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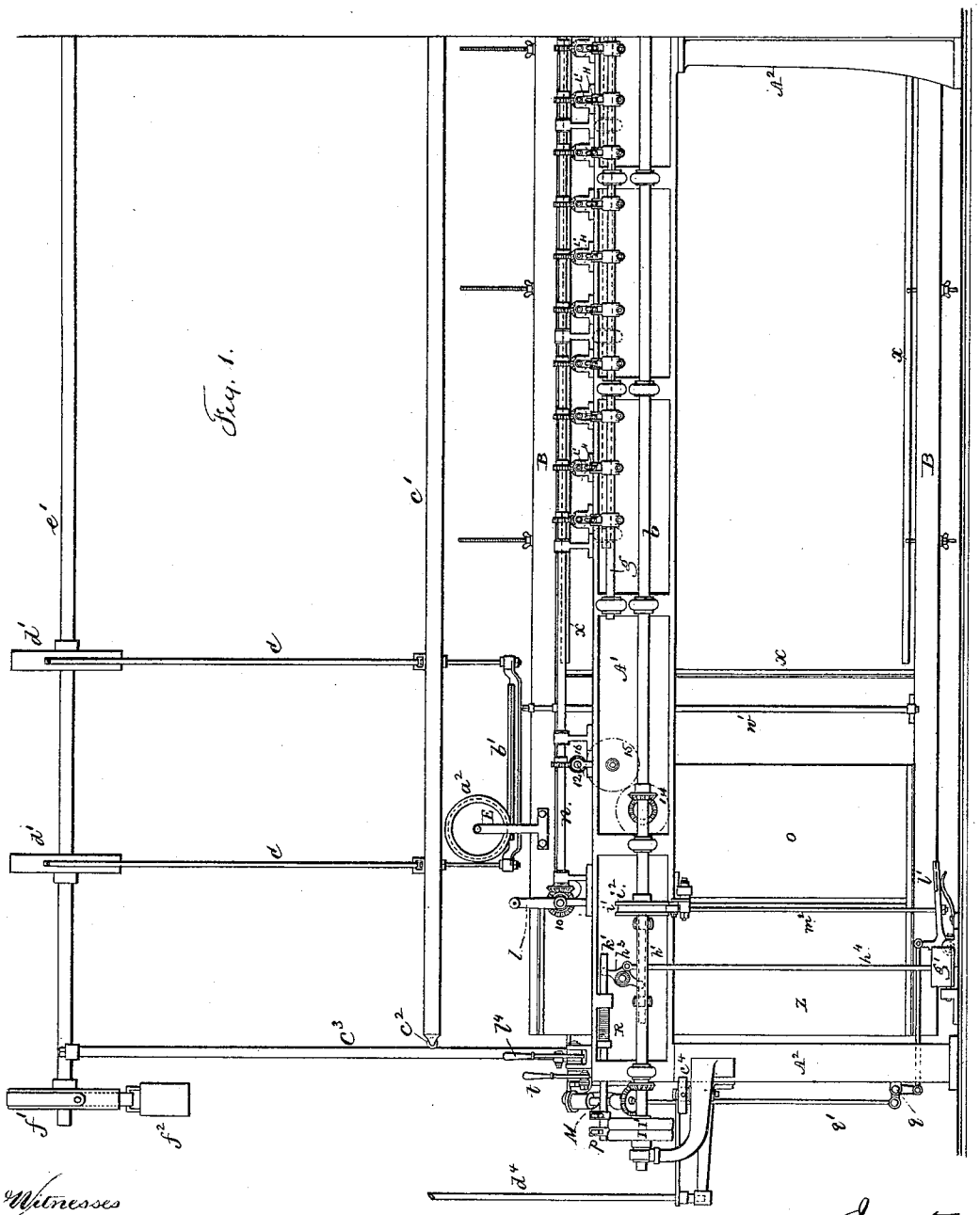
J. EBNETER.

EMBROIDERING MACHINE.

No. 262,383. Patented Aug. 8, 1882.



Witnesses

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(No Model.) 8 Sheets—Sheet 2.

J. EBNETER.

EMBROIDERING MACHINE.

