No. 731,112. PATENTED JUNE 16, 1903.

H. LINDSAY.

LOOM.

APPLICATION FILED NOV. 26, 1902.

NO MODEL. 5 SHEETS—SHEET 1.

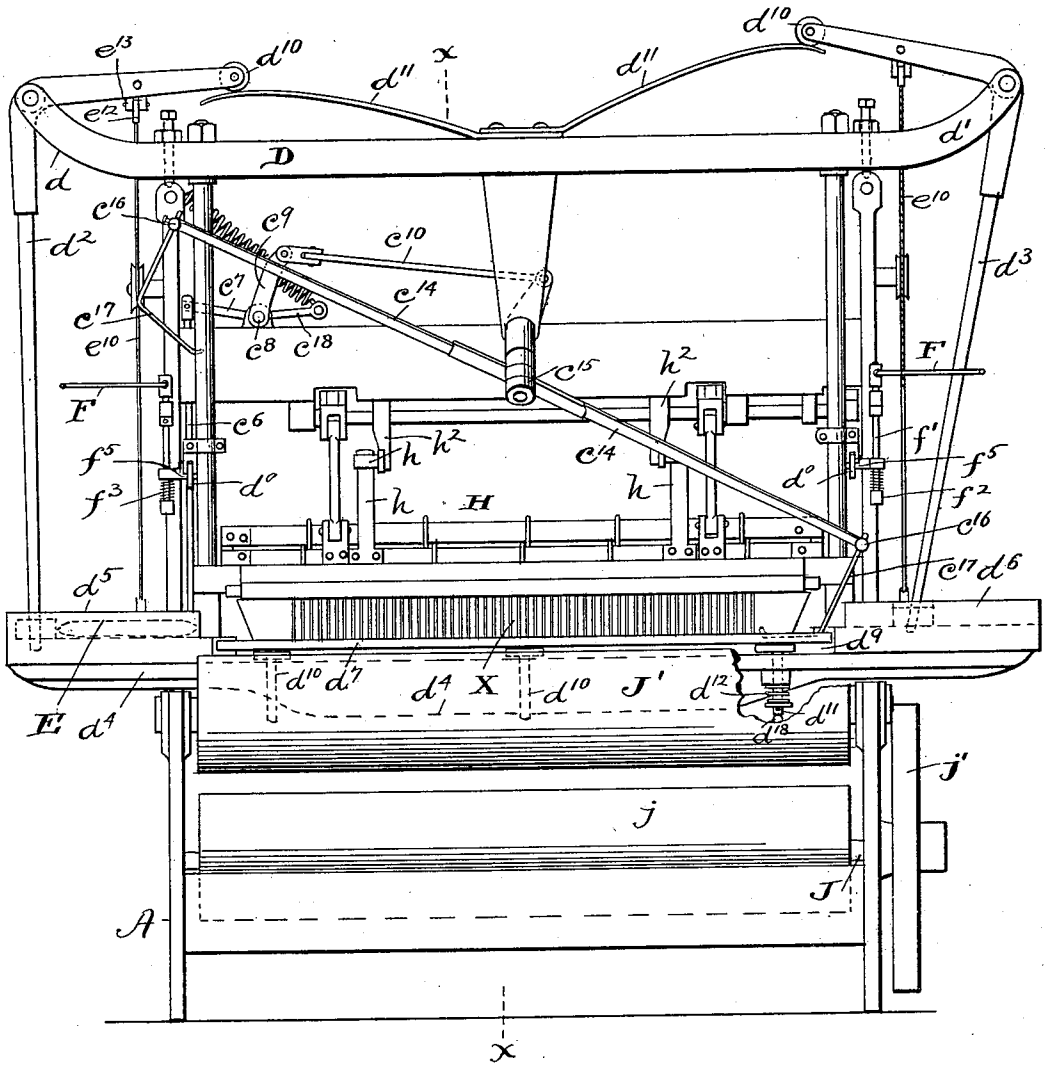

Fig. 1.

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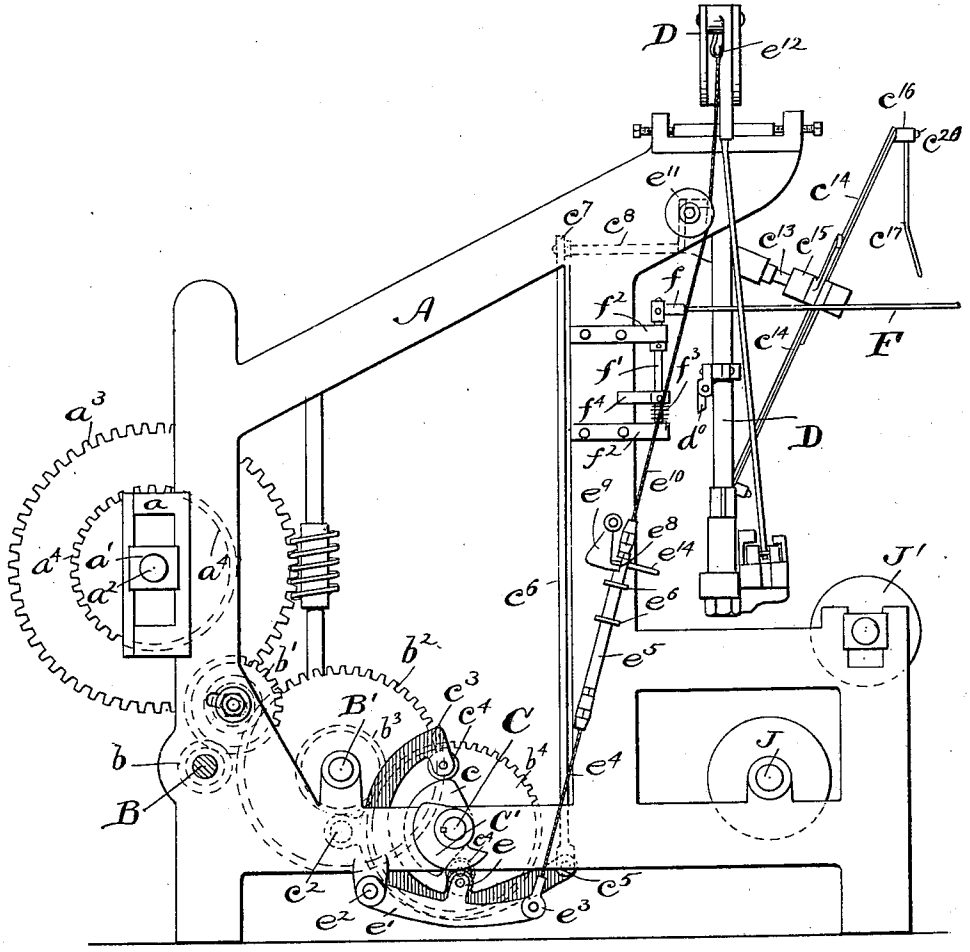
NO MODEL. 5 SHEETS—SHEET 2.

