

5 Sheets--Sheet 1.

Patented Oct. 12, 1880.



Inventors
Charles E. Skinner
Eugene T. Jenson
by their Attorneys
Brown & Brown

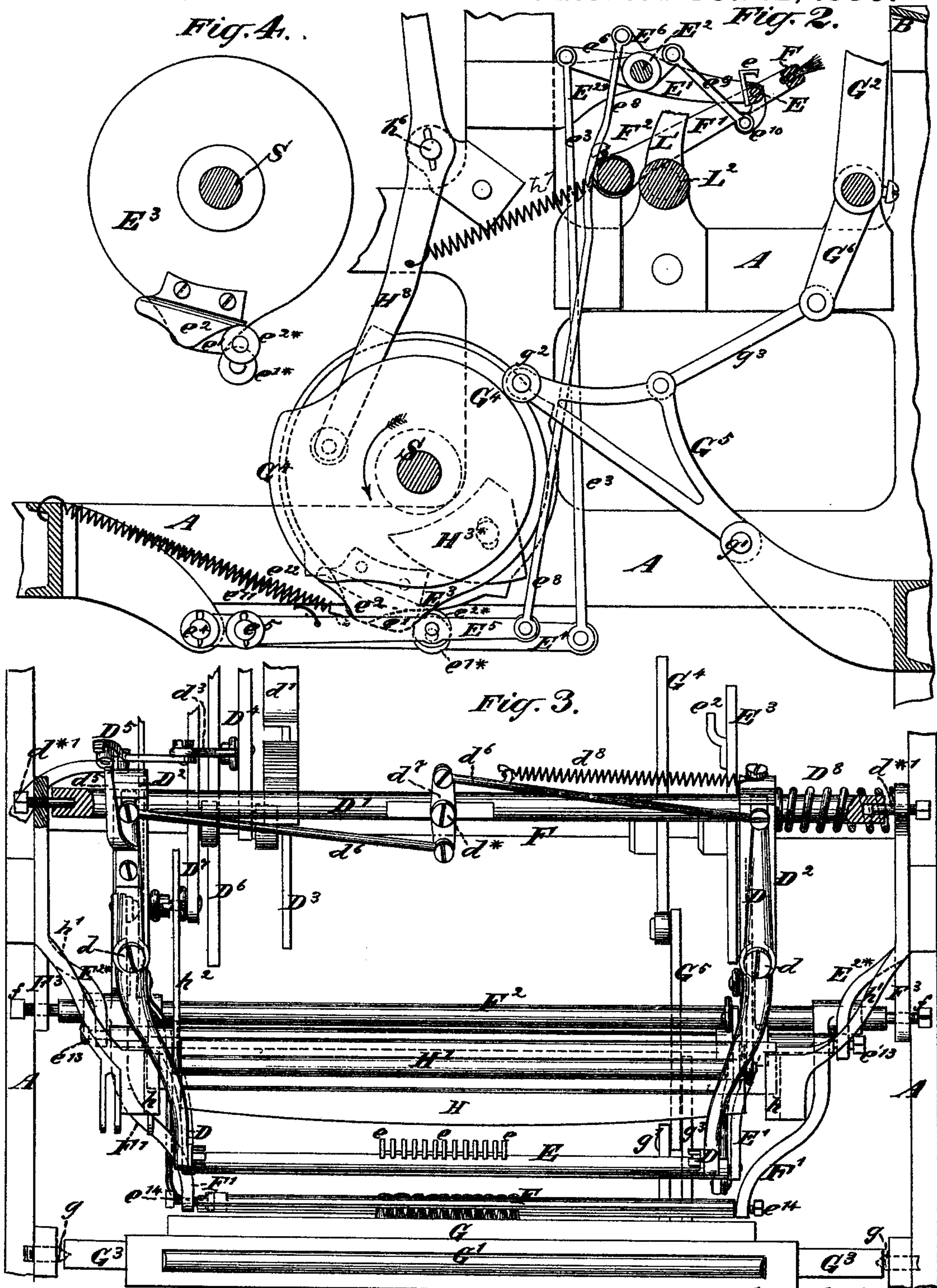
(No Model.)

5 Sheets--Sheet 2.

C. E. SKINNER & E. TYMESON.
Loom for Weaving Tufted Fabrics.

No. 233,290.

Patented Oct. 12, 1880.



Witnesses { John Becker.
Thos. H. Hays.

