8 Sheets—Sheet 1.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

Embroidering-Machine.

No. 203,142. Patented April 30, 1878.

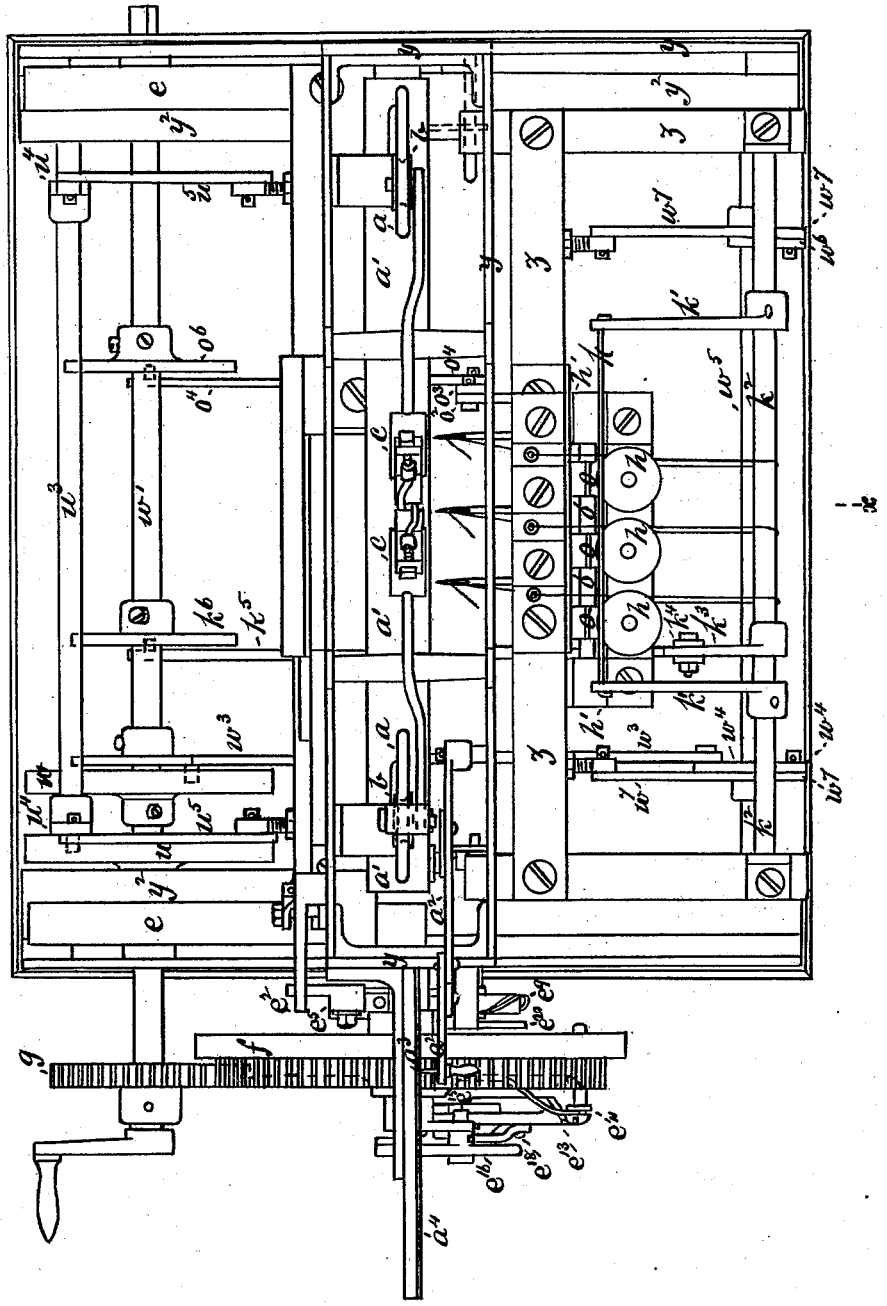

Fig. 1.

Witnesses

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W. L. Bonnem

Inventors.

Isaac Gröbli, Carl Arnold Caflisch, John Wehrli.

per Munn & Co Attorneys.

