

No. 638,573.

Patented Dec. 5, 1899.

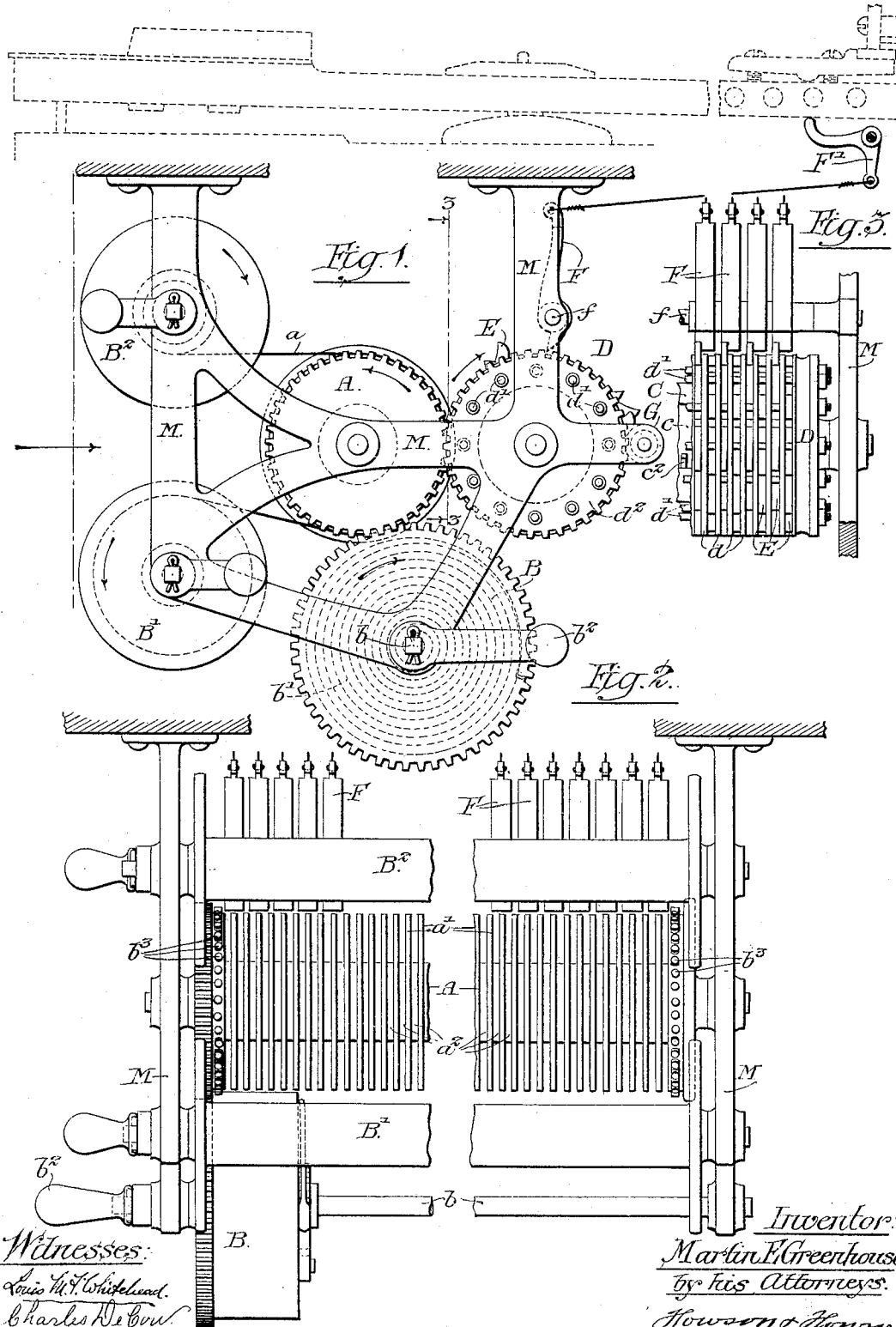
M. E. GREENHOUSE.

PATTERN OPERATED MECHANICAL MOVEMENT.

