4 Sheets—Sheet 1.

F. PANSE.

Plaiting-Machine.

No. 214,788. Patented April 29, 1879.

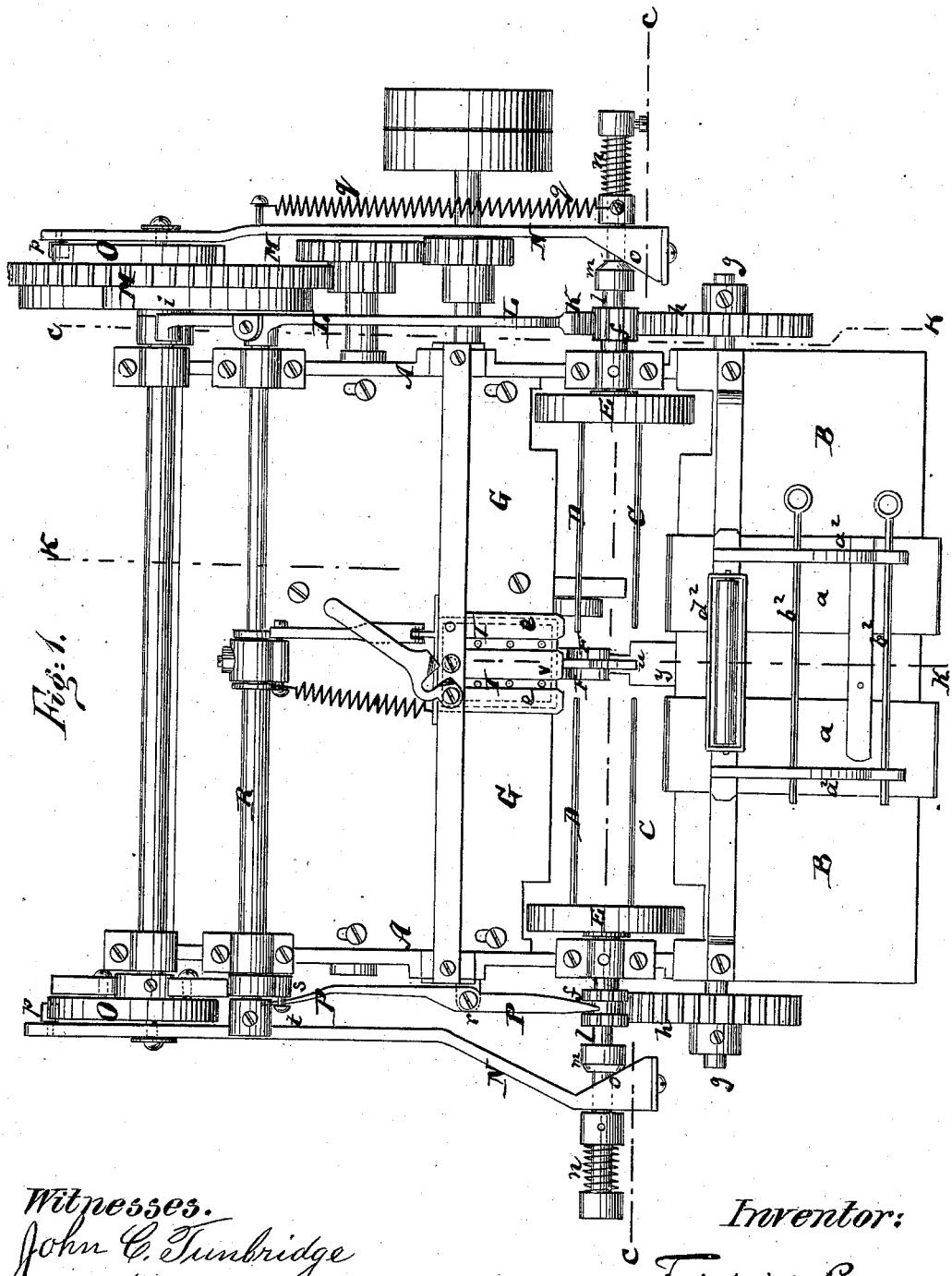

Fig: 1.

Witnesses.
John C. Tumbridge
T. B. Mosher

Inventor:
Friedrich Panse
by his attorney
A. v. Briesen

4 Sheets—Sheet 2.

F. PANSE.

Plaiting-Machine.