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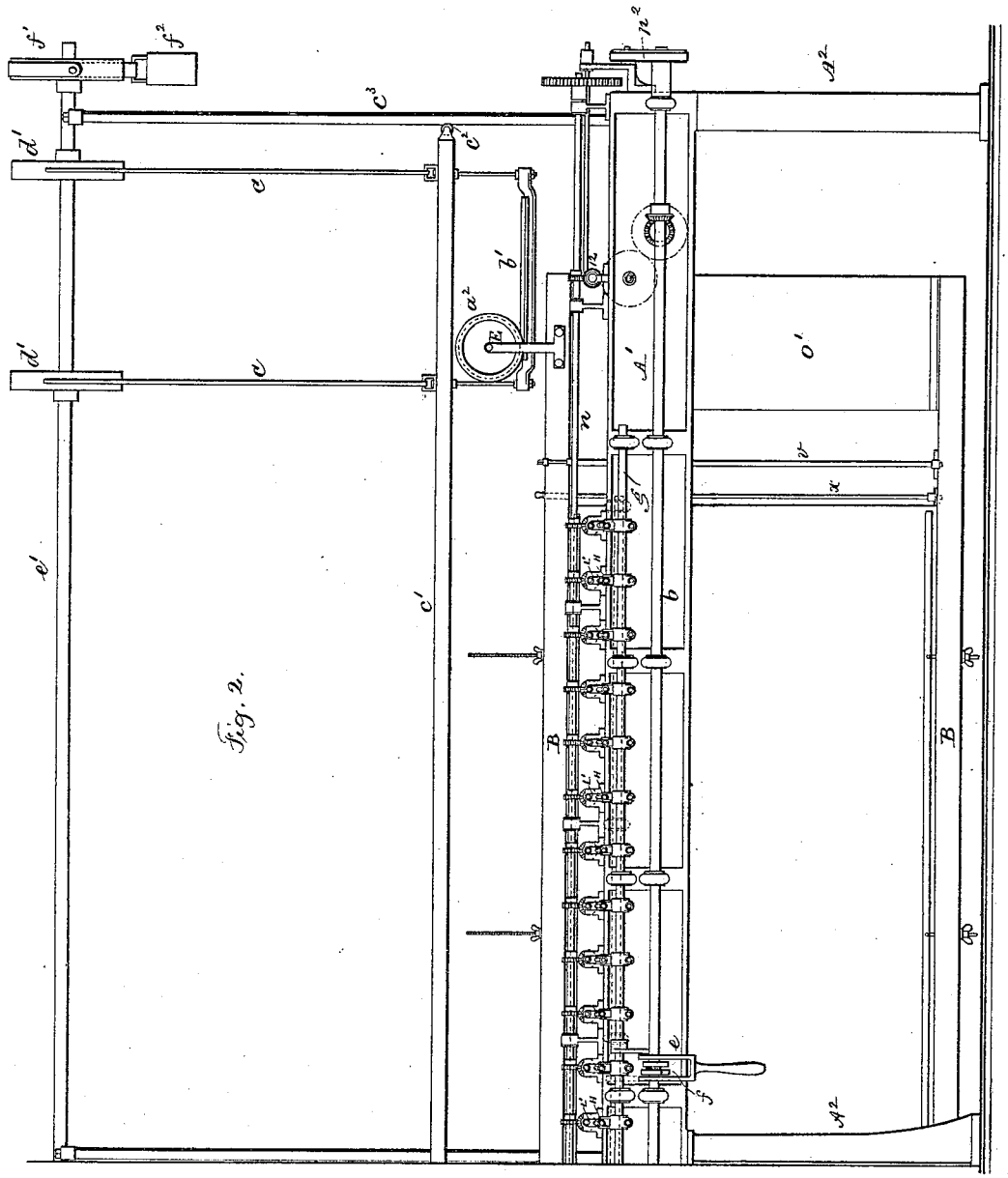

Fig. 2.

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(No Model.) 8 Sheets—Sheet 3.

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EMBROIDERING MACHINE.

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Fig. 3.

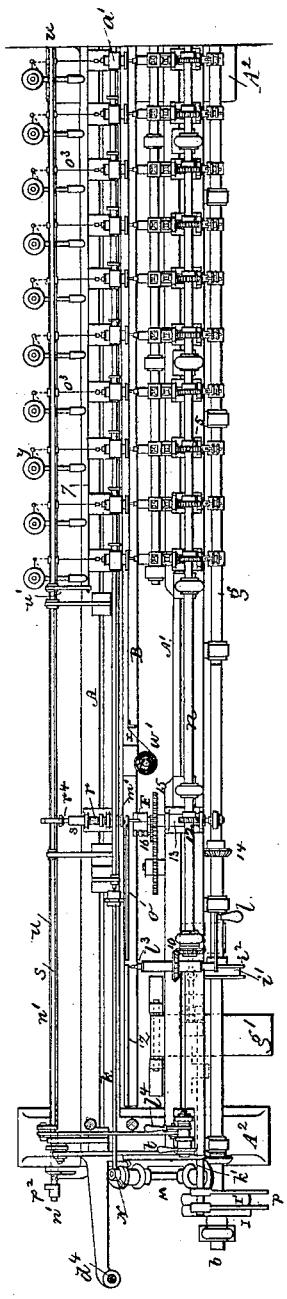
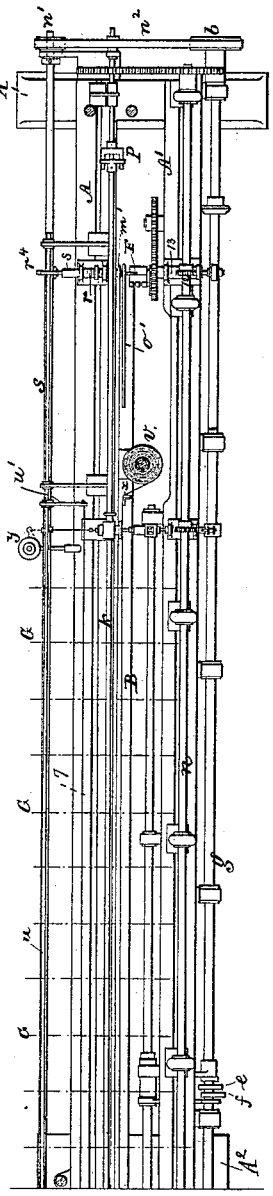


Fig. 4.



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EMBROIDERING MACHINE.

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Fig. 6.

