(No Model.) 6 Sheets—Sheet 1.

L. P. SHERMAN.

MACHINE FOR DRAWING IN WARP THREADS.

No. 282,124. Patented July 31, 1883.

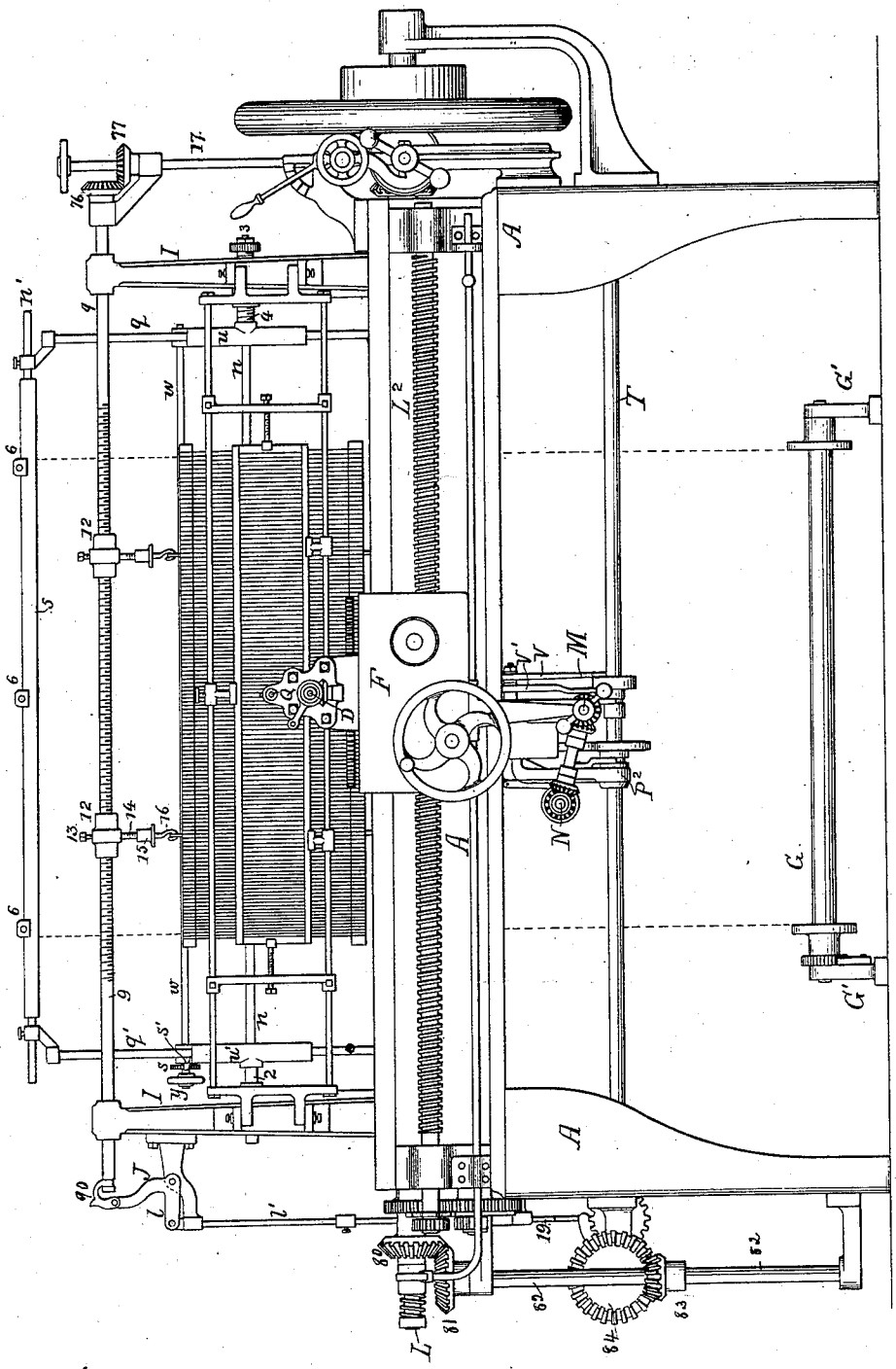


FIG. 1.

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L. P. SHERMAN.

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FIG. 3.

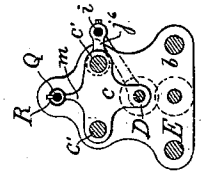


FIG. 2.

FIG. 4.

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L. P. SHERMAN.

