No. 631,593. Patented Aug. 22, 1899.

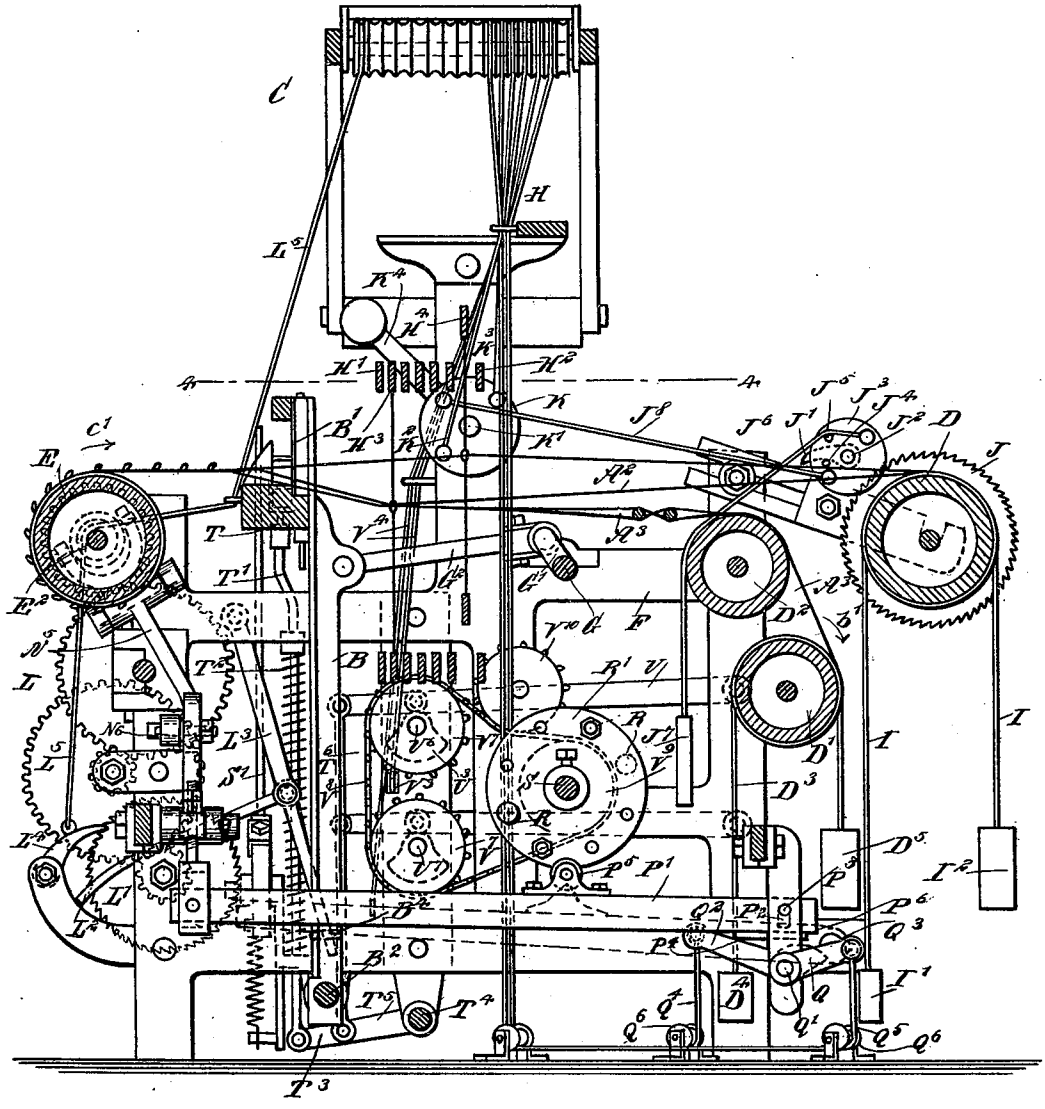
J. H. SMALLWOOD.

LOOM.

(Application filed Dec. 28, 1898.)

(No Model.) 4 Sheets—Sheet 1.

FIG. 1.