No. 214,788. Patented April 29, 1879.

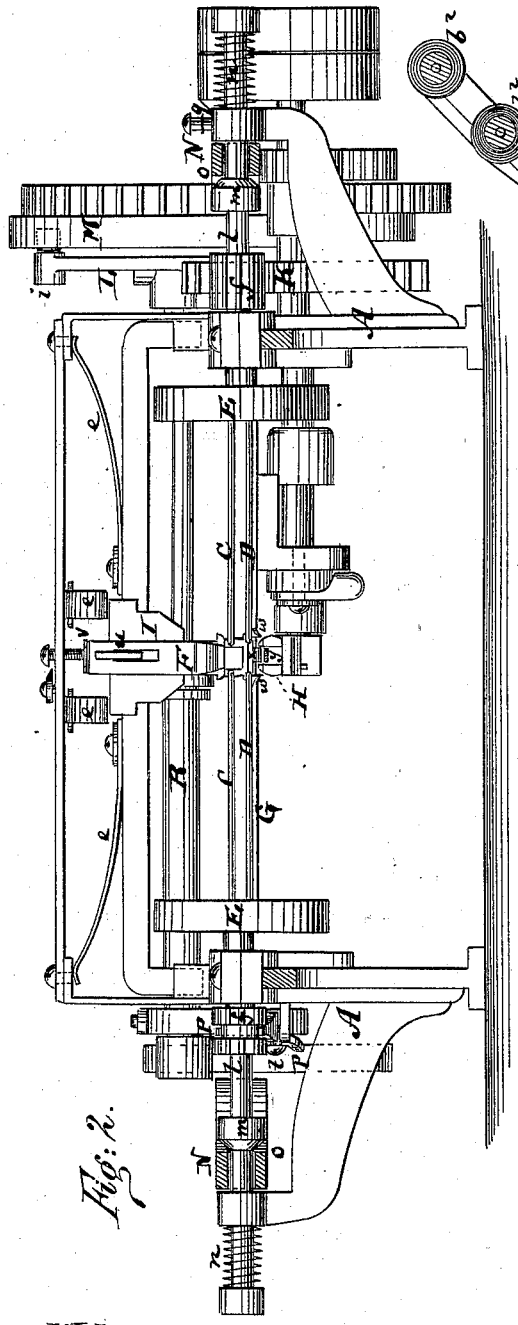

Fig: 2.

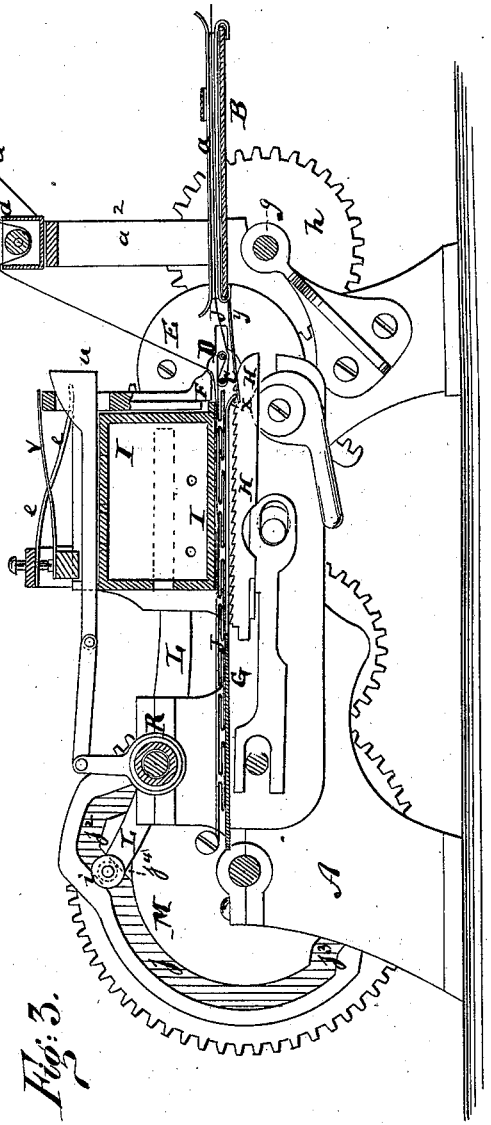

Fig: 3.

