(No Model.) 2 Sheets—Sheet 1.

H. BORCHARDT.

MACHINE FOR SETTING SPIRAL SPRINGS.

No. 313,706. Patented Mar. 10, 1885.

Fig. 1.

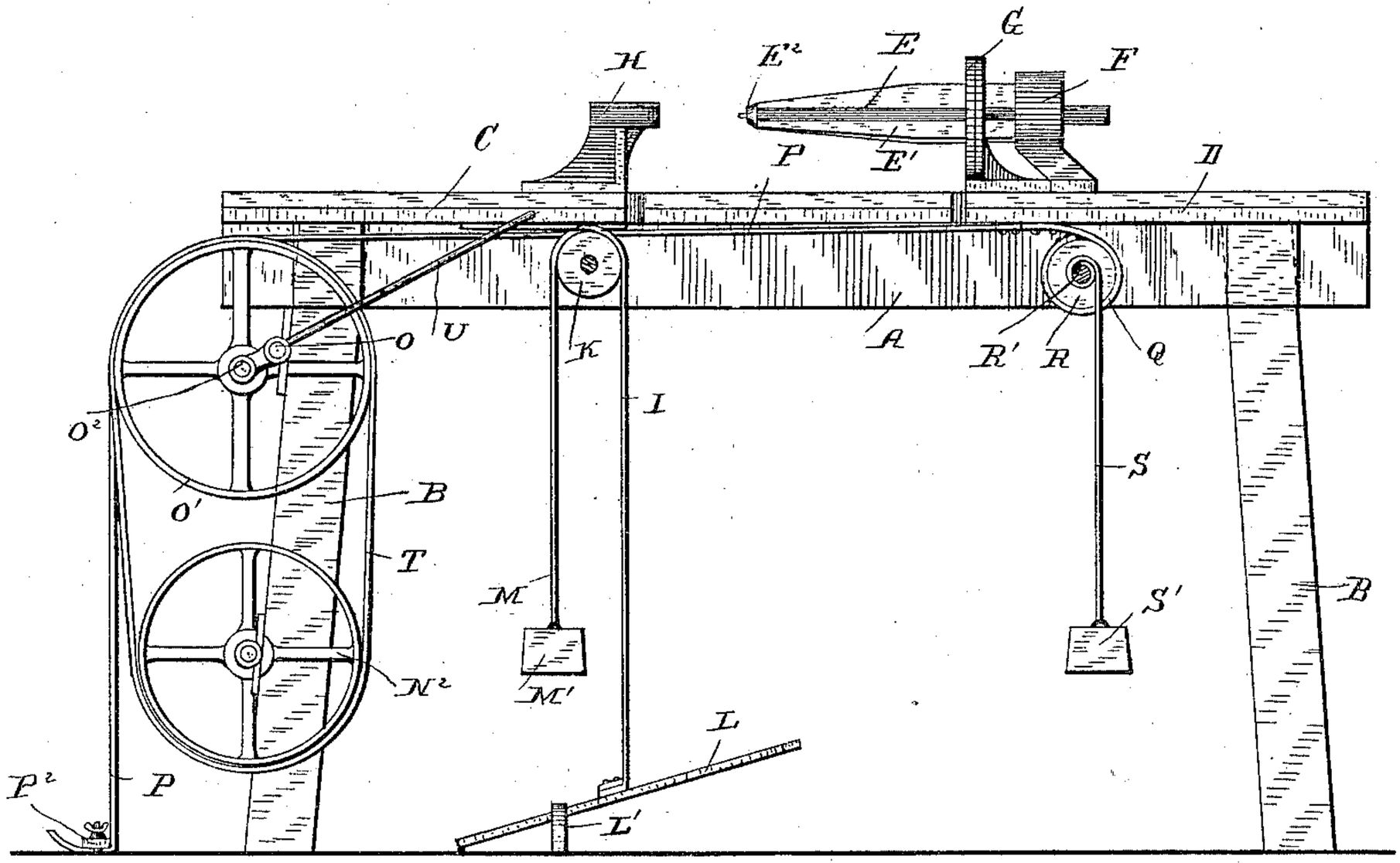
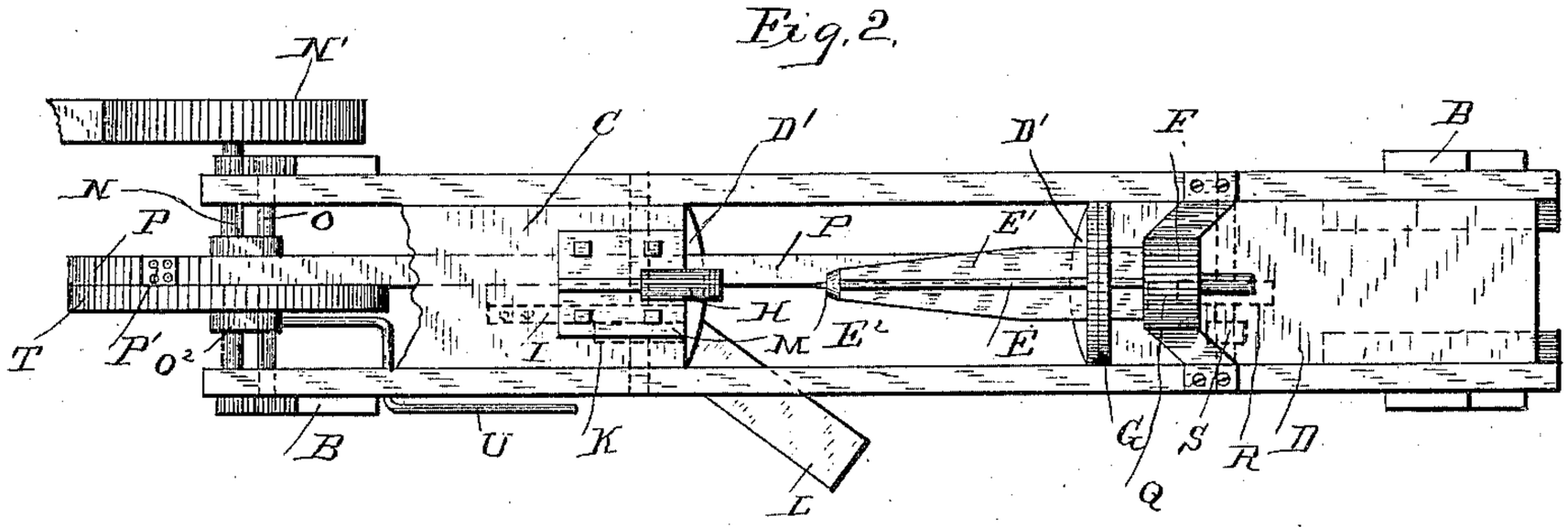