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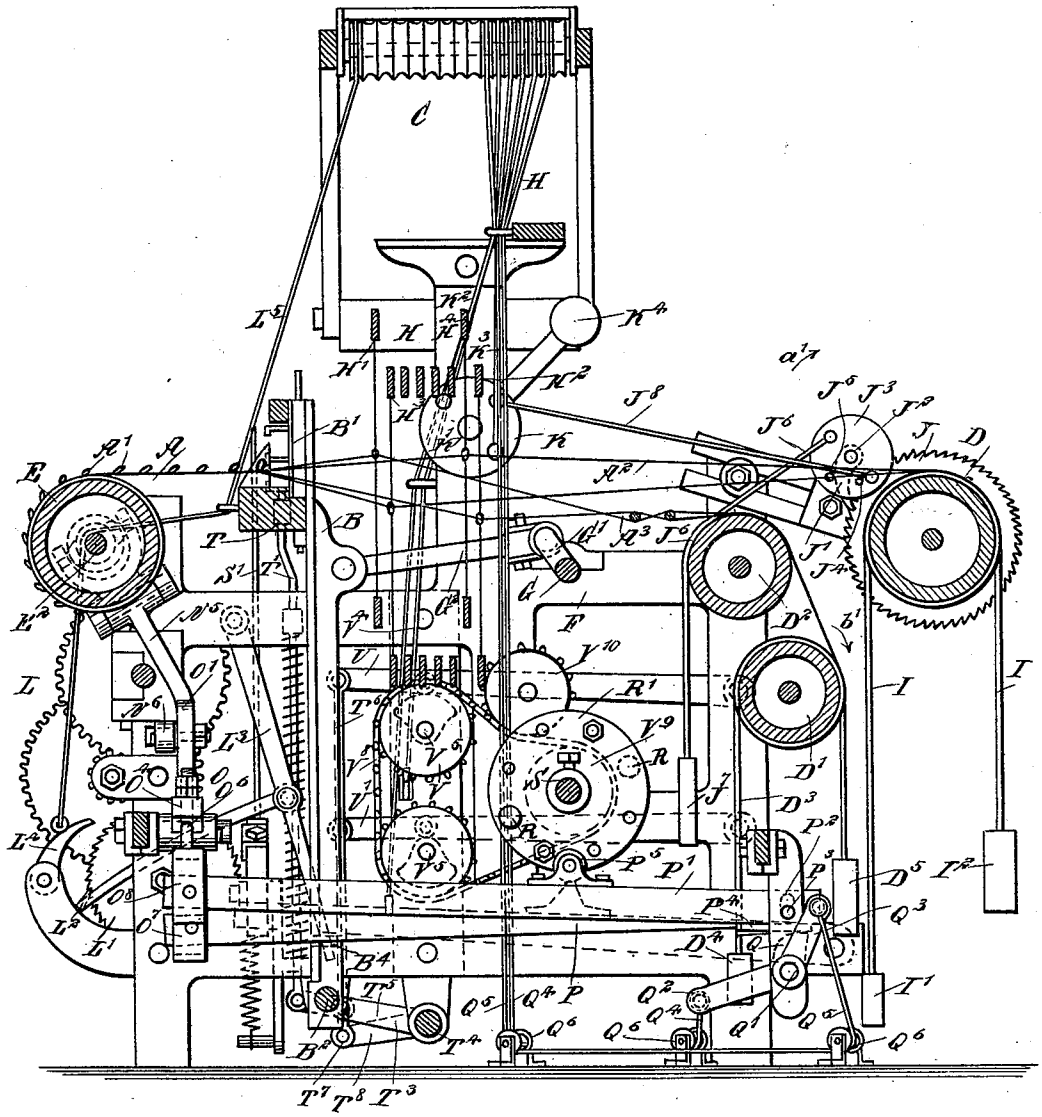
J. H. SMALLWOOD.

LOOM.

(Application filed Dec. 28, 1898.)

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FIG. 2.



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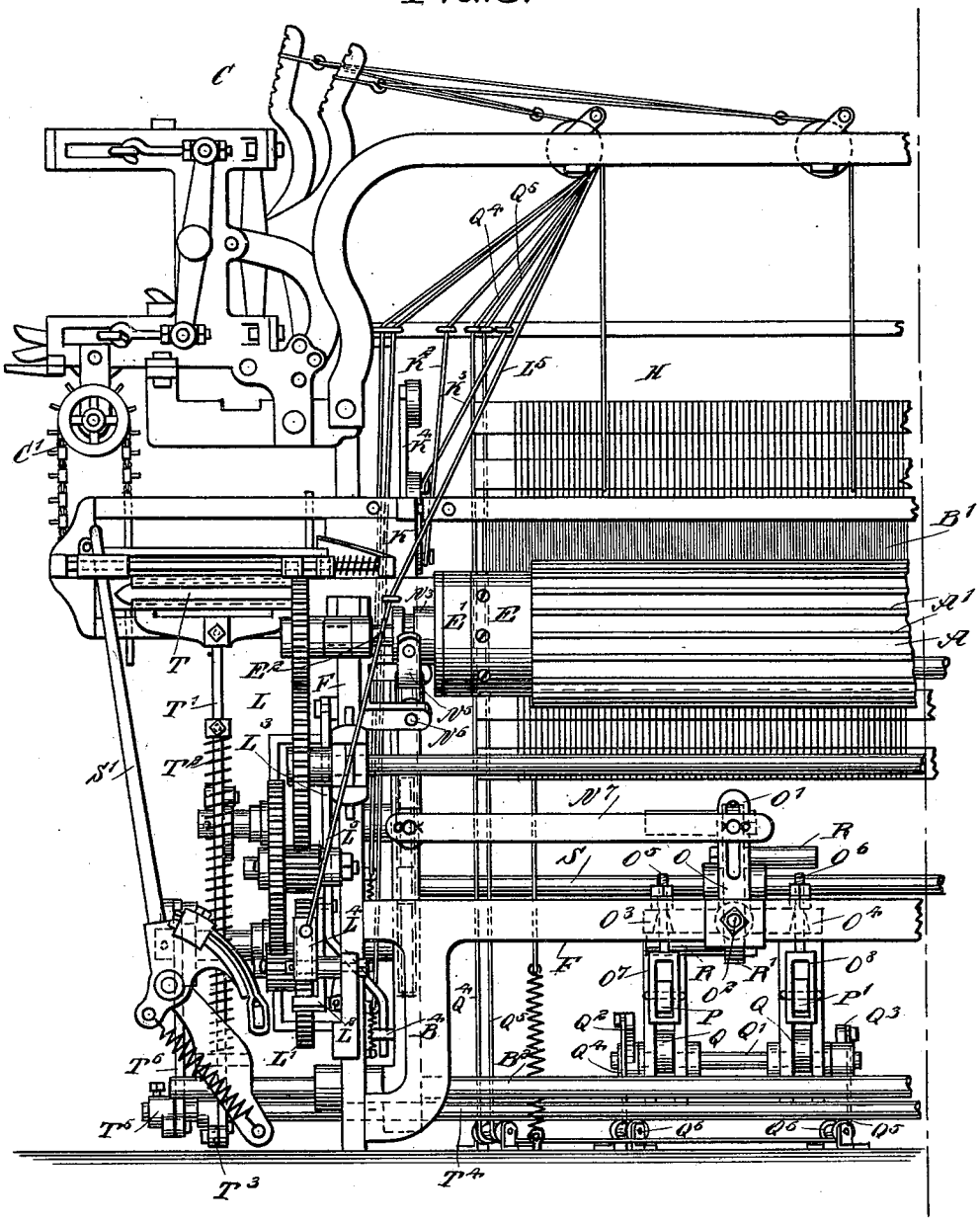
J. H. SMALLWOOD.