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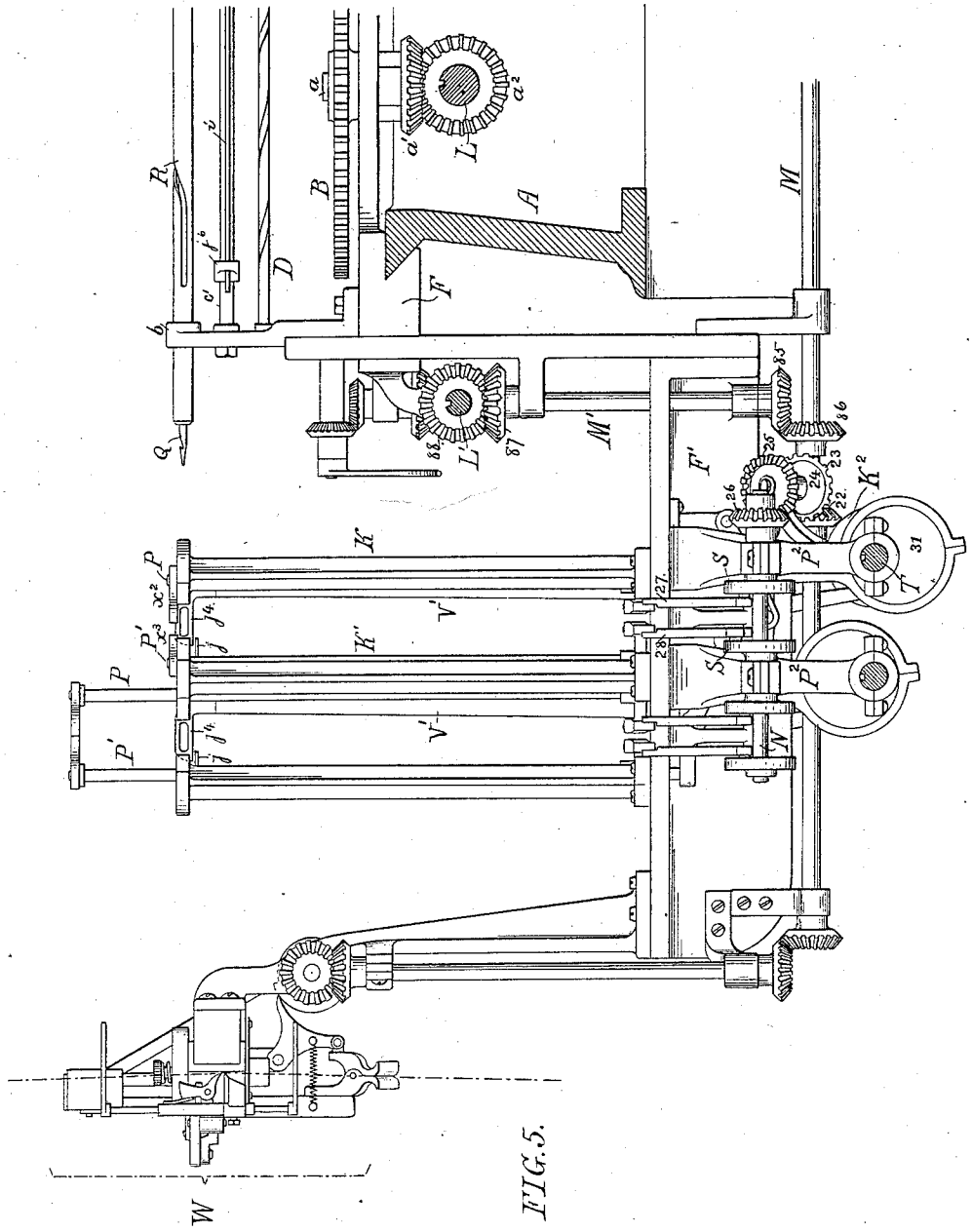


FIG. 5.

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L. P. SHERMAN.

MACHINE FOR DRAWING IN WARP THREADS.

No. 282,124. Patented July 31, 1883.

FIG. 7.

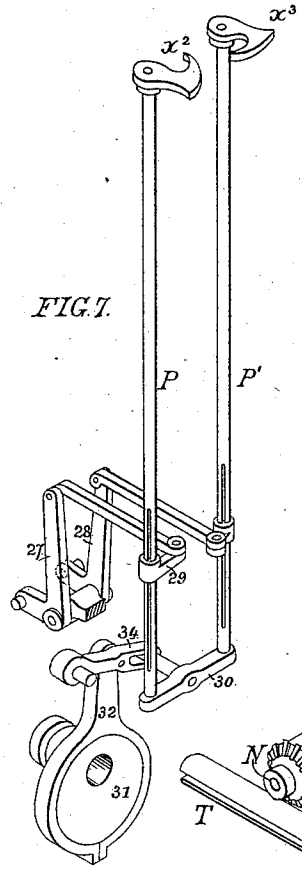


FIG. 6.