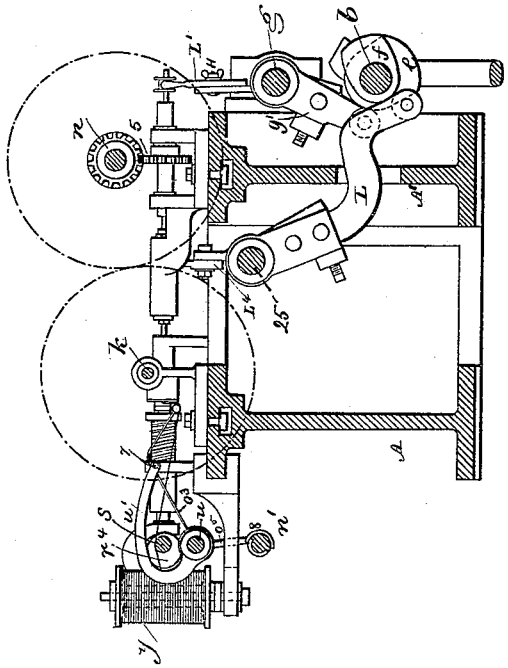
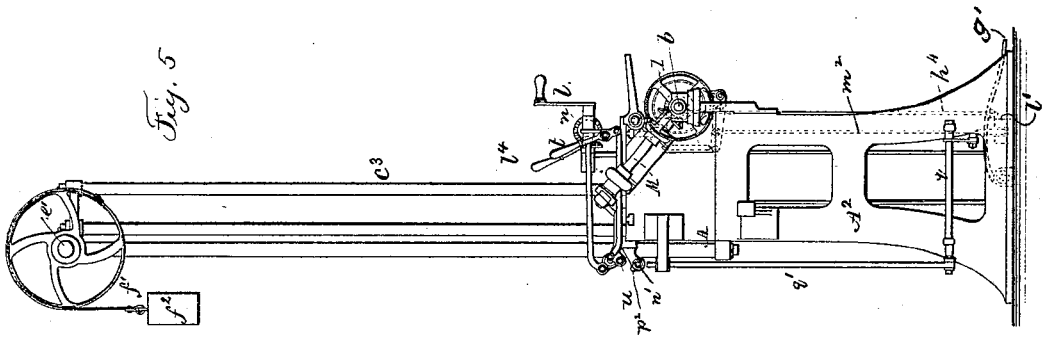


Fig. 5



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EMBROIDERING MACHINE.

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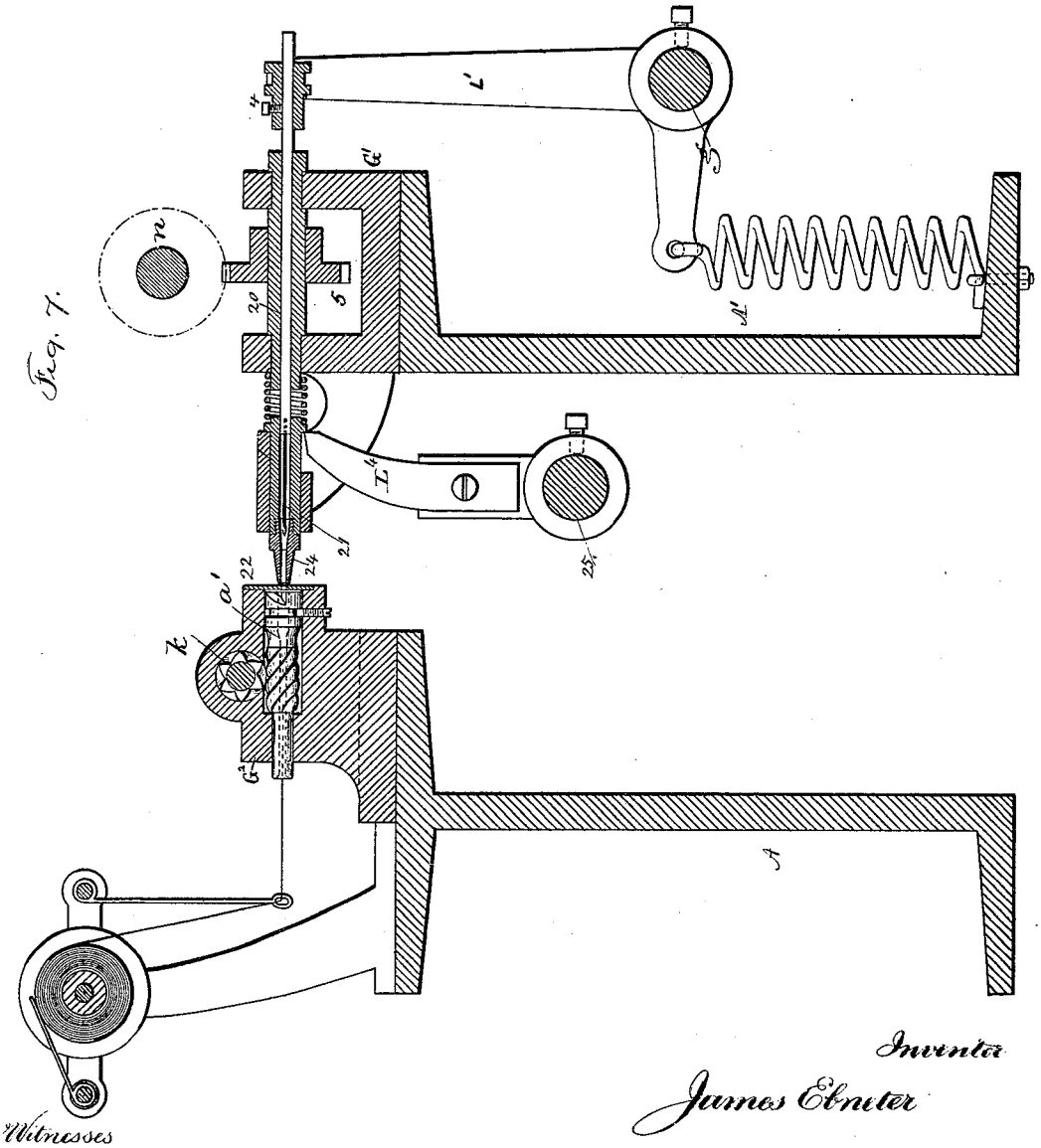

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(No Model.) 8 Sheets—Sheet 6.