Witnesses:
John C. Tumbridge
T. B. Mosher

Inventor:
Friedrich Panse
by his attorney
A. V. Briesen

4 Sheets—Sheet 3.

F. PANSE.

Plaiting-Machine.

No. 214,788. Patented April 29, 1879.

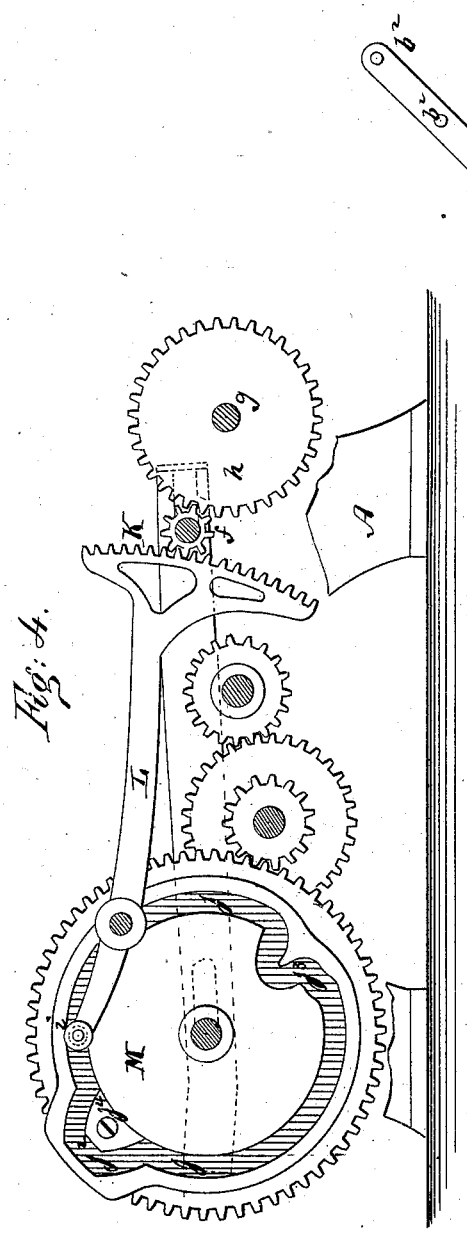

Fig. 4.

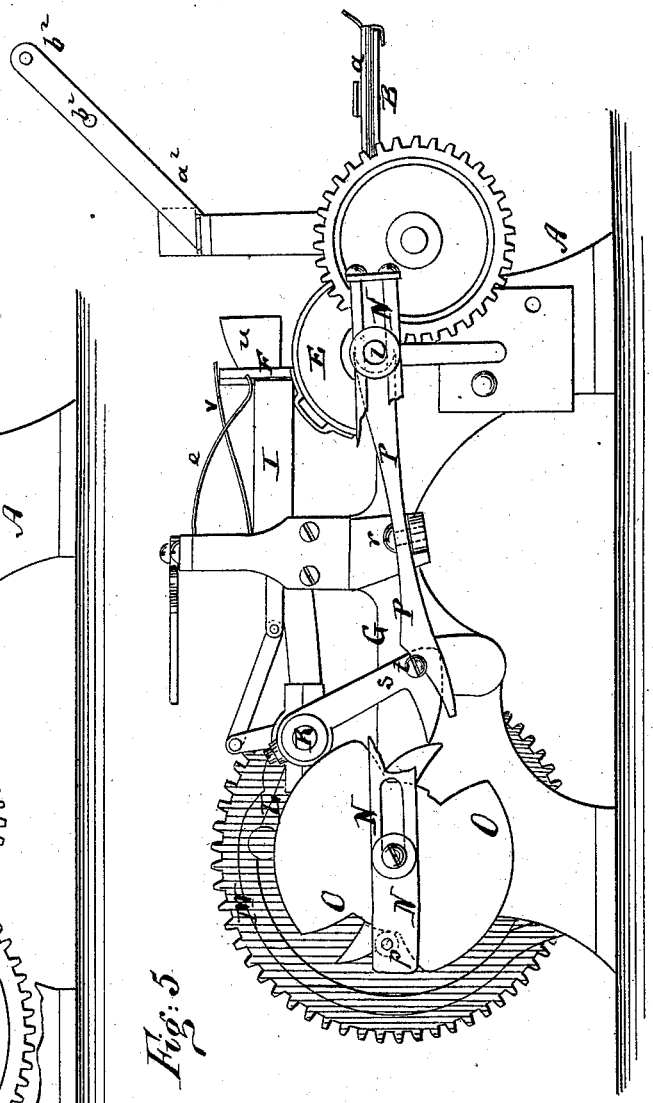

Fig. 5.