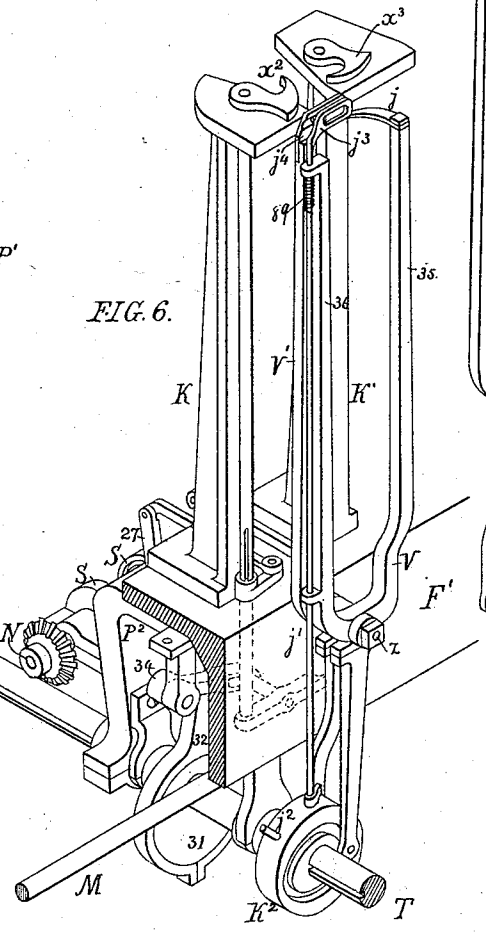


FIG. 9

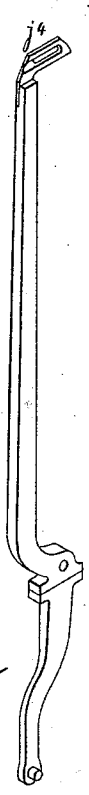
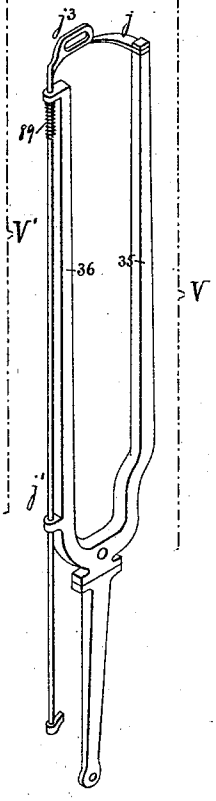


FIG. 8.



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L. P. SHERMAN.

MACHINE FOR DRAWING IN WARP THREADS.

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FIG. 13.

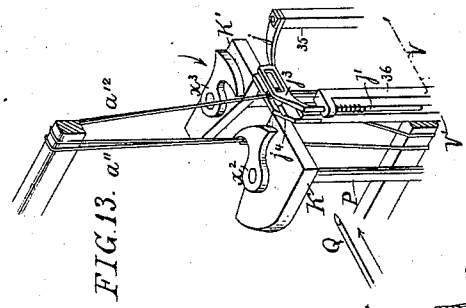


FIG. 16.

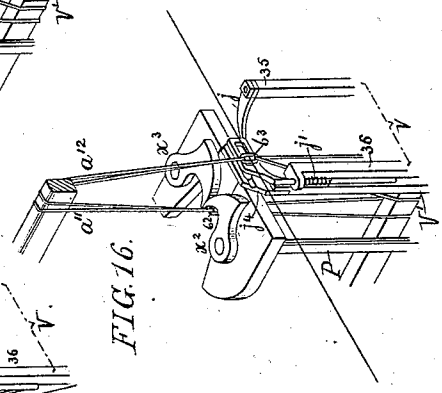


FIG. 12.

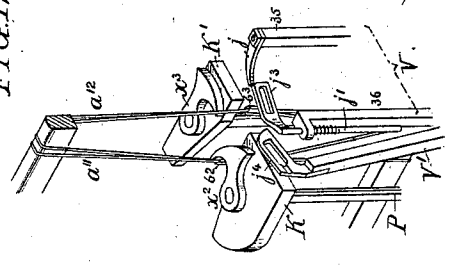


FIG. 15.

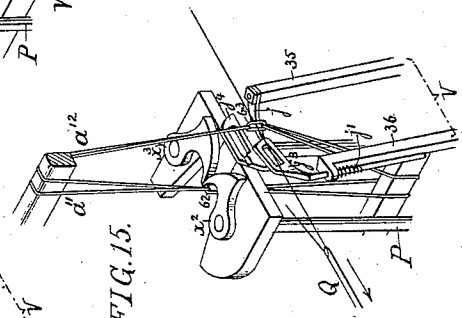


FIG. 11.

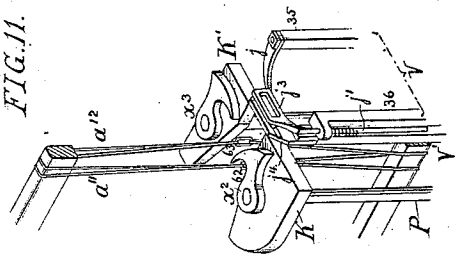


FIG. 14.

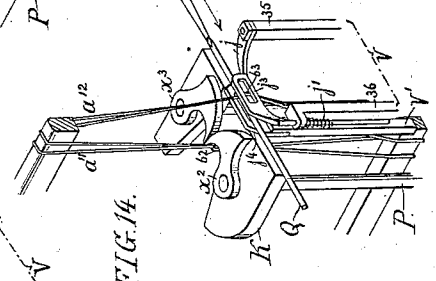
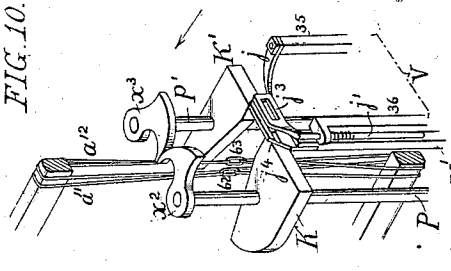


FIG. 10.