LOOM.

(Application filed Dec. 28, 1898.)

(No Model.) 4 Sheets—Sheet 3.

FIG. 3.



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No. 631,593. Patented Aug. 22, 1899.

J. H. SMALLWOOD.

LOOM.

(Application filed Dec. 28, 1898.)

(No Model.) 4 Sheets—Sheet 4.

FIG. 4.

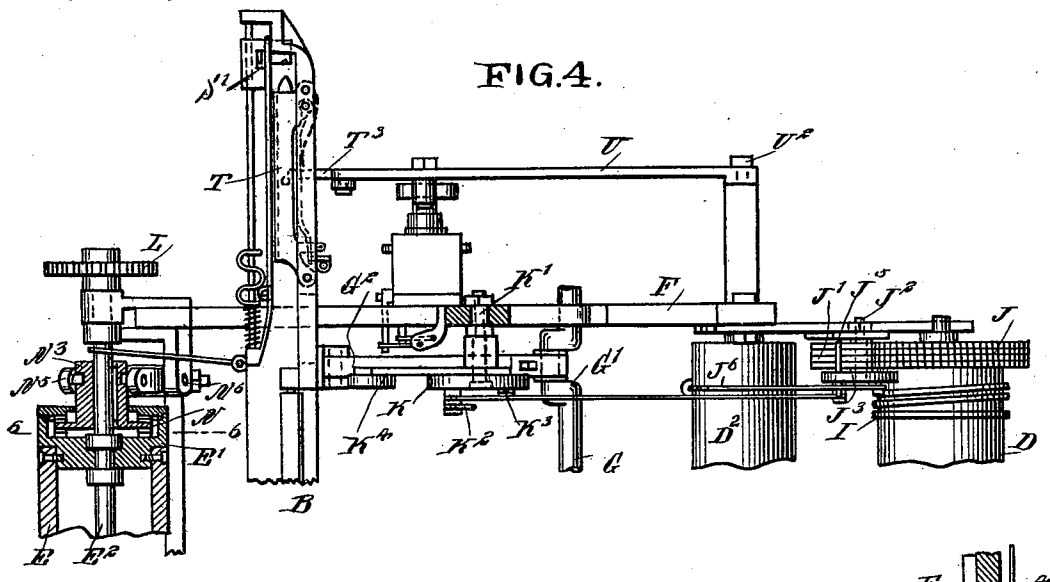


FIG. 6.

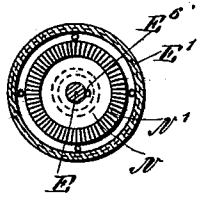
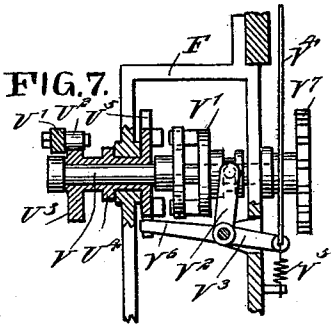


FIG. 5.

FIG. 7.



WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN H. SMALLWOOD, OF PATERSON, NEW JERSEY, ASSIGNOR OF ONE-HALF TO E. T. MASON & CO., OF NEW YORK, N. Y.

LOOM.

SPECIFICATION forming part of Letters Patent No. 631,593, dated August 22, 1899.