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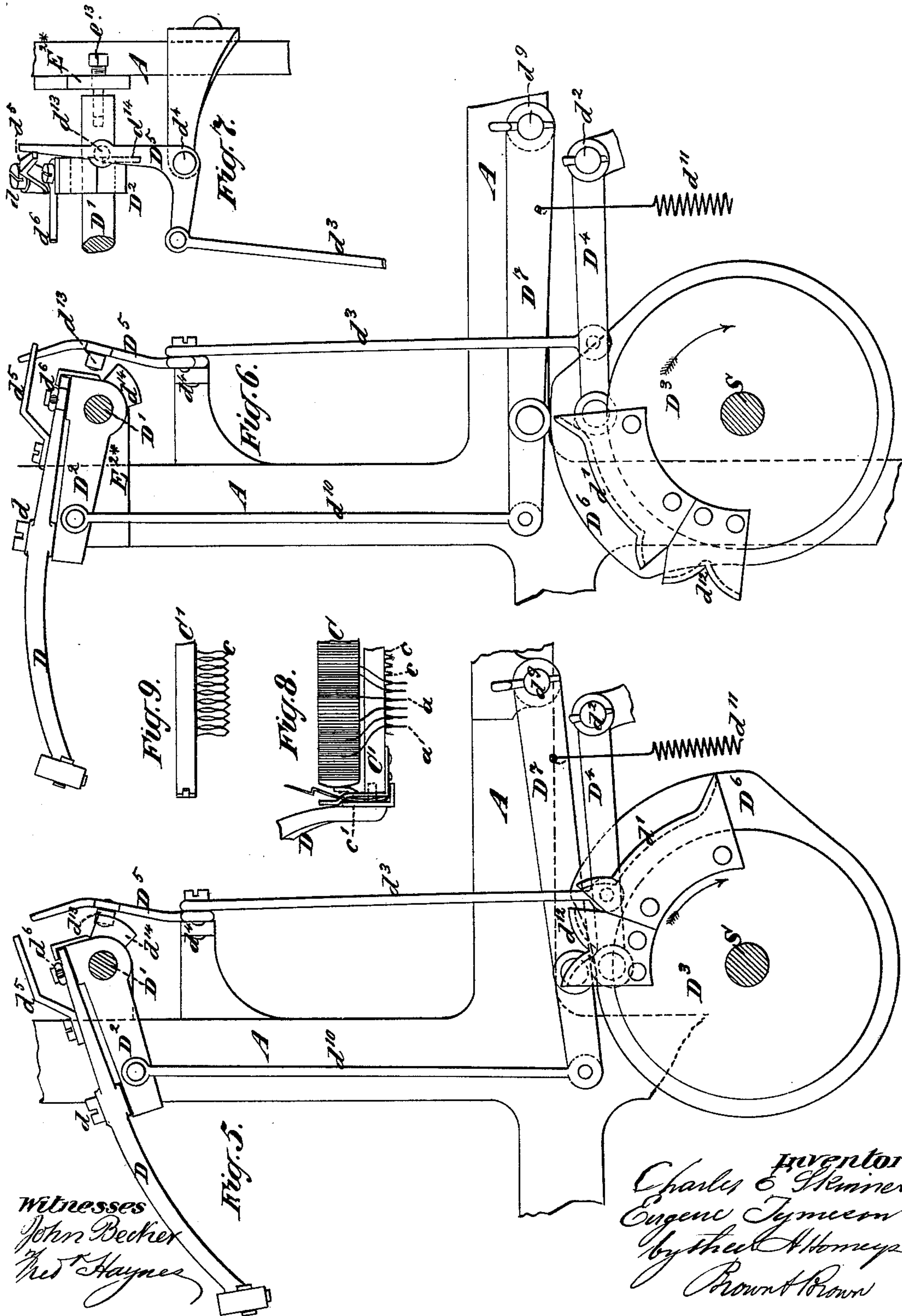
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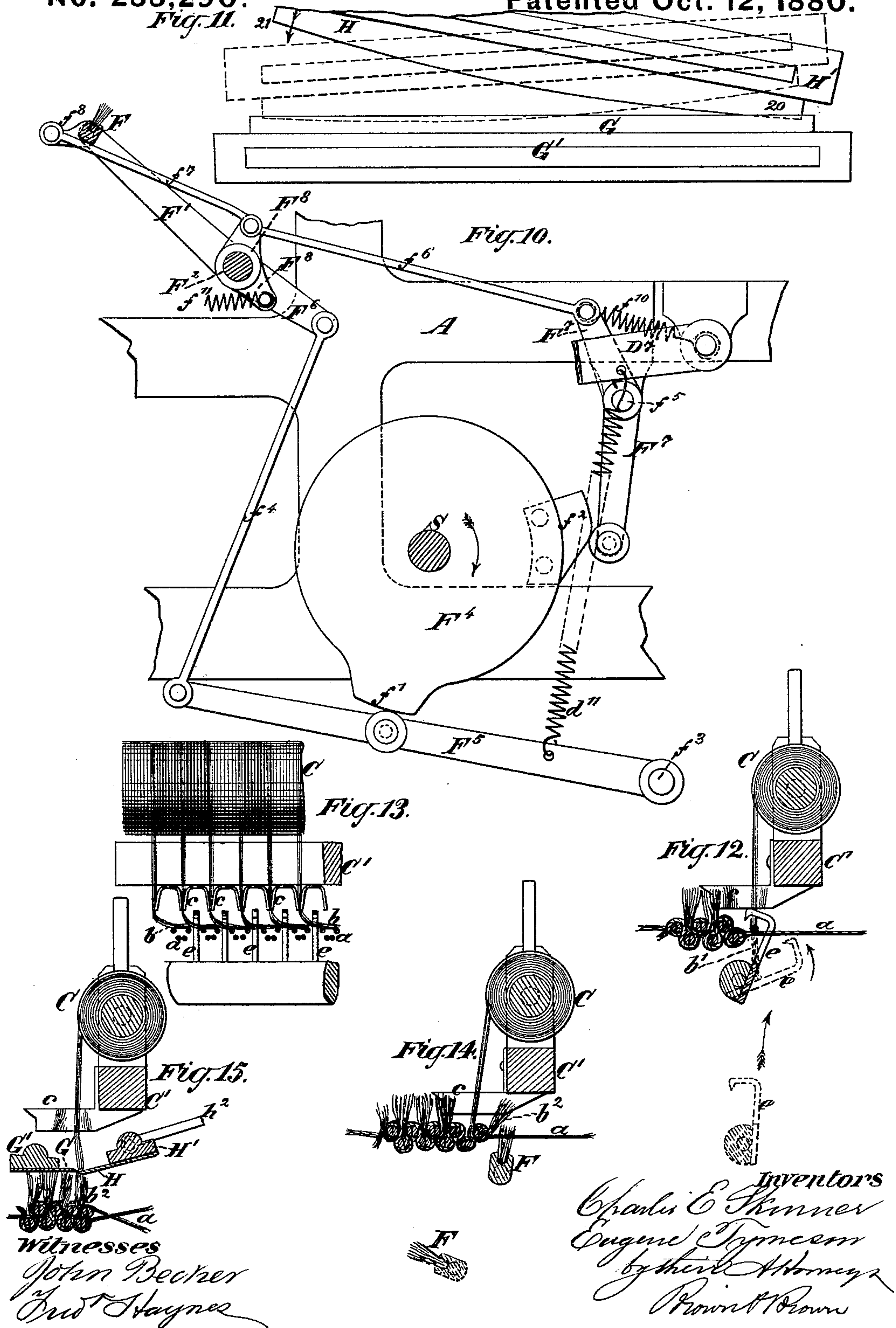