Fig. 2.



Witnesses.
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A. B. Fairchild.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

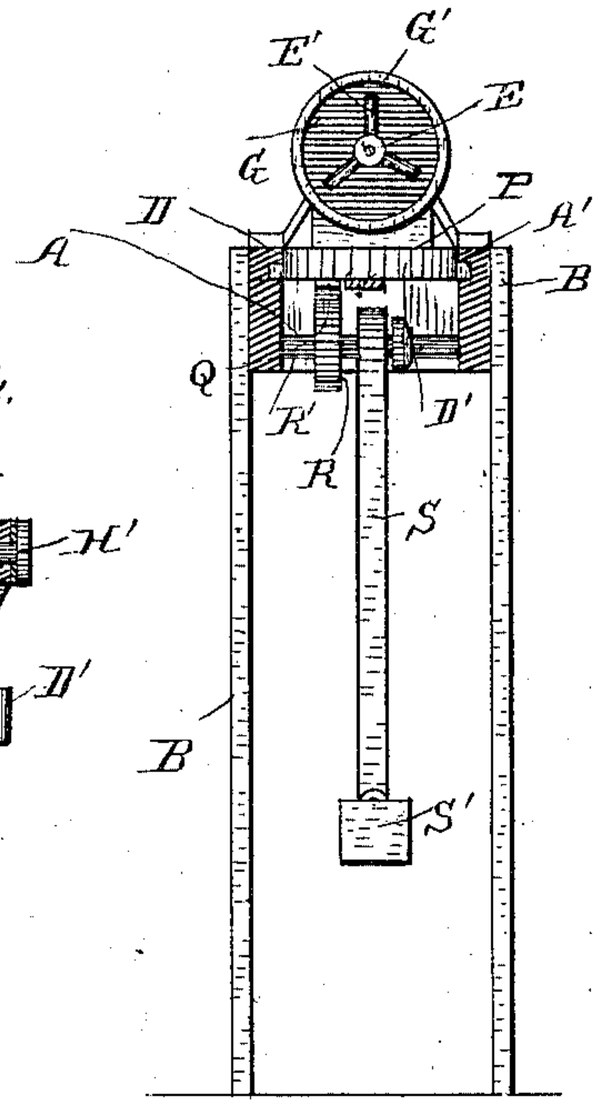


Fig. 4.

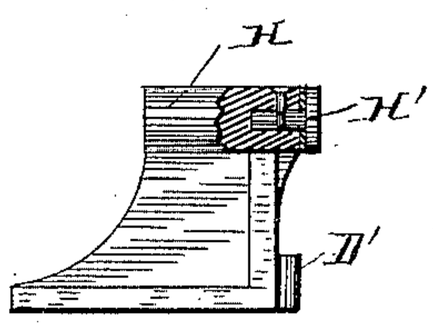


Fig. 5.

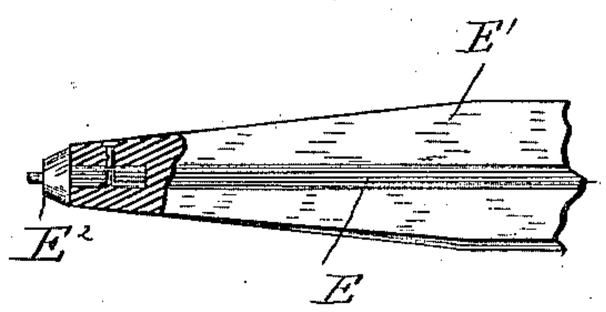


Fig. 7.

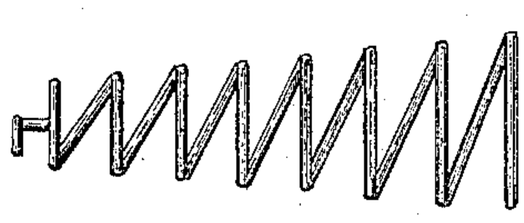
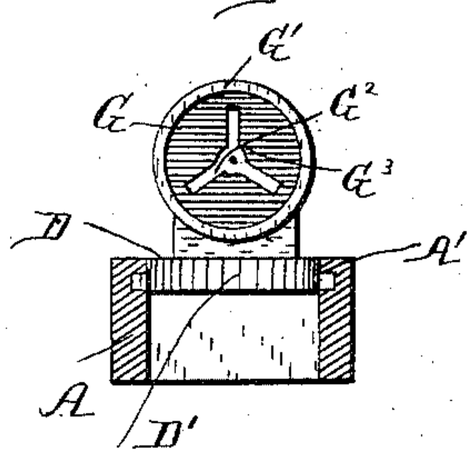


Fig. 6.



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UNITED STATES PATENT OFFICE.

HUGO BORCHARDT, OF BRIDGEPORT, CONNECTICUT.

MACHINE FOR SETTING SPIRAL SPRINGS.