Witnesses:
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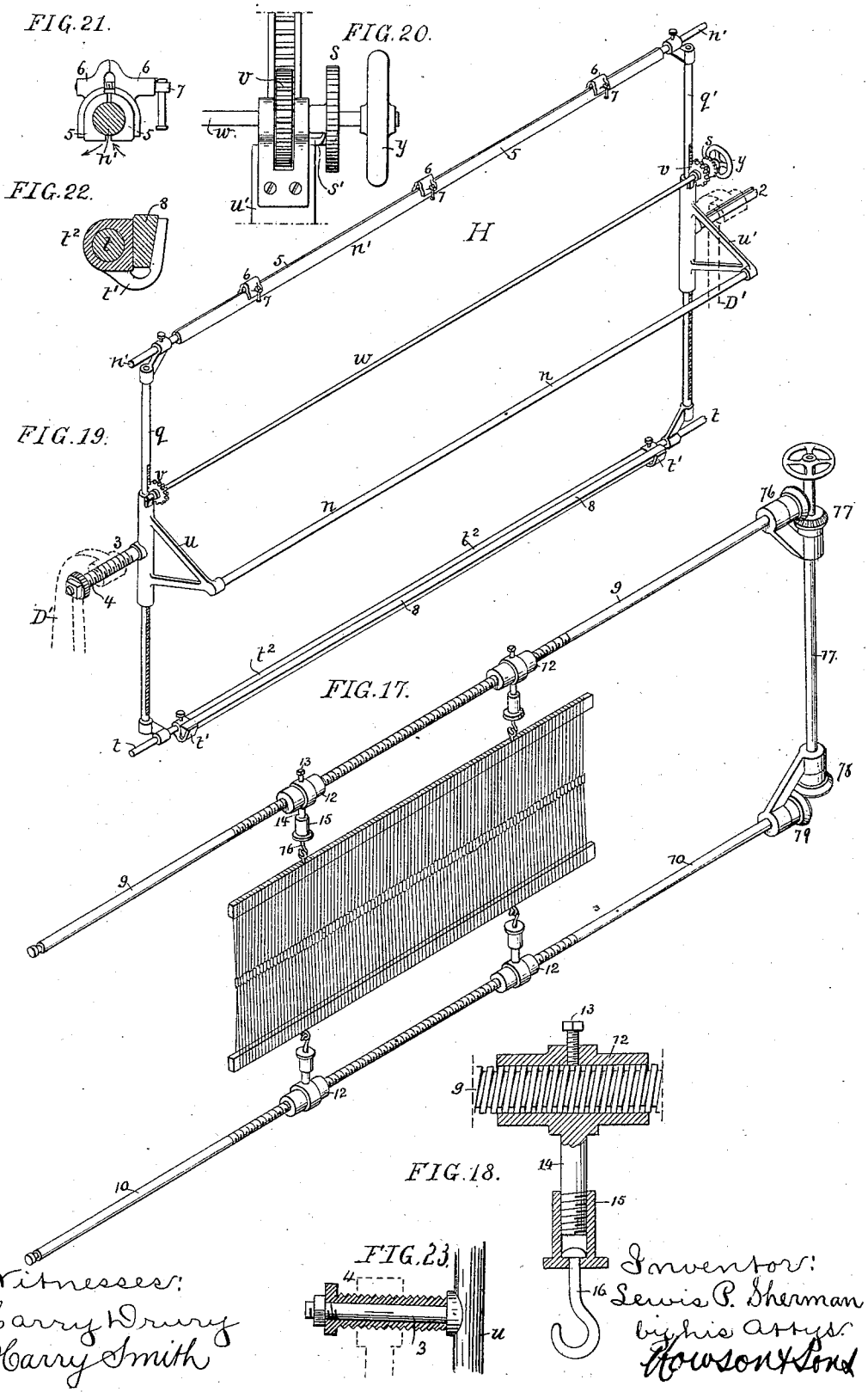
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(No Model.) 6 Sheets—Sheet 6.

L. P. SHERMAN.

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Howson & Sons

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

LEWIS P. SHERMAN, OF BIDDEFORD, MAINE.

MACHINE FOR DRAWING IN WARP-THREADS.

SPECIFICATION forming part of Letters Patent No. 282,124, dated July 31, 1883.

Application filed August 14, 1882. (No model.) Patented in England February 22, 1882, No. 863; in Belgium March 9, 1882, No. 57,299, and in France March 14, 1882.

To all whom it may concern:

Be it known that I, LEWIS P. SHERMAN, a citizen of the United States, residing in Biddeford, county of York, Maine, have invented certain Improvements in Machines for Drawing in Warp-Threads, (for part of which Improvements British Letters Patent, February 22, 1882, French Letters Patent, March 14, 1882, and Belgian Patent, March 9, 1882, have been issued,) of which the following is a specification.

My invention consists of certain improvements, fully described hereinafter, in the machine for drawing in warp-threads, for which Letters Patent No. 255,038 were granted to myself, R. H. Ingersoll, and G. Moore, March 14, 1882.

My improvements relate, first, to mechanism for reciprocating the intermittently-traversed needle in place of the devices described in the said patent; second, to mechanism for facilitating the application of the warp-threads to the machine; third, to a new heddle-frame holder; and, fourth, to devices for acting on the heddle-cords and presenting their eyes to the reciprocating needle.

It should be stated in the outset that although my improvements are restricted to the above features, I have deemed it necessary to their full explanation to introduce into the drawings many parts which are to be found in the said patent, but have omitted the details of the carrier and its appliances, whereby thread after thread of the warp is selected and moved into the path of the reciprocating needle, for this mechanism is essentially the same as that described in the said patent.