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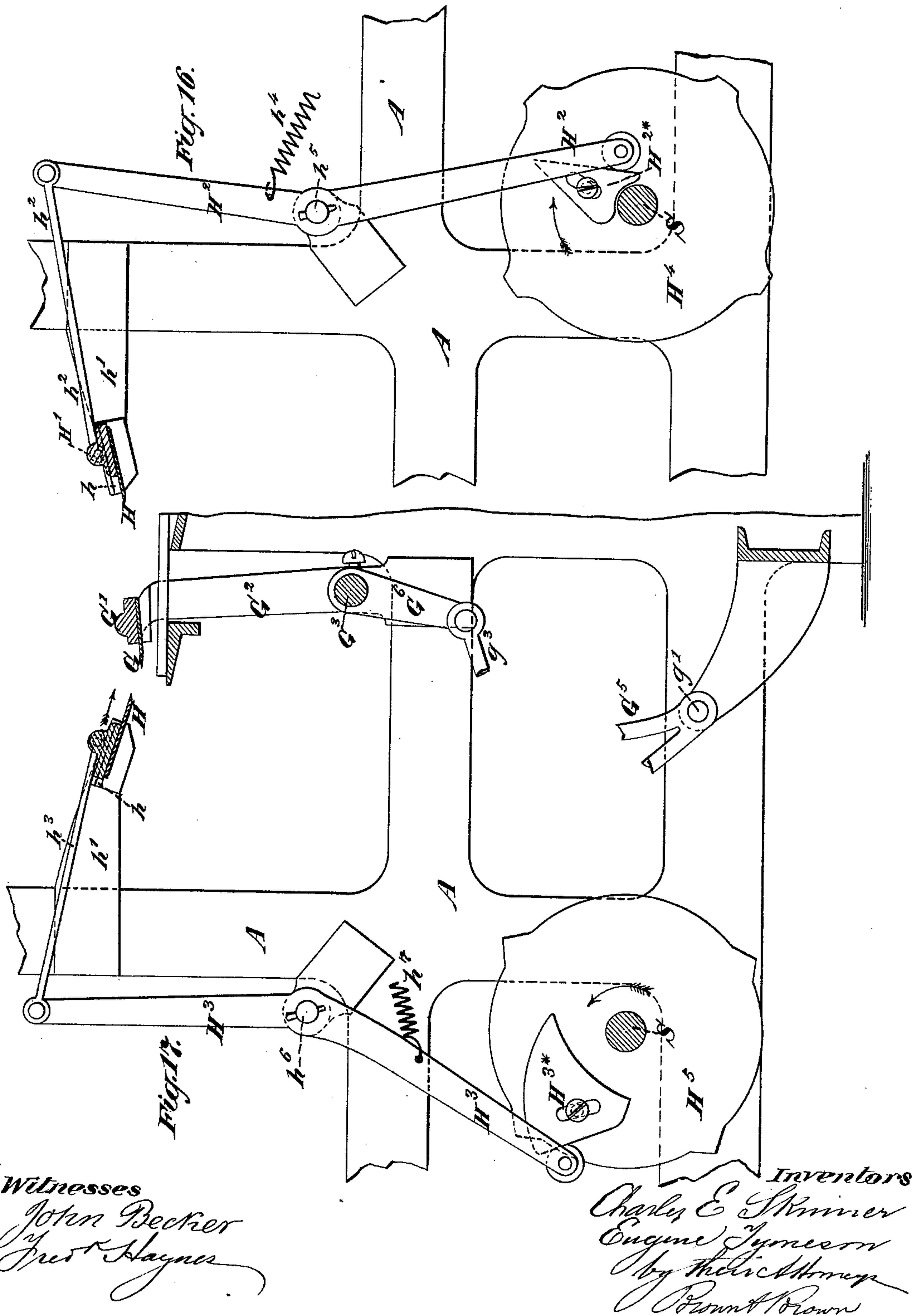
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5 Sheets—Sheet 5.