8 Sheets—Sheet 2.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

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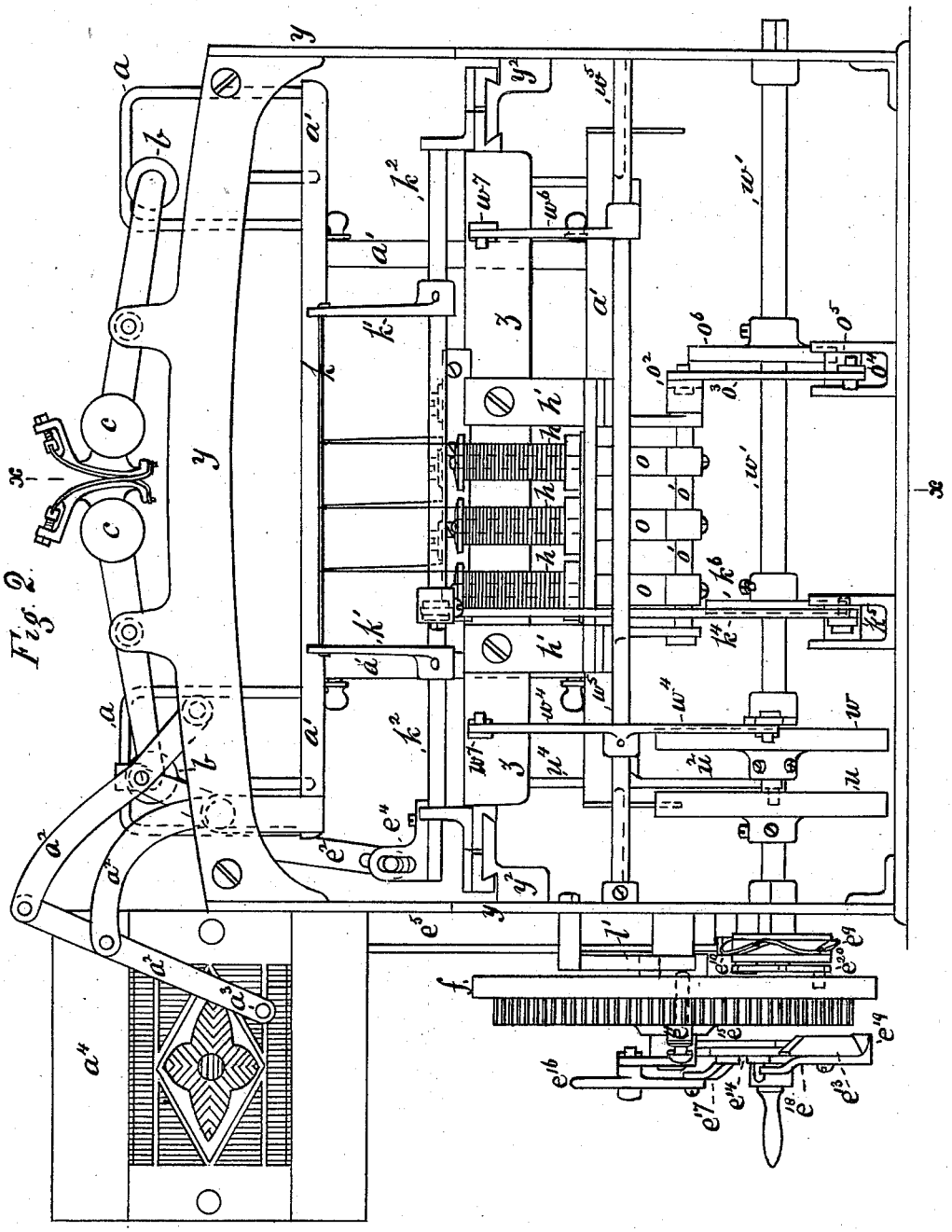

Fig. 2.

Witnesses.

Sa.S. Wightman.

W.L. Jennem.

Inventors.

Isaac Gröbli, Carl Arnold Caflisch, John Wehrli.

per Henry B. Wenmick atty

8 Sheets—Sheet 3.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

Embroidering-Machine.

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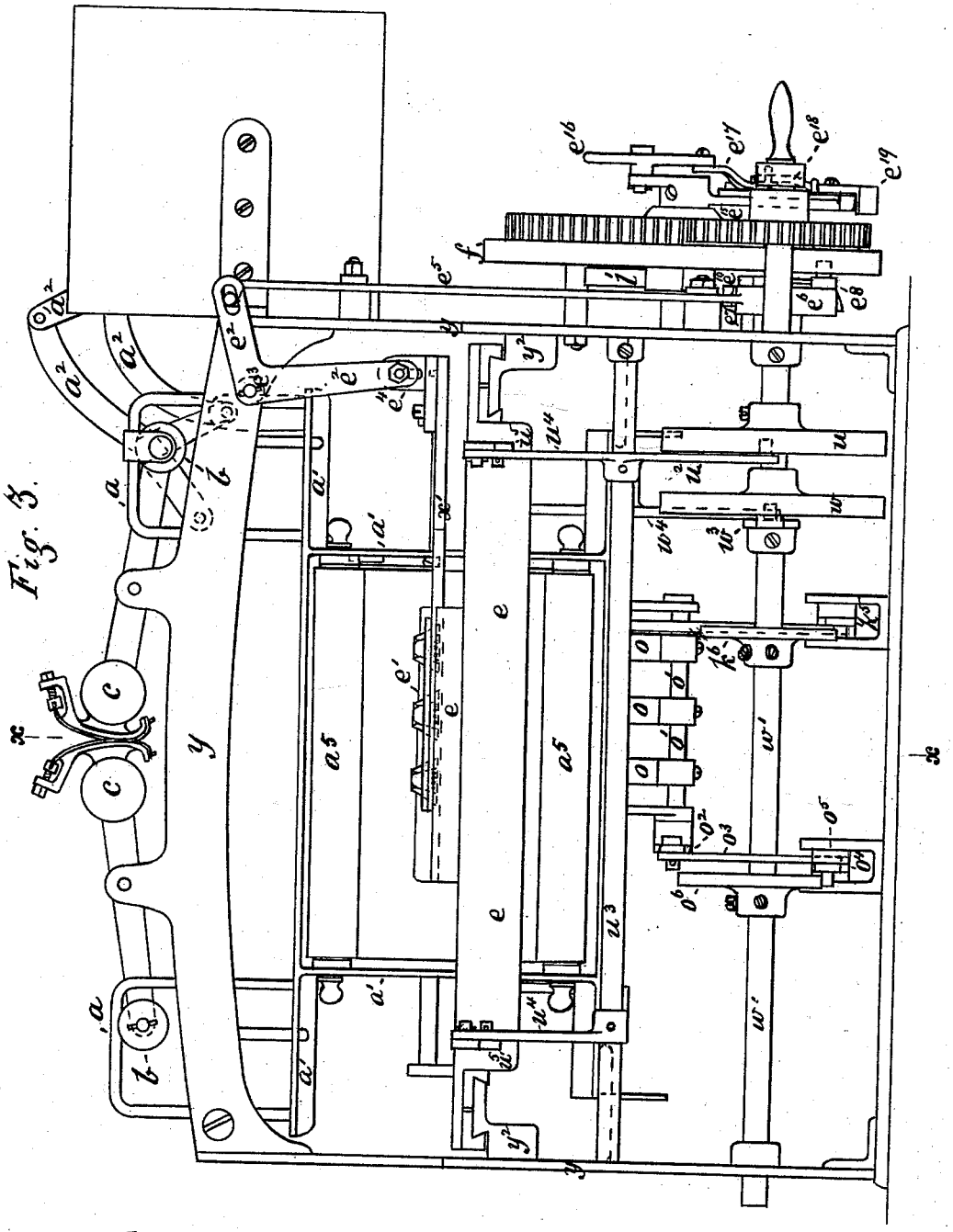
Fig. 3.