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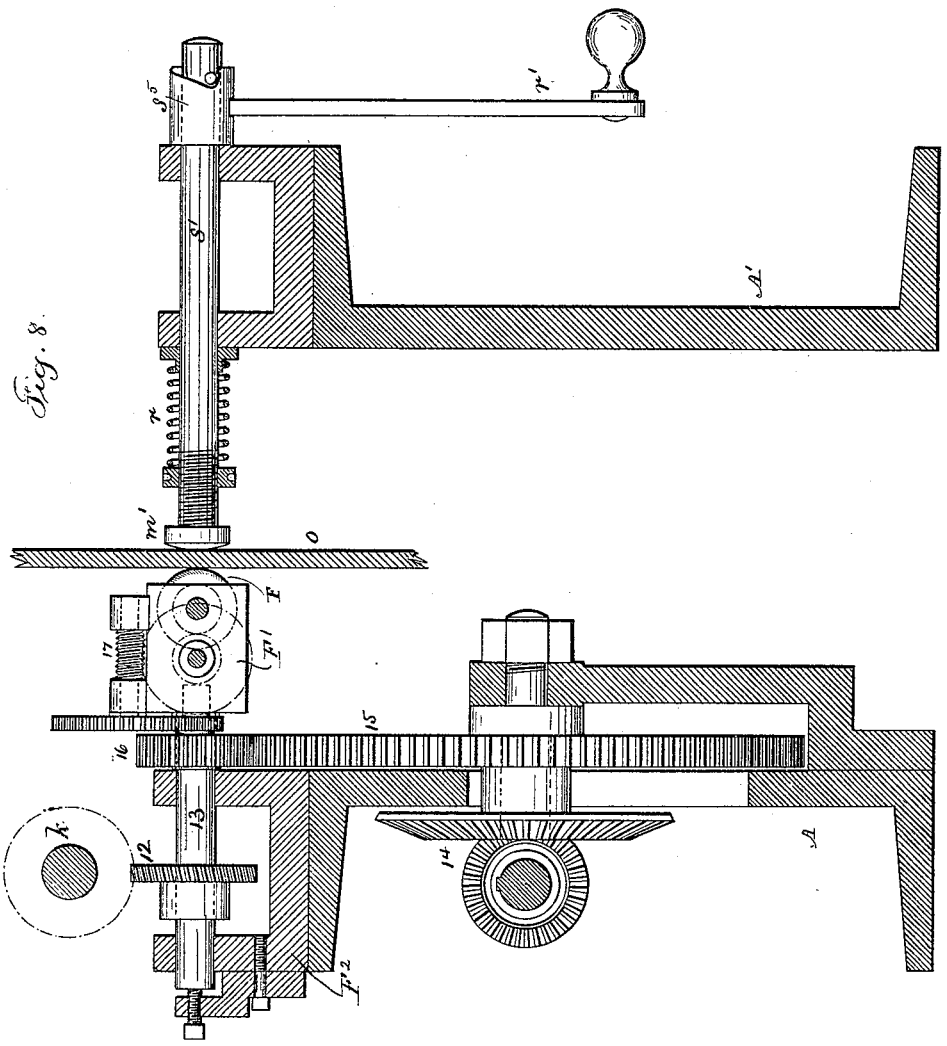
EMBROIDERING MACHINE.

No. 262,383. Patented Aug. 8, 1882.

Fig. 8.



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EMBROIDERING MACHINE.

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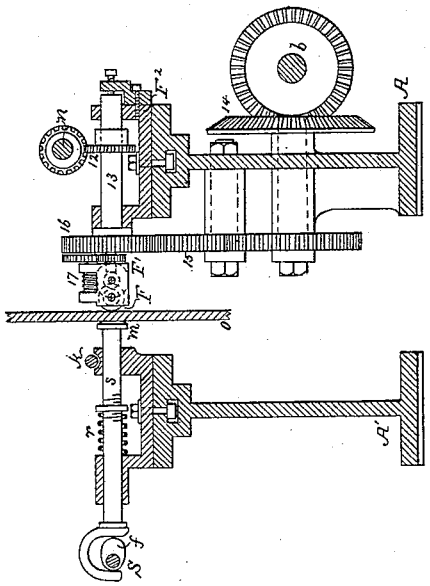
FIG. 9.



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David Williams

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Howson and Sons

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EMBROIDERING MACHINE.

No. 262,383. Patented Aug. 8, 1882.

