

E. GATES.

ELECTRICALLY OPERATED SHEDDING MECHANISM FOR LOOMS.

No. 565,446.

Patented Aug. 11, 1896.

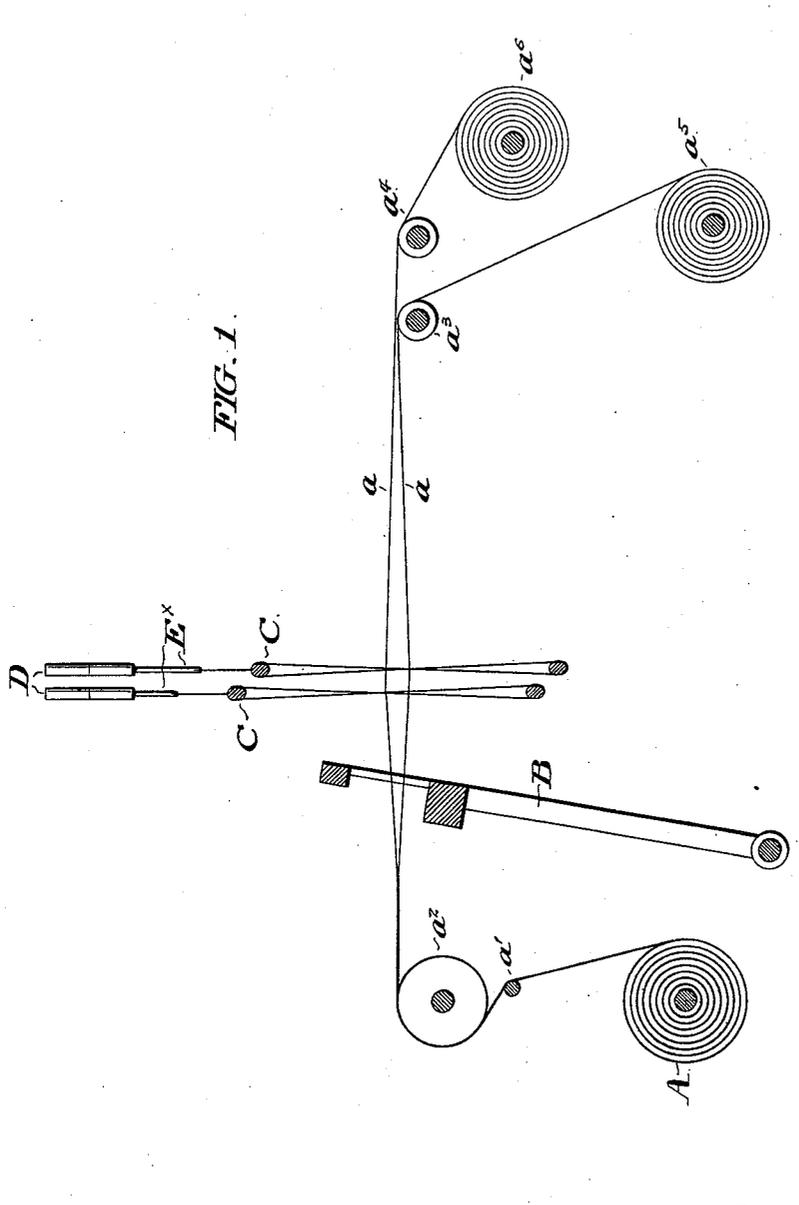


FIG. 1.

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BY HIS ATTORNEYS;

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WITNESSES:

A. E. Paige
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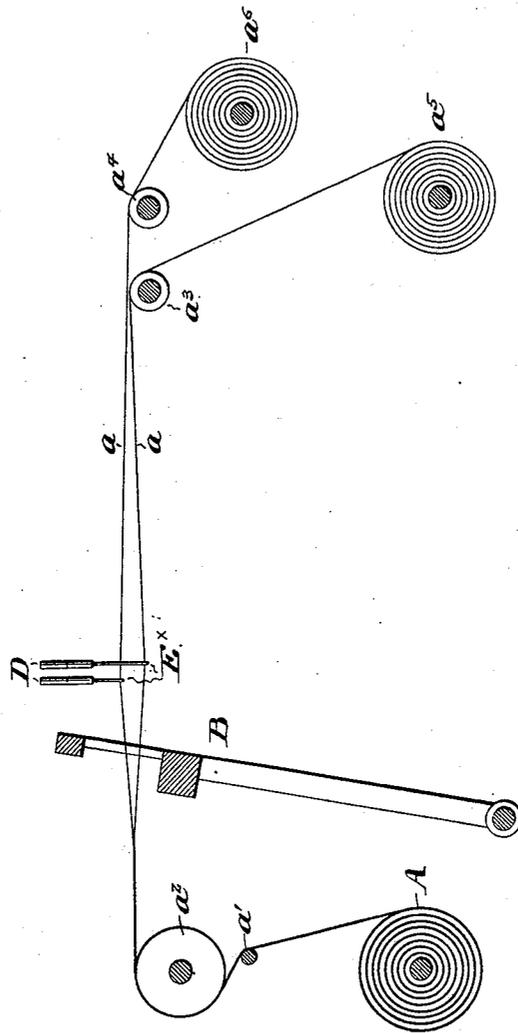
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FIG. 2.



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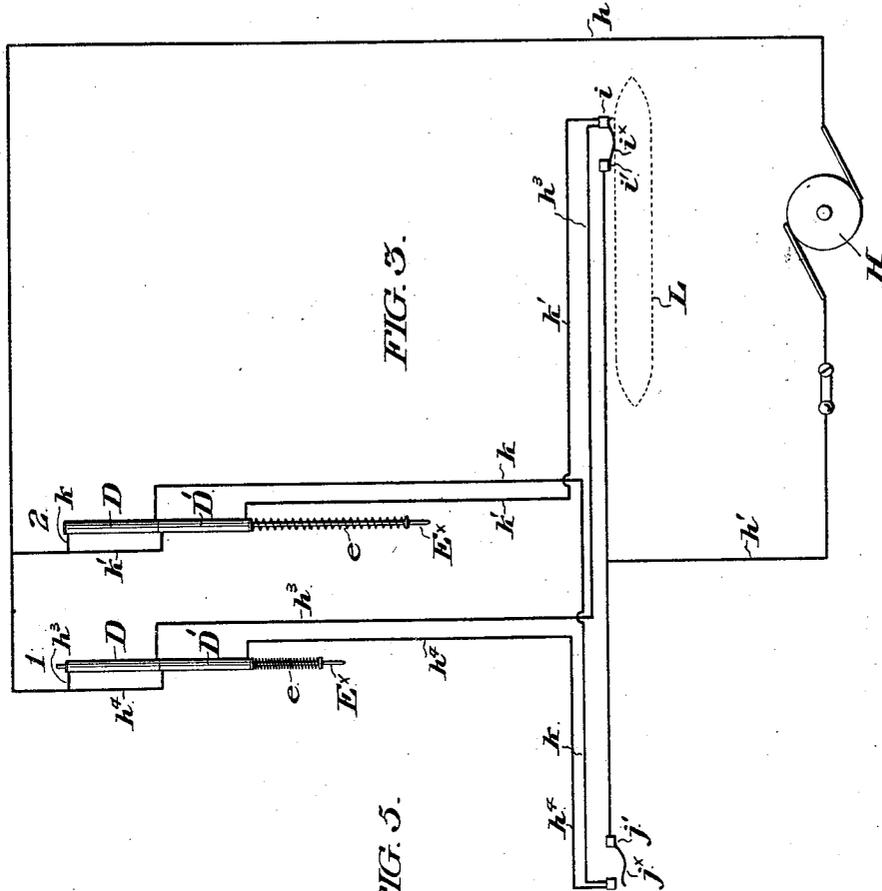


FIG. 3.