(Application filed Apr. 30, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:  
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Inventor:  
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by his Attorneys:  
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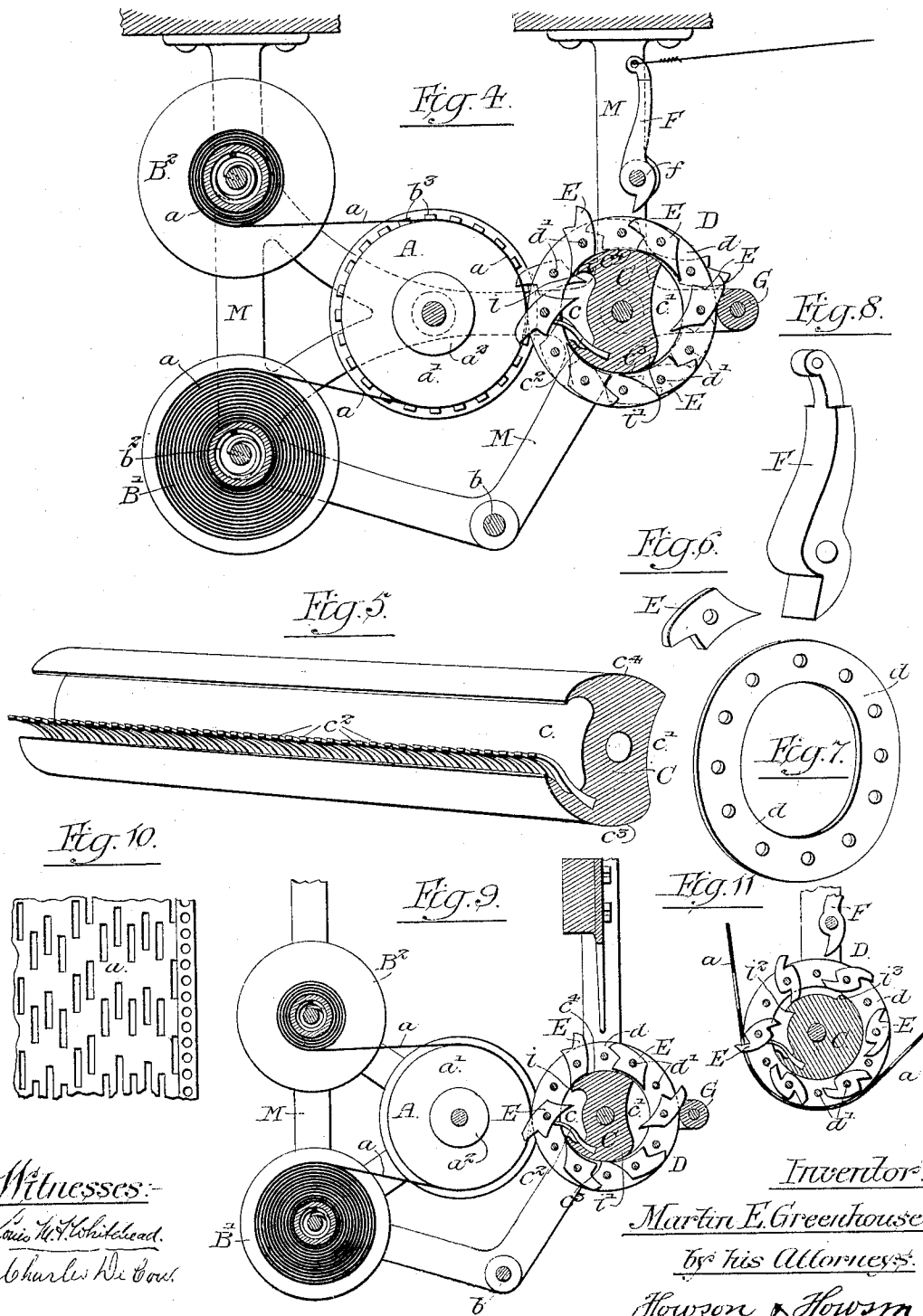
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(No Model.)

2 Sheets—Sheet 2.



Witnesses:  
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# UNITED STATES PATENT OFFICE.

MARTIN E. GREENHOUSE, OF CAMDEN, NEW JERSEY, ASSIGNOR TO SARAH  
B. GREENHOUSE, OF SAME PLACE.

## PATTERN-OPERATED MECHANICAL MOVEMENT.

SPECIFICATION forming part of Letters Patent No. 638,573, dated December 5, 1899.

Application filed April 30, 1898. Serial No. 679,383. (No model.)

*To all whom it may concern:*

Be it known that I, MARTIN E. GREENHOUSE, a citizen of the United States, and a resident of Camden, New Jersey, have invented certain Improvements in Pattern-Operated Mechanical Movements, of which the following is a specification.

The object of my invention is to construct a device which will be controlled by a perforated pattern-sheet and set so as to positively operate other mechanism, as fully described hereinafter.

My invention can be used to automatically play a musical instrument—such, for instance, as a piano, organ, or music-box—or can be used to operate the jacks of a loom or a knitting-machine or any mechanism which may be controlled by a perforated pattern.