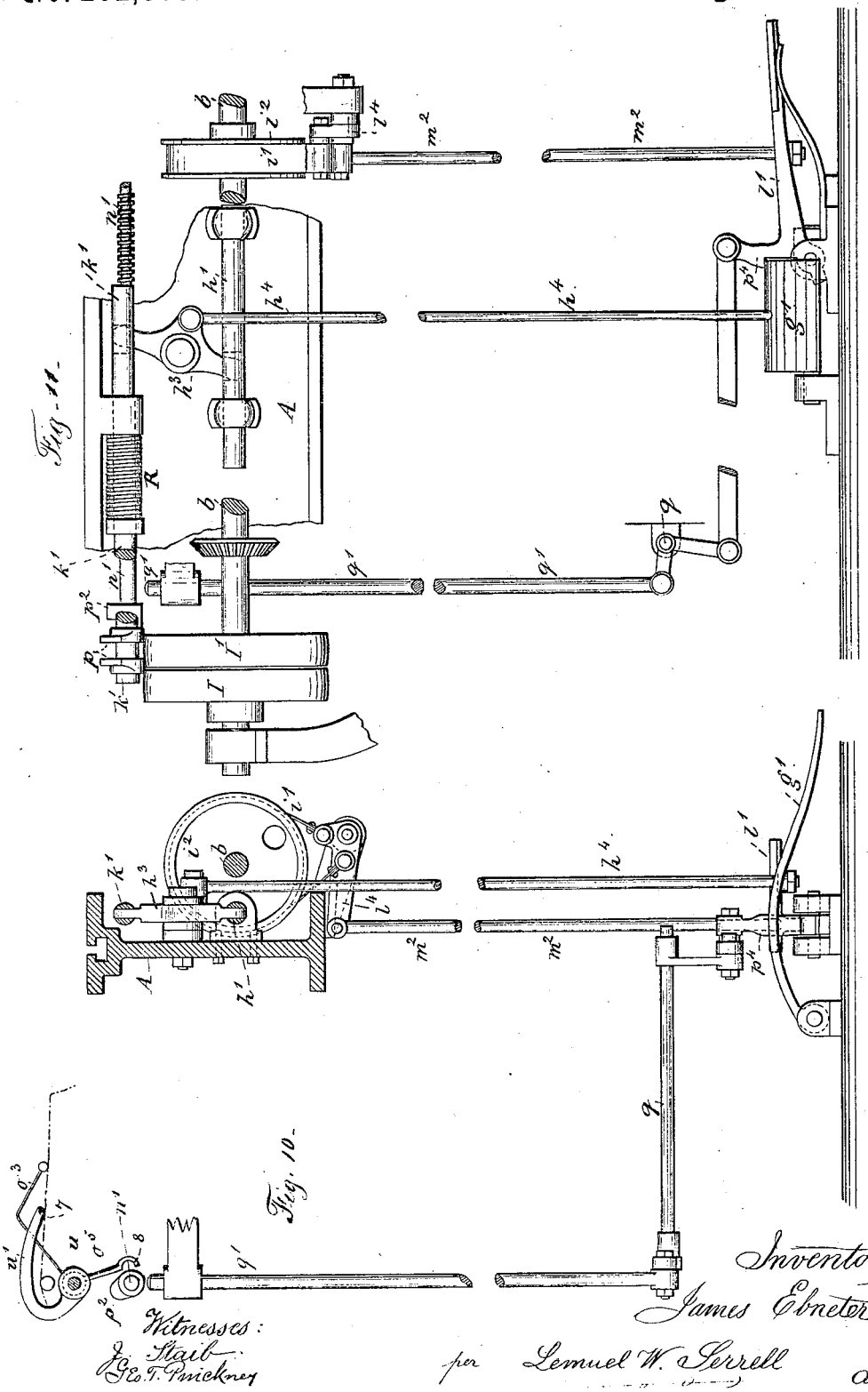

Fig. 10.

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UNITED STATES PATENT OFFICE.

JAMES EBNETER, OF ST. GALLE, SWITZERLAND.

EMBROIDERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 262,383, dated August 8, 1882.

Application filed April 17, 1882. (No model.) Patented in France December 9, 1873, No. 101,438, and in England July 1, 1879, No. 2,657.

To all whom it may concern:

Be it known that I, JAMES EBNETER, of St. Galle, Switzerland, have invented an Improvement in Embroidering-Machines, of which the following is a specification.

My invention relates to improvements in that class of embroidering-machines in which a suspended frame carrying the stretched fabric to be embroidered is so combined with a series of embroidering devices and is so traversed that a series of figures exactly like each other and like a given pattern will be embroidered simultaneously on the said fabric.

The main object of my improvements is to obviate the difficulties attending the practical use of former machines of this class, in which the frame carrying the fabric was traversed intermittently—that is, at the intervals between the stitches; and this object is attained by traversing the frame and fabric continuously, for it has been found that, although small portions of the fabric are held temporarily by the pressers of the embroidering devices, the fabric is elastic or yielding enough to permit the main body of the same to be continuously moved while portions are thus momentarily held, and it has also been found that this continuous movement results in better work more rapidly executed than in machines in which there is an intermittent movement of the frame.

There are other features of my invention, the operation and objects of which are too fully described hereinafter to need preliminary explanation.

It should be stated in the outset that there are many operating parts of the machine to which I lay no claim, as they are incidental to my improvements. These parts I shall not describe with more minuteness than is necessary to illustrate my improvements.

A French patent for fifteen years was granted to me for this invention December 9, 1873, and a certificate of addition was added to this patent October 30, 1875.

I shall describe my invention in its most improved condition, and point out such parts as appeared in the original French patent.

