(No Model.) 2 Sheets—Sheet 1.

S. MIDGLEY.

CARD SETTING MACHINE.

No. 348,529. Patented Aug. 31, 1886.

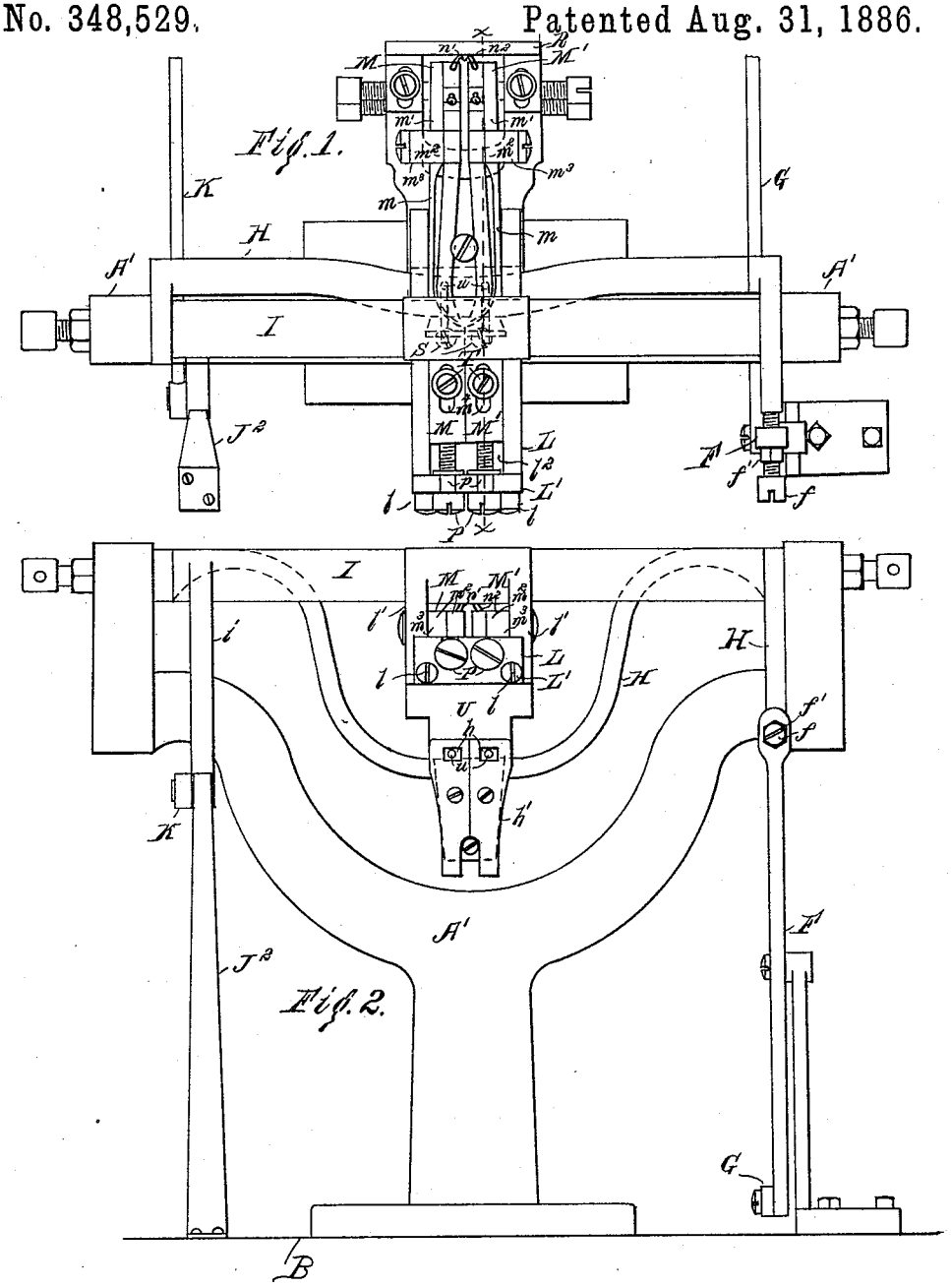

Fig. 1.