Fig. 2.



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NO MODEL. 5 SHEETS—SHEET 3.

Fig. 3.

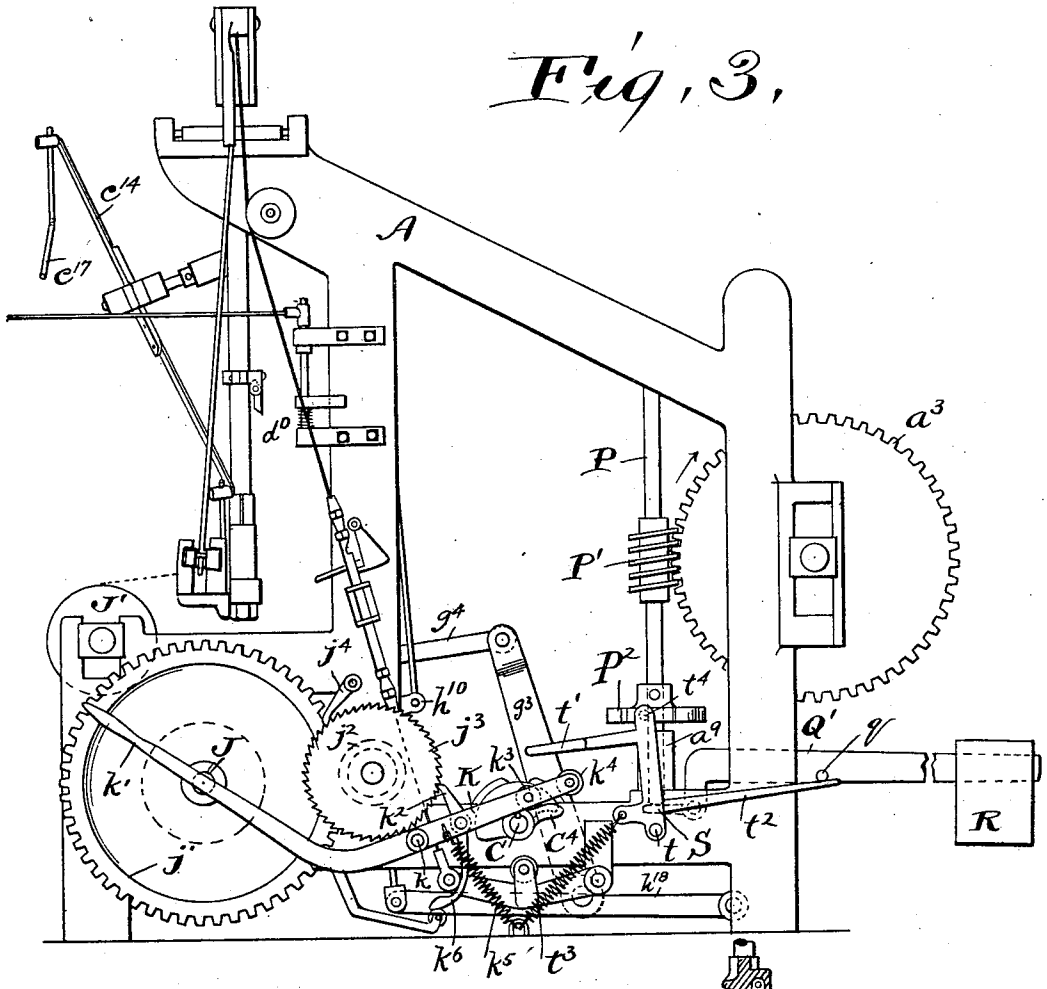
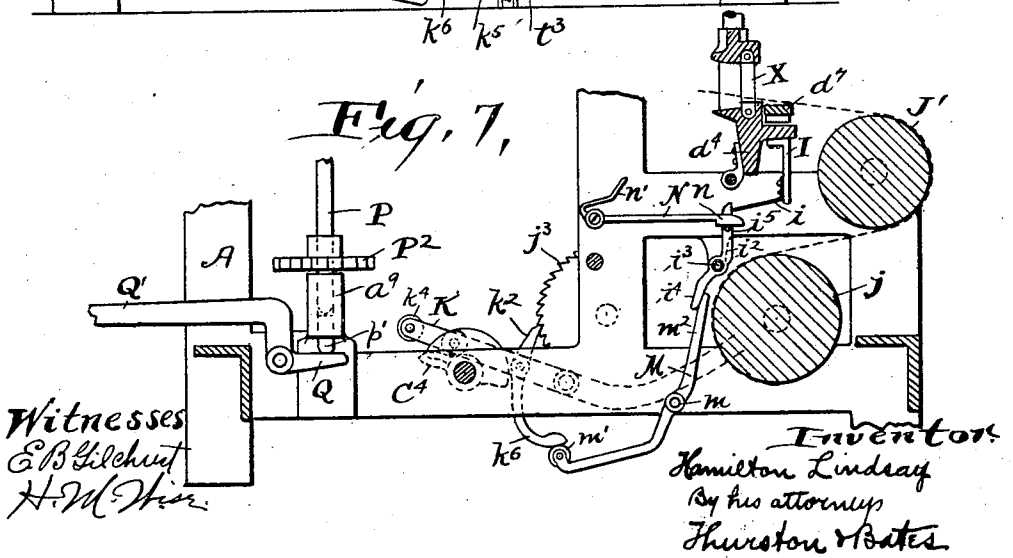


Fig. 7.