Witnesses.

Jas. S. Wightman.

W. L. Bennett

Inventors.

Isaac Gröbli, Carl Arnold Caflisch John Wehrli.

by Munn & Co Attorneys

8 Sheets—Sheet 4.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

Embroidering-Machine.

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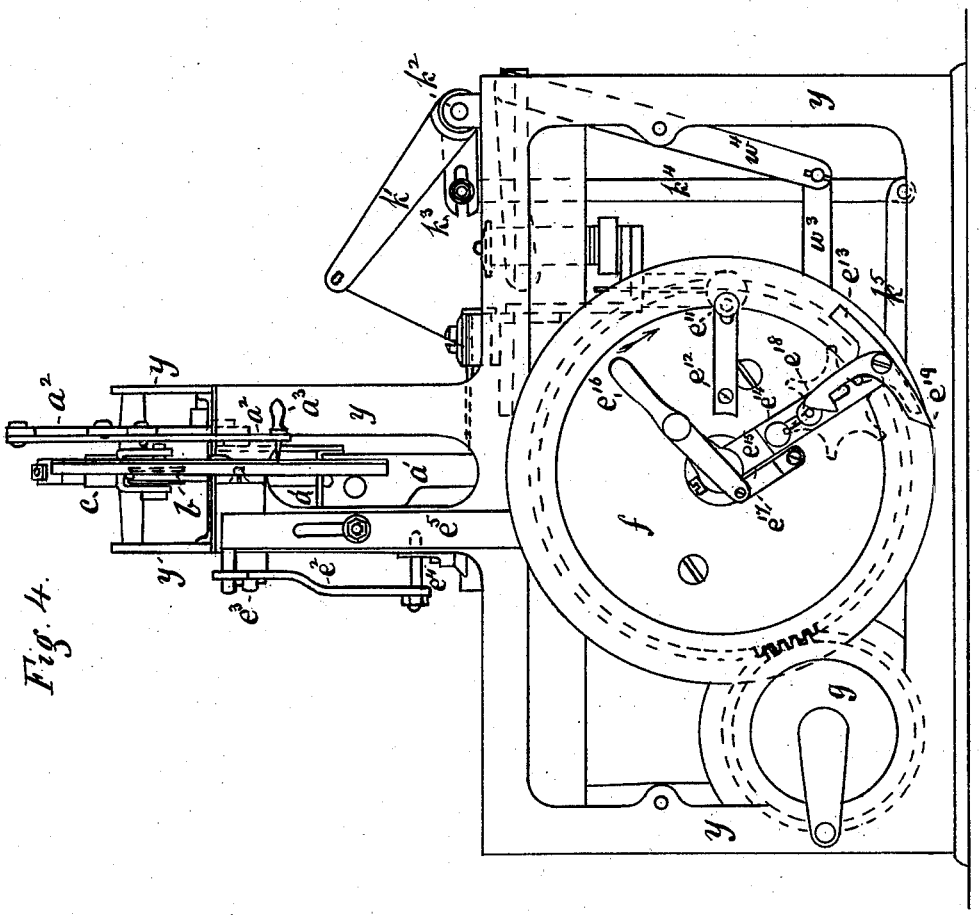

Fig. 4.

Witnesses.
Jas. S. Wightman.
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Isaac Gröbli, Carl Arnold Caflisch, John Wehrli.
per Henry B. Renwick atty