Witnesses:
John C. Tumbridge
T. B. Mosher

Inventor:
Friedrich Panse
by his attorney
A. v. Briesen

4 Sheets—Sheet 4.

F. PANSE.

Plaiting-Machine.

No. 214,788. Patented April 29, 1879.

Fig: 1.

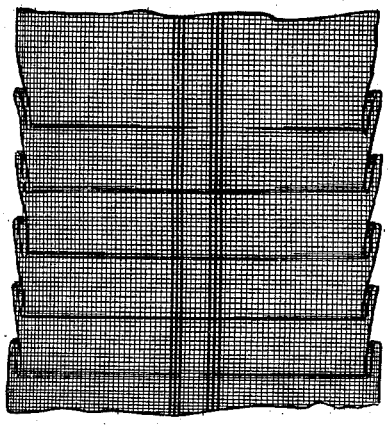

Fig: 6.

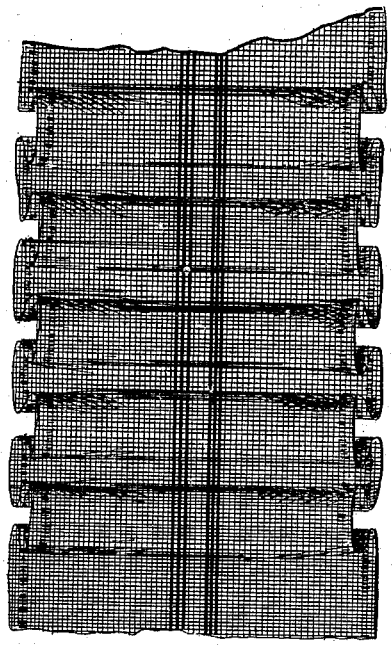

Fig: 12a.

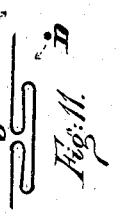

Fig: 11.

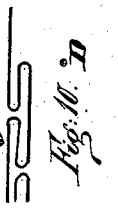

Fig: 10.

Fig: 9.

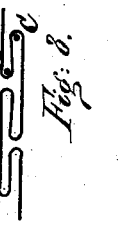

Fig: 8.

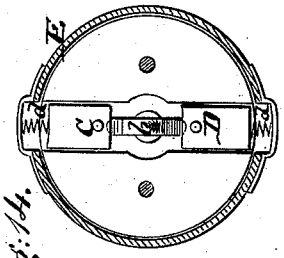

Fig: 14.

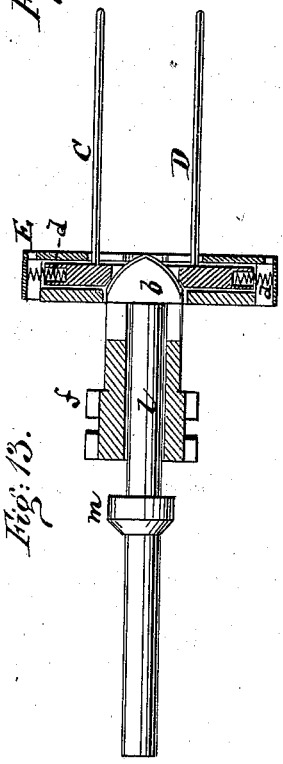

Fig: 13.

Witnesses:
John C. Tumbridge
T. B. Mosher

Inventor:
Friedrich Panse
by his attorney
A. v. Briesen

UNITED STATES PATENT OFFICE.

FRIEDRICH PANSE, OF NEW YORK, N. Y., ASSIGNOR OF ONE-HALF HIS RIGHT TO DAVID KISCH AND LOUIS M. SIMSON, OF SAME PLACE.

IMPROVEMENT IN PLAITING-MACHINES.

Specification forming part of Letters Patent No. **214,788**, dated April 29, 1879; application filed December 6, 1878.

To all whom it may concern:

Be it known that I, FRIEDRICH PANSE, of the city, county, and State of New York, have invented a new and Improved Plaiting-Machine, of which the following is a specification.