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Patented Oct. 12, 1880.



UNITED STATES PATENT OFFICE.

CHARLES E. SKINNER AND EUGENE TYMESON, OF YONKERS, NEW YORK.

LOOM FOR WEAVING TUFTED FABRICS.

SPECIFICATION forming part of Letters Patent No. 233,290, dated October 12, 1880.

Application filed May 26, 1880. (No model.)

To all whom it may concern:

Be it known that we, CHARLES E. SKINNER and EUGENE TYMESON, both of Yonkers, in the county of Westchester and State of New York, have invented certain new and useful Improvements in Looms for Weaving Tufted Fabrics; and I do hereby declare that the following is a specification of the same, reference being had to the accompanying drawings.

10 This invention is more especially intended for the weaving by power of what are known as "moquette" carpets, but may be wholly or in part applicable to power-loom for weaving other tufted fabrics.

15 It relates to the means employed for presenting the tuft-yarns to and for inserting the same into the fabric, and for cutting off the tufts.

20 In carrying out the invention the tuft-yarns are or may be supplied, as in other power-loom for the same kind of weaving, from a series of spools mounted in frames or carriages, which are carried by carrying-chains, and thereby presented successively or in proper order to transferring-arms, which place the spools and their yarns in proper positions relatively to the warp. Other carrying devices might, however, be substituted for the chains, and other transferring devices may be substituted for the arms.

30 Our invention consists in the combination, with such transferring-arms or transferring devices, of mechanism for giving them a motion sidewise or crosswise of the loom for laying the ends of the tuft-yarns across the spaces between the warp-yarns in suitable positions to be drawn through the warp.

40 It also consists in the combination, with the spool frames or carriages and the transferring devices having a motion sidewise or crosswise of the loom, of hooks organized to enter and pass through the spaces between the warp-yarns from below the same and return, for the purpose of drawing the tuft-yarns into or through the warp.

45 It likewise consists in the combination, with the means of inserting the tuft-yarns through the warp, of brushes organized to enter and pass through the spaces between the warp-yarns from below and return, for the purpose of brushing the ends of the warp-yarns back

through the warp and around the last shot of filling.

It further consists in a novel system of cutters for cutting off the tufting-yarn.

Furthermore, it consists in certain details, to be hereinafter fully described, of the mechanism employed in carrying out the operations of presenting, inserting, and cutting off the tufts.

55 In the accompanying drawings, Figure 1 is a nearly central longitudinal vertical section of a loom, showing the parts involved in our invention, but having omitted all parts not necessary for the illustration of the invention. 65 Fig. 2 is a sectional view taken in the same plane as Fig. 1, but showing working parts on the opposite side of such plane. Fig. 3 is a plan view of the principal parts. Fig. 4 is a side view of the cams for operating the tuft-inserting hooks. Figs. 5 and 6 are side views of the transferring-arms and their operative mechanism. Fig. 7 is a back view of a portion of the said mechanism. Fig. 8 is a front view of portions of one of the transferring-arms and of one of the tuft-yarn spools and its carriage and several of the "tins" through which the tuft-yarns are delivered. Fig. 9 is an inverted plan of part of one of the above-mentioned carriages and its attached tins. Fig. 10 is a side view of the brush-operating mechanism, showing the brush and its shaft in transverse section. Fig. 11 is a plan of the cutters, showing them in different positions. Fig. 12 is a sectional view taken in a plane parallel with the warp, and on a larger scale than the previously-described figures, showing a spool and its carriage and tuft-tins and one of the tuft-inserting hooks. Fig. 13 is a front view corresponding with Fig. 12. Fig. 14 is a sectional view parallel with Fig. 12, showing a spool and its carriage and the brush. Fig. 15 is a section in the same direction as Figs. 12 and 14, showing a spool and carriage and the cutters. Figs. 16 and 17 exhibit side views of the cams for operating one of the tuft-cutters and the means through which the cams therein represented transmit motion to the back cutter.