Application filed December 28, 1898. Serial No. 700,515. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. SMALLWOOD, of Paterson, in the county of Passaic and State of New Jersey, have invented a new and Improved Loom, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved loom especially designed for weaving plaits integrally with the body-fabric.

The invention consists of novel features and parts and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

A practical embodiment of my invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a sectional side elevation of the improvement with parts in positions for weaving a plait. Fig. 2 is a like view of the same with parts in position for weaving the fabric-body. Fig. 3 is a front end elevation of the same. Fig. 4 is a plan view of one side of the loom, parts being in section. Fig. 5 is an enlarged plan view of one end of the cloth-beam with parts in section, showing the mechanism for unwinding the cloth-beam after weaving the plait. Fig. 6 is a cross-section of the same on the line 6 6 in Fig. 4, and Fig. 7 is a cross-section of the actuating mechanism for the shuttle-boxes.

In weaving a fabric with a body A having integral transversely-extending plaits A′, I employ two warps A^2 A^3, both of which are used in forming the fabric-body A, one warp A^2 only being employed when weaving the plaits A′, the other warp A^3 then being downward—that is, dropped sufficiently to be out of the path of the shuttle. Thus the warp for the body A contains the warp-threads of both the warps A^2 and A^3, while the plait contains only the warp-threads of the warp A^2, together with the usual filling. In the arrangement shown in the drawings the plait-warp A^2 is arranged somewhat above the warp A^3, but both extend through the reed B′ of the lay B, and the filling for both the fabric A and the plaits A′ is beaten in by the lay B in the usual manner. I prefer to provide the loom with change shuttle-boxes actuated in the usual manner to supply different fillings for the body A and the plaits A′, so as to contrast the same as much as possible, and thereby enhance the appearance of the weave.

After a portion of the fabric-body A is woven and immediately previous to beginning weaving the plait it is necessary to drop the lower warp A^3, as shown in Fig. 1, by actuating the heddles from this warp according to the pattern-chain of the head C, the shuttle-box mechanism bringing the plait-shuttle into the race. Weaving now proceeds in the usual manner, the cloth being wound up on the cloth-beam and both warps unwinding from their beams until the length of the loop or plait is woven, the dropped warp extending from the fabric-body at the beginning of the woven-plait portion. (See Fig. 1.) The warp-beam D for the plait-warp A^2 is now locked against rotation to wind up its warp A^2, and the cloth-beam E is automatically turned back to unwind the cloth the full distance of the woven-plait portion, at the same time turning the warp-beam D′ for the lower or drop warp A^3 to wind up the latter as the unwinding of the cloth proceeds. The lower warp is then again raised to work with the upper warp, the box mechanism is shifted to bring the fabric-body shuttle in position in the race, and weaving now proceeds for the body fabric, the cloth being wound up on the cloth-beam and the warps unwinding from their warp beams. On the first beating in, after the plait portion has been woven and the weaving of the fabric-body proceeds, the plait portion is formed into a loop, as will be readily understood by reference to the drawings. In order to produce the weave in the manner described, I employ various devices, presently to be described in detail.

On the frame F of the loom is journaled in suitable bearings the transversely-extending main or crank shaft G, provided on one end with fast and loose pulleys (not shown) connected by belt with suitable machinery for imparting a continuous rotary motion to said shaft G. On the latter are formed or secured crank-arms G′, connected by pitmen G^2 with the lay B to impart to the lay the usual rock-

ing motion for beating in the filling in both the fabric-body A and the plaits A′, said lay having its shaft B^2 journaled in suitable bearings arranged in the lower portions of the frame F.

The harness H for the warps A^2 A^3 is actuated from the head C, the first and last heddles H′ and H^2 carrying the warp A^3 and the heddles H^3 and H^4 carrying the warp A^2, as indicated in the drawings, said heddles being actuated from the head C by means of the pattern-chain C′ by the usual mechanism in such a manner that the heddles H′ H^2 drop the lower warp A^3 during the time the plait A′ is woven, as previously described, and raise said warp during the time the fabric-body is woven, the heddles H′ H^2 then operating in conjunction with the heddles H^3 H^4 for the warp A^2. As the connection between the harness and the head C is of the usual construction, it is not deemed necessary to describe this construction in detail.

The warp-beam D for the warp A^2 is mounted to rotate loosely in suitable bearings carried by the main frame F, and on said beam is wound several times a cord I, extending downward on opposite sides of the beam to carry at the end of the forward side of the beam a weight I′, somewhat smaller than the weight I^2, carried on the other end of the cord, so that when the warp A^2 unwinds by the drawing action of the cloth-beam E the weight I^2 is drawn upward, while the weight I′ descends, and thus proper tension is given to the warp A^2.