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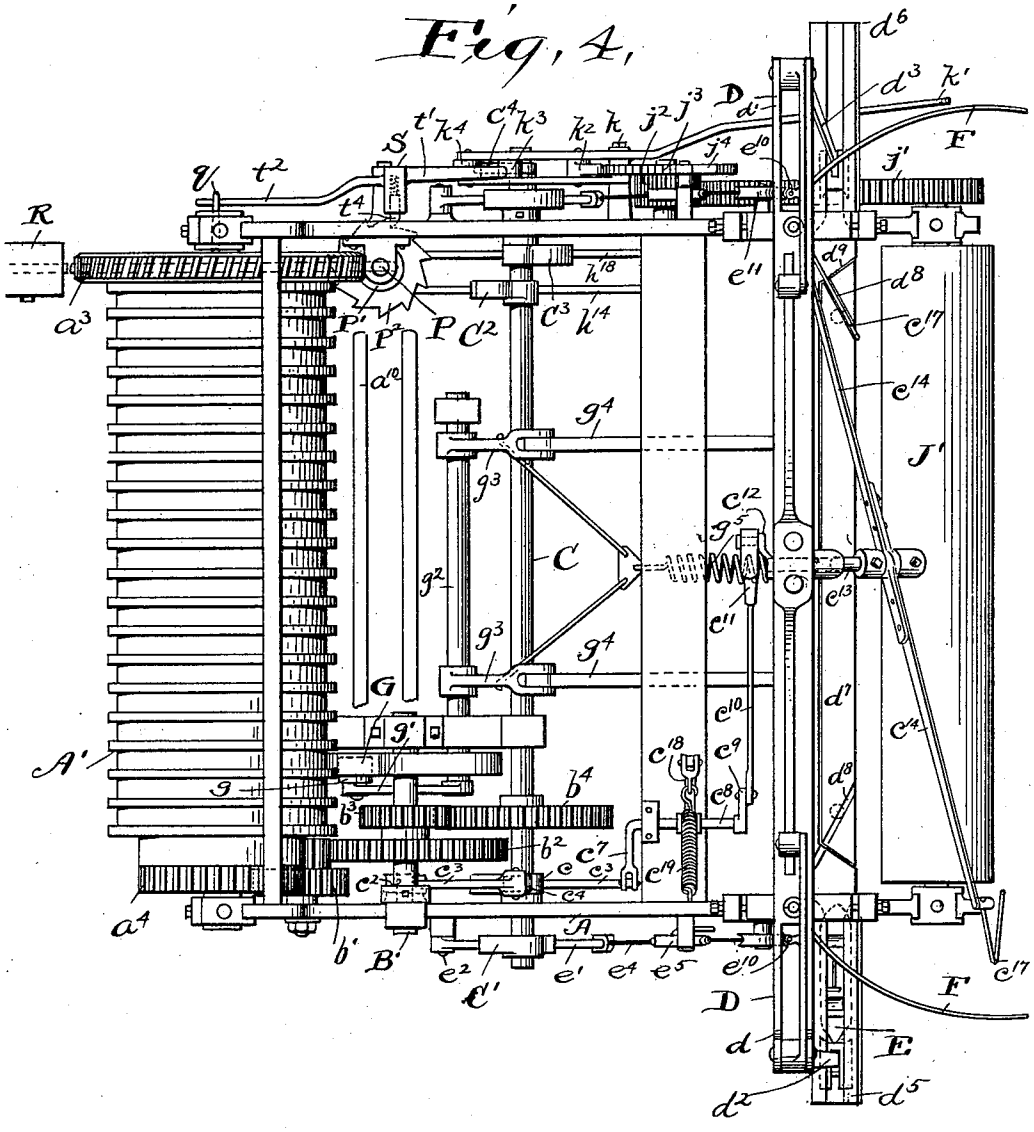
NO MODEL. 6 SHEETS—SHEET 4.

Fig. 4.



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NO MODEL. 5 SHEETS—SHEET 5.