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

The loom represented has the framing A

and breast beam B and other parts common to looms of ordinary form and construction. It has the spool-carriages C', which contain the tuft-yarn spools C, and the carrying-chains C², which carry the said carriages, and the transferring-arms D, which take the said carriages from and return them to said chain, constructed and operated as in other looms for weaving tufted fabrics—as, for instance, in the loom which is the subject of Letters Patent No. 16,037, granted November 11, 1856, to Smith and Skinner, except that the said arms, besides having the usual motions upward and downward and toward and from each other for transferring the spool-carriages, have a motion together sidewise, while a spool-carriage and spool are in them, to lay the ends of the tuft-yarns across the spaces between the warp-yarns. The mechanism for operating the said chains C² is or may be the same as that described in the patent hereinabove mentioned, but is not represented in the drawings, all that is necessary to illustrate the improvement relating to the transferring-arms being the lower shaft, C³, for working the said chains, and a portion of one of the said chains, as shown in Fig. 1.

The mechanism for operating the transferring-arms is fully represented in Figs. 1, 3, 5, 6, and 7. The movement of the said arms sidewise or crosswise of the loom with the spool-carriage held between them is produced by a longitudinal movement given to the rock-shaft D', to which the said arms are attached; and in order to illustrate this a brief description only of the whole of the mechanism for operating these arms and their rock-shaft will be necessary.

The transferring-arms D are not attached directly to the rock-shaft D', but are pivoted at d to arms D² D², which are secured rigidly to the said rock-shaft. The opening movement of the said arms, whereby they are prepared to take hold of and made to liberate the spool-carriages, is produced by the inner face of a cam, d' , carried by a cam-head, D³, on the rotary cam-shaft S, from which the movements of all the working parts of the loom are derived. The form of the working-face of this cam d' is shown in dotted outline in Figs. 1, 5, and 6. The said cam acts, for the purpose above mentioned, upon a lever, D⁴, which has a fixed fulcrum, d^2 , and which is connected, by a rod, d^3 , with an elbow-lever, D⁵, which works crosswise of the loom on a fixed fulcrum, d^4 , secured to the upper framing behind and below the rock-shaft D'. The upper end of this lever acts against the outer side of a tail-piece, d^5 , on the rear end of one of the transferring-arms D, and the opening movement of this arm causes a similar movement to be communicated to the other arm by reason of the two being connected by rods d^6 with a short lever, d^7 , (see Fig. 3,) which, is by a pivot, d^* , pivoted to the upper side of the rock-shaft D'. The closing movement of the

arms and their grasp of the spool-carriages is effected by a spring, d^8 , which connects one of the rods d^6 with one of the arms D². The upward and downward movements of the transferring-arms are produced by a cam, D⁶, on the shaft S and a spring, d^{11} , the said cam acting to produce the upward movement upon a lever, D⁷, which works upon a fixed fulcrum, d^9 , and connects, by a rod, d^{10} , with the arm D² of the rock-shaft D', and the said spring acting to pull the said lever D⁷ downward.

The longitudinal movement of the rock-shaft D' to produce the movement of the transferring-arms sidewise or crosswise of the loom with a spool-carriage in them is also effected through the elbow-lever D⁵, rod d^3 , and lever D⁴, (though not by the cam d' ,) a separate cam, d^{12} , on the same cam-head D³ being used for this purpose. The form of the inside face of this cam d^{12} and its position relatively to d' and D⁶ are shown in Figs. 1, 5, and 6 in dotted outline. The said cam d^{12} causes a stud or roller, d^{13} , carried by the said elbow-lever D⁵, to act on the outer side of a flange or projection, d^{14} , (represented as of sector or segmental shape,) on the back of one of the arms D² of the rock-shaft D'. This flange is, by the rocking motion of the rock-shaft, moved downward out of the way of the stud or roller d^{13} at the times when the opening movements of the arms are to be produced; but when the shaft is to be moved endwise, which is while the front ends of the transferring-arms are at or near their lowest position, the said flange is brought by the said rocking movement to a position opposite the said stud or roller. The cam d^{12} only produces the movement of the rock-shaft in one direction, its movement in the other direction being produced by a spiral spring, D⁸, (see Fig. 3,) coiled around it between one of the arms D² and the adjacent side framing of the loom.

To provide for the longitudinal movement of the rock-shaft, it is shown in Fig. 3 as supported on center screws, d^{**} , screwing into the framing; but it may be fitted to slide in journal-boxes on the framing.

The clutches c' , (shown in Fig. 8,) which attach the carriages to the arms, are or may be like those in the loom which is the subject of the hereinabove-mentioned Letters Patent No. 16,037 and in that which is the subject of Letters Patent No. 186,374.

The laying of the ends of the tuft-yarns across the spaces of the warp by the above-described transverse movement of the arms and of the spool-carriage and spool held between them is illustrated in Fig. 13, where a indicate the warp-yarns, and b indicate the ends of the tuft-yarns projecting downward through the tins or holders c attached to the carriage C'. These tins are represented as like those in Patent No. 16,037, and their construction is shown in Figs. 8 and 9. The ends of the tuft-yarns protrude sufficiently through these tins to be engaged in the warps, and while the car-

riage and spool are descending the so-protruding parts of the said yarns are straight; but just before the ends come in contact with the warp the sidewise movement of the transferring-arms and the carriage and spool takes place, sweeping the ends over the warp and causing the parts of the yarns which are to form a row of tufts to lie over the spaces of the warp, as shown in Fig. 13, ready to be seized by the hooks e , which are employed to draw them through the warp.