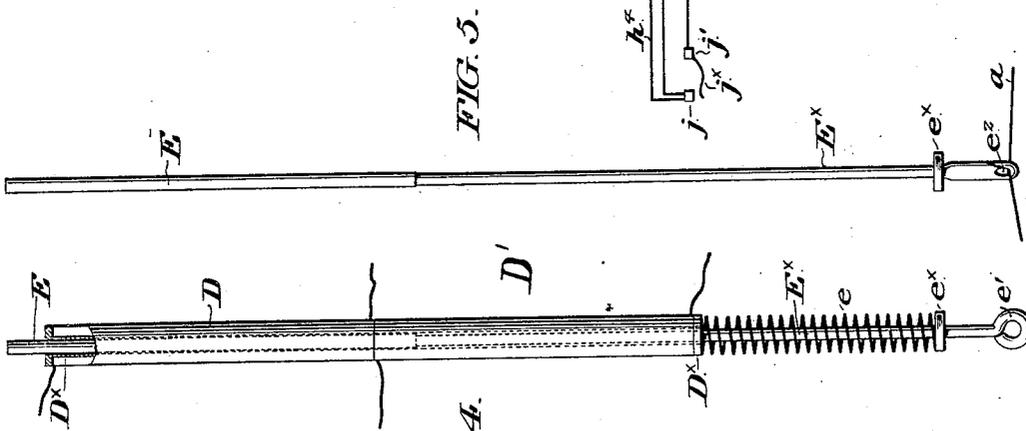


FIG. 4.

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UNITED STATES PATENT OFFICE.

ELMER GATES, OF PHILADELPHIA, PENNSYLVANIA.

ELECTRICALLY-OPERATED SHEDDING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 565,446, dated August 11, 1896.

Application filed August 5, 1895. Serial No. 558,301. (No model.)

To all whom it may concern:

Be it known that I, ELMER GATES, a citizen of the United States, residing in the City and County of Philadelphia, in the State of Pennsylvania, have invented certain new and useful Improvements in Electrically-Operated Shedding Mechanism for Looms, of which the following is a specification:—

My invention relates generally to looms, and especially to that portion of the loom mechanism by which the shedding of the warp threads is effected.

In the operation of looms as heretofore commonly constructed, the lingoes, through eyes in which the warp threads pass, have been through the intervention of intermediate connective and supporting mechanism of a well known character, reciprocated in planes transverse to the direction of travel of the warp threads, by the action of the power shafts of the machines. These connective and supporting instrumentalities, however, being weighty and somewhat cumbrous in character, have rendered the looms costly not only in construction, but also, by reason of the large amount of power required to drive them, in operation.

It is the object of my invention to dispense with a great portion of the mechanism heretofore necessary, and to employ for the operation of the lingoes, electrically operated,—as opposed to mechanical,—instrumentalities, and, especially, electrically-operated instrumentalities of the character hereinafter described in detail.

A good form of a convenient embodiment of my invention is illustrated in the accompanying drawings and described in this specification, the particular subject-matter claimed as novel being hereinafter definitely set forth.

In the accompanying drawings,

Figure 1 is a view in side elevation of the warp beams, the cloth winding and guide rolls, the lay, and a pair of heddle frames of ordinary construction.

Figure 2 is a view similar to Figure 1, with the exception that the heddles are dispensed with, and extensions of the cores engaged directly with the warp threads.

Figure 3 is a view partly diagrammatic in character, of the solenoids and their circuit connections.

Figure 4 is a view in side elevation of a set of solenoids and a core with its associated parts, of a form which I find it of advantage to employ.

Figure 5 is a view in side elevation of a core provided with a modified form of eye.

Similar letters of reference indicate corresponding parts.

In the accompanying drawings,

A is the winding roll, $a^1 a^2 a^3 a^4$ the guide rolls, $a^5 a^6$ the warp beams, and a the warp threads. B is the lay, and C C, Figure 1, are heddles.

The ordinary parts of a loom other than those with which my invention is immediately concerned, are not illustrated or described, as such parts are well known to those familiar with the art and therefore unnecessary to be herein described; it is to be understood, however, that my present improvements may be employed in connection with any preferred form of loom.