Fig. 5,

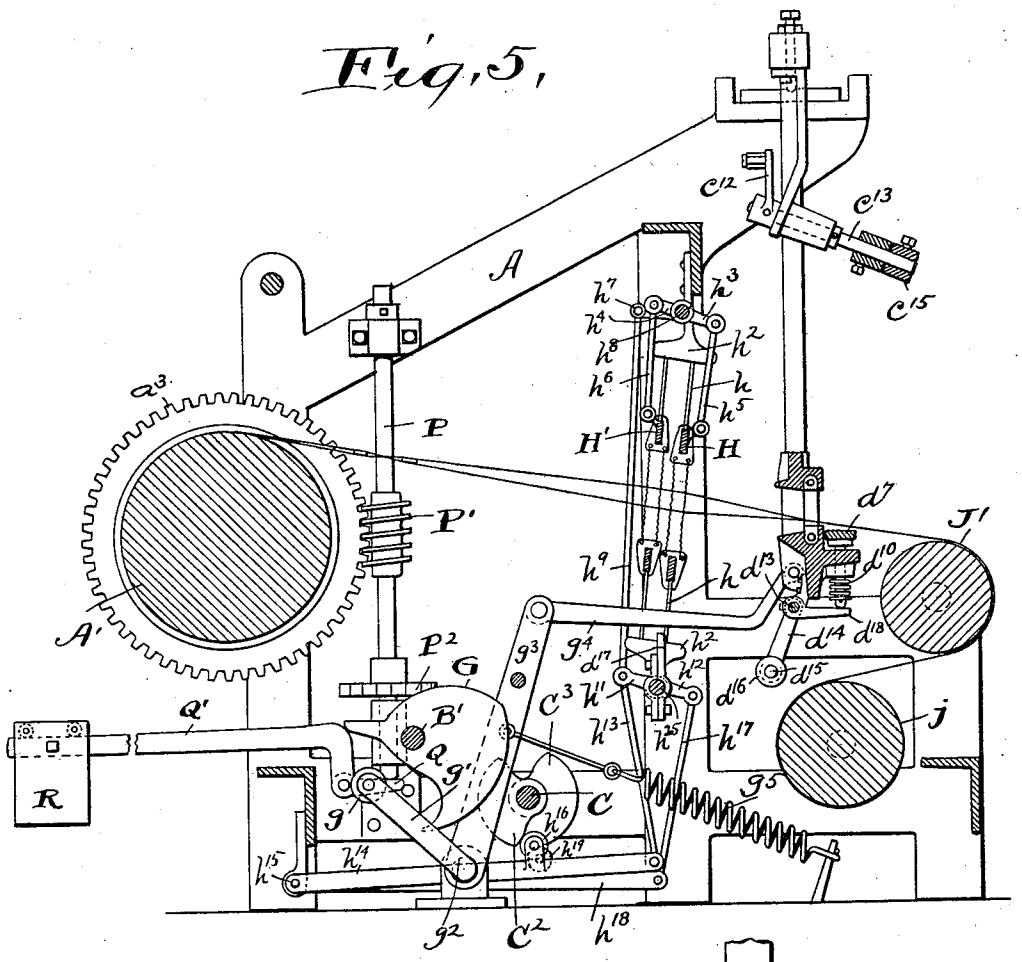
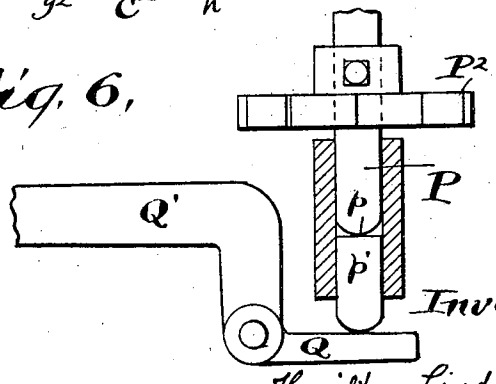


Fig. 6,



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No. 731,112. Patented June 16, 1903.

UNITED STATES PATENT OFFICE.

HAMILTON LINDSAY, OF GLENVILLE, OHIO.

LOOM.

SPECIFICATION forming part of Letters Patent No. 731,112, dated June 16, 1903.

Application filed November 26, 1902. Serial No. 132,911. (No model.)

To all whom it may concern:

Be it known that I, HAMILTON LINDSAY, a citizen of the United States, residing at Glenville, in the county of Cuyahoga and State of Ohio, have invented a certain new and useful Improvement in Looms, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

In looms for weaving wire-cloth it is necessary to provide some means in connection with the shuttle whereby the wire thread will be pulled from the bobbin within the shuttle before the weft is layed in the shed and also for stretching the weft after it is layed. It is further necessary to provide some means in connection with the warp-beam for retaining a tension at all times upon the warp-wires and, furthermore, provide such mechanism as is necessary to take up the cloth after it has been woven.

In carrying out the above objects I have provided a loom having a device with hooks which are arranged to lie in the path of the shuttle and catch the weft-wire, pull a sufficient length thereof from the bobbin for the next weft-thread, and at the same time tighten the last weft layed; to provide mechanism for releasing the picker-staff, so as to throw the shuttle from one shuttle-box to the other, and to provide, in connection with the warp-beam, a tension device which will keep the warps tight at all times and which will let off said warps as the finished cloth is wound up.

The invention primarily consists in the construction and combination of parts hereinafter described, reference being had to the accompanying drawings, which will illustrate one form in which I have contemplated embodying my invention, and said invention is fully disclosed in the following description and claims.

Referring to the drawings, Figure 1 is a front elevation of a loom. Fig. 2 is a left-hand side elevation. Fig. 3 is a right-hand side elevation. Fig. 4 is a top plan. Fig. 5 is a longitudinal vertical section on the line $x\ x$ of Fig 1 looking to the right. Fig. 6 is a detailed view, and Fig. 7 is a longitudinal vertical sectional view of the parts lying about the mechanism for taking up the cloth as it is woven.

Referring to the parts by letters, A represents the frame of the machine, of suitable arrangement and construction for containing the several parts and mechanisms hereinafter described. Upon two standards of the frame are bearing-brackets a, having slidably mounted therein the bearings a', supporting the shaft a^2 of the warp-beam A', which carries a worm-gear a^3, secured to one end thereof and at the opposite end carries a gear-wheel a^4.