Fig. 2.

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Gertrude M. Day.

Inventor—
Sam Midgley,
By Albert M. Moore,
His Attorney.

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(No Model.) 2 Sheets—Sheet 2.

S. MIDGLEY.

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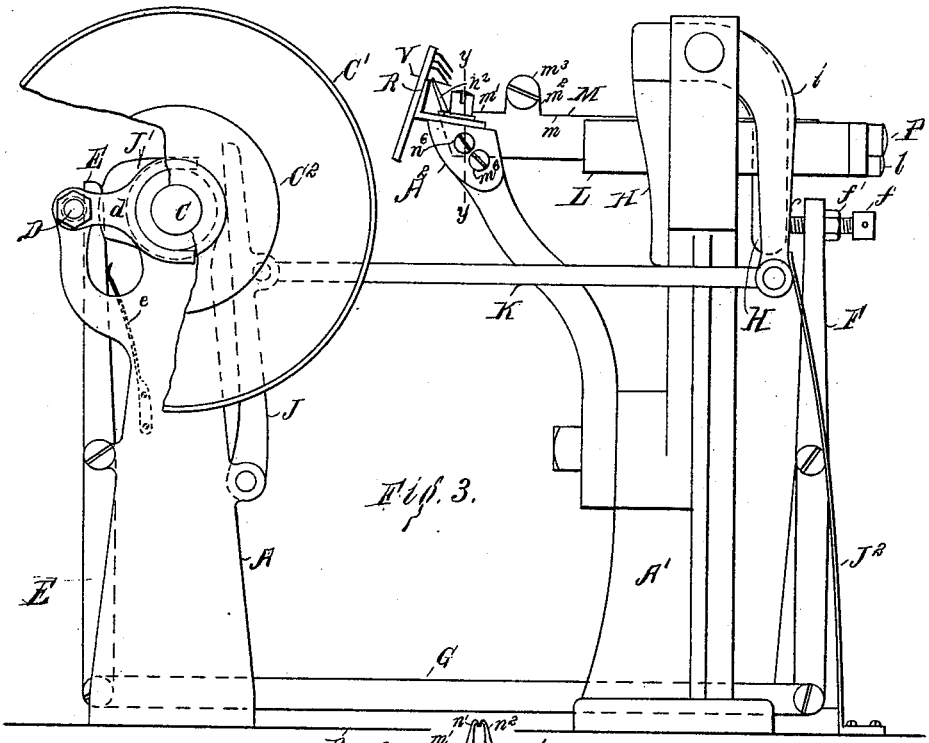

Fig. 3.

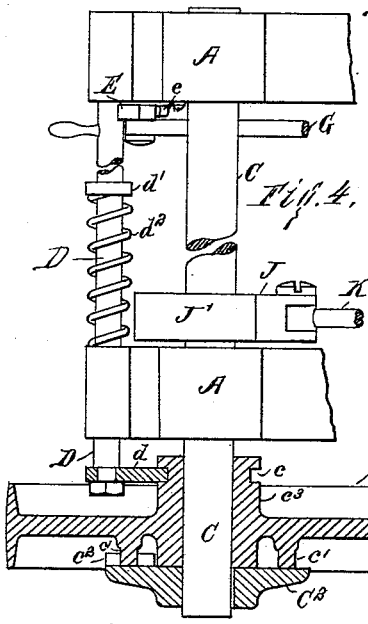

Fig. 4.

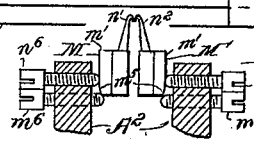

Fig. 5.