Referring now to Figures 3 and 4,—D D' are a pair of independent coils or solenoids, conveniently and preferably mounted upon the respective extremities of a hollow spool D^x , and independently connected with a source of energy so as to be thrown alternately into and out of circuit. E is a core of suitable magnetizable material, mounted free for reciprocation preferably within the bore of the spool, and in the form shown, provided with a core-extension E^x , of brass or other suitable non-magnetizable material, extending a convenient distance beyond the extremity of the spool, and adapted to engage with a heddle frame, or with one of the warp threads direct.

The lower portion of the core-extension E^x is provided with a collar e^x or other device, adapted to engage one end of a spiral spring e which surrounds said extension and engages as to its other end with the adjacent end of the spool D^x , and thus serves to maintain the core normally in a position of balance midway between the respective centers of the two coils or solenoids.

As will be readily understood by those familiar with the electric art, when one of the coils or solenoids is thrown into circuit and energized, while the other remains out of circuit, the magnetic influence of the first named

coil will act upon the core and occasion its longitudinal movement to a position in which its center coincides with the center of the energized solenoid, while, when the coil first mentioned is cut out, and the other thrown into, circuit, the last named coil will act upon the core and occasion its longitudinal movement in the opposite direction and to a position in which its center coincides with the center of the second named coil.

When, then, the upper and lower coils are regularly alternately thrown into and out of circuit, the effect will be, as is obvious, to impart regular longitudinal movement of reciprocation to the core piece and to any devices connected with or carried by it.

If then the cores of the two sets of solenoids shown in Figure 3, and designated "1" and "2" respectively,—are connected respectively to the two heddles C C of Figure 1, or to two of the warp threads as shown in Figure 2, and the coil D of set "1" and coil D' of set "2" be thrown into circuit and the coil D' of set "1" and coil D of set "2" be thrown contemporaneously out of circuit, and vice versa, the result will be a contemporaneous mutual opposite shifting of position by the respective cores and the corresponding contemporaneous mutual opposite shifting of the heddle frames, or warp threads, as the case may be, with which said cores are connected.

In Figure 3, H is a dynamo or other source of energy, and $h h'$ are the main conductors, into and out of circuit with which the coils mentioned are to be thrown. One of the main conductors, namely, that designated h' is shown as divided into two branches terminating respectively in the terminals $i' j'$.

Referring to the set of coils designated "1", h^3 is a branch of the main conductor h , the intermediate portion of which forms or is in circuit with the coil D, and which branch leads to a terminal i which is one of the pair of terminals $i' i'$, adapted to be connected by a normally open switch tongue or spring i^x .

h^4 is a branch of the main conductor h , the intermediate portion of which forms or is in circuit with the coil D' and which branch h^4 leads to a terminal j which is one of a pair $j j'$, adapted to be connected by a normally open switch tongue or spring j^x .

Referring now to the set of coils designated "2", k is a branch of the main conductor h , the intermediate portion of which forms or is in circuit with the coil D, and which branch leads to the terminal j ; and k' is a branch of the main conductor h , the intermediate portion of which forms or is in circuit with the coil D' and which branch leads to the terminal i .

As will be apparent from an examination of the circuit conductors shown in Figure 3, when the switch tongue i^x is closed and the switch tongue j^x open, the coil D of the set "1" and the coil D' of the set "2" will be in circuit, and the other two coils or solenoids out of circuit,—while, when the switch tongue

j^x is closed and the switch tongue i^x is open, the coil D' of the set "1" and the coil D of the set "2" will be in, and the other two, out, of circuit.

While the switches may be thrown or manipulated in any desired manner, as by hand or clockwork,—I prefer to arrange or place them in such relation to a selected moving part of the loom as to be operated by such part, and in the embodiment of my invention illustrated, I have shown the switch tongues as occupying positions assumed to be at the opposite sides of the loom and projecting into the shuttle race, in which positions said tongues will be encountered and tripped and the switches alternately closed by the shuttle L as the latter passes to and fro in its reciprocation.