The hooks e , (shown in Figs. 1, 2, 3, 12, and 13,) of which there are as many as the number of tufts in a row, are all secured firmly to a straight bar, E , which is arranged transversely of the loom and pivoted into the ends of two arms, E' , secured to a rock-shaft, E^2 , which is fitted to rock on center screws, e^{13} , or in suitable bearings in arms E^{2*} on the side frames of the loom. The said hooks have two movements—viz., an upward-and-downward one, produced by the movement of the rock-shaft E^2 on its axis, and a tilting one backward and forward, produced by the rocking of the bar E . These movements, which are best illustrated in Figs. 2 and 12, are produced by a cam, E^3 , on the rotary cam-shaft S . This cam, which is shown separately in Fig. 4 and partly shown in Figs. 2 and 3, has an offset, e' , by which the movement of the rock-shaft E^2 is produced, and a wing, e^2 , by which the separate rocking movement of the bar E is produced. The offset e' acts upon a roller, e'^* , carried by a lever, E^4 , which works on a fixed fulcrum, e^4 , and which is connected, by a rod, e^3 , with an arm, e^6 , (see Fig. 2,) rigidly secured to the rock-shaft E^2 . The wing e^2 acts upon a roller, e^{2*} , which is carried by a lever, E^5 , which works upon a fixed fulcrum, e^5 , and which is connected, by a rod, e^8 , with one end of a small elbow-lever, E^6 , which works loosely upon the rock-shaft E^2 , and the other end of which is connected, by a rod, e^9 , with an arm, e^{10} , on the hook-bar E .

The levers E^4 and E^5 are held in contact with their cam by springs e^{11} and e^{12} .

The arrangement of the hook-bar and its carrying rock-shaft and of the several levers and connections above described is such and the movements of their operating cams are so timed that the hooks, which, in common with all the tuft-inserting apparatus, are only required to operate at every fourth beat of the lay, remain, when at rest, in the depressed position shown in Fig. 1, which is the lowest position shown in Fig. 12. The first movement, which is produced by the action of the cam-offset e' on the rock-shaft E , is simply upward, and when this movement has proceeded some distance the cam-wing e^2 acts on the hook-bar to tilt the hooks backward to about the position shown in dotted outline in Fig. 12. The continued upward movement of the bar carries the hooks through the warp, the shed of which is at this time closed, and after they have passed through the warp the action of

the cam-wing e^2 is to tilt the bar and the hooks forward to bring the hooks over the tuft-yarns lying on the warp, as indicated by the highest position of the hooks. (Shown in Fig. 12.) The downward movement of the hook-bar is then produced by the cam-offset e' , and this draws the hooks down through the warp, causing them to pull through the ends of the tuft-yarns, which then protrude through the warp, as shown at b' in Fig. 12, ready to be swept upward and turned back through the warp by the brush F after a shot of filling has been inserted behind the tuft-yarns and the shed has been closed on said shot.

By the above-described compound movement of the hooks—viz., upward through the warp behind the tufts before tilting, and afterward tilting forward over the tufts before descending—the drawing through of the tufts without any disarrangement of them is secured.

The brush F , which is shown in Figs. 1, 2, 3, 10, and 14, has its back composed of a straight bar arranged across and below the warp, and having on its upper side bristles of hair or other suitable elastic material long enough to protrude through the closed shed of the warp and stiff enough to pass through the warp and brush the tufts through it, but yet of a sufficiently flexible nature to yield in a considerable degree to the resistance produced in the tufts by the friction of the warp in the passage of the tufts through the warp. The bristles of this brush are so numerous that several will pass through each of the lateral spaces of the warp through which the tufts are inserted, and their number and flexibility produce a softer action on the tuft and insure all its numerous fibers being carried through the warp in a certain and easy manner. This brush is pivoted at its ends, by center screws, e^{14} , or otherwise, into the front ends of two arms, F' , secured to a rock-shaft, F^2 , which is fitted to rock between center screws, f , or in suitable bearings in arms F^3 secured to the side framing of the loom. The said brush has two movements—viz., an upward-and-downward movement, produced by the movement of the rock-shaft about its axis, and a rocking or turning one, produced by the independent rocking of the brush itself on its pivots e^{14} in the arms F' . These movements are produced by a cam, F^4 , on the cam-shaft S . This cam, which is best shown in Fig. 10, has an offset, f' , by which the movement of the rock-shaft F^2 is produced, and a wing, f^2 , by which the independent rocking or turning of the brush itself is produced. The offset f' acts upon a lever, F^5 , which works on a fixed fulcrum, f^3 , secured to the loom-framing, and the front end of which is connected, by a rod, f^4 , with an arm, F^6 , of the rock-shaft F^2 . The wing f^2 of the cam acts upon the lower end of a lever, F^7 , which works on a fixed fulcrum, f^5 , secured to the loom-framing, and the upper end of which is connected by a rod, f^6 ,

with a short lever, F^8 , which rocks loosely upon the rock-shaft F^2 , the said lever F^8 being connected, by a rod, f^7 , with an arm, f^8 , secured rigidly to the bar of the brush F .