Figure 1 is a plan or top view of my improved plaiting-machine. Fig. 2 is a front elevation, partly in section, of the same, the line *c c*, Fig. 1, indicating the plane of section. Fig. 3 is a vertical transverse section of the machine, taken on the plane of the line *k k*, Fig. 1. Fig. 4 is a cross-section on the line *c k*, Fig. 1, showing the operating mechanism. Fig. 5 is a side elevation, partly in section, of the machine. Figs. 6 and 7 are views of the plaiting produced on the machine. Figs. 8, 9, 10, 11, and 12 are diagrams showing the movement of the needles in forming the plaits. Figs. 13 and 14 are detail sectional views of the mechanism for adjusting the needles toward each other.

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

This invention relates to a new machine for forming simple or side and double or box plaits by continuous process, and for securing the fabrics in the plaited form after the folds have been produced.

The invention consists, chiefly, in the use of two needles or pins, between which the fabric passes, and which, from time to time, are turned relatively to each other, so as to make an **S**-shaped fold in the fabric between them. If the needles are alternately turned in reverse direction they will produce double or box plaiting; if turned in the same direction they produce simple or side plaiting.

The invention comprises mechanism for turning the needles, for spreading them apart, for moving them longitudinally; also, mechanism for pressing the plaited fabric, and for heating and securing it in shape, and other details of improvement, hereinafter more fully pointed out.

In the accompanying drawings, the letter A represents the frame of the machine, which frame carries a receiving-table, B, that is provided with suitable gages *a a*, for guiding the fabric to the folding-needles C D. The machine is shown with two pairs of such needles, but may be operated with one single pair only. Each pair C D of needles operates independent of the other pair, but simultaneously therewith. The said needles are slender pins of steel or other material, secured at one end in a rotary head, E, Fig. 13, with which they must revolve, but within which they may move laterally apart from or toward each other.

In the drawings, I have shown a cone, *b*, as inserted in the head E, for moving the needles apart, as in Fig. 13, while springs *d d* serve to crowd them together, as in Fig. 3; but any other suitable mechanism for effecting these movements may be devised.

The fabric passes from the table B between the two needles C D, and thence under a receiving or holding foot, F, to another table, G. It is taken hold of, while between the two tables B and G, by a suitable feed, H, acting like a sewing-machine feed, and the fabric is, while fed, exposed to the action of a heated presser-foot, I, which, by springs *e e* or appropriate weights, exerts the desired degree of pressure. The feed takes hold of the fabric in front of the presser-foot I and below the receiving-foot, and then continues to act upon it below the presser-foot. While on its way to the foot F the fabric is acted upon by the needles C D in manner following: The needles are crowded toward each other, and then make a three-quarter turn with their holding-head E, thereby bending the fabric J between them in manner shown in Fig. 8, and forming a plait. The needles are next turned back half a revolution of the head E into the position shown in Fig. 9, and at the same time gradually spread apart, and turned one quarter-revolution farther back, and still farther spread apart into the position shown in Fig. 10. They are now in a vertical plane, or nearly so, and the fabric is free to be fed along between them. Having been fed sufficiently far, another plait is formed by turning the needles, after they have first been gradually contracted, Fig. 11, in the reverse direction from the turn that terminated in the position shown in Fig. 8, thus producing another reverse plait, as clearly shown in Fig. 12. Fig. 12 shows that the needle C, which in Fig. 8 formed the lower bend of the fabric to the

right, now forms the lower bend to the left, while the needle D forms the upper bend to the right, whereas in Fig. 8 it formed the upper bend to the left. Thus the box-plaiting shown in Fig. 6 is produced.

After the formation of each plait the needles are moved apart and brought to a vertical plane, the needle C being always above and the needle D always below the fabric, as shown.

If side-plaiting of the kind shown in Fig. 7 is to be made, the reverse movement of the needles is dispensed with, the single movement from the position shown in Fig. 10 to that shown in Fig. 8 (or in Fig. 12) alone being used.

The head E receives the rotations for making the box-plaiting from a toothed segment, K, (shown in Fig. 4,) which meshes into a pinion, *f*, that is rigidly connected with the head E. If there are two pairs of needles used, and two heads, E, as in Fig. 1, they are geared together by a shaft, *g*, and toothed wheels *h*, so that their motions are simultaneous and alike. The segment K is on a pivoted lever, L, which is provided with a pin, *i*, that enters a cam-groove, *j*, of a rotary disk, M.