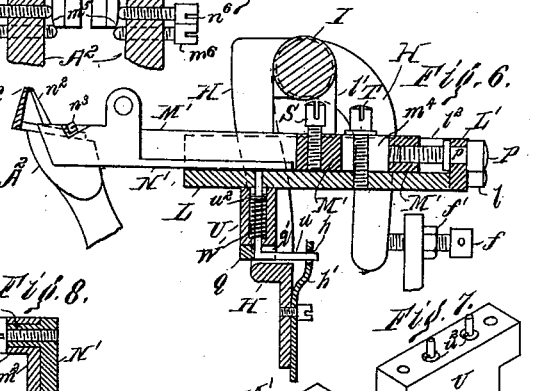

Fig. 6.

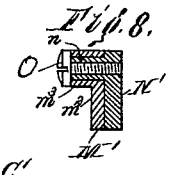

Fig. 8.

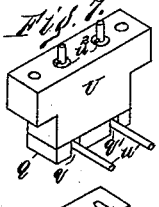

Fig. 7.

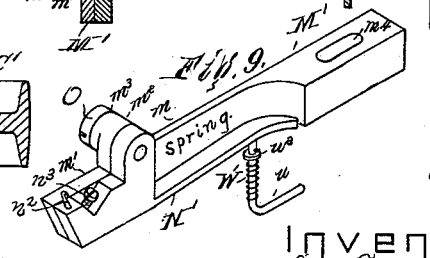

Fig. 9.

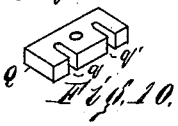

Fig. 10.

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UNITED STATES PATENT OFFICE.

SAM MIDGLEY, OF LOWELL, MASSACHUSETTS.

CARD-SETTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 348,529, dated August 31, 1886.

Application filed January 20, 1886. Serial No. 189,124. (No model.)

To all whom it may concern:

Be it known that I, SAM MIDGLEY, a subject of Victoria, Queen of the United Kingdom of Great Britain and Ireland, residing at Lowell, in the county of Middlesex and Commonwealth of Massachusetts, have invented a certain new and useful Improvement in Card-Setting Machines, of which the following is a specification.

My invention relates to card-setting machines, and has for its object to simplify and improve the construction of the bending and stopping devices, and to cause the bending devices to "nip in" or bend toward each other the points of a card-tooth in order to leave the legs of the tooth parallel with each other after the bending or nipping devices let go of the tooth.

In the accompanying drawings, Figure 1 is a plan, and Fig. 2 is a rear elevation, of the rock-shaft and its stand and the bending devices which are supported by said rock-shaft, and a part of the stop-motion mechanism; Fig. 3, a right side elevation of the same and of the driving-pulley and its shaft and the other parts of the stop-motion mechanism, a part of the driving-pulley being broken out and other parts of the machine being shown in dotted lines; Fig. 4, a plan of the driving-shaft and a part of the frame of the machine, the sliding stop-rod, and its spring, showing also in horizontal cross-section the driving-pulley and the collar fixed on the driving-shaft, and which forms with said pulley a clutch, and showing also in horizontal section the arm which projects from the stop-rod and engages with an annular groove on the hub of said pulley; Fig. 5, a cross-section on the line *y y* in Fig. 3 through the grooved block which supports the benders, said benders being represented in front elevation; Fig. 6, a longitudinal section on the line *x x* in Fig. 1; Fig. 7, an isometric view of the stop-motion pins and their holder; Fig. 8, a vertical cross-section on the line *z z* in Fig. 9, showing the pivoting of the bending-lever to its support; Fig. 9, an isometric view of the beuder detached and a stop-motion pin and its spring arranged below said bender; Fig. 10, an isometric view of the guide-plate which prevents the stop-motion pins from turning on their axes.

The devices hereinafter described are used in connection with other mechanisms which take wire from a coil, cut it to a suitable length to form a card-tooth, bend it into the form of a staple, punch fine holes in a strip or sheet of leather, and insert the legs of said staple in said holes. These mechanisms are well known and need no description here.