5 The lever F^5 is kept in contact with the cam F^4 by means of the spiral spring d^{11} , before mentioned, which connects the said lever with the lever D^7 , before mentioned. The lever F^7 has its return movement, after the action of the cam-wing f^2 , produced by a spring, f^{10} , connecting it with a fixed portion of the loom, and a spring, f^{11} , is applied to the lever F^8 to produce the forward rocking or turning movement of the brush, the cam-wing f^2 acting directly to produce only the backward tilting, rocking, or turning movement of the brush.

The movement of the cam F^4 is so timed and the arrangement of the brush F and its carrying-arms F' and their connections is such that the brush, until required to operate, is at rest below the warp in the position shown in Figs. 1 and 2, which is also the lowest position of the brush shown in Fig. 14, in which position it remains until after the shot of filling has been inserted behind the tuft-yarns, as hereinbefore described, when, by the operation of the cam-offset f' on the rock-shaft F^2 , it is raised until it arrives close under the fell of the fabric and in front of the downwardly-protruding tuft-yarns. The brush is then rocked or turned over upward and backward on its pivots e^{14} , while its upward movement with the arms F' continues, and it is so caused to brush up the tuft-yarns close under and behind the filling and carry them up through the warp, as shown at b^2 in Fig. 14, by its bristles passing through the latter. The backward rocking or turning movement continues while the brush commences descending, and the bristles are so carried back out of the way of the tufts and withdrawn from the warp, after which another shot of filling is inserted. By the following beat of the lay this shot is beaten up and the tufts are secured and made ready to be cut off in front of the fell by the action of the cutters G and H .

The cutters G and H , which are shown in Figs. 1, 3, and 11, consist of two shear-blades, which are arranged crosswise of the loom above the warp. The front cutter, G , which preferably is the upper one, and has a straight edge, is arranged at right angles to the warp, and has a simple backward-and-forward movement. The back cutter, H , which has preferably a curved edge, has a peculiar movement, which will be presently described, for the purpose of causing only a small portion of each one to be at any time in action.

The stock G' of the cutter G is carried by two arms, G^2 , which are firmly secured to a rock-shaft, G^3 , arranged to work between center screws g , or otherwise, in fixed bearings secured to the front part of the loom-framing A , and the movement of this cutter is produced by a cam, G^4 , (see Fig. 2,) on the cam-shaft S , the said cam acting on a bell-crank lever, G^5 , (see Fig. 2,) working on a fixed ful-

crum, g' , the said lever being furnished with a roller, g^2 , bearing on the said cam, and being connected, by a rod, g^3 , with an arm, G^6 , of the rock-shaft G^3 . The cutter-stock G' is drawn forward after the action of the cam G^4 by a spring, g^4 , (see Fig. 1,) which connects one of the arms G^2 with the breast-beam.

The stock H' of the back cutter H is fitted to slide back and forth in guides h in two rigid arms, h' , secured to the framing of the loom, the said guides having a slight downward and forward inclination, as shown in Fig. 1. The said stock is connected, by two rods, h^2 and h^3 , one at each end, with two levers, H^2 and H^3 , which are acted upon by two cams, H^{2*} and H^{3*} , carried by the cam-shaft S .

The lever H^2 nearest the left-hand side of the loom shown in Fig. 1 works on a fixed fulcrum, h^5 , and is actuated to produce the forward movement of its corresponding end of the cutter H by the cam H^{2*} , which is shown dotted in Fig. 1, and which is also shown fully in Fig. 16, where the cam-disk H^4 , to which it is secured, is also shown. The backward movement of the cutter is produced by springs h^4 and h^7 applied to the levers H^2 and H^3 . The lever H^3 nearest the right-hand side of the loom shown in Fig. 2 works on a fixed fulcrum, h^6 , and is actuated to produce the forward movement of its corresponding end of the cutter by the cam H^{3*} , which is shown dotted in Fig. 2, and is also shown fully in Fig. 17, where the cam-disk H^5 , to which it is secured, and the cutter H and lever H^3 and their connections, are also shown.

The cams G^4 , H^{2*} , and H^{3*} are relatively so arranged on the shaft S and the levers upon which they operate, and the connections between the said levers and the cutter-stocks so operate, that the two cutters approach each other from before and behind those portions of the tuft-yarns between the fell and the spool from which the said yarns are supplied, and the front cutter, G , comes to a stop with its edge close to the yarns, while the back one, H , continues moving forward, as illustrated in Fig. 11, with one end, 20, in advance of the other, until the said end passes the edge of the front one, G , as shown in bold outline in Fig. 11, and stops, while the other end, 21, continues to move forward until it passes the edge of G . In this way the several portions of the edge of H , beginning at 20 and ending at 21, are caused to pass each other in succession, like the blades of a pair of shears, so that only small portions of the edges of the cutters are in operation at any time, and the cutting is effected with little resistance; and, moreover, this movement of the cutter H causes its edge to have a slight longitudinal movement relatively to the edge of G , by which a slight drawing action is produced, which also facilitates the operation and tends to make a very clean cut.