Whenever the pin *i* enters the outward bend, j^2, of the cam-groove *j*, the heads E and their needles (then contracted) are revolved in one direction; whenever the pin *i* enters the inward bend, j^3, of the cam-groove *j*, the heads E and their needles (then also contracted) are revolved in the opposite direction in manner already stated.

If side-plaits are to be made, the piece j^4, which produces the outward bend, j^2, of the cam-groove *j*, is removed, leaving the cam-groove with only one bend, j^3, and insuring, consequently, a rotation in but one direction of the heads E and their needles; but this mechanism for giving alternately-reversed or like turns to the heads E may be varied at pleasure without departing from the spirit of my invention.

The cones *b*, for spreading the needles apart in the heads E, are mounted upon rods *l*, which have flanges *m*, and are drawn outward by springs *n*, for contracting the needles.

Reciprocating rods N, having oblique faces *o*, bear with said faces against the flanges *m*, as shown in Fig. 1, and serve, when moved by the projecting parts of cam-disks O, (shown in Fig. 5,) to push the flanges, and with them the cones *b*, inward, and thereby to spread the needles apart.

The cam-disks O take hold of pins *p*, that project from the rods N, and serve thus to move them in manner stated. Suitable springs *q*, (top of Fig. 1,) or the springs *n* alone, (bottom of Fig. 1,) serve to hold the pins *p* in proper contact with the edges of the cam-disks; but, in lieu of these springs, suitable positive motion may be employed. Likewise may positive motion be used to move the needles together, instead of the springs *d*. In fact, on an operating machine, I prefer to use a regular chuck mechanism in the head E for moving the needles together and apart from each other.

Where two pairs of needles are used, as in Fig. 1, it is desirable that, when making a plait, the points of one pair of needles be brought near to those of the other pair of needles, so that a continuous plait be formed, extending entirely across the fabric, even beneath the receiving-foot F. To this end the needles, in making a plait, extend beneath the receiving-foot F, as shown in Fig. 2; but, after having formed the plait, it is necessary that the needles be quickly moved away from beneath the receiving-foot to allow the latter to descend and hold the newly-formed plait secure. For this purpose a longitudinal movement—that is to say, a movement in the direction of its axis—is imparted to the head E, so that after forming the plait the points of the two pairs of needles may be withdrawn from beneath the receiving-foot, even before the turn from the position shown in Fig. 8 to that shown in Fig. 9 is made. The head E is therefore made to slide in its bearings together with its needles. This motion is shown to be produced by a lever, P, engaging in a groove of the pinion *f*, and swung on a vertical pivot, *r*, by an oscillating cam, *s*, Fig. 5, on which there is a headed pin, *t*, that takes hold of an oblique part of the lever P. The vibration of the lever P causes the requisite sliding motion of the head E for drawing the needles away from under the foot F, and also to carry them under said foot; but the means described for moving the head E may be essentially varied without departing from the spirit of my invention, and I do not confine myself to any special mechanism for imparting the motions specified to the needles, heads E, or to the receiving-foot F.

In Fig. 1 but one lever, P, is shown, and only one of the heads E is represented movable on the line of its axis; but it is evident that both heads may be so moved whenever desired.

The receiving-foot F slides up and down along the face of the main presser-foot I, or is hinged thereto, and serves the purpose of immediately fixing the plaited fabric after the formation of every new plait. It is moved upward out of the way of the fabric whenever the needles form a plait, and is brought down upon the plait immediately after its formation. The up-and-down motion may be imparted to it by suitable means. The means shown in the drawings is a wedge, *u*, which is slid forward and backward by a suitable connection with a rock-shaft, R, said rock-shaft being vibrated by any suitable means.

Whenever the wedge *u* is drawn back, the receiving-foot F is raised; but whenever said wedge is moved forward the receiving-foot is depressed by springs *v*, or other means.