The stands A A′, resting upon a suitable bed, B, support the hereinafter-described parts of the machine in the usual manner. The driving-shaft C, the driving-pulley C′, forming one part of a clutch and turning and sliding loosely on said shaft, the other part of said clutch being a collar, C^2, rigidly secured to said shaft, and provided with one or more projections, c^2, which engage with one or more pins, c', which project from the sides of said pulley, the hub c^3 of said pulley being provided with an annular groove, c, to receive an arm, d, which projects from the stop-rod D, said stop-rod sliding in bearings on the stand A, and having a collar, d', between which and said stand A a spiral spring, d^2, surrounding said stop-rod, is compressed, are all of the usual construction and operation. The expansion of the spiral spring d^2 tends to slide the stop-rod D and to draw the driving-pulley away from the collar C^2, and thereby to stop the machine. The stop-rod D is prevented from operating by the upper end of a lever, E, entering a groove in said stop-rod when the machine is running properly. The lever E is pivoted between its ends to the stand A, and is kept in engagement with the groove in the stop-rod by a spring, e, secured to said stand and pressing against the upper end of said lever E. Another lever, F, is pivoted between its ends to the stand A′. A connecting-rod, G, connects the lower ends of the levers E and F. A bent lever, H, is pivoted between the arms of the stand A′, said stand being shaped something like a **Y**. When the lever H is swung backward, as hereinafter described, it strikes the upper end of the lever F, or against an adjusting-screw, f, which is run horizontally through the upper end of said lever F, and is prevented from being accidentally turned by a check-nut, f'. The backward motion of the upper end of the lever F operates the stop-motion, as above described. When

the machine is doing its work properly, the lever H remains stationary. A horizontal rock-shaft, I, swings in bearings in the top of said stand A', and is provided with a pendent arm, *i*, rigidly secured thereto. A lever, J, is pivoted on the stand A and rests against an eccentric, J', secured to the driving-shaft, the lever J and the arm *i* being connected by the rod K, so that when the upper end of the lever J is thrown backward by the eccentric J' the arm *i* is swung backward and the shaft I is rocked in its bearings, the lever J being held in contact with the eccentric J', and the shaft I being rocked in the other direction by a spring, J^2, secured to the stand A' and pressing against the back of the arm *i*. To the rock-shaft, below the same, is secured a grooved block, L, by arms *l l'*, and is oscillated by the rocking of said shaft. In a longitudinal groove, l^2, in the top of said block L, at right angles to the axis of said shaft I, are placed the side benders, M M', the object of which is to nip in the legs of the card-tooth and to support and adjust the knee-benders, which make the usual bends or knees at the middle of the legs of the card-tooth. The side benders, M M', are precisely alike, except that one is right-handed and the other is left-handed. Each side bender at its rear end is half as wide as the groove l^2, and has a thin spring middle part, *m*, formed in one piece with it, said side bender being somewhat wider than said spring *m* at its front end, at *m'*, and being provided on its upper edge, just in front of said spring *m*, with an upward projection or ear, m^2, said ear having an outwardly-projecting boss, m^3. The two knee-benders N N' are also one right-handed and the other left-handed, the left-handed one, N', being best shown in Fig. 9. Each side bender is flat on its under surface, and is provided with a hub, *n*, the same being a horizontal cylinder, which enters and turns freely in a corresponding hole formed in the ear m^2 and boss m^3, being held therein by a flat-headed screw, O, turned into said hub *n* concentrically therewith, the flat head of said screw resting against the outer end of said boss, as shown in Fig. 8. The rear end of each side bender M M' is provided with a longitudinal slot, m^4, through which passes a vertical screw, T, into the bottom of the groove l^2 in the block L. The bender is adjusted to bring the hooks of the knee-bender to the proper distance from the rest R, named below, by means of a screw, P, which turns in a threaded hole in the rear end of said side bender, and is provided in its head with an annular groove, *p*, just wide enough to receive the top edge of the plate L', secured by screws *l* across the rear end of said block L and the groove l^2. By turning said screw P into or out of the side benders said side benders are moved backward or forward in the groove l^2 to adjust the distance of the hooks n' n^2 of the knee-benders N N', in order that said hooks may in their forward motion be carried to the proper degree of nearness to the rest R to obtain a bend of the required angle in the legs of the card-tooth. Other screws, S, turn in threaded holes formed through said side benders from top to bottom thereof, and thrust against the bottom of said groove l^2 to throw the front ends of said side benders upward from the bottom of said groove, in order that the hooks n' n^2 may each be raised to the same height and make knees of the same angle in the legs of a card-tooth, V, placed over said rest, as shown in Fig. 3. After the side benders have been adjusted by the screws P and S they are held in place by turning down the screws T, above named. The knee-benders N N' are provided at their front ends with forwardly-inclined hooks n' n^2, or wires hooked at their upper ends and inserted in holes formed in said knee-benders and retained therein by set-screws n^3. The rear ends of the knee-benders rest upon the upper ends of L-shaped stop-motion pins *u*. These pins *u* are arranged in a block, U, secured to the under side of the block L, the vertical parts of said pins sliding in vertical holes in said block U and being provided with collars u^2, the holes in which said vertical parts slide being counterbored for a distance from the top of said block. Spiral springs W W' surround the vertical parts of said pins *u* between said collars and the bottom of the counterbored parts of the holes in which said vertical parts slide. Said pins *u* are prevented from turning in said block U by a guide-plate, Q, provided with slots *q q'*, which reach backward, said guide-plate Q being secured to the bottom of the block U in such a manner that the horizontal parts of said stop-pins lie in the groove *q q'* of said guide-plate.