Mounted in the frame is a drive-shaft B, which is adapted to be geared to a short parallel shaft B' by means of the gear-wheels b b' b^2. This shaft B' is provided with a gear-wheel b^3, which meshes with a gear-wheel b^4, rigid with a cam-shaft C. This cam-shaft C is provided with cams c, one upon each end of the shaft just inside of the framework. Pivoted at a suitable point, such as c^2, is a yoke c^3, having two friction-rollers c^4, which project inward from the arms of the same and are adapted to engage said cam upon either side of the center of the shaft C. One of the arms of the yoke c^3 is extended beyond the friction-roller and has pivoted thereto at c^5 a link c^6, which extends to the upper portion of the frame and is there pivoted to a crank c^7 of a shaft c^8. Upon the shaft c^8 is an arm c^{18}, rigid with the same and having secured to the end thereof a coiled spring c^{19}, which in turn is fastened to the frame. A crank c^9 is also rigid with the shaft c^8 and has pivoted thereto a link c^{10}, which is pivoted to a clip c^{11}, pinned to a crank-arm c^{12} and mounted upon a shaft c^{13}. This shaft carries upon its outer end two arms c^{14}, which are rigidly carried by collars c^{15}, having suitable adjusting-screws therein. The arms c^{14} are provided upon their outer ends with sockets c^{16}, which carry wire-hooks c^{17} for engaging the weft after it has been laid by the shuttle. Screws c^{20} are arranged in said sockets c^{16} for adjusting said hooks. The shaft c^{13} is mounted in a suitable bearing carried by the batten hereinafter described.

Pivotally mounted upon a suitable portion of the frame is the batten D, which is of the ordinary construction, as shown in Fig. 1, having two brackets d' extending from the upper portion thereof for supporting the picker-staffs d^2 and d^3, and a slay d^4, which has at either end a shuttle-box d^5 and d^6 for con-

taining the shuttle and the pickers at the end of the picker-staffs. The slay d^4 is provided with a recess portion d^9, which is adapted to receive a receding bottom plate d^7. This plate is mounted upon suitable pins d^{10}, which pass down through the slay-bottom and are provided with pins d^{11}, which bear against coiled springs d^{12}, surrounding said pins and tending to normally hold the bottom plate in a downward position. The plate is so arranged that when it is raised by the mechanism about to be described the top face thereof will be flush with the bottom of each shuttle-box, thus making a continuous flat surface for the travel of the shuttle. The upper face is provided with grooves d^8, as shown in Fig. 4, for the purpose of receiving the wire-hooks c^{17}, which are adapted to lie therein.

Mounted upon a stationary shaft carried by the batten D is an arm d^{14}, having at its lower end a pin d^{15}, upon which is loosely mounted a friction-roller d^{16}. Arms d^{18} are carried by the shaft d^{13} and are so positioned with respect to the pins d^{10} that they engage underneath the lower end of the same. Rigidly secured to the shaft h^{15} is a stop d^{17}, which is placed in the path of the friction-roller d^{16}.

The operation of the device is as follows: As the batten D is drawn back by means of the cams and levers for that purpose the friction-roller d^{16} will be brought into contact with the fixed stop d^{17}, when the arm d^{14} will rock the shaft d^{13}, and the arm d^{18} will lift the pins d^{10}, which in turn raise the bottom plate b^7 of the slay. Thus it will be seen that when the batten is back in the position for the shuttle to pass from one shuttle-box to the other through the ranks of the warp-threads the bottom of the slay will be one continuous surface, which will facilitate the traveling of the shuttle over the same.

The shaft c^{13}, carrying the arm c^{14}, is mounted upon the batten, as above stated, and swings with it in order that the wire-hooks c^{17} will have a fixed relation with respect to the slay d^4—that is, when the shaft c^{13} is oscillated in one direction or the other one of the wire-hooks c^{17} will be brought down, so that it will lie flat in one of the grooves d^8, provided in the slay-bottom.

The mechanism just described constitutes the device for pulling the wire thread from the shuttle and for stretching the weft after it has been laid, and the operation is as follows: When the shuttle E is in the shuttle-box d^5, one of the hooks c^{17} is in the groove c^8 in the opposite end of the slay-bottom, and when the picker-staffs shoot the shuttle through the ranks of the warp-threads the weft from the shuttle is laid across the hook c^{17}, just referred to, and the shuttle E enters the shuttle-box d^6 at the opposite end of the slay. Then as the cam c upon the shaft C is so arranged that the shaft c^{13} will be operated through the mechanism just described, connecting said shaft and the shaft C, the hook c^{17}, with the weft laid over it, will be raised from the slay-bottom by its arm c^{14} until it has reached its limit of movement, said movement being sufficient to tighten the weft last laid and to draw off from the bobbin in the shuttle sufficient wire thread for the next weft to be laid. The same operation is gone through with the wire-hook upon the opposite arm c^{14} on the shaft c^{13} when the shuttle is shot into the other shuttle-box.

In order that the wire thread shall leave the hook c^{17} in proper time, discharge-prongs are provided for that purpose, which consists of arc-shaped prongs F, adjustably secured in sockets f, carried upon a short vertical shaft f', mounted in suitable bearings f^2. These prongs F are held normally in the position shown in Fig. 4 or in their outward position by means of coiled springs f^3 and are limited in their outward movement by stops f^4, which carry inwardly-projecting lugs f^5, which are in the path of trip-pawls d^0, pivoted in the batten D. Thus it will be seen that when the batten swings into its rearward position the trip-pawls d^0 will engage the lugs f^5 and rotate the shafts f', thus swinging the prongs F inward; but these prongs are arranged so that they will travel just below the hooks when they are in their highest position. Therefore one of said prongs will knock the wire thread from the hook, which is raised at that particular time, and the shuttle will be free to pass from one shuttle-box to the other without any drag being placed thereon by the wire thread unwinding from the bobbin in the shuttle.

The mechanism for drawing and stretching the weft-thread having been described, I will now proceed to describe the operating of the picker-staffs.

The picker-staffs d^2 and d^3 are spring-actuated staffs—that is, the upper portions thereof constitute bell-crank levers, the short arms of which carry friction-rollers d^{10}, which are engaged by leaf-spring d^{11}, tending to normally force the picker-staff inward. Rigid with the cam-shaft C is a cam C′, which is of substantially the form shown in full lines of Fig. 2 and travels in the path of a friction-roller e, carried by an arm e', which is pivoted at e^2 and at its free end carries a clip e^3, rigidly carrying a cable e^4. This cable e^4 is connected at its opposite end to a reciprocating bar e^5, mounted in suitable guides e^6 and having a notch e^8 in one side thereof. Pivoted to the frame is a gravity-pawl e^9, which is adapted to engage in said notch e^8 and prevent the bar e^5 from reciprocating in its guides and is provided with an arm e^{14}, projecting in the direction of the batten D. Secured in the upper end of this bar e^5 is a cable e^{10}, which passes around the sheave e^{11} and is secured to a hook e^{12}, which engages a clip e^{13}, pivoted to the bell-crank arm of one of the picker-staffs.