Beneath the receiving-foot the table G is provided with two projecting lips, *w*, that are curved downward, as indicated in Fig. 2. These lips serve to sustain the plaited portion of the fabric, and enable it to gradually ride up onto

the table G, and at their upper parts they receive the pressure of the receiving-foot. Between said lips *w* there projects from the table G a similarly-curved spring-plate, *x*, which also serves the purpose of the lips *w*, and, in addition, bears upon a spring-tongue, *y*, that extends from the table B, as indicated in Fig. 3. The said tongue, in connection with the spring-plate *x*, serves to maintain the fabric in proper place, and prevents it from dropping between the two tables B and G, and serves, also, to permit the receiving-foot to exert its proper function upon the middle part of the plait. Being thus fixed under the receiving-foot, the plaited fabric is further acted upon by the feed, which carries it under the main presser-foot I, that is heated by gas let into its interior, or by other suitable means.

The feed acts beneath the presser-foot I, and the latter flattens out and compresses the middle part of the completed fabric, and by its heat fixes it in the compressed condition, thus leaving those parts of the completed fabric which are not directly beneath the presser-foot with open plaits, and fixing said open plaits by the compression referred to. The receiving-foot and the presser-foot yield to the upward action of the feed.

In suitable brackets, a^2, that project from the frame A are hung spools b^2 of threads, the threads from which are drawn through a gumming-trough, d^2, beneath a roller hung therein, to be sized, and the sized threads thus produced are guided and placed upon the flattened part of the fabric, beneath the receiving-foot F and presser-foot I, in manner indicated in Fig. 3 of the drawings, and are securely pressed upon the flattened portion of the fabric by the heated-foot I, to take the position indicated in Figs. 6 and 7, and to assist in maintaining the flattened parts of the plaited fabric in the proper condition. Instead of gumming the threads they could be stitched on by a needle passing through the presser-foot, and the machine may therefore be used in combination with sewing mechanism.

I do not claim the application of these threads to plaited fabrics; nor do I in any manner confine myself to their use in my machine; nor do I confine myself to any means of moving any of the parts of my machine; but

I claim—

1. In a plaiting-machine, the needles C D, carried in a rotary head, E, and adapted to approach and slide apart from each other in said carrying-head, substantially as herein shown and described.

2. The box-plaiting machine containing needles C D, that are arranged to rotate, alternately, in reverse directions for forming opposing plaits, as specified.

3. The combination, in a plaiting-machine, of two pairs of needles arranged to turn independently of each other, but simultaneously, as specified.

4. The combination of the needles C D in a plaiting-machine with a receiving-foot, F, for operation substantially as described.

5. The combination of the receiving-foot F and table G with a feed and with the presser-foot I of a plaiting-machine, all arranged so that the receiving-foot reciprocates in front of the table G, substantially as and for the purpose herein shown and described.

6. In a plaiting-machine having the receiving-foot F, the combination of the table G, having projecting lips *w w*, substantially as and for the purpose shown and described.

7. The combination of a table, B, in a plaiting-machine with table G and intervening plaiting mechanism, which folds the fabric between said two tables, substantially as specified.

8. The combination of the table B with projecting tongue *y*, and with table G, having the projecting spring *x*, substantially as specified.

9. The combination of the needles C D, which are alternately rotated, moved apart, and also moved lengthwise, with the receiving-foot F, all arranged to operate so that after the first rotation of the needles the receiving-foot F descends, substantially as specified.

10. The head E, combined with the needles C D, and with chuck mechanism for moving the same apart or together in said head, substantially as specified.

11. The head E, made movable lengthwise on its axis, and also capable of rotation around its axis, in combination with the needles C D, which it carries, substantially as specified.

12. The combination of the segment K, or mechanism for rotating the needles C D, with the cam-disk M, having cam-groove *j* and bends j^2 and j^3 therein, substantially as specified.

13. The cam-disk M, constructed with a removable cam portion, j^4, in combination with the movable lever L and needles C D, all arranged so that by withdrawing the piece j^4 the needles will produce side-plaiting, while they will produce box-plaiting if such piece j^4 is left in place.

14. In a plaiting-machine, the combination of rotating needles C D with feed mechanism for moving the fabric after each rotation of the needles, and with mechanism for alternately rotating the needles and moving the feed, substantially as specified.

15. The combination of the feed mechanism H with the receiving-foot F, presser-foot I, and tables B G, all arranged so that the feed begins to act upon the fabric in front of the presser-foot and beneath the receiving-foot, substantially as specified.

FRIEDRICH PANSE.

Witnesses:
T. B. MOSHER,
W. H. C. SMITH.