8 Sheets—Sheet 5.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

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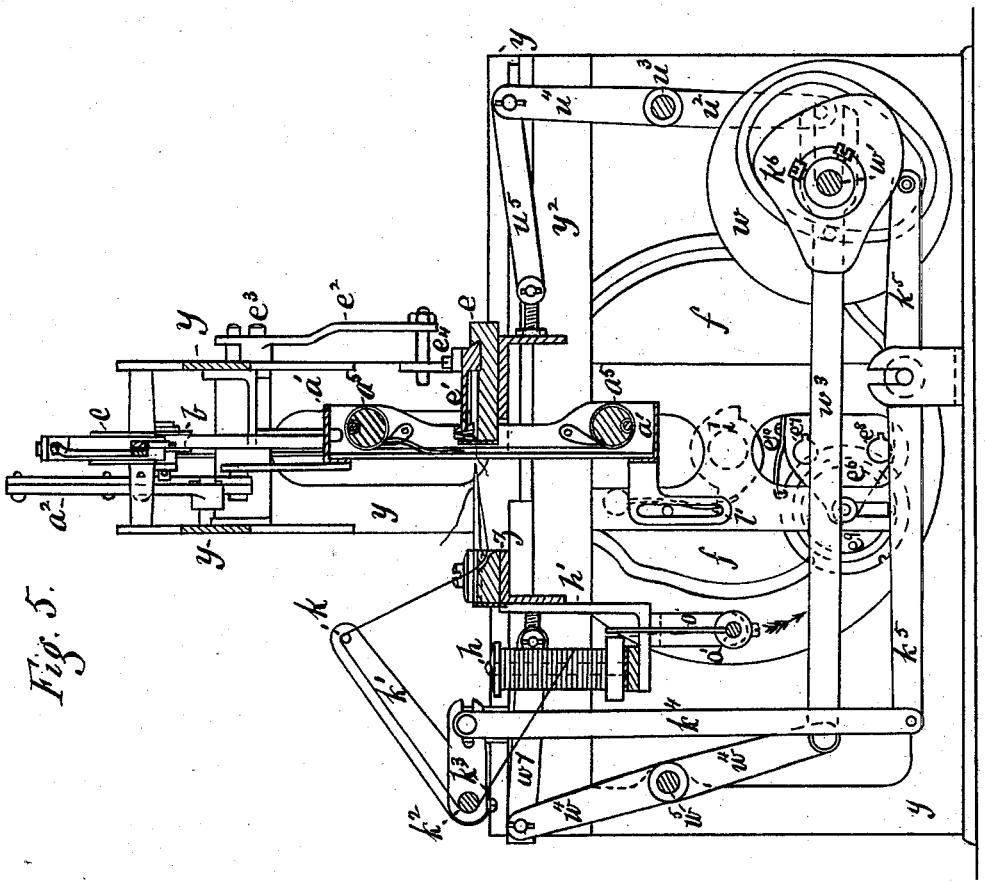

Fig. 5.

Witnesses.

Sa.t S. Wightman.

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Isaac Gröbli, Carl Arnold Caflisch, John Wehrli

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8 Sheets—Sheet 6.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

Embroidering-Machine.

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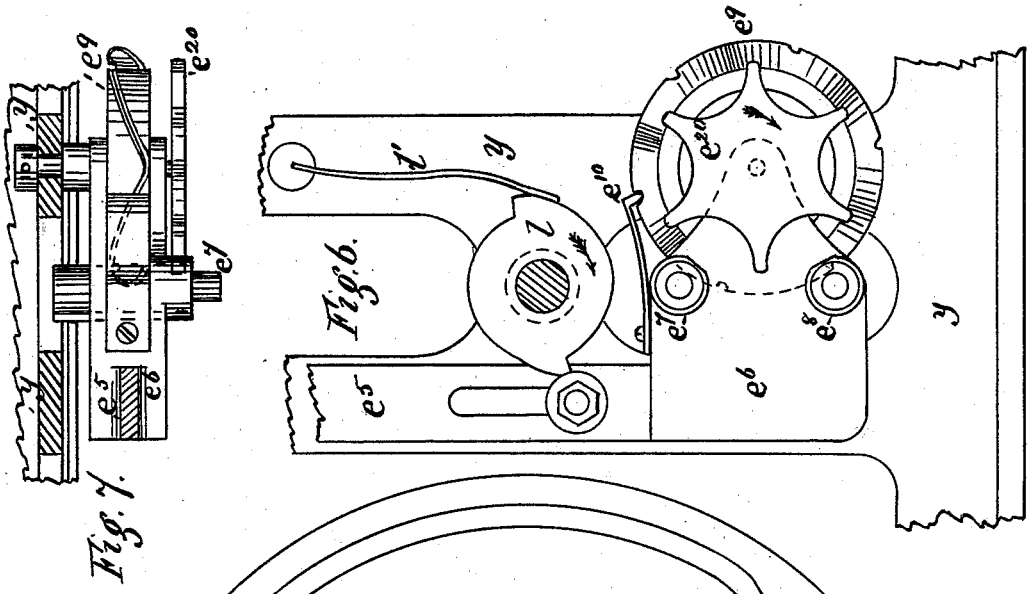