As the cam-shaft C rotates, the arm e' will be forced down by the cam C′, thus drawing

down the bar c^5, through the cable connection e^4, until the pawl e^9 drops into the notch e^8; but the drawing down of the bar e^5 has also drawn the bell-crank arm of the picker-staff against the tension of its leaf-spring and has moved the picker outward in a position to strike the shuttle when the bar e^5 is released from engagement with the pawl e^9. The length of the face of the cam C′ is such that the bar e^5 will be drawn down a sufficient distance to permit the pawl to drop into the notch e^8 before the friction-roller drops over the abrupt stop in the cam-face. When the batten is drawn back to its most rearward position by the mechanism of the machine for that purpose, the slay engages the arm e^{14}, rigid with the pawl e^9, and knocks the same out of engagement with the notch e^8. This operation releases the picker-staff to the action of its leaf-spring, when it will operate to throw the shuttle into the opposite shuttle-box.

The mechanism described for setting the picker-staff is provided on each side of the machine for operating in connection with each of the staffs.

Mechanism for shifting the batten upon its pivot is of ordinary construction, consisting of a cam G, mounted upon the shaft B′ and traveling in the path of a friction-roller g, carried by an arm g', rigid with a rock-shaft g^2, having secured thereto rock-arms g^3. Links g^4 are pivoted to these arms g^3 at one end and at the other end are pivoted to the batten. A spring g^5 holds the friction-roller g against the face of the cam.

The heddles and the mechanism for operating the same will now be described.

H and H′ represent the heddle-frames, which have the usual rods for carrying the eyes and also are provided with tongues h, which operate between the friction-rollers h', mounted in suitable frames h^2, secured to the frame. Two of these tongues are provided on the upper and the lower members of each heddle-frame and together with said rollers serve to guide the heddles in their upward and downward movement. Mounted in suitable bearings in the frame is a heddle-operating shaft, which is provided with arms h^3 and h^4, rigid with said shaft, the arm h^3 being pivotally connected to the heddle-frame H by means of a link h^5 and the arm h^4 to the heddle-frame H′ by means of a link h^6. An arm h^7 is rigid with the heddle-operating shaft h^8 and is adapted to operate the same. Reciprocating motion is conveyed to this arm by means of a link h^9, which is pivoted to said arm h^7 at one end and to an arm h^{10} at the other. The arm h^{10} is rigid with a sleeve carrying an arm h^{11} and another arm h^{12} and is mounted upon the shaft h^{25}. The arm h^{11} is connected by a link h^{13} to a rock-arm h^{14}, pivoted at h^{15} and having a friction-roller h^{16} for engaging a cam C^2, and the arm h^{12} is connected by a link h^{17} to a rock-arm h^{18}, pivoted at h^{15} and having a friction-roller h^{19} for engagaging the cam C^3.

As the cam-shaft C rotates the cams C^2 and C^3 the rock-arms h^{14} and h^{18} are moved about their pivot in one direction or the other—that is, the cams are so arranged that when one arm is up the other is down, and vice versa. This operation through the links and arms and heddle-operating shaft just described will retain one heddle-frame in an elevated position while the other one is in its extreme lowest position. This mechanism is so timed with respect to the batten and the picker-staffs that the alternate sheds formed between the ranks of the warps will be ready for the admission of the shuttle before it is shot through the same.

The construction of the parts for taking up the woven cloth and keeping the warps taut will now be described. Mounted in suitable bearings in the framework of the machine is a shaft J, carrying a roll j, which is provided in the ordinary way with hooks for engaging the end of the woven cloth. On the end of this shaft J is a gear-wheel j', which meshes with a pinion j^2, mounted upon a stud secured to the frame and having rigid therewith a ratchet-wheel j^3. A suitable pawl j^4 is pivoted to the frame and is adapted to engage the teeth of the ratchet-wheel j^3 and prevents the same from rotating backward.

Pivoted to a stud k is a lever K, having a suitable handle k' at one end and carrying on the other side of the pivotal point a gravity-pawl k^2, which is adapted to normally engage the teeth upon the periphery of the ratchet-wheel j^3. Two friction-rollers are mounted on this lever, one at k^3 and another at k^4. The friction-roller k^3 is adapted to be engaged by a cam C^4, mounted upon the cam-shaft C, and a spring k^5 tends to normally retain the friction-roller k^3 in a position to be operated upon by said cam. The pawl k^2 is provided with a weighted tail portion k^6, which extends down a suitable distance from said lever and tends to throw the said pawl into engagement with said ratchet.

It will be seen from the foregoing that should the lever K be operated either by hand or by means of the cam C^4 the pawl k^2 will engage said ratchet-wheel j^3 and rotate the roll j to wind up the woven cloth.

Mechanism is provided for preventing the pawl k^2 from rotating the gear j' too rapidly and taking up too much cloth upon the roll j. This mechanism consists of the parts shown in Fig. 7, wherein a rigid arm I is secured to the slay-bottom on the under side and projects down within the frame and is provided at its lower end with a rearwardly-projecting leaf-spring i. Adjacent to the end of this spring when the batten is in its forward position is a trip i^2, which is pivoted to the frame i^3 and has a downwardly-projecting tail portion i^4, which engages an arm m^2 of a lever M, which is pivoted to the frame at m and has upon its extreme end a friction-roller m', which is adapted to engage the under side of the tail portion k^6 of the pawl k^2.