On the beam D are secured ratchet-wheels J, adapted to be engaged by pawls J′ to lock the beam against rotation to wind up the warp A^2 at the time the cloth-beam E is reversed to unwind the cloth, as previously described, said pawls J′ being mounted to swing loosely on a stud J^2, carried by the main frame F. On the stud J^2 is mounted to turn a disk J^3, having spaced pins J^4 and J^5, between which extend the pawls J′, so that when the disk is turned in the direction of the arrow a' (see Fig. 2) then the said pawls are thrown out of mesh with the ratchet-wheels J, and when the disk is turned in the opposite direction then the pawls J′ are thrown in engagement with said ratchet-wheels. I prefer to employ a number of ratchet-wheels J and pawls J′ instead of only a single one of each and arrange the faces of the registering teeth somewhat inclined, as indicated in Fig. 4, so that one of the pawls always engages a tooth to prevent lost motion. The disk J^3 is connected with a cord J^6, extending over an upper beam D^2 for the warp A^3 and then extending downward, having at its lower end a weight J^7 to turn the disk J^3 in the inverse direction of the arrow a' when said disk is released, as presently described.

The disk J^3 is connected diametrically opposite the point where the cord J^6 is fastened by a cord J^8 with a disk K, mounted to turn on a stud K′, carried by the frame F, (see Figs. 1, 2, and 4,) and said disk K is connected at diametrically opposite points with cords K^2 K^3, actuated by the head C, so as to turn said disk alternately in opposite directions to cause the disk K to pull on the cord J^8 and turn the disk J^3 in the direction of the arrow a' to release or slacken said cord J^8 and permit the weight J^7 and the cord J^6 to return the disk J^3 to its former position. (Shown in Fig. 2.) The cords K^2 and K^3 are actuated from the head C by the pattern-chain C′ at the proper time to lock or unlock the warp-beam D for the purpose mentioned. The disk K is provided with a weighted arm K^4 to assist in turning the disk K to bring it rapidly into a final right-hand or left-hand position, according to which of the cords K^2 or K^3 is active at the time.

Around one end of the other warp-beam D′ is wound several times a cord D^3, the ends of which depend from opposite sides of the beam, a weight D^4 being on the forward end of the cord and a heavier weight D^5 on the rear end of the cord to maintain a frictional hold on the beam, and when the cloth-beam E is reversed to unwind the cloth the heavy weight D^5 on the cord D^3 will turn the beam D′ in the direction of the arrow b' to wind up a portion of the warp A^3 and bring the end of the cloth in proper position relatively to the reed of the lay and to permit of forming the woven portion of the plait into a loop, the slackened warp A^2 permitting such movement.

In order to unwind the cloth the desired distance on the cloth-beam E for the purpose previously mentioned, I provide an automatic mechanism for turning the cloth-beam E in the reverse direction—that is, in the direction of the arrow c'. On one end of the cloth-beam E (see Figs. 3 and 4) is secured a head E′, having central bearings for the shaft E^2 of the beam, said shaft being mounted to turn loosely in the head, and the outer end of said shaft is connected with the usual take-up mechanism L for turning the shaft E^2 constantly in the inverse direction of the arrow c'. On the inside of the head E′ (see Fig. 5) is secured or formed a ratchet-wheel E^3, and a similar ratchet-wheel E^4 is placed opposite the ratchet-wheel E^3 and is secured or formed on a cap E^5, bolted or otherwise fastened to the head E′. Between the two ratchet-wheels E^3 and E^4 is arranged a wheel N, provided on its faces with ratchet-wheels N′ N^2, adapted to engage the ratchet-wheels E^3 E^4, respectively. The wheel N turns with the shaft E^2, and when the ratchet-wheel N^2 is in mesh with the ratchet-wheel E^4, as shown in Fig. 5, then the cloth-beam E is turned by the shaft E^2 and the wheel N in the inverse direction of the arrow c' to wind up the cloth as the latter is woven. During the pick following the weaving of the plait it is necessary to turn the cloth-beam E in the direction of the arrow c' to unwind the cloth, the distance corresponding to the full length of the woven

plait, and in order to accomplish this movement by the wheel N the latter is once or several times moved longitudinally on the shaft E^2 first toward the ratchet-wheel E^3 in the direction of the arrow d' and then back in the inverse direction of said arrow to the position shown in Fig. 5. On the movement of the wheel N in the direction of the arrow d' the inclined backs of the teeth of the ratchet-wheel N′ come in contact with the inclined backs of the teeth of the ratchet-wheel E^3, as the points of the teeth of the ratchet-wheels N′ and E^3 are then out of register, (see Fig. 5,) and further movement of the wheel N in the direction of the arrow d' causes the teeth of the ratchet-wheel N′ to push the teeth of the ratchet-wheel E by a wedge action from the left to the right, and consequently causes a turning of the ratchet-wheel E^3 and the cloth-beam E in the direction of the arrow c' a distance approximately corresponding to the distance between adjacent teeth of the ratchet-wheel E^3. On the return sliding motion of the wheel N in the inverse direction of the arrow d' a similar wedge action by the teeth of the ratchet-wheel N^2 on the teeth of the ratchet-wheel E^4 takes place to give the beam E a further turn in the direction of the arrow c' corresponding to the distance between adjacent teeth of the ratchet-wheel E^4. Thus for a full to-and-fro stroke of the wheel N the cloth-beam E is turned the distance between three successive teeth of a ratchet-wheel, it being understood that the several ratchet-wheels N′ N^2 E^3 E^4 have preferably teeth of the same size. By reference to Fig. 5 it will be noticed that the teeth of the ratchet-wheels E^3 and E^4 are out of alinement relative to each other, while those of the ratchet-wheels N′ and N^2 are in alinement with each other, so that the points of the teeth of the ratchet-wheels N′ and N^2 previous to engagement with the teeth of the ratchet-wheels E^3 E^4 respectively overlap or are out of register with the points of the teeth of the ratchet-wheels E^3 E^4. When long plaits are woven, it is necessary to repeat this to-and-fro sliding of the wheel N two or more times to unwind the cloth from the cloth-beam E a distance corresponding to the length of the plait. As this single or repeated to-and-fro sliding of the wheel N is very rapid and takes place during a single pick, it is evident that the turning of the cloth-beam E from the lay B in the inverse direction of the arrow c' during the short time the ratchet-wheels N′ N^2 and E^3 E^4 are in mesh is so insignificant to the distance the cloth-beam is turned in the direction of the arrow c' by the wedge or incline action of the ratchet-wheels N′ and N^2 on the ratchet-wheels E^3 E^4, respectively, that the desired result is readily accomplished. In order to impart this rapid to-and-fro sliding motion to the wheel N on the shaft E^2 during one pick, I provide the following mechanism:

The ratchet-wheel N is turned from the shaft E^2, on which the beam E is mounted to rotate loosely, and for this purpose the hub N^3 of the wheel N is mounted to slide on and to turn with the shaft E^2 by means of a key or feather E^6 on said shaft engaging a key-way in the hub. The hub N^3 is provided with an annular groove N^4, engaged by the forked end of a shifting lever N^5, fulcrumed at or near its middle at N^6 on a suitable bracket carried by the main frame F. The lower end of the shifting lever N^5 is pivotally connected by a link N^7 (see Fig. 3) to the vertical member O′ of a three-armed lever O, fulcrumed at O^2 on a cross-bar of the main frame F. The horizontal members O^3 O^4 of the three-armed lever O are engaged by bolts O^5 O^6, having loops or heads O^7 O^8 at their lower ends to pivotally connect with the free ends of treadles P P′, respectively, standing longitudinally and fulcrumed on a pin P^3, carried by the frame, said pin engaging elongated slots P^2 formed in the pivot ends of said treadles.

On the under side of the treadles P P′, at the pivot ends, are secured wear-plates P^4, adapted to be engaged by cams Q, secured on a transversely-extending shaft Q′, journaled in suitable bearings carried by the frame F. On the shaft Q′ are secured arms Q^2 Q^3, standing at an angle to each other and connected with cords Q^4 Q^5, respectively, passing under pulleys Q^6 up to the head C to be actuated by a corresponding pattern-chain C′ at the proper time to turn the shaft Q′ and move the cams Q in or out of engagement with the wear-plates P^4. When the shaft Q′ is in the position shown in Fig. 1, the cams Q are out of contact with the wear-plates P^4, and the pivot P^3 for the treadles P P′ engages the upper walls of the slots P^2 to hold the pivot ends of the treadles in a lowermost position. When the head C pulls the cord Q^4, the arm Q^2 is swung downward, turning the shaft Q′ to move the cams Q into the position shown in Fig. 2 against the wear-plates P^4 and lift the pivot ends of the treadles, as indicated in said Fig. 2. When it is again desired to allow the pivot ends of the treadles P P′ to drop to their former position, then a pattern-chain C′ actuates the cord Q^5 to exert a pull on the arm Q^3 and turn the shaft Q′ and cam Q back to the position shown in Fig. 1.

On the top of the treadles P P′ and between their pivot ends and the heads O^7 and O^8 thereon are journaled friction-rollers P^5, adapted to be alternately engaged by tappets R, projecting from opposite faces of a disk R′, secured on a picker-shaft S, driven from the main shaft G by the usual mechanism. (Not shown.) The picker-shaft S is connected in the usual manner with picker-sticks S′ for operating the same.

It is evident that when the cams Q are in the position shown in Fig. 1 and the pivot ends of the treadles are dropped the tappets R do not strike the friction-rollers P^5, and consequently the treadles remain at a standstill; but when the pattern-chain C′ of the head C actuates the cord Q^4 and the shaft Q′

is turned to lift the pivot ends of the treadles by the action of the cams Q then the friction-rollers P^5 are lifted into the path of the tappets R, so that said tappets impart alternate swinging motions to the treadles, and as the latter are connected with the three-armed lever O a rocking motion is given to the latter, and this motion is transmitted by the link N^7 to the shifting lever N^5 to move the hub N^3 and wheel N longitudinally on the shaft E^2 and impart a turning motion to the beam E in the direction of the arrow c'.

The tappet-disk R′ is arranged to carry one, two, or more sets of tappets R for actuating the treadles P P′ as often as is necessary, according to the length of the plait Q′, to turn the cloth-beam E the desired distance for unwinding the cloth the full length of the woven portion for the plait. As soon as this has been accomplished the pattern-chain in the head C causes a pulling of the cord Q^5 and a turning of the shaft Q′ to its former position, so as to swing the cams Q out of engagement with the wear-plates P^4 and allow the pivot ends of the treadles P P′ to drop to bring the friction-rollers P^5 out of the path of the tappets R.