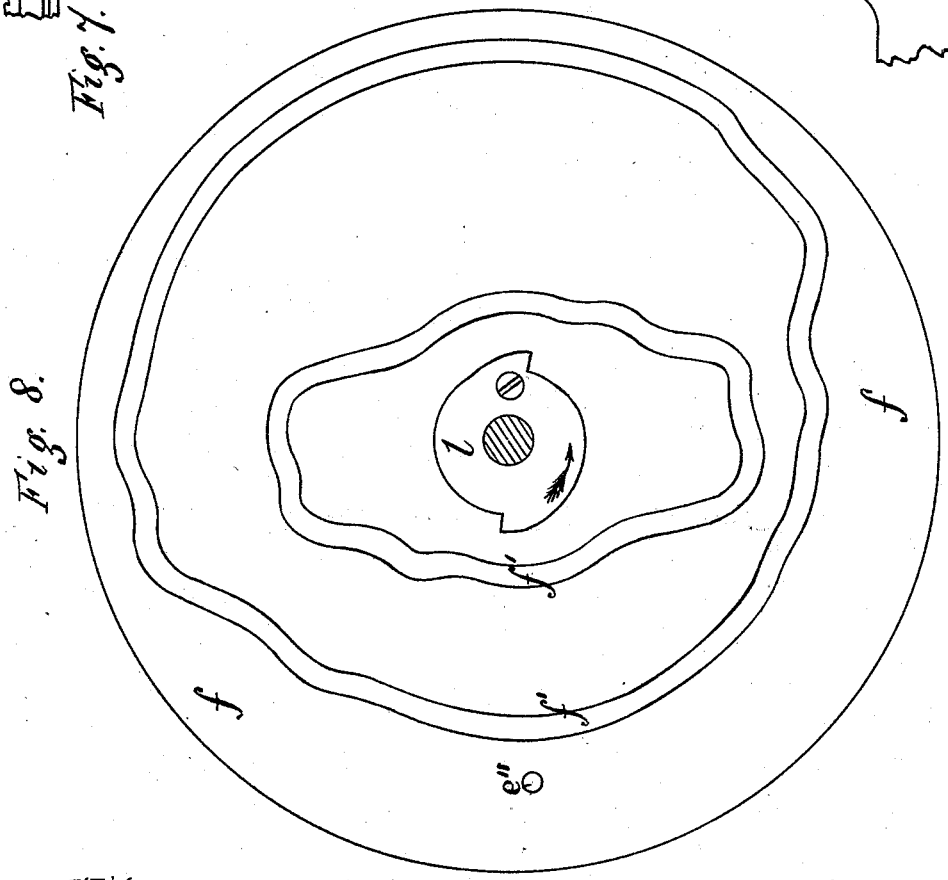

Witnesses
Jas. S. Wightman.
W. L. Zenneni.

Inventors.
Isaac Gröbli, Carl Arnold Caflisch, John Wehrli.
per Munn & Co Attorneys

8 Sheets—Sheet 7.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

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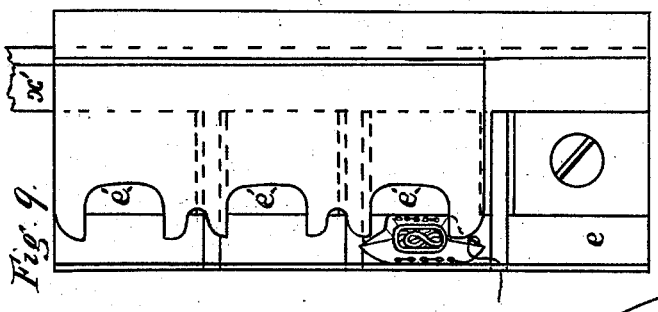


Fig. 9.

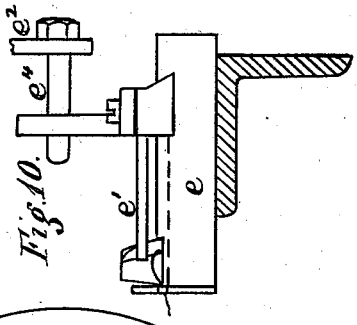


Fig. 10.

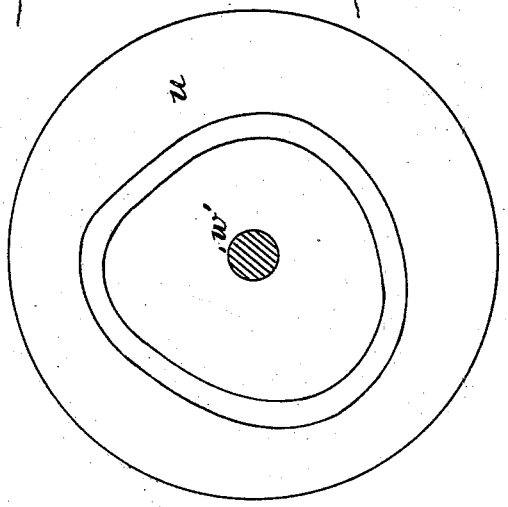


Fig. 11.

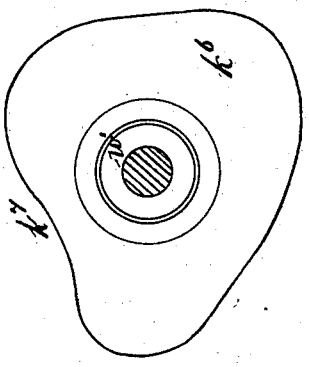


Fig. 12.

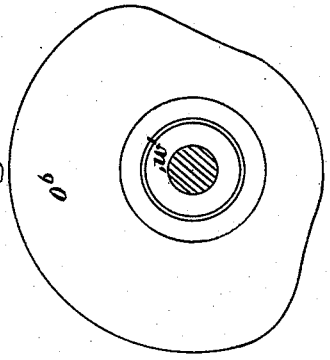


Fig. 13.

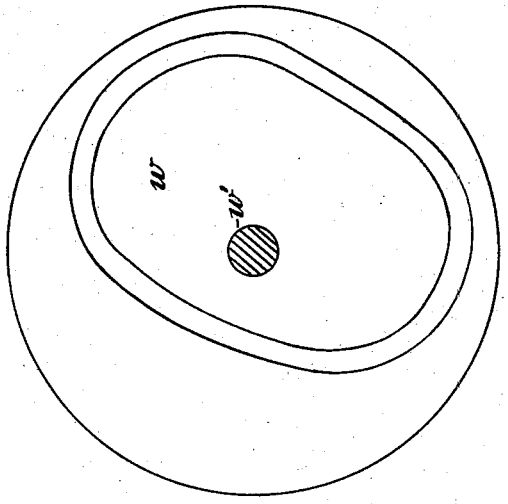


Fig. 14.

Witnesses.
Jas. L. Wightman.
W. C. Zeamans

Inventors.
Isaac Gröbli, Carl Arnold Caflisch, John Wehrli.
per Henry Brinckerhoff

8 Sheets—Sheet 8.

I. GRÖBLI, C. A. CAFLISCH & J. WEHRLI.

Embroidering-Machine.

No. 203,142. Patented April 30, 1878.