While I prefer to use a perforated pattern-sheet adapted to be rolled upon a spool and made, preferably, of paper, it will be understood that the pattern may be made of sheet metal or may be in the form of a cylinder or a plate without departing from my invention.

In the accompanying drawings, Figure 1 is a side view of sufficient of my pattern-controlled mechanical movement as to illustrate my invention. Fig. 2 is an end view looking in the direction of the arrow, Fig. 1. Fig. 3 is a section on the line 33, Fig. 1. Fig. 4 is a transverse sectional view. Fig. 5 is a perspective view of the fixed cam. Fig. 6 is a perspective view of one of the dogs. Fig. 7 is a perspective view of one of the rings. Fig. 8 is a perspective view of one of the jacks actuated by the dogs. Fig. 9 is a view showing my invention applied to a comb musical box. Fig. 10 is a view of a section of the perforated pattern-sheet. Fig. 11 is a view of a modification.

A is a carrier for the perforated paper *a*. This carrier is driven at a given speed by any suitable motor. I have shown in the present instance a spring-drum B geared to the carrier A. Within this drum is a coiled spring *b'*, with one end attached to the shaft *b* and the other attached to the drum. The shaft is provided with a suitable handle *b''*, by which it is turned to wind the spring.

The paper *a* has a series of perforations, ac-

cording to the music to be played or the pattern to be produced. The paper is rolled upon a spool B', which has a long coiled spring *b''* within it, so that the paper will be under tension. The opposite end of the paper is attached to a spool B'', also having a tension-spring within it.

On each edge of the carrier A are a series of pins *b''* in the present instance, which engage the paper projecting through perforations therein, so as to positively feed the paper. The carrier in the present instance is made up of a series of disks *a'*, separated by a series of washers *a''*. This construction allows the dogs described hereinafter to have free movement in the carrier.

D is a cylinder made up of a series of spaced rings *d*. Connecting the rings together are a series of pivot-pins *d'*, on which are mounted the dogs E. These dogs are so shaped that when in one position they will not extend beyond the periphery of the cylinder and when in the other position they will extend beyond the periphery. The cylinder or carrier D is mounted on a fixed hub C, having recesses *c c'* on opposite sides. Within the recess *c* project a series of narrow springs *c''*, which are in line with the series of dogs. The cylinder D has a gear-wheel *d''* on one end, which gears with the wheel in the present instance on the carrier A, so that the carrier and cylinder revolve at the same speed.

F represents a series of levers which are pivoted at *f*. These levers are so spaced as to be in line with the several rows of dogs, and one arm of each lever extends into the path of the dogs when they are projected, so that as the cylinder revolves the projecting dogs will strike the levers. These levers may be connected to a device to actuate the keys of a piano, as shown by dotted lines in Fig. 1, so that certain dogs will operate certain keys, or they may be connected to the mechanism of an organ or made to act directly upon the comb of an ordinary Swiss music-box. The levers may also be connected to the jack mechanism of a loom or, in fact, any device which can be operated from a perforated pattern.

The dogs are returned to their normal po-

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sition by a bar G at the back of the cylinder, which is arranged in close proximity thereto and directly in front of the cavity  $c'$  in the fixed hub, so that when the projecting dogs strike the bar the tails will simply turn in the cavity and will be locked in their normal position when they reach the concentric surface  $c^3$  of the hub.

The several parts are mounted on a suitable frame M, which in the case of a piano can be either placed under the instrument or above it or may form part of a music-box. In the case of a music-box I prefer, however, to dispense with the levers F, as shown in Fig. 9, and allow the dogs to strike the teeth of the comb, as clearly illustrated in said figure.

When the device is used for operating a piano, as shown in the drawings, I prefer to make the levers F wide enough to cover two or more rows of dogs. In the drawings I have shown each lever covering two rows of dogs. By this arrangement I am enabled to reduce the speed of travel of the carrier, at the same time to allow the dogs to quickly actuate the levers, as one set of dogs is so spaced as to alternate with the other set; but it will be understood that the levers may be arranged with only one set of dogs actuating each lever.