In the accompanying drawings, Figure 1 is a front view of the warp-drawing machine with my improvements; Fig. 2, an end view, omitting the devices for separating the heddle-cords in order to prevent confusion; Fig. 3, a transverse section (drawn to an enlarged scale) on the line 1 2, Fig. 2; Fig. 4, a transverse section on the line 3 4, Fig. 2; Fig. 5, a transverse vertical section of the machine drawn to a larger scale than Figs. 1 and 2, and showing the mechanism for acting on the heddle-cords; Figs. 6, 7, 8, and 9, perspective views illustrating the heddle-cord mechanism; Figs. 10 to 16, inclusive, perspective views illustrating the action of the heddle-cord mechanism; Fig. 17 a perspective view of the heddle-supporting frame; Fig. 18, an enlarged view, partly in section, of a portion of the heddle-supporting frame; Fig. 19, a perspective view of the warp-frame; and Figs. 20, 21, 22, and 23, enlarged views of parts of the said warp-frame.

As in the aforesaid patent, there is a reciprocating and intermittently traversed and oscillated hooked needle, Q, carried by a slide, F, adapted to guides on the bed or frame A, which is supported on suitable legs or stands. There is also the driving-shaft L, and a screw-shaft, L^2, through the medium of which the slide is intermittently traversed. The driving mechanism and devices for operating the screw-shaft are substantially the same as in the aforesaid patent, and hence they need not be described; but I have changed the devices through the medium of which the needle is reciprocated, and this feature of my improvements I will first describe, reference being had to Figs. 2, 3, and 5.

A horizontal cog-wheel, B, is secured to a vertical spindle, *a*, which has its bearings in the slide F, and this spindle has a bevel-wheel, a', gearing into a similar wheel, a^2, on the driving-shaft L, the eye of the said wheel having a key or feather adapted to a longitudinal groove in the said shaft, so that the wheel a^2 can traverse freely with the slide, but must turn with the shaft, the hub of the wheel a^2 having a groove for admitting a projection on the under side of the slide F.

The needle Q reciprocates in a tube, R, secured to the plates *b b'*, which are attached to the slide F, and there is in this tube a slot for receiving a pin on the needle, the slot being of such a shape that the needle will be turned to a limited extent and back again when it is completing its forward and commencing its rearward movement, as in the aforesaid patent. A small shaft, D, has its bearings in the plates *b b'* of the slide F, and this shaft has a spiral groove adapted to receive a pin on the cross-head *c*, Fig. 3, through which the shaft D passes, this cross-head being guided by rods

c' c', secured to the plates b b'. A shaft, E, has one bearing in a stand, d, on the slide F, and another bearing in the plate b', and this shaft is geared to the wheel B by a bevel-pinion, 50, on the said shaft E, a bevel-wheel, 51, adapted to turn on a pin on the slide and gearing into the said pinion, and a small pinion, 52, on the wheel 51, gearing into the said wheel B. The shaft E has a wheel, e, gearing into a similar wheel, e', on the hub of the bevel-wheel f, which is loose on the spirally-grooved shaft D, and this bevel-wheel is geared into by a like wheel, f^2, revolving freely on a pin carried by an attachment to the plate b', the said wheel f^2 gearing into another bevel-wheel, f', which is also loose on the shaft D. A clutch, h, between the two wheels f f', can slide on, but must turn freely with, the shaft D. This clutch is connected to a rod, i, carried by two arms, j^6 j^6, which can slide on one of the guide-rods c'. The direction in which the cross-head is traversed on its guides will depend upon which of the bevel-wheels, f or f', the clutch h is in gear with; and this is determined by the cross-head c, which strikes first one arm j^6 and then the other arm of the clutch-rod, the spirally-grooved shaft being thus reversed when the cross-head reaches the limit of its forward movement, and being again reversed on reaching the limit of its rearward movement. A projection, m, on the cross-head enters and traverses in a groove in the tube R, and is connected to the needle, as in the patent aforesaid, so that while the latter reciprocates with the cross-head the needle is free to oscillate as it approaches and retreats from the limit of its forward movement.