When the machine operates properly, the action of the parts herein described is as follows: By the rocking of the shaft I the benders are thrown upward and forward until the hooks n' n^2 reach above the rest R just far enough to allow the legs of a wire tooth, V, driven through a sheet of card-leather, to pass under said hooks and above said rest. The benders are then drawn downward and backward and the legs of the card-tooth drag on the hooks n' n^2, and thereby raise the front ends of the knee-benders, turning them on their horizontal fulcrums, and cause the rear ends of said knee-benders to press the stop-pins *u* downward until their upper ends are flush with the bottom of the groove l^2. When the stop-motion pins *u* are thus pressed downward, their horizontal parts, in swinging backward, pass into holes *h* in the block *h'*, secured to the lever H, and do not stop the machine. In case the legs of the card-tooth do not each enter one of the hooks n' n^2 and throw the rear ends of the knee-benders down flat upon the bottom of the groove l^2, and thus depress the tops of the stop-motion pins until they are flush with the bottom of said groove l^2, the lower rear ends of said stop-motion pins will strike against the block *h'* and swing the lever H backward and cause it to strike the lever F,

and, through the connecting mechanism above described, to uncouple the clutch formed by the driving-pulley C' and the collar C^2 and allow the machine to stop. Should the wire of the tooth fail to enter either hook of the knee-benders, or should either of said hooks be broken and the necessary angle or knee not be given to the tooth, the machine will be stopped, as above described. The hooks n' n^2 are adjusted to the same distance apart as the holes in the card-sheet, which are intended for the reception of a single tooth, by means of screws n^6, which turn horizontally in the arm A^2 and thrust against the outer faces of the side benders, the spring portions m of which yield under the pressure of said last-named screws.

In using any wire, especially tempered-steel wire, for making card-teeth it is necessary to bend the wire somewhat beyond the position in which it is expected to remain when the bending pressure is removed from it. Accordingly it is desirable to cause the hooks of the knee-benders not only to draw down upon the legs of the tooth, but in drawing down to approach each other, in order that the points of the tooth, after leaving the hooks of the knee-benders and springing out slightly, as they will do, may still be parallel with each other. This result is accomplished by beveling off the lower side corners of the side benders, M M', as shown at m^5, Fig. 5, and inserting horizontal screws m^6 in the arm A^2, which supports the rest R in such a position that when the block L swings backward and the lower beveled corners of said side benders are depressed they will ride over the points of said screws and cause the hooks n' n^2 to approach each other.