In the accompanying drawings, Figure 1 is a front view of the left-hand portion of the embroidering-machine with my improvements; Fig. 2, a front view of the right-hand portion of the machine; Fig. 3, a plan view of Fig. 1; Fig. 4, a plan view of Fig. 2; Fig. 5, an end view of the machine; Fig. 6, a transverse section, drawn to an enlarged scale, showing the embroidering device made according to the most recent improvement; Fig. 7, a vertical section, drawn to a still larger scale, of the embroidering device as originally made; Fig. 8, a transverse section of my first pantograph device for traversing the frame carrying the fabric to be embroidered; Fig. 9, the same as modified by my recent improvements, and Figs. 10 and 11 views illustrating the stop-motion.

I propose to describe my invention under the following heads: first, the traversing frame; second, mechanism for traversing the frame continuously; third, the embroidering devices; fourth, a brief general description of the driving appliances and their connections; fifth, the stop-motion.

The traversing frame and its connections.—This frame is shown in Figs. 1, 2, and 5, and in describing it it will be necessary to refer in the first place to the permanent frame of the machine, which consists of two bars, A A′, connected together at the ends by suitable cross-pieces and supported on legs A^2. B is the rectangular traversing frame, on which is stretched the fabric to be embroidered, the said fabric being held by bars *x x*, having small points, and being stretched lengthwise by means of vertical rollers *v* and *w′*, journaled to the frame, upon which rollers the fabric is wound. The traversing frame B can be raised and lowered vertically, being suspended by steel bands *c*, one end of each of which is attached to the periphery of a pulley, *d′*, the pulleys being secured to the shaft *e′* and the bands being fastened at their lower ends to a rod, *c′*. It will be observed that there are two pulleys *d′*, and two bands attached thereto near each end of the machine. On each end of the shaft *e′* there is a pulley, *f′*, to the periphery of which is suspended a weight. f^2, the two weights serving to counterbalance the traversing frame and its attachments. Each end of the bar *c′* is provided with an anti-friction roller, c^2, bearing against a bar, c^3, secured to the permanent

frame of the machine, thus preventing endwise movement of the said bar c', to which are suspended rails b', one near each end of the machine. Pulleys a^2 are adapted one to each rail, each pulley being journaled to a bracket, E, secured to the traversing frame, one near each end of the same. It will thus be seen that the said traversing frame is at liberty to be moved vertically, longitudinally, or at any angle in the same plane by a very slight effort.

Mechanism for traversing the frame.—It should be remarked, in the first place, that to one end of the above-described traversing frame is secured a metal plate, o, and to the opposite end a similar plate, o', for the two pantograph-wheels, referred to hereinafter, to act against, and that on the frame, near the plate o, is a board, z, to which the pattern to be followed in embroidering is affixed.

Referring to Fig. 9, A is the front bar and A′ the rear bar, of the permanent frame of the machine.

o is the metal plate above referred to as being attached to the traversing frame; F, the pantograph-roller, and s a spring presser-bar for forcing the said plate o against the periphery of the pantograph-roller, which is carried by the holder F, the latter being secured to a transverse shaft, 13, having its bearings in a head-stock, F^2, secured to the bar A of the permanent frame.

The roller F, when the machine is in action, is rotated continuously from the driving-shaft b, in the present instance through the medium of the bevel-wheels 14, cog-wheel 15, pinion 16, loose on the shaft 13, and carrying a small pinion gearing into a wheel on a shaft which carries the worm 17, the latter being geared to the said pantograph-roller F. It will be seen that this roller rotates independently of the shaft 13, which is under the control of the attendant, through the medium of a shaft, n, to which is secured a wheel having inclined teeth gearing into a similar wheel, 12, on the shaft 13.

A spindle provided with a pointer directed to the pattern on the board Z, above referred to, and having a suitable handle, l, Figs. 1 and 3, is geared to the shaft n, and it is this pointer and its relation to the pattern which guide the attendant, who determines in what plane the pantograph-roller shall revolve in order that the traversing frame shall pursue the proper course indicated by the pattern.

It must be remembered that there is a pantograph-roller acting on the plate at each end of the traversing frame, the power-driven shaft b and hand-governed shaft n being continued and operating through mechanism already described, so that both pantograph-rollers shall be driven simultaneously and moved by hand simultaneously.

As before remarked, there is a spring-presser, s, opposite to each pantograph-roller and bearing against the back of the metal plate, and the two pressers can be retracted simultaneously by cams f on a shaft, S, at the rear of the machine, a lever suitably situated for the attendant being connected to an arm on the retracting-shaft, which the attendant can turn without leaving his seat. The moment the presser-bars are retracted the traversing effect of the pantograph-rollers on the plates o o' ceases and the movement of the traversing frame is arrested.

In my first machine the retractile spring-presser was in front of the machine and the pantograph-wheel in the rear, as shown in Fig. 8; but I prefer the plan described above.