I will now describe that feature of my improvements which relates to mechanism for facilitating the adjustment of the warp-threads to the machine, reference being had to Figs. 2, 19, 20, 21, 22, and 23, a portion of the mechanism being also shown in the front view, Fig. 1. Referring to the latter figure and Fig. 2, it will be observed that the warp-beam G is journaled to stands G', secured to the floor, the warp-threads passing upward and against a rod, n, on a frame, H, the detailed construction and object of which will be fully explained hereinafter. The warp-threads pass over a rod, n', and are clamped thereto, the said rod forming part of the said frame H, and down to a rod, t, at the lower end of the said frame, to which rod the warp-threads are fastened. These warp-threads, between the upper and lower portions of the frame, are presented to the reciprocating needle Q. Two fixed bars, A', are secured to and extend from the bed A of the frame, and to each bar or extension is secured a bracket, B^2, and to each bracket is pivoted, at p, an arm, D', which can be moved from the position shown by plain lines to that shown by dotted lines in Fig. 2. As a provision for securing each arm after adjustment to either of those positions, a screw, k, passes through a segmental slot in the bracket and into the arm. As a means of moving these arms D' D', I prefer to use an operating-handle, k', pivoted to the frame, and having an arm, p', connected by a link to one of the arms D'. It is these arms which carry the warp-frame H, the detailed construction of which I will now proceed to describe by reference to Figs. 19, 20, 21, and 22. The frame consists, mainly, of the two side rods, q q', the upper horizontal rod, n', which has been previously referred to, and which is made adjustable in the upper ends of the side rods, and the lower horizontal rod, t, which is also adjustable in the lower ends of the said rods q q'. Each of these rods q q is arranged to slide, one in a bracket, u, and the other in a bracket, u', and the outer ends of these brackets are connected together by the above-mentioned rod n. On each of the rods q q' is formed a rack, and into each rack gears a pinion, v, the two pinions being secured to a shaft, w, which has its two bearings in the two brackets u u', the shaft being furnished with a hand-wheel, y, or with a crank-handle, on turning which the frame, composed of the rods q q', n', and t, can be moved up and down in the brackets. There is a ratchet-wheel, s, on the shaft w, and a pawl, s', on the bracket u' to prevent the frame from sliding down in the brackets. The bracket u' has a journal or trunnion, 2, adapted to a bearing in one of the arms D', and the bracket u has a journal, 3, adapted to a bearing in a tubular screw, referred to hereinafter, in the other arm, portions of both of these arms being shown in dotted lines in the perspective view, Fig. 19, and a side view of one of the arms being shown in Fig. 2. The journal 2 of the bracket u' can move endwise in the arm D', and can turn therein, but it is grooved to receive the point of a set-screw, 75, (shown in Fig. 2,) so as to prevent the journal from turning until the frame has to be tilted in the manner described hereinafter. The journal 3 of the bracket u does not bear directly in the arm D', but in a tube, 4, screwed into the arm, as shown in Fig. 23, this tube being confined longitudinally to the journal, so that on turning the tubular screw the entire frame can be adjusted transversely on the machine. It may be remarked here that a nice transverse adjustment of the series of warp-threads to accord with the reed and heddles, is often required; hence this provision for adjustment. To the rod n' of the warp-frame are fitted two wooden strips, 5 5, which conform with the rod, as shown in Fig. 21, and at intervals clamping-jaws 6 6 are secured to the strips, the opposite jaws being combined with handled screws 7, by manipulating which the two strips can be bound to the rod or moved away from the same. The warp-threads pass upward between the strips, round the rod n', and down between the strips, as indicated by the arrows in Fig. 21, and are confined to the rods by the strips 5 5 and clamps 6 6. The lower rod, t, of the warp-frame passes through a wooden strip, t', extending between

the two sockets t', secured to the rod, one near each end of the same, and a wedge-shaped strip 8 fits into the sockets, as shown in Fig. 22. The ends of the warp-threads are confined by and between these wooden strips. When the warp-threads have to be applied to this frame, it is first elevated in its pivoted guiding-brackets $u\,u'$, so that in turning the frame to the position shown by dotted lines in Fig. 2 it will clear the mechanism by which thread after thread of the warp is taken by a hook and presented to the reciprocating needle. This mechanism is partly shown at W, Fig. 5; but as it is essentially similar to that described in the aforesaid patent it has not been deemed necessary to illustrate it with any more minuteness than to indicate its location. When the warp-frame has been turned to the inclined position shown in Fig. 2, it can be turned down, so as to occupy the vertical position shown by the dotted line, where it will be conveniently situated for the ready application of the warp-threads in the manner described.

It may be remarked here that the frame may be pivoted to stands which can be moved rearward on the extensions A′ of the main frame, where it will be so far clear of the mechanism that it can be turned down without first sliding it in pivoted brackets, in which case said brackets can be dispensed with and trunnions formed on the side bars, $q\,q'$, of the said frame for adaptation to bearings in the arms D′.

Fig. 17 is a detached perspective view of one of the heddle-supporting frames, which each consist of two threaded rods, 9 and 10, adapted to slide in standards I I, Fig. 1, secured to the extensions A′ A′ of the bed A of the machine, and actuated simultaneously in the manner and by driving appliances described hereinafter. The upper bar of a heddle-frame is connected to the upper screw-rod, 9, and the lower bar to the lower screw-rod, 10, as shown in Fig. 17, by devices, an enlarged view of one of which is shown in Fig. 18. It consists of a sleeve, 12, which is made to engage in the thread of the screw-shaft by a screw, 13. To a threaded stem, 14, on the sleeve is screwed a coupling, 15, and to the latter is swiveled a hook, 16, adapted to a staple on the bar of the heddle-frame. The two screw-shafts 9 and 10 are geared together by a shaft, 17, and bevel-wheels 76, 77, 78, and 79, Fig. 17. On turning the shaft 17, by means of a suitable handle with which it is furnished, all the sleeves 12 will be moved simultaneously on the screw-rods, and the heddle-frame can thus be adjusted transversely in the machine to the greatest nicety.

While I do not desire to restrict myself to any specific devices through the medium of which the desired endwise-reciprocating motion is imparted to the heddles, I will briefly describe that which I prefer.