Thus it will be seen that if the leaf-spring i should engage the trip i^2, said trip would be operated upon its pivot, and upward motion would be conveyed to the friction-roller m' through the tail portion i^4 of said trip and the arm m^2 of said lever M. This upward motion of the friction-roller m' will throw the pawl k^2 out of engagement with the ratchet-wheel j^3, and in order to keep it in this position a pin i^5 is provided upon the trip i^2 for engagement with a pivoted latch N, which has a shoulder n for engaging said pin i^5. An arm n' projects from said latch into the path of the leaf-spring i.

As the weaving operation continues and the reed X advances to follow up the weft and press it against the weft previously laid the batten will go forward until the wefts are pressed together sufficiently and will stop, (the mechanism for controlling said batten having been released from the cam G.) Should the compressed wefts cause the batten to stop before the leaf-spring i has passed beyond the trip i^2, the pawl k^2 will not be thrown out of engagement with the ratchet-wheel j^3, and the cam C^4 will operate the lever K, which in turn will rotate said ratchet-wheel and wind up the material upon the roll j a distance which is equivalent to a little more than the space occupied by a single weft. This operation moves the woven material sufficiently so that when the batten next advances the reed will stop it at a point where the leaf-spring i will just miss the edge of the trip i^2 and will drop down in front of it into the position shown in Fig. 7. Now when the batten is drawn backward the leaf-spring will shift the trip upon its pivot until the latch N drops over the pin i^5; but since the tail portion i^4 of the trip has operated the lever M the pawl k^2 will be taken out of engagement with the ratchet-wheel j^2 before the lever K is operated by said cam c^4. Therefore any further winding up of the woven material before the laying of the next weft will be prevented. The backward movement of the batten, however, disengages the latch N from the pin i^5 and again releases the pawl k^2. The amount that the woven material was taken up at the last operation preceding the one just described was, as stated, only equal to just a little more than the width of a weft and not quite equal to the distance occupied by two wefts. Therefore the batten will not come forward upon its next forward movement a distance which will permit the leaf-spring i to drop in front of the trip i^2. Consequently the pawl k^2 will be free to rotate the ratchet-wheel j^3, as at first described, and the woven material will be taken up another step.

Certain devices are provided for keeping the warps taut and for letting them off from the warp-beam. These devices will now be described.

Mounted in suitable brackets a^9 is a shaft P, adapted to reciprocate therein and having rigid therewith a worm P', adapted to engage the worm-wheel a^3 upon the warp-beam, and also a ratchet-wheel P^2, which is also rigid with the shaft P. The lower end of this shaft P is rounded at p and rests upon a short section p', which in turn bears against an arm Q of a lever Q'. This lever extends a considerable distance from the pivot thereof to the rear and carries a weight R for the purpose of forcing the arm Q upward against the shaft P. The downward tendency of the weight R will, through the arm Q, the shaft P, and the worm P', tend to rotate the warp-beam in the direction indicated by the arrow in Fig. 3. This tendency tightens the warp-threads against the pull of the device for taking up the woven cloth.

As the woven cloth is wound up and the warp-beam rotated to unwind the warp-threads the shaft P will be forced downward by the worm-wheel a^3 acting upon the worm P' as a rack, thus raising the weighted lever Q about its pivot, and in order to lower the lever to its normal horizontal position the worm Q' must be rotated in order to allow the shaft P to travel upward upon the worm-wheel a^3 as a rack. This is brought about by a lever S, which is pivoted at t and has an arm t', which projects out into the range of movement of the friction-roller k^4, mounted on the lever K. Another arm t^2 projects out in the opposite direction and engages a pin q, carried by the lever Q' on the under side of said pin. A spring t^3 holds the arm t^2 rigid with this lever S against the under side of the pin q. The upper end of the lever S is provided with a spring-actuating pawl t^4, which is arranged to engage the ratchet-wheel P^2 upon the shaft P.

The unwinding of the warp-beam, and the consequent raising, as before described, of the lever Q necessarily permits the arm t^2 to rise through the tension of the spring t^3 until the arm t' is brought down into closer range with the friction-roller k^4, and as the cam c^4 operates the lever K the friction-roller k^4 will raise the arm t' of the lever S and the spring-pawl will engage one of the teeth of the ratchet-wheel P^2 and rotate the worm in a direction which will allow the shaft P to rise in its bearings, and this rising of the shaft P will necessarily lower the lever Q' to its normal position, when the arm t^2 will be forced down by its pin q and the arm t' will be taken out of range with the friction-roller k^4. The construction just described tends to always keep the lever Q in a horizontal position, and as the warp-threads are drawn off of the warp-beam the same lever will be lowered to its normal position by this mechanism.

Having described my invention, I claim—

1. In a loom, in combination with the batten, arms carried thereby and hooks operated by said arms for catching the weft, tightening the same and pulling sufficient thread from the shuttle for the next weft.

2. In a loom, in combination with the batten, arms pivotally mounted thereupon, hooks

carried by said arms, adapted to catch the weft last laid, tighten the same and pull sufficient thread from the shuttle for the next weft, and means for operating said arms.

3. In a loom, in combination with the batten, arms pivotally mounted thereupon, hooks carried by said arms and arranged in one position to lie below the path of the shuttle, a shaft for operating said arms and means for operating said shaft.

4. In a loom, the combination with the batten, of a slay-bottom provided with suitable grooves, of hooks adapted to lie in said grooves and engage the weft after it has been laid thereon by the shuttle, and means for operating said hooks so that they will tighten the weft just laid and will pull sufficient thread from the bobbin in the shuttle for the next weft, and means for releasing the thread from said hooks.

5. In a loom, the combination with the batten, of a shaft rotatably mounted thereon, arms rigid with said shaft, hooks provided on said arms, a slay-bottom carried by said batten having suitable grooves for receiving said hooks, said hooks being adapted to stretch the weft laid by the shuttle and pull sufficient thread therefrom for the next weft, means for releasing the thread from said hooks, and means for operating said shaft.