The embroidering device.—It will be seen on reference to Figs. 3 and 4 that there are on the machine a series of embroidering devices; but as they are all alike and operated in the same manner I will describe those shown in Figs. 6 and 7. To bearings in a head-stock, G′, Fig. 7, secured to one of the bars of the permanent frame, is adapted a tubular spindle, 20, in which a needle-bar, 21, can reciprocate freely, but must oscillate with the spindle, and the oscillation of the latter is coincident with the movement of the pantograph-wheel, as the hand-controlled shaft n is geared to the spindle in the present instance through the medium of the wheels having inclined teeth. The object of this arrangement will appear hereinafter. The needle-bar carries an ordinary crochet-needle, 21, which passes through a tube, 20, terminating in a nipple, 24. This combined tube and nipple I will hereafter term the "tubular presser." When this presser is free from the action of a toe, L^4, on a shaft, 25, it forces the fabric carried by the traversing frame against the plate 22 on the head-stock, G^2, which is secured to the frame of the machine, and which contains the tubular looper a', the latter being oscillated to the extent of about one revolution and a quarter and back again by a reciprocating rod, K, having spiral teeth gearing into similar teeth on the tubular looper. This looper and the crotchet-needle acting in conjunction therewith are well-known devices, which need not be minutely described. The needle passes through the fabric, which is pressed against the plate 22, and is immediately followed by the tubular presser 24, which, being released from the control of the toe L^4, is forced against the fabric by a spring, and holds the fabric against the plate 22 until the needle is retracted therefrom. It will thus be seen that at every embroidering device a limited portion of fabric will be held stationary for an instant, while the whole body of the fabric is moving continuously with the traversing frame; but, as before remarked, there is sufficient elasticity in all fabrics used in embroidering to permit this. In retracting the needle it is important that its hook should be turned in such a direction that the loop of thread will not escape from it, and in order to do this its hook should be turned in the direction opposite to that in which the fabric will move. In other words, the fabric should move directly toward the hook of the needle, in order to prevent the

escape of the loop of thread therefrom; hence the importance of placing the needle-bar under the control of the same hand-driven appliance as controls the pantograph-wheel. It should be understood that the fabric is relieved from the action of the tubular presser as soon as the needle is fully retracted. I prefer the devices shown in Fig. 6 for operating the needle-bar and tubular presser. In this view the main driving-shaft *b*, previously referred to, has a cam, *f*, which, through the medium of a lever, L, retracts the tubular presser and releases it at the proper time, and on the same shaft is another cam, *e*, which acts against an arm, *g'*, on the shaft *g*, and, in connection with a suitable spring, oscillates the said shaft, which is continued in front of the machine, so as to reciprocate the needle-bars of all the embroidering devices, there being an arm, L', on the shaft for each needle-bar, and this arm being preferably made in two parts, the upper part being adjustable, so that it can be depressed out of connection with a grooved collar on the needle-bar whenever it becomes necessary to discontinue the operation of one of the embroidering-machines without disturbing the others, the two-part arm being provided with suitable appliances by which the parts can be rigidly secured together after adjustment. This plan I consider much superior to the arm L', (shown in Fig. 7,) and which can only be detached from the needle-bar by loosening the grooved collar 4.

I will here give a general explanation of the machine and the mechanism through which the above-described devices are driven; but it will not be necessary to introduce a very minute description, as the main features of my invention do not depend upon any specific driving mechanism.

Referring to Figs. 1, 2, 3, 4, 5, and 6, it will be seen that the driving-shaft *b*, previously referred to, is placed in front of the machine, where it is adapted to suitable bearings.

It has already been shown, by reference to Fig. 6, how and through the medium of what mechanism the said driving-shaft is caused to reciprocate all the needles and actuate all the pressers of all the embroidering-machines simultaneously.

In order to operate all the looper-tubes simultaneously, the shaft *k* is reciprocated, the reciprocation and consequent oscillation of the tubular loopers being of course properly timed to accord with the movements of the needles and pressers. In order to do this, the driving-shaft is geared by bevel-wheels to an inclined shaft, M, Figs. 3 and 5, at one end of the machine, and this shaft carries a crank, the pin of which is connected to the said rod *k*. While this rod by its teeth, with which it is provided wherever an embroidering device occurs, imparts through the teeth of the looper a determinate oscillating motion to all the loopers simultaneously, every looper is under the control of the pantograph-shaft *n*, and consequently under the control of the attendant, for it will be seen that this shaft *n* is geared to the rod *k* at the outer end of the machine, so that whenever the pantograph-wheel is moved the rod *k* will be turned to a limited extent, and at the same time all the loopers will be turned through the medium of the teeth on the rod and the spiral teeth on the loopers; but it will be understood that this turning of the rod *k* does not interfere with its determinate reciprocation, owing to a slip-joint, P, near the end of the shaft, as shown in Fig. 4.

It must be remembered that the looper, in order to co-operate with the hooked needle, must always be in a given position in respect to the latter when this co-operation takes place, and as the needle is turned when the pantograph-wheel is turned it is essential that the looper should also be turned at the proper time by hand, independently of the oscillating movement imparted by the power-driven rod *k*.

The stop-motion.—It is important that the machine should be automatically stopped whenever one of the threads which is directed through a looper breaks. The situation of the spool from which the thread passing through a tubular looper is derived is shown in Fig. 6, and the course of this thread, to which, when the embroidering device is in action, tension is imparted, is shown by dotted lines in Fig. 10. The bent end of a light finger, o^3, rests on the thread, this finger forming one arm of a lever pivoted to a rod, *u*, the other arm, o^5, of the lever having a segmental termination, 8, within which is cut a screw-thread adapted to the thread of a screw-shaft, *n'*, which is continuously rotated as long as the machine is in operation. While the thread, Fig. 10, remains whole, it retains the end 8 of the arm o^5 out of gear with the screw; but if the thread breaks the finger o^3 will fall, and the said end 8 of the arm o^5 will be in gear with the thread of the screw-shaft, and as the lever cannot move longitudinally on the rod *u* there must be a longitudinal movement of the screw-shaft, by which the stoppage of the machine is effected in the manner described hereinafter. Every embroidering device has this mechanism, so that no matter which thread be broken the breakage must instantly be followed by a longitudinal movement of the screw-shaft. The rod *u* extends as far as the embroidering devices in one direction, and in the other direction to a point where a handle, *t*, connected to the rod, is conveniently situated for the attendant. On the rod *u* there are two arms, *u'*, and from the end of one arm to the end of the other extends a wire, 7, beneath the whole of the fingers o^3. By means of this device the whole of the fingers o^3 may be lifted up and held clear of the threads when it is not desired to use the stop-motion, as when a few threads only are being used, in which case the attendant can readily see when one of the threads is broken, and can throw the machine out of operation until the broken thread is pieced. More than two arms *u'* may be used, if desired; but two will in