The operation of the mechanism is as follows: If, for instance, the device is used for playing a piano, as shown in Fig. 1 of the drawings, the pattern-sheet is perforated according to the tune to be played. It is adjusted in the machine on the two rolls and the driving-spring coiled. Then the mechanism is set in motion, the carrier feeding the paper in front of the cylinder at the same speed that the cylinder travels. The springs  $c^2$  of the fixed hub C act upon all the dogs as they travel past the cavity  $c$  and in front of the paper; but the portion of the paper not perforated will not allow the spring to force the dogs past the opening in the cylinder. Consequently when the dogs reach the point  $i$  of the hub they are locked in their normal position; but when a perforation in the paper is in line with one of the dogs then the spring will act to turn the dog on its pivot, forcing it into the perforation, causing the tail to pass into the recess in the hub, so that when the dog is forced forward the tail will come in contact with the point  $i$  of the hub, which will turn the dog to the position shown in Fig. 4, with its head projected beyond the periphery of the cylinder, and as the dog passes on it will strike one arm of the lever F, which will in turn operate the key, it being in the present instance connected to the lever F', situated directly under one of the keys of the piano. As the cylinder travels the projected dog reaches a point directly opposite a cavity  $c'$  in the back of the hub, when the bar G will turn the dog back to its normal position before it reaches the concentric portion  $c^3$  of the hub. In the event of the dogs not being turned fully the rounded portion  $i'$  of the hub will force the dogs in, as shown in Fig. 4.

It will be noticed that the dogs are locked by the concentric portion  $c^4$  of the hub during the time they are striking the levers F.

It will be readily understood that the levers F may be connected to any suitable mechanism, as described above, and while I have shown my invention as applied to a piano it will be understood that it may be used in connection with any device which can be operated by mechanism controlled by a perforated pattern-sheet and that the pattern-sheet may be either mounted on rolls, as shown, or may be a plain sheet of either paper, metal, or other suitable material, and where a fixed short pattern is used the pattern-sheet may be in the form of a punched metal cylinder and simply a substitute for the carrier A.

Fig. 11 is a view of a modification of the cylinder in which the back bar is dispensed with and the fixed hub is made in two steps, so that when the dogs, which are constructed as shown in the drawings, are projected by springs they engage with the first step  $i^2$  and are thrown out into operative position and are held there by the surface of the hub while they operate, and then they strike the second step  $i^3$  and are thrown into their normal position and are held in such position until again projected. In Fig. 11 I have dispensed with the carrier A, simply allowing the pattern to pass around a portion of the cylinder D.

While I have shown special mechanism for driving the several parts, it will be understood that the mechanism may be modified without departing from my invention. The construction of the driving mechanism and mechanism for feeding the pattern will depend greatly upon the construction of the apparatus to which it is connected.

I claim as my invention—

1. The combination in a pattern-operated mechanical movement, of a rotary cylinder, a perforated pattern-sheet cooperating therewith, a series of dogs mounted in said cylinder, and means for projecting or retracting said dogs, and a fixed hub acting to lock the dogs either in the projected or retracted position as set by the pattern-sheet and during the time they are passing the mechanism to be operated, substantially as described.

2. The combination of a pattern-carrier adapted to receive a perforated pattern-sheet, a cylinder mounted in front of the carrier on which are mounted dogs arranged side by side in series, means for moving the cylinder in unison with the pattern, a fixed hub, two cavities in said hub, means in one of the cavities for projecting the dogs into the openings in the pattern-sheet, and means for retracting the dogs after they have operated, substantially as described.

3. The combination of a fixed hub having cavities at each side, a series of springs in one of the cavities, a cylinder, dogs arranged side by side in series, each series of dogs being in position to be actuated by the springs of the hub, and a carrier for the perforated

pattern-sheet mounted in close proximity to the cylinder carrying the dogs, substantially as described.

4. The combination of a hub having cavities, a series of springs in one of the cavities, a carrier made up of a series of rings, a series of pivoted dogs in each space adapted to be turned by the springs, a carrier for the perforated pattern-sheet mounted in front of the cylinder so that the dogs will be turned when in line with the opening in the pattern-sheet and held in the turned position while acting on the mechanism to be operated, substantially as described.

5. The combination of a fixed hub having two cavities, springs in one cavity and a bar opposite the other cavity, a cylinder carrying a series of dogs suitably spaced adapted to be forced out by the springs and to be retracted by the bar, said carrier being made

up of a series of disks and washers, and drums for carrying the perforated sheet, with means for positively feeding the pattern-sheet and the cylinder at the same speed, substantially as described.

6. The combination in a perforated pattern-carrier, a fixed hub, a cylinder mounted on said hub having dogs arranged in series around the cylinder, and a lever actuated by the dogs, said lever being broad enough to cover two or more series of dogs, substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARTIN E. GREENHOUSE.

Witnesses:

WILL A. BARR,  
JOS. H. KLEIN.