6. In a loom, the combination with the batten, of hooks pivotally mounted thereon, said hooks being adapted to engage the weft laid by the shuttle and stretch the same and pull sufficient thread from the shuttle for the next weft, prongs operated by said batten for releasing the thread from said hooks, and means for operating said hooks.

7. In a loom, the combination with the batten, of hooks pivotally mounted thereon, said hooks being adapted to engage the weft laid by the shuttle and stretch the same and pull sufficient thread from the shuttle for the next weft, prongs operated by said batten for releasing the thread from said hooks, a cam-shaft mounted in said frame, a cam carried by said shaft, a yoke provided with friction-rollers for engaging said cams, and connections between said yoke and the shaft on said batten whereby said shaft may be oscillated by said cam.

8. In a loom, the combination with the warp-beam of a worm-wheel secured to said beam, a worm for rotating said worm-wheel, a shaft rigid with said worm and adapted to reciprocate longitudinally and thereby rotate said warp-beam, said shaft having its lower end rounded, a short shaft-section in contact with said rounded end portion, a lever carried by a suitable pivot and having an arm extending under said shaft-section, means for exerting a downward pressure upon the opposite end of said lever, and means for rotating said worm to compensate for the downward movement thereof caused by said worm-wheel.

9. In a loom, the combination with the warp-beam of a worm-wheel secured to said beam, a worm for rotating said worm-wheel, a shaft rigid with said worm and adapted to reciprocate longitudinally and thereby rotate said warp-beam, a lever pivoted intermediately of its ends and having one end extending under said shaft, a weight upon the other end of said lever, a ratchet-wheel on said shaft, a ratchet-lever carrying a pawl for operating said ratchet-wheel and connections between said weighted lever and an operative part of the machine whereby when said lever is raised, said ratchet-wheel will rotate said worm and lower said weighted lever.

10. In a loom, the combination with the warp-beam of a worm-wheel secured to said beam, a worm for rotating said worm-wheel, a shaft rigid with said worm and adapted to reciprocate longitudinally, a weighted lever having an arm bearing upon the lower end of said worm-shaft thereby rotating said beam to keep the warps taut, a ratchet-wheel carried by said worm-shaft, a lever having a suitable pawl for operating said ratchet-wheel, connections between said ratchet-lever and the weighted lever whereby a portion of said ratchet-lever is thrown into engagement with an operative part of the machine thereby operating said ratchet-lever and rotating the worm so as to raise the worm-shaft and lower said weighted lever.

11. In a loom, the combination with the batten of a roll for receiving the woven cloth, a ratchet-wheel connected with said roll, a ratchet-lever, means for rocking said lever upon its pivot, a pawl carried by said lever adapted to engage said ratchet-wheel, and means whereby said batten may lock said pawl out of engagement with said ratchet-wheel until a sufficient number of wefts have been laid to compensate for the amount of cloth taken up.

12. In a loom, the combination with the batten, of a roll for receiving the woven cloth, a ratchet-wheel pivotally mounted on the frame, gearing between said ratchet-wheel and said roll, a ratchet-lever mounted upon the frame, mechanism for operating said lever upon its pivot, a pawl pivoted to said ratchet-lever, a trip lying in the path of said batten, means whereby said trip may operate said pawl, and hold it out of engagement with said ratchet-wheel thereby preventing any taking up of the woven material until a sufficient number of wefts have been laid.

13. In a loom, the combination with the batten, of a roll for receiving the woven cloth, a ratchet-wheel pivotally mounted on the frame, gearing between said ratchet-wheel and said roll, a ratchet-lever mounted upon the frame, mechanism for operating said lever upon its pivot, a pawl pivoted to said ratchet-lever, a trip lying in the path of said batten, a latch for said trip, connections between said trip and said pawl carried by the ratchet-lever, and an arm carried by the batten for engaging said trip and forcing it into

engagement with its latch thereby holding the pawl from operating to take up the woven cloth until a sufficient number of wefts have been made to compensate for the amount of cloth previously taken up.

14. In a loom, the combination with the batten, of a roll for receiving the woven cloth, a ratchet-wheel pivotally mounted on the frame, gearing between said ratchet-wheel and said roll, a ratchet-lever mounted upon the frame, a cam-shaft, a cam mounted on said shaft for operating said ratchet-lever, a pawl pivoted to said ratchet-lever, a trip lying in the path of said batten, a latch for said trip, connections between said trip and said pawl carried by the ratchet-lever, and an arm carried by the batten for engaging said trip and forcing it into engagement with its latch thereby holding the pawl from operating to take up the woven cloth until a sufficient number of wefts have been made to compensate for the amount of cloth previously taken up.

15. In a loom, the combination of spring-actuated picker-staffs each having a horizontal arm, rotating cams, levers severally engaging said cams, cables connecting said levers with the horizontal arms of the picker-staffs, a bar connected to each of said cables between its ends, and pawls adapted severally to engage with said bars, and means whereby the batten in its rearward movement operates said pawls to disengage them from said bars.

16. In a loom, the combination of the batten, of means for shifting said batten back and forth, a slay having a bottom plate and carried by said batten, pins rigidly carried by said bottom plate, rock-arms for operating said pins, a shaft for carrying said arms, an arm provided with a suitable stop for rocking said shaft, and thereby raising the bottom plate, and means for operating said arm.

17. In a loom, the combination of the batten, of means for shifting said batten back and forth, a slay having a bottom plate and carried by said batten, pins rigidly carried by said bottom plate, rock-arms for operating said pins, a shaft for carrying said rock-arms, an arm provided with a suitable stop for rocking said shaft, thereby raising the bottom plate, and springs for retaining said bottom plate in its lowered position.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

HAMILTON LINDSAY.

Witnesses:

E. B. GILCHRIST,

E. L. THURSTON.