I claim as my invention—

1. The stop-pin holder provided with vertical holes extending through the same and counterbored from the top, substantially as described, to receive spiral springs, in combination with said springs and L-shaped stop-pins, the vertical arms of which are arranged in said holes and are provided with collars above said springs, said pins having backwardly-projecting horizontal arms, said holder being provided with backwardly-extending slots which receive the horizontal arms of said stop-pins and prevent them from turning on the axis of their vertical arms, as and for the purpose specified.

2. The combination of the oscillating block, the knee-benders pivoted near their front ends, and provided at their front ends with hooks, the pivots of said knee-benders being supported by said oscillating block, the stop-pin holder provided with vertical holes extending through the same and counterbored from the top to receive spiral springs, said springs and L-shaped stop-pins, the vertical arms of which are arranged in said holes and project upward through holes formed in said oscillating block and press against the under side of the rear ends of said knee-benders, and which are provided with collars above said springs, said pins having backwardly-projecting horizontal arms, and said holder being provided with backwardly-extending slots which reach from the holes in said holder and receive the horizontal arms of said stop-pins and prevent said stop-pins from turning in said holder, as and for the purpose specified.

3. The side benders provided with ears having outwardly-projecting bosses and with cylindrical holes formed in said ears and bosses, in combination with the knee-benders provided with hubs which enter said holes, and screws turned into said hubs and provided with heads which rest against the outer ends of said bosses, as and for the purpose specified.

4. The combination, in a card-setting machine, of side benders the front ends of which are adapted to be sprung toward each other, and knee-benders pivoted to said side benders, as and for the purpose specified.

5. The combination of the oscillating block, the side benders rigidly secured at their rear ends to said oscillating block, the middle portions of said side benders being elastic laterally, said side benders being beveled off near their front ends at their lower side edges, and stationary horizontal screws arranged to be struck by said beveled parts of said side benders and to force said side benders toward each other, and knee-benders pivoted to said side benders and provided with hooks adapted to receive and bend the legs of a card-tooth as said side benders and oscillating block are swung downward and backward, as and for the purpose specified.

6. The combination of the side benders and the knee-benders pivoted thereto, and provided with hooks adapted to receive and bend the legs of a card-tooth to form the knees of the same, stop-pins, L-shaped, as herein described, means for pressing up the vertical parts of said stop-pins against the rear ends of said knee-benders, said knee-benders being adapted to be rocked on their pivots by the resistance to bending of said card-tooth and to press said stop-pins downward, mechanism, substantially as herein described, for oscillating said benders and pins, and the stop-motion mechanism of a card-setting machine and its actuating-lever, having a block secured thereto, provided with holes arranged to receive the horizontal parts of said stop-pins when the same are forced downward by the rear ends of said knee-benders, said block being arranged to be struck by the rear ends of said horizontal parts of said stop-pins when the same are not so depressed, and to be moved backward to operate said stop-motion, as and for the purpose specified.

7. The combination of the frame consisting of stands supported upon a suitable bed, a rock-shaft, a grooved block secured to said rock-shaft beneath the same, side benders placed within the groove of said block and adjustable therein, knee-benders arranged between said side benders and each pivoted to one of said side benders, and provided with

forwardly-inclined hooks, stop-pins arranged beneath the rear ends of said knee-benders and forced upward against the same by springs, and being L-shaped, a swinging lever provided with a block having holes to receive the horizontal parts of said stop-pins when the same are depressed and swung backward, the driving-shaft, a collar secured thereto, provided with projections, a driving-pulley sliding on said driving-shaft and having projections adapted to engage the projections on said collar, said driving-pulley having also an annular groove, a sliding rod provided with an arm which enters said annular groove, a slot in said sliding rod, a lever one end of which enters said slot, and mechanism, substantially as described, for connecting said last-named lever and said first-named lever to draw said last-named lever out of said slot, and a spring to slide said sliding rod and to cause said driving-pulley to be disengaged from said collar when said stop-pins strike said block on said lever, as and for the purpose specified.

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