Fig. 16

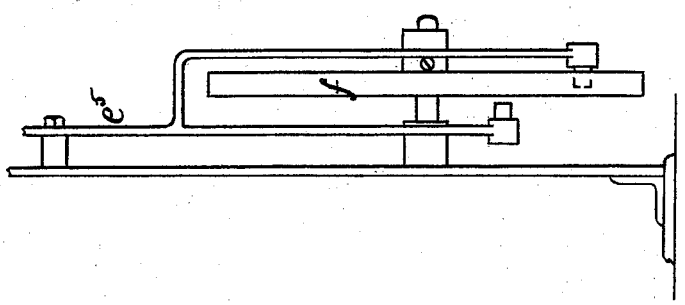
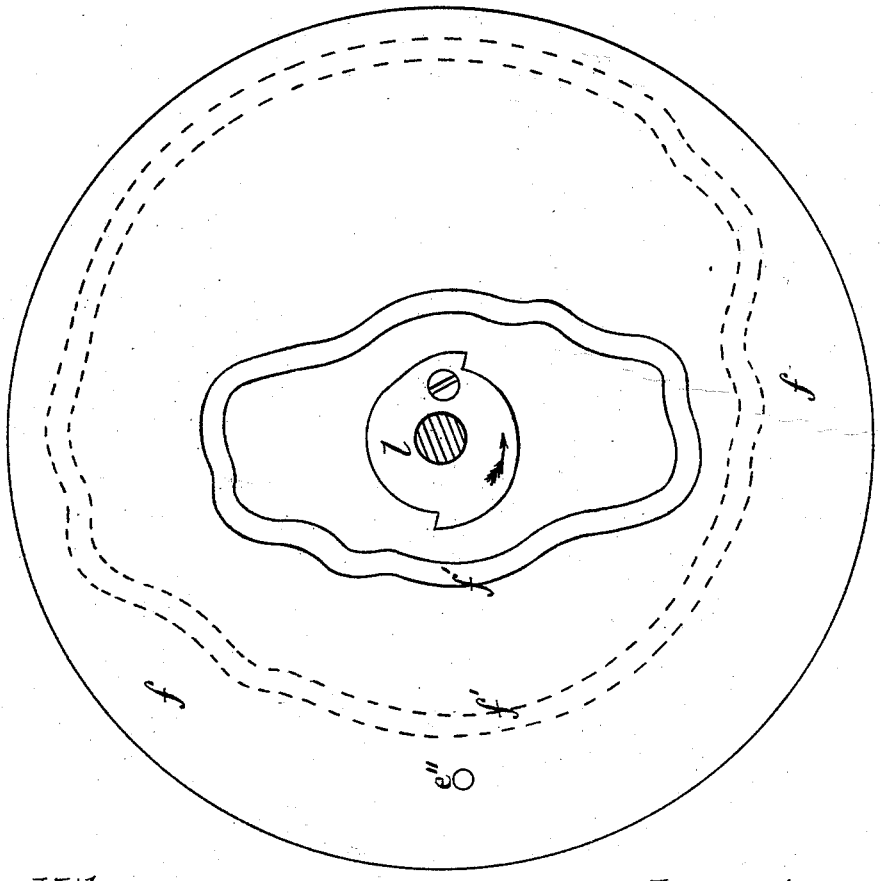


Fig. 15.



Witnesses.

Sa. S. Wightman.

W. L. Gennens.

Inventors.

Isaac Gröbli, Carl Arnold Caflisch, John Wehrli.

per Crump & Simmons

UNITED STATES PATENT OFFICE.

ISAAC GRÖBLI, OF WÜLFLINGEN, CARL ARNOLD CAFLISCH, OF FÖSS, AND JOHN WEHRLI, OF WÜLFLINGEN, SWITZERLAND, ASSIGNORS TO F. A. KURSHEEDT AND A. E. KURSHEEDT, OF NEW YORK, N. Y.

IMPROVEMENT IN EMBROIDERING-MACHINES.

Specification forming part of Letters Patent No. **203,142**, dated April 30, 1878; application filed December 14, 1877.

To all whom it may concern:

Be it known that we, ISAAC GRÖBLI, of Wülflingen, and CARL ARNOLD CAFLISCH, of Föss, and JOHN WEHRLI, of Wulflingen, all in the Republic of Switzerland, have invented certain new and useful Improvements in Embroidering-Machines; and the following, taken in connection with the drawings, is a full, clear, and exact description thereof.

These improvements are represented in the drawings as applied to a machine in which the embroidering is produced by means of a gang of needles and a gang of shuttles, each needle and shuttle acting to make embroidery-stitches by interlocking threads, much in the same way that a needle and shuttle act in an ordinary sewing-machine; and the improvements which relate to the mechanism by means of which the shuttles can be caused to operate in relation to the needles, as they do in an ordinary sewing-machine, or to enter the loops alternately from opposite sides thereof, as the shuttle does in the shuttle-machine patented by A. B. Wilson, November 12, A. D. 1850, are applicable only to embroidery-machines using needles and shuttles.

In the drawings, Sheet 1, Figure 1, is a top view or plan of the machine. Sheet 2, Fig. 2, is a side elevation thereof, from the side on which the attendant stands. Sheet 3, Fig. 3, is also a side elevation, but taken on the opposite side of the machine. Sheet 4, Fig. 4, is an end elevation thereof. Sheet 5, Fig. 5, is a vertical transverse section through the machine on the line *x x* of Fig. 1. Sheet 6, Fig. 6, is an elevation; and Fig. 7 is a plan, partly in section, of parts of the apparatus for moving and causing the change of motion of the shuttles. Fig. 8 is an elevation, on an enlarged scale, of the cam tracks or grooves which actuate the shuttles; and on Sheet 7 are various figures, on an enlarged scale, of details of the same machine. On Sheet 8, Figs. 15 and 16 are elevations of the shuttle-cam as used in the original machine, patented in England December 3, 1870, and of the rollers and rod by which motion was communicated from the same to the shuttles.