A shuttle-box T for accommodating two shuttles is provided for each side of the loom to bring the shuttle for the filling of the fabric into the race during the time said fabric is to be woven and then to bring a shuttle for the filling of the plait A′ into the race during the time the plait portion is woven. The shuttle-box T on one side of the machine, as shown, is mounted on a rod T′, pressed on by a spring T^2, to hold the shuttle-box normally in an uppermost position and bring the fabric-shuttle into the race to be actuated on by the picker-stick S′. The rod T′ is connected at its lower end with an arm T^3, mounted to turn loosely on a shaft T^4, journaled in suitable bearings on the frame, the said arm T^3 being rigidly connected with an arm T^5, pivotally connected by a link T^6 with a lever U, fulcrumed on one side of the frame F. The shuttle-box on the other side of the loom is likewise provided with a spring-pressed rod T″, connected with the arm T^3, secured on the shaft T^4, and said shaft T^4 is provided with an arm T^8, connected by a link T^7 with a lever U′, similar to the lever U and located directly below the same.

Each of the levers U and U′ is controlled by the pattern-chain from the head C, and for this purpose the following mechanism is provided, special reference being had to Figs. 1, 2, 4, and 7. Each lever U U′ is provided with a friction-roller U^2, engaging the peripheral surface of a cam U^3, secured on a sleeve U^4, mounted to turn loosely on a shaft V, journaled at one end of the frame F, the other end being in the sleeve, which is likewise journaled in the said frame. (See Fig. 7.) On the sleeve U^4 is arranged a clutch-wheel U^5, adapted to be engaged by a clutch-wheel V′, controlled by a shifting fork V^2, having an angular arm V^3, connected by a cord V^4 with the head C, so that when the pattern-chain comes into action the cord V^4 is pulled and a swinging motion is given to the shifting fork V^2 to move the clutch-wheel V′ into engagement with the clutch-wheel U^5 and rotate the latter from the continuously-rotating shaft V, on which is the clutch-wheel, also rotating with the shaft. A spring V^5 draws upon the arm V^3 and holds the clutch-wheel V′ normally out of engagement with the clutch-wheel U^5, and the latter is normally locked in position by an arm V^6, extending from the shifting fork V^2, as indicated in Fig. 7. Thus when the arm V^3 is pulled the arm V^6 is moved out of engagement with the clutch-wheel U^5 at the time the clutch-wheel V′ moves in engagement with the clutch-wheel U^5. Each of the shafts V carries a sprocket-wheel V^7, and both sprocket-wheels are engaged by a sprocket-chain V^8, also passing over a sprocket-wheel V^9 on the picker-shaft S to impart a continuous rotary motion to said sprocket-wheels V^7 and the shafts V for the purpose previously mentioned. A tightening-wheel V^{10} gives the necessary tension to the sprocket-chain V^8. It is understood that when the pattern-chain for operating the shuttle-boxes comes into position in the head C either of the levers U or U′ is actuated to shift the boxes accordingly by the mechanism described.

The take-up mechanism L for the cloth-beam E is actuated in the usual manner from the lay B and is provided for this purpose with a ratchet-wheel L′, engaged by a pawl L^2, pivoted on a lever L^3, fulcrumed on the frame F and engaging at its lower free end an eye B^4 on the lay B. (See Figs. 2 and 3.) This ratchet-wheel is connected with the usual gearing for rotating the shaft E^2 of the cloth-beam, said shaft imparting a rotary motion to the beam E by means of the wheel N, as previously explained. The ratchet-wheel L′ is held against return movement by a dog L^4, which latter, however, can be thrown out of mesh with the ratchet-wheel from the pattern-chain in the head C to allow the ratchet-wheel to return to its previous position after being actuated by the pawl L^2, so that no taking up of the cloth takes place during the time the pawl L^4 is out of mesh with the ratchet-wheel, and consequently more filling is put in the plait. To this end the dog L^4 is connected by a cord L^5 with the head C and the pattern-chain is arranged so as to operate the said dog L^4 whenever it is desired to throw more filling into the plait than into the fabric.

When the several parts are in the position illustrated in Fig. 1 and the loom is in action, then the lower warp A^3 is out of action and the plait portion is now woven, and when the desired length has been reached then the pawl J′ is brought into engagement with the ratchet-wheel J to hold the warp-beam D against rotation by the action of the weight

I^2. Furthermore, the cams Q are now thrown into action to lift the treadles P P' into an active position, as shown in Fig. 2, and permit the tappets R to actuate said treadles to rotate the cloth-beam E in the direction of the arrow c' and unwind the cloth, so that the warp A^2 becomes slack and the warp A^3 is drawn backward and rewound on its warp-beam D' by the action of the heavy weight D^5. The lower warp A^3 is now raised by its heddles and the lay B in its forward movement causes a forming of the plait portion into a loop, and as the box mechanism now changes and the pawls J' are thrown out of action with the ratchet-wheel J and the weaving proceeds it is evident that the new additional part of the fabric-body is woven continuous to the previously-woven fabric-body, the plait standing on the fabric integrally therewith. The fabric-body is now woven the desired distance and then the several changes automatically take place as described—that is, the warp A^3 is dropped, the box mechanism changes, and weaving proceeds, weaving the plait portion only.