At the end of each heddle-supporting frame a bell-crank lever, J, is pivoted to a bracket on the standard I, and one arm of this lever has a link, 90, engaging in a groove near one end of the rod 10, while a link connected to the arm of a precisely similar bell-crank lever engages in a similar groove near the end of the other rod, 9, and the short arms b^2 of the two levers are connected together by the guided rod l', so that any vertical movement of the latter must be accompanied by a simultaneous endwise movement of the rods 9 and 10, and consequently of the heddle-frame. A shaft, g, derives its motion from the main driving-shaft L, through the medium of gearing consisting of a bevel-wheel, 80, on the said driving-shaft, a similar wheel, 81, on a vertical shaft, 82, a bevel-pinion, 83, on the same shaft, and a bevel-wheel, 84, secured to the shaft g and gearing into the said pinion, as shown in Fig. 2, and to this shaft are hung arms 18—one for each heddle-supporting frame—each arm being connected by a rod, 19, to an adjustable sleeve on one of the rods l', and a pin on each arm fitting into a groove in the side of a cam-wheel, 20, on a shaft, 21, geared to the shaft g. (See Fig. 4.)

The devices for acting on the heddle-cords are shown in Figs. 5, 6, 7, 8, and 9, and Figs. 10 to 16, inclusive. A shaft, M, having its bearings in brackets attached to the extension F′ of the slide F, derives its motion, through the medium of bevel-wheels 85 and 86, from the vertical shaft M′, which is geared by bevel-wheels 87 and 88 to the horizontal shaft L′, the latter being geared to the main driving-shaft, as described in the aforesaid patent, this shaft M driving the shaft N through the medium of the bevel-wheels 22 23, shaft 24, and bevel-wheels 25 and 26, the said shaft N having its bearings on hangers P^2, secured to the extension F′ of the slide F. Bell-crank levers 27 and 28 are pivoted to attachments on the extension F′ of the slide, pins on the short arms of the levers entering scroll-grooves in cams S on the shaft N, and the long arm of a lever, 27, being connected by a link to an arm on a rod, P, and the arm of a lever, 28, to an arm on a rod, P′. The lower ends of a pair of these rods P P′ are connected together by a cross-piece, 30, to which a vertical reciprocating motion is imparted by an eccentric, 31, from the shaft T, which is driven through the medium of bevel-wheels from the shaft 21. (See Fig. 4.)

The eccentric-rod 32, Fig. 7, is connected to an arm, 34, pivoted to a hanger on the extension F′ of the slide, and a pin from the cross-piece 30 projects into a slot in the said arm 34.

It will be seen that a vertical reciprocating motion is imparted simultaneously to the two rods P P′, and that each has an oscillating motion independent of the other. The two rods pass through and have their bearings in the tops of the standards K K′, above which the rods are furnished with hooks, the rod P with a hook, x^2, and the rod P′ with a hook, x^3.

Two levers, V V′, are hung to a pin, z, on the extension F′ of the slide beside each pair of rods P P′, the lower arms of these levers having

pins, one adapted to a scroll-groove in one side of a cam, K^2, on the shaft T, and the other pin adapted to a scroll-groove in the opposite side of the cam. The lever V has two upper arms, 35 and 36, the former terminating at the top in a finger, *j*, and the arm 36 carrying a vertically-guided rod, *j'*, which terminates at the top in the jaw j^3, having an elongated eye, and a projection at the lower end of the guided rod *j'* is struck by a pin, j^2, on the cam-wheel K^2 every time the latter revolves. The long arm of the lever V' has at the top a jaw, j^4, in which is an elongated eye.

It will be seen that the device above described is in many respects similar to that shown in the aforesaid Patent No. 255,038, the vibrating separators, however, described in the said patent being dispensed with.

In order that the operation of the above-described mechanism may be thoroughly understood, I will proceed to describe its function in connection with the heddle-cords and the reciprocating needle Q. It must be remembered, in the first place, that there are the following movements of the parts described above: First, there is the intermittent vertical and simultaneous reciprocating movement of the two hooks x^2 and x^3; second, the intermittent oscillation of the said hooks at different intervals; third, the intermittent vibration of the finger *j*; fourth, the intermittent oscillation of the jaw j^4; fifth, the intermittent vibration of the jaw j^3 simultaneously with the vibration of the finger *j*; and, sixth, the sudden lateral oscillation of the jaw j^3, due to the striking of the projection at the lower end of the rod *j'* by the pin j^2 on the cam-wheel K^2. It should be understood that there is a spring, 89, which moves the jaw j^3 inward after it has been moved outward by, and is free from the control of, the pin j^2 on the cam-wheel.