Prior to the date of the invention on which this patent is based, it had been discovered that it was useful in an embroidering-machine so to construct the devices for moving the shuttles that these latter might either be made to enter the loops always from the same side or alternately from opposite sides thereof.

In order to effect these motions and to change them, as desired, a revolving disk was employed, which had a cam-groove on each face thereof, the groove on one side being of such shape as to cause the shuttles, by the aid of a pin entering a groove and proper levers in connection therewith, to enter the loops always from the same side. The cam-groove on the other side of this disk was so shaped as to cause the shuttles, by the aid of a pin and connections, to enter the loops alternately from opposite sides thereof.

In order to change the shuttles from one mode of working to the other, it was necessary to slide the disk along its shaft, or on a sleeve surrounding its shaft, so that the groove on one side of it left one of the pins above spoken of, and the groove on the other side embraced the other pin above spoken of, all as shown in Figs. 15 and 16, Sheet 8. It was difficult and inconvenient to make this change by sliding the disk, as the machine had to be stopped before the change could be made. I have devised a plan by means of which the machine itself effects this change of the motion of the shuttle whenever it is desired to do so.

In the drawings, the shuttles are shown as actuated by shuttle-drivers e^1 e^1, (see Figs. 9 and 10, Sheet 7,) all formed on a long bar of metal, which is moved to and fro in consequence of its being secured to a rod located in a suitable guide upon the shuttle-carriage *e*. This rod is moved to and fro by a bent lever, e^2, pivoted at e^3, which has at its lower end a pin, e^4, which takes into a slot formed in a piece of metal, which is secured to the end of the long rod of metal to which the shuttle-drivers are attached. (See Figs. 1, 3, 5, and 10.) This bent lever is actuated by a rod, e^5, which is free to move up and down, at the end of the frame of the machine. (See Figs. 2, 3, and 4.) The rod e^5 is guided by pins, which are attached to the frame, and pass through

slots in the rod, and is connected with the bent lever by means of a pin attached to its upper end, which enters a slot in the end of the bent lever. (See Fig. 3.)

It will appear from the consideration of this description that the shuttles will reciprocate when the rod e^5 is moved up and down, and that this reciprocative motion will not be interfered with by reason of the motions of the shuttle-carriage and shuttle-driver toward and away from the cloth, for the reason that the slot carried by the end of the rod on which the shuttle-drivers are mounted can move to and fro on the pin e^4. (See Figs. 4 and 10.)

In order to move the rod e^5 up and down, so as to cause the shuttles to move in either of the ways before described, the wheel f (see Figs. 1, 2, 3, 4, 5, and 8) is provided on its inner side with two cam-grooves, one so shaped as to move the shuttle in one of the ways described, and the other so shaped as to move the shuttle in the other way. These grooves actuate the rod e^5 by means of two cam-pins, e^7 e^8, which are mounted in a frame, e^6, which is securely attached to the lower end of the rod e^5. These cam-pins e^7 e^8 can be slid horizontally in the frame e^6, so that one of them may rest in its cam-groove, while the other, being pushed away from the wheel f, is not embraced by its cam-groove. When one of these cam-pins is in its groove the shuttles will move in one of the ways before described, and when the other cam-pin is in its groove the shuttles will move in the other way, before described. It will therefore be seen that it will only be necessary to remove one cam-pin from one groove, and place the other cam-pin in the other groove, in order to change the mode of working the shuttles, as it is expedient to make this change while the machine is in operation. The two cam-grooves are made for a short distance (as about the locality indicated by the letters f^1 f^1, Fig. 8) of such shape and relation to each other that both cam-pins may be in the grooves at the same time, while the cam-wheel is moving through a short distance, the grooves being for this angular distance at the same space apart from each other.