most cases be sufficient. When the shaft n', which is always turning as long as the machine is in operation, is moved longitudinally on the breaking of a thread, a cam, p^2, Figs. 10 and 11, is brought within range of the upper end of a rod, q', which is connected by a bell-crank lever and a rod, q, to the short arm p^4 of a lever, the long arm of which is forced upward by a spring, the said short arm of the lever having a shoulder bearing on the treadle-lever g', and serving to retain the same in a depressed condition until the rod q' is depressed by the above-mentioned cam p^2 on the screw-shaft, when the treadle-lever will be released. It should be stated here that there are on the driving-shaft b, Fig. 10, a fast and loose pulley, I' I, and that above the shaft there is a sliding rod, k', furnished with the usual belt-shifting arms, p. This sliding rod is adapted to guides on the permanent frame of the machine, and a spring, R, so acts on the rod that it tends to move the driving-belt onto the loose pulley. This takes place when the treadle g' is released in the manner described above, for the said treadle is connected by a rod, k^4, and a lever, k^3, pivoted to the frame, to the belt-shifting rod k'. The moment the belt is thus shifted a sliding bolt, h', is projected by an arm on the said lever k^3 into an orifice in the brake-pulley i^2 on the driving-shaft b, the position of this orifice being such that the shaft is stopped by the bolt when the embroidering-needles are retracted from the fabric.

In order that the bolt shall not stop the shaft b too abruptly, a brake-band, i', is applied to the brake-pulley i^2, this application being made by the cam p^2 on the screw-shaft n' through the medium of the rod q', bell-crank lever q, spring-lever l', rod m^2, and brake-lever l^4, which acts on the brake-band so as to cause it to embrace the brake-pulley, as in ordinary braking appliances. It should be understood that this braking device does not stop the driving-shaft, but only retards its movement, the actual stoppage of the retarded shaft being effected by the bolt at the proper time.

I claim as my invention—

1. The combination, in an embroidering-machine, of the following elements, namely: first, a traversing frame carrying the fabric to be embroidered; second, a series of embroidering devices; third, mechanism whereby the said devices are operated, and, fourth, mechanism whereby during the operation of the embroidering devices the frame may be traversed continuously, substantially as set forth.

2. The combination, in an embroidering-machine, of a frame, B, carrying the fabric to be embroidered, mechanism by which the said frame is suspended from the fixed frame, and permitted to be moved vertically, horizontally, or at any angle, with a pantograph-wheel, F, mechanism through the medium of which the said wheel is caused to traverse the frame continuously, and devices whereby the said wheel can be caused to revolve in different planes, all substantially as set forth.

3. The combination, in an embroidering-machine, of a traversing frame carrying the fabric to be embroidered, and having a plate, o, with a pantograph-wheel, F, and gearing for operating the same, and causing it to act on one side of the plate, and with a presser acting on the opposite side of the plate to force the same against the wheel, and mechanism by which the presser can be retracted from the plate, substantially as described.

4. The combination, in an embroidering-machine, of a traversing frame carrying the fabric to be embroidered, a pantograph-wheel, F, and mechanism through the medium of which the frame may be traversed continuously by the wheel, and a series of embroidering devices carrying needle-bars, which are provided with hooked needles, and which are adapted to oscillate as well as reciprocate, with mechanism whereby the needles are oscillated in unison with the said wheel, all substantially as set forth.

5. The combination, in an embroidering-machine, of a traversing frame carrying the fabric to be embroidered, a pantograph-wheel, F, and mechanism for revolving the same and causing it to traverse the frame continuously, with a series of embroidering devices, the loopers and hooked needles of which are combined with the said wheel, and with intervening mechanism by which the needles and loopers are caused to co-operate with the wheel, all substantially as set forth.

6. The combination, in an embroidering-machine, of the following elements, namely: a frame carrying the fabric to be embroidered, and mechanism for moving the same continuously, with a series of crocheting devices, each of which consists of a tubular looper, a supporting-plate, 2, a tubular presser, 24, and a hooked needle, 22, and mechanism for so operating the same that the fabric is held by the presser against the plate during the retraction of the needle, all substantially as set forth.

7. The combination of the frame B, the guided rod c', and rails b', suspended therefrom and adapted to wheels on the frame, with the shaft c', having wheels attached to the said guided bar by straps c c, all substantially as specified.

8. The shaft u, arms u', and wire 7, in combination with the levers o^3 o^5, having segmental terminations 8, screw-shaft n', and mechanism connected with the belt-shifter to stop the machine if a thread breaks, as set forth.

Signed by me this 3d day of December, A. D. 1881, at Paris, France.

J. EBNETER.

Witnesses:
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