The timing of the movements of the several parts and the result attained thereby can be best explained by reference to Figs. 10 to 16, inclusive. In Fig. 10 the two hooks x^2 and x^3 have been elevated, and the points of both hooks are opposite the space between the cords a^{11} and a^{12} of the heddles. When the hooks have reached this position a movement in the direction of the arrow, Fig. 10, is imparted to the slide F and reciprocating needle, and consequently to the entire mechanism above described, the points of the hooks consequently entering the spaces between the said cords. As the hooks descend the first cord, a^{12}, will be separated from the next cord, a^{11}, and by the time the hooks have reached the limit of their downward movement the hook x^3 will have released the cord a^{12}, while the hook x^2 retains the cord a^{11}, as shown in Fig. 11, and holds the said cord a^{11} back, as well as all the succeeding cords. After the hooks have reached the position shown in Fig. 11 the jaw j^4 is moved back to the position shown in Fig. 12, and the jaw j^3 is moved outward. At this point takes place the sudden endwise, reciprocating movement of the heddle-frame, referred to above, and this shakes the cord a^{12} free from the cord a^{11}, should there be a disposition of one cord to adhere to the other. The cord a^{12} and its eye 63 are now in such a condition that when the jaw j^4 resumes its former position, Fig. 13, and the jaw j^3 is released, so as to spring back, the eye 63 will be so held by the jaws that the needle Q will pass through the said eye. It should be understood that when the heddle-cords are gripped by the jaws the eye of the heddle is opposite the elongated openings in said jaws, so that the closing of the jaws will not compress the eye. The needle Q having passed through the eye of the heddle-cord in the act of retreating after seizing a warp-thread, the hooks will assume the position shown in Fig. 14. After the needle has drawn the warp-thread through the eye of the heddle-cord, and its point is clear of the jaws, the jaw j^3 is moved backward, as shown in Fig. 15, and simultaneously the finger *j* is moved in the same direction and pulls the eye away from the path of the needle, the jaw j^3 yielding and permitting this movement of the eye of the heddle-cord. Immediately after this the several parts assume the position shown in Fig. 16, and a repetition of the above-described movements takes place, the eye 62 of the next heddle-cord being operated upon. This is the case when the selecting and drawing devices are used in connection with a single heddle-frame. The machine, however, is intended to act upon two heddle-frames, as in the former patent, and in Figs. 1, 2, and 51 have shown the machine as constructed for receiving and acting upon two heddle-frames. In this case the operation of the parts is so timed that the needle Q passes first through an eye of a heddle in one heddle-frame, then through an eye of a heddle in the other heddle-frame, then through an eye of the first heddle-frame, and so on.

The machine may, if desired, be constructed for acting upon three or more heddle-frames as well as upon two by simply duplicating the parts which carry the heddle-frames and those which act upon the heddle-cords.

It may be remarked, in conclusion, that mechanism for imparting a vertical reciprocating motion to the hooks x^2 and x^3 may be dispensed with, and that they will perform the duties described if they are not vertically reciprocated.

I claim as my invention—

1. The slide F, mechanism for intermittently traversing the slide, the driving-shaft L, the needle Q, the spirally-grooved shaft D, the reversing-wheels, gearing for driving the same from the said shaft L, a guided cross-head, *c*, controlled by the said spirally-grooved shaft, and connected to the needle, and devices whereby the said cross-head is caused to operate the reversing mechanism, all substantially as set forth.

2. The combination of the main frame of the machine, bearings thereon, and a frame,

H, pivoted to said bearings, and having devices for retaining warp-threads, all substantially as set forth.

3. The combination of the bars A′, brackets B^2 thereon, the arms D′, pivoted to said brackets, and a frame, H, pivoted to said arms, and having devices for retaining warp-threads, all substantially as described.

4. The combination of the brackets *u u′*, having journals 2 3, the arms D′, having bearings for said journals, and the warp-carrying frame *q q′ n′ t*, adjustable in said brackets, all substantially as set forth.

5. The combination of the brackets *u u′*, the rod *n*, connecting the same together, the journals on the brackets, the arms D′, having bearings for the journals, and the warp-carrying frame *q q′ n′ t*, adjustable in said brackets, all substantially as set forth.

6. The pivoted brackets *u u′*, and the warp-carrying frame *q q′ n′ t*, the end rods, *q q′*, of which are adapted to slide in the brackets, and are provided with racks, in combination with the shaft *w*, having pinions *v v*, adapted to the said racks, all substantially as set forth.

7. The combination of the warp-carrying frame *q q′ n′ t*, with the strips 5 5, adapted to the rod *n′*, and the clamps 6 6, substantially as described.

8. The combination of the frame H, having journals 2 and 3, with bearings in one of which the said journal 2 can slide, the bearing for the other journal being adjustable, substantially as set forth.

9. The combination of the threaded rods 9 and 10 of the heddle-supporting frame, heddle-connections controlled by the threads of the rods, and gearing for connecting the rods, substantially as set forth.

10. The within-described heddle-frame connection, the same consisting of the sleeve 12, a device whereby the said sleeve is made controllable by the thread of a screw-rod on which the sleeve can slide, the stem 14, coupling 15, and swiveled hook 16, all being constructed substantially as specified.

11. The combination of a heddle-frame holder with hooks x^2 and x^3, and mechanism whereby the within-described oscillating motion is imparted to the said hooks, substantially as set forth.

12. The combination of a heddle-frame holder with hooks x^2 and x^3, and mechanism by which the within-described vertical reciprocation and horizontally-oscillating movement is imparted to the hooks for operating on the heddle-cords, substantially as described.

13. The combination of the hooks x^2 and x^3, and mechanism for imparting the within-described movements to the same, with the jaws j^3 and j^4, and mechanism for actuating the jaws, substantially as set forth.

14. The combination of the hooks x^2 x^3, and jaws j^3 and j^4, with the finger *j*, and mechanism for operating the same, substantially as specified.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LEWIS P. SHERMAN.

Witnesses:
SAMUEL B. BRACKETT,
CHARLES WALKER.