As will be understood, any desired mechanical connection between the core extension E^x and the warp threads may be resorted to; thus in Figure 4 I have shown the core extension provided with an eye e' of a character adapted to engage a corresponding eye or hook upon the upper transverse member of a heddle frame,—while in Figure 5 I have shown said core extension as provided with a split eye e^2 adapted to engage directly with a warp thread without the intervention of a heddle frame. It will also be understood that to a single core extension, one or a series of the warp threads may be operatively connected.

As will also be understood, moreover, where two heddles are to be operated, a single set of coils, such as that designated "1" may be employed and placed in circuit with the dynamo in the manner set forth, and its core connected with one of the heddles, and the other heddle be connected with the heddle first named by a pulley cord or harness so as to receive motion from and be operated by said first named heddle, in a manner common in the harnessing of loom heddles.

Having thus described my invention, I claim:—

1. In a loom, in combination, a pair of solenoids, an electric circuit, means for throwing said solenoids alternately into and out of circuit, a core or magnetizable device, a warp thread eye, and devices connective of said eye and said core, substantially as set forth.

2. In a loom, a warp thread eye, a magnetizable core and a solenoid or magnetic coil, one of said last mentioned devices being fixed and the other movable, a connection between the movable device and the eye, and means, tripped or controlled by a moving part of the loom, for varying or changing the condition of the solenoid to occasion the movement of the warp thread eye, substantially as set forth.

3. In a loom, in combination, a pair of solenoids having hollow bores and disposed in axial alinement, an electric circuit, means actuated by a moving part of the loom for throwing said solenoids alternately into and out of circuit, a core disposed within said solenoids, a warp thread eye, and devices con-

nective of said eye and said core, substantially as set forth.

4. In a loom, in combination, a pair of solenoids having hollow bores and disposed in axial alinement, an electric circuit, means actuated by a moving part of the loom for throwing said solenoids alternately into and out of circuit, a core disposed within said solenoids, a spring for normally maintaining the core in balance midway between the solenoids, a warp thread eye, and devices connective of said eye and said core, substantially as set forth.

5. In a loom, in combination, a pair of solenoids mounted in multiple circuit, normally open switches mounted in the multiple circuits, and disposed in the path of a moving part of the loom, a warp thread eye, a magnetizable core, and means connective of said eye and said core, substantially as set forth.

6. In a loom, in combination, a pair of solenoids having hollow bores and disposed in axial alinement and mounted in multiple, normally open switches mounted in the multiple circuits, and disposed at the respective ends of the shuttle race, a warp thread eye, and means connective of said eye and said core, substantially as set forth.

7. In a loom, in combination, a series of sets of solenoids each set consisting of two solenoids having hollow bores and disposed in axial alinement, a main circuit connected with a dynamo or other source of supply, one division of the main circuit having branches in circuit with the respective solenoids the two solenoids of each set being arranged in multiple circuit, and the several sets being mounted in multiple circuit, conductors from different sets terminating in a common terminal, other conductors from the different

sets terminating in another common terminal, and means for switching said terminals alternately into circuit with the main line, magnetizable cores corresponding in number to the number of sets of solenoids, one employed in connection with each set, eyes or similar devices for engaging the warp threads and suitable connections between said cores and said eyes substantially as set forth.

8. In combination with a dynamo or source of energy, two sets of solenoids, each set provided with a core connected to a warp thread eye, a conductor leading from said dynamo having branches in circuit respectively with each of the solenoids, the branch connected with the upper solenoid of the first set and the branch connected with the lower solenoid of the second set, leading from said solenoids to a common terminal, and the branch connected with the lower solenoid of the first set and the branch connected with the upper solenoid of the second set leading from said solenoids to a common terminal, a second branch conductor leading from said dynamo one branch of the same being provided with a terminal in the vicinity of the first terminal mentioned with which it is adapted to be connected by a switch, and the other branch being provided with a terminal in the vicinity of the second terminal mentioned, with which it is adapted to be connected by a switch, and means for automatically moving said switches, substantially as set forth.

In testimony that I claim the foregoing as my invention, I have hereunto signed my name this ninth day of July, A. D. 1895.

ELMER GATES.

In the presence of—

F. NORMAN DIXON,
A. E. PAIGE.