If the two cam-pins e^7 e^8 were attached to the two ends of a lever pivoted in the center, an attendant, by moving this lever, could change the motions of the shuttle, provided he watched the cam-groove and made the change when the cam-pins were at or about the positions indicated by the letter f^1 in the grooves; but, as before stated, we prefer to make the machine itself shift the shuttle-motion. To this end we have mounted upon the frame e^6 a wheel, e^9, which has a wave-shaped cam-flange on its periphery. (See Figs. 1, 2, 6, and 7.) This wheel is so located that its cam-flange takes into a nick formed in each of the cam-pins e^7 e^8, and the waves of the flange are so formed with reference to the location of the cam-pins that when the flange holds one cam-pin out of the one cam-groove it holds the other cam-pin in the other. A partial revolution of the cam-wheel e^9 will therefore move one cam-pin out of, and the other cam-pin into, a cam-groove. This cam-wheel is so shaped that it will change the cam-pins in their cam-grooves by moving through the arc between two of the nicks (shown in Fig. 6) into which the spring-pawl e^{10} enters, in order to prevent accidental movement of the cam-wheel e^9. If this cam-wheel were moved by hand, at the proper time the shuttle-motion would be changed; but we prefer to do it by means of a shifting-pin, e^{11}, (see Figs. 1, 2, 4, and 8,) which is supported in a hole in the wheel f in such manner that it can slide through the wheel in lines parallel to its axis. This shifting-pin, when pressed in toward the frame of the machine, will, at a certain period of the revolution of the wheel f, enter between the points of the star-wheel e^{20}, (see Figs. 6 and 7,) secured upon the shaft of the cam-flange wheel e^9, and will, as the wheel f revolves, turn the star-wheel through the angular distance between two of its teeth, and thus move the cam-flange wheel e^9 through the same distance, and move one of the cam-pins (either e^7 or e^8) out of its groove, at the same time moving the other cam-pin into its cam-groove. This shifting-pin might be moved in and out by hand; but we prefer to force the machine to perform this duty. In order to effect this, the shifting-pin e^{11} has secured to it one end of a light spring, e^{12}, the other end of which is fastened to the wheel f. (See Figs. 1 and 4.) This spring always tends to throw the shifting-pin e^{11} outward or away from the star-wheel, so that it cannot act upon the star-wheel unless the spring is bent and the shifting-pin forced inward. In order to force the shifting-pin inward, we provide an inclined plane, e^{13}, (see Figs. 1, 2, and 4,) so located and mounted that it may be moved into such a position that the head of the shifting-pin e^{11} will strike against it during the revolution of wheel f, thus forcing the shifting-pin e^{11} inward and causing it, when rotated by wheel f, to move the star-wheel e^{20}. When the shifting-pin e^{11} has in its rotation passed the piece of metal on which this inclined plane is formed, the spring e^{12} will again throw the shifting-pin outward.

The inclined plane e^{13} is formed upon a T-shaped piece of metal, e^{14}, which has a slot in it, through which pass pins which are secured in an arm, e^{15}, which is fastened to the stud on which the wheel f turns. This inclined plane can therefore be moved toward or away from the axis of the wheel f. In order to move it, there is a small hand-lever, e^{16}, attached to the T-shaped piece of metal by a link, e^{17}. This hand-lever is pivoted upon a bracket projecting from and attached to the arm e^{15}, and by moving the lever the inclined plane can be moved toward or from the axis of the wheel.

In the drawings, the inclined plane e^{13} is shown in its position farthest away from the

axis of wheel *f*, and the head of the shifting-pin e^{11} would be carried round and round by wheel *f* without ever striking the inclined plane; but when the attendant depresses the hand end of the lever e^{16} the inclined plane is moved toward the axis. When it is in this position the head of the shifting-pin e^{11}, moving in the direction indicated by the arrow, strikes the inclined plane, which forces the shifting-pin inward, so that it may engage with the star-wheel and change the motion of the shuttle.

After the shifting-pin has passed the T-shaped piece of metal (upon which the inclined plane e^{13} is formed) it will be thrown outward again by its spring.

In order to relieve the attendant from the necessity of holding the inclined plane in proper position, we have pivoted upon the T-shaped piece of metal a latch, e^{18}, the hook of which takes over one of the pins which pass through the slot in the T-shaped piece of metal, and thus holds the inclined plane in such position that it may act upon the pin. If this were the whole contrivance, the motions of the shuttle would change at every revolution of the wheel *f* until the attendant unlatched the latch, thus permitting the inclined plane to fall out of its acting position and away from the axis of the cam-track wheel *f*. In order to relieve the attendant of this duty and prevent an undesired change of the shuttle movement, (in case the attendant should be negligent), we have bent the lower end of the latch inward, as shown at e^{19}, (see Figs. 2 and 4,) in such manner that, after the shifting-pin e^{11} has been forced in by the inclined plane and turned the star-wheel, its head will strike against this bent-inward portion of the latch, and thus throw the hook of the latch out of engagement with its pin. As soon as the shifting-pin e^{11} performs this duty the T-shaped piece which carries the inclined plane will drop, by gravity, out of the path of the shifting-pin e^{11}, and the shifting-pin will therefore remain inoperative until the attendant again works the hand-lever and brings the inclined plane into its operating position.

The drawings show the ordinary pantograph connected with the cloth-frame; also all the mechanism necessary for giving motion to the shuttles and shuttle-carriage, and likewise to the needles and take-up apparatus, when motion is imparted to the wheels *f* or *g* in any proper manner. I do not describe these parts of the drawings, as they form no part of the invention claimed in this patent.

We claim as of our invention—

1. The combination of two cam-pins mounted on a sliding rod with a disk provided with two cam tracks or grooves formed on the same side thereof, substantially in the manner and for the purpose specified, whereby said pins may be shifted from one groove to the other without shifting the disk on its shaft.

2. In combination with two cam-pins and a disk or wheel provided with two cam tracks or grooves, a cam-wheel, which operates to move these pins into and out of their respective tracks, the combination being and acting substantially as hereinbefore set forth.

3. In combination with two cam-pins mounted on a sliding rod, and a cam-wheel, which operates to move them, a star-wheel and a shifting-pin, mounted substantially as described, so as to be revolved and capable of being slid into or out of gear with the star-wheel, the combination being and operating substantially as specified.

4. In combination with the shifting-pin, mounted as described, and the star-wheel and cam-wheel, the inclined plane and spring for moving the shifting-pin parallel to the axis of its supporting-wheel, the combination operating substantially as specified.

5. In combination with a shifting-pin and its spring, and the inclined plane, mounted substantially as specified, whereby it is capable of motion to act or not to act upon the shifting-pin, the latch, formed substantially as described, so that the shifting-pin shall, in its revolution, unlatch the latch, thereby permitting the inclined plane to drop out of its acting position, the combination being substantially such as before described.

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JOHN WEHRLI.

In presence of—
HENRY RIETER,
E. L. CORNING.