Having thus fully described my invention, I claim as new and desire to secure by Letters Patent—

1. A loom, provided with a lay, a cloth-beam, a take-up mechanism for the cloth-beam, a reversing mechanism for the cloth-beam, two warp-beams, means for locking one of the warp-beams against return movement, and means for winding up and unwinding the warp on the other warp-beam, substantially as shown and described.

2. A loom provided with a lay, a cloth-beam, a take-up mechanism for the cloth-beam, a reversing mechanism for the cloth-beam, a plurality of warp-beams each carrying a warp, means for locking one of the warp-beams against winding up its warp upon reversing the cloth-beam, and means for turning the other cloth-beam to wind up its warp upon reversing the cloth-beam, substantially as shown and described.

3. A loom provided with a lay, a cloth-beam, a take-up mechanism for said cloth-beam, a reversing mechanism for the said cloth-beam, two independent warp-beams, and a harness for the warps of said warp-beams and arranged to move one of the warps out of action while the other warp remains in action, substantially as shown and described.

4. A loom provided with a cloth-beam, a take-up mechanism for said cloth-beam and an automatic reversing mechanism for the same, substantially as shown and described.

5. A loom provided with a cloth-beam, a take-up mechanism for said cloth-beam and an automatic reversing mechanism for said cloth-beam, the said mechanism comprising a slidable wheel having two ratchet-wheels, and ratchet-wheels on the head of the cloth-beam and adapted to be engaged alternately by said ratchet-wheels on said slidable wheel, substantially as shown and described.

6. A loom provided with a cloth-beam, a shaft on which the cloth-beam is mounted to rotate loosely, a take-up mechanism connected with said shaft to rotate the latter intermittently, a head on the cloth-beam and provided with oppositely-arranged ratchet-wheels, and a wheel mounted to turn with and to slide on said driven shaft and having ratchet-wheels for meshing with said head ratchet-wheels, to turn the cloth-beam in both directions, substantially as shown and described.

7. A loom provided with a cloth-beam, a shaft on which the cloth-beam is mounted to rotate loosely, a take-up mechanism connected with said shaft to rotate the latter intermittently, a head on the cloth-beam and provided with oppositely-arranged ratchet-wheels, a wheel mounted to turn with and to slide on said driven shaft and having ratchet-wheels for meshing with said head ratchet-wheels, to turn the cloth-beam in both directions, and means, substantially as described, for sliding said wheel forward and backward on said shaft, as set forth.

8. A loom provided with a cloth-beam, a shaft on which the cloth-beam is mounted to rotate loosely, a take-up mechanism connected with said shaft to rotate the latter intermittently, a head on the cloth-beam and provided with oppositely-arranged ratchet-wheels, a wheel mounted to turn with and to slide on said driven shaft and having ratchet-wheels for meshing with said head ratchet-wheels, to turn the cloth-beam in both directions, a shifting lever for said slidable wheel, a three-armed lever connected with said shifting lever, a pair of treadles for operating said three-armed lever, and a revoluble disk carrying tappets for actuating said treadles, substantially as shown and described.

9. A loom provided with a cloth-beam, a shaft on which the cloth-beam is mounted to rotate loosely, a take-up mechanism connected with said shaft to rotate the latter intermittently, a head on the cloth-beam and provided with oppositely-arranged ratchet-wheels, a wheel mounted to turn with and to slide on said driven shaft and having ratchet-wheels for meshing with said head ratchet-wheels, to turn the cloth-beam in both directions, a shifting lever for said slidable wheel, a three-armed lever connected with said shifting lever, a pair of treadles for operating said three-armed lever, a revoluble disk carrying tappets for actuating said treadles, and means for throwing the treadles in and out of mesh with the tappets, substantially as shown and described.

10. A loom provided with a cloth-beam, a shaft on which the cloth-beam is mounted to rotate loosely, a take-up mechanism connected with said shaft to rotate the latter intermittently, a head on the cloth-beam and provided with oppositely-arranged ratchet-wheels, a wheel mounted to turn with and to slide on said driven shaft and having ratchet-

wheels for meshing with said head ratchet-wheels, to turn the cloth-beam in both directions, a shifting lever for said slidable wheel, a three-armed lever connected with said shifting lever, a pair of treadles for operating said three-armed lever, a revoluble disk carrying tappets for actuating said treadles, cams for raising or lowering the pivot ends of said treadles, a head for controlling said cams, and intermediate mechanism between the head and cams, substantially as shown and described.

11. A loom provided with a warp-beam having a weighted cord wound thereon, a ratchet-wheel on said beam, a pawl adapted to engage the ratchet-wheel to hold the said beam against winding up the warp, and a mechanism for throwing the pawl in and out of engagement with the ratchet-wheel, the mechanism being controlled from the head of the loom, substantially as shown and described.

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Witnesses:
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