The heddles and other parts not herein mentioned or represented in the drawings of a loom with these improvements may be constructed,

arranged, and operated as in other looms—for instance, that described in Letters Patent No. 16,037, hereinbefore mentioned, or in any other suitable manner. The lay L may be also constructed and operated as in other looms for weaving the same kind of goods—as, for instance, in Patent No. 186,374. It is represented in Fig. 1 of the drawings as carried by swords L' on a rock-shaft, L², which derives motion from a cam, L³, having four offsets, l, on the rotating cam-shaft S, the said cam operating on a lever, L⁴, which works on a fixed fulcrum, l', and is connected, by a rod, L⁵, with an arm, L⁶, on the rock-shaft L². A spring, l², is applied to keep in contact with the cam L³ the roller l⁴ mounted on the lever L⁴.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with the tuft-yarn spool-carriages and their transferring-arms, of mechanism for giving to the said arms and a spool-carriage held between them a movement transverse to the warp or crosswise of the loom, for the purpose of laying the ends of the tuft-yarns across the spaces in the warp, substantially as herein described.

2. The combination, with the rock-shaft and the attached spool-transferring arms, of mechanism for giving to the said rock-shaft a longitudinal motion, substantially as and for the purpose herein described.

3. The combination, with the rock-shaft D', provided with the flange d¹⁴, and the spool-transferring arms carried thereby, of the cam d¹², lever D⁴, rod d³, and lever D⁵, and spring D⁸, for producing a longitudinal movement of the said rock-shaft, substantially as and for the purpose herein set forth.

4. The combination, with the longitudinally-moving rock-shaft D', furnished with a flange or projection, d¹⁴, the spool-transferring arms D D, one of which is provided with a tail-piece, d⁵, carried by said rock-shaft, the lever d⁷, and rods d⁶, connecting the said arms together, the two cams d' and d¹², the levers D⁴ and D⁵, connected together and operated by the said two cams successively, and means of oscillating the said rock-shaft to raise and lower the said arms, whereby the opening movements of the transferring-arms and their movement together crosswise of the loom are both effected by the same levers D⁴ and D⁵, substantially as herein described.

5. The combination, with the tuft-yarn spool-carriages and attached tuft-holders and means for giving to the said carriages and tuft-holders a movement crosswise of the loom to lay the ends of the tuft-yarns across the spaces of the warp, of a series of hooks for entering the said spaces and means for carrying the said hooks upward through and withdrawing them downward from the warp to pull through the warp the portions of the tuft-yarns so laid across its spaces, substantially as herein described.

6. The combination, with the spool-carriages and their transferring-arms, having a movement together in the same direction crosswise of the loom for the purpose of laying the tuft-yarns across the spaces of the warp, of a series of hooks and mechanism for inserting the same through and withdrawing them from the warp, substantially as and for the purpose herein described.

7. The combination, in a loom, of a series of hooks for inserting the ends of tuft-yarns through the warp, mechanism for giving the said hooks an upward-and-downward motion through the warp, and mechanism for tilting the said hooks forward and backward, substantially as herein described.

8. The combination, in a loom, of a series of hooks for inserting the ends of tuft-yarns through the warp, a bar to which said hooks are firmly attached, a rock-shaft furnished with arms into which said bar is pivoted to tilt the said hooks, mechanism for producing the movement of said rock-shaft, and mechanism for producing the movement of the said bar on its pivots, substantially as and for the purpose herein described.

9. The combination of the rock-shaft E², furnished with arms E' e⁶, the hook-bar E, pivoted to said arms E' and furnished with an arm, e¹⁰, the lever E⁶, working loosely on said rock-shaft, the cam E³, the levers E⁴ and E⁵, operated by said cam, and the rods e³ e⁸, connecting said levers with the arms e⁶ and e¹⁰, respectively, all substantially as herein described.

10. The combination, in a power-loom, of tuft-yarn carriages and mechanism for moving them crosswise of the loom to lay the tuft-yarns across the spaces of the warp, hooks and mechanism for operating the same to insert the so-laid tuft-yarns through the warp, and a brush and mechanism for operating the same to brush back through the warp the ends of the so-inserted tuft-yarns, substantially as herein described.

11. The combination, in a loom for weaving tufted fabrics, of two tuft-cutters, one of which has a straight and the other a curved edge, and mechanism for moving the two ends of one of the said cutters independently, one after the other, toward the other of said cutters, substantially as and for the purpose herein described.

12. The combination, with the back cutter H and its stock H', of the guides h for the ends of the said stock, the two cams H^{2*} H^{3*}, the two levers H² H³, to be operated upon independently and at different times by said cams, and independent connections between the said levers and the cutter-stock H', all substantially as herein described.

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