the pulley C′, and allow it to be moved by the goods alone.

I do not confine the invention to the making of articles technically known as "ruches."

By making the ruching or fluting device B in different forms I can make the cross corrugations or plaits of different breadths and forms, and may term it "crimping," or various other names.

It will be understood that I use organdie, tarlatan, or any other material which can be thrown into waves or plaits, and held, and which can be steamed, flattened, and thrown into the multiplied plaits, when required, in substantially the manner herein shown.

When the multiplied plaits are not required I can disconnect the molds P and Q, either taking off the working parts altogether or turning them out of the way.

When the molds P Q are used they may be differently connected, so as to work independently of the presser J, instead of, as shown, turning on a common center; but I prefer the precise arrangement shown.

I claim as my invention—

1. In a ruching-machine, the vibrating presser J, in combination with a fluting device, B, and with means, D, for moving the fluted material forward under the vibrating presser, arranged as shown, so that the operations are separate, the flutes being first produced and the flattening of a portion being effected on each flute at a later period, all substantially as herein specified.

2. In combination with fluting device B and flattening device D J, the molds P Q, for arranging the flutes to produce aggregations or multiplied plaits, as herein specified.

3. In a ruching-machine, the combination, with fluting device B, of the carrier D, vibrating presser J, and oscillating lever K, arranged as shown, so that the presser J and its connections are allowed to move forward with the said carrier during the period while the pressure is on the material, and are caused to move back when the pressure thereon is relaxed, substantially as herein specified.

4. The mold P, formed with the webs P′, in combination with the mold Q, having the webs Q′, arranged as shown, so that the webs alternate in position with spaces between and with means for operating them with an opening and closing movement, as herein specified.

5. The rough rollers G′ G² H′ H², arranged, as shown, relatively to the fluting device B and to the carrier D, flattening means J, and laundering means C C′ C², as herein specified.

6. In a ruching-machine, the pulleys C′ C² and flexible band C, mounted on the frame W′, and adapted to be vibrated forward and backward relatively to the carrier D, as herein specified.

7. The framing W and W′, pivoted together, as shown, in combination with the rod *b′* and operating means *b*, and with the carrier D, pulleys C′ C², and belt C, and provisions for applying steam at an early stage and dry heat at a later stage, as herein specified.

8. The rigid gage L, and the yielding gage L′, in combination with each other and with fluting means B, and pressing means adapted to flatten a narrow portion of the breadth, as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, N. Y., this 29th day of April, 1880, in the presence of two subscribing witnesses.

CORNELIUS CLARK.

Witnesses:
CHARLES R. SEARLE,
CHARLES C. STETSON.