SPECIFICATION forming part of Letters Patent No. 313,706, dated March 10, 1885.

Application filed August 4, 1884. (No model.)

To all whom it may concern:

Be it known that I, HUGO BORCHARDT, a citizen of the United States, residing at Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Machines for Setting Springs; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to the manufacture of coiled-wire springs, and has for its object to produce a simple and convenient device, to be operated by power, for setting the springs.

Heretofore, so far as I am aware, the setting of most classes of springs, particularly volute half-springs, has been performed by hand. This, when the springs are heavy, necessitates the exertion of considerable physical force, and is, moreover, as compared with my present method, a slow and expensive operation.

In order that the operation of setting may be performed as rapidly as the springs can be handled, I have devised the simple and novel machine which I will now describe, referring by letters to the accompanying drawings, forming part of this specification, in which—

Figure 1 is a side elevation of the entire machine, with one side of the frame-work wholly removed, leaving the slides in place; Fig. 2, a plan view with one of the slides partially broken away; Fig. 3, a transverse section between the slides, showing the mandrel and spring-carrying plate in elevation; Fig. 4, a detail of the bumper or striker; Fig. 5, a detail of the mandrel; Fig. 6, a front elevation of the rear slide which carries the spring-carrying plate, the mandrel not being shown; and Fig. 7, an elevation of a spring.

Similar letters indicate like parts in all the figures.

A indicates the side pieces of the machine, and B the legs.

C and D are slides arranged in ways A′ in the side pieces.

E is a mandrel, which is made integral with or firmly attached to a yoke, F, which is bolted to the side pieces. The mandrel I construct as indicated in Figs. 3 and 5—that is, to consist of radial wings E′, which gradually taper toward the apex of the mandrel, and are firmly joined together at the center thereof. Three or any suitable number of wings may be used; but three will be found quite sufficient. The object of this construction is to provide a firm support for the spring as the plate is moved forward in the act of setting a spring. At the end of the mandrel I provide a rotating point or pin, E^2, the shank of which extends into the mandrel, and is provided with a groove which is engaged by a pin or screw driven in from the outside, so that the point is firmly secured, but at the same time is free to rotate.

G is a plate carried by the rear slide, D. This plate is provided with radial slots G^2, which correspond in number with the radial wings on the mandrel, and are just large enough to permit the plate to slide freely over the mandrel.

G^3 are the solid portions of the plate between the slots which support the inner coils when the spring is compressed, as referred to above.

G′ is a flange around the outside of the plate, within which the base of the spring rests when the machine is in use.

H is a fixture attached to the front slide, C, which I term a "bumper." At the end of the bumper which is toward the mandrel I provide a plate, H′, with which the point E^2 of the mandrel is adapted to engage, and which is provided with a grooved shank engaged by a pin in the same manner as the point at the end of the mandrel, thus leaving plate H′ free to rotate, the purpose of which will presently be explained. As stated above, both slides are adapted to reciprocate in the ways. In Figs. 1 and 2 both slides are shown as in their normal position.

The slide C, which carries the bumper, is actuated as follows:

I is a strap attached to the under side of the slide far enough back to allow plenty of movement to the slide. This strap is carried forward over a pulley, K, journaled under the slide, and its lower end attached to a foot-lever, L, hinged to the floor.

M is a strap attached to the under side of slide C, near its forward end, which is carried back over pulley K, and provided at its lower end with a weight, M′, which is sufficiently heavy to draw back slide C the moment the foot is lifted from lever L. Straps I and M, both of which pass over pulley K, are arranged side by side, so that neither interferes with the working of the other.

L′ is a metallic strap which straddles the foot-lever and acts as a stop to limit the backward movement of the slide, caused by weight M′, when the foot is lifted from lever L. The setting of the springs is caused by the forward movement of the spring-carrying plate G, which is carried by the other slide, D. The necessary movement may be imparted to this slide in any suitable manner, although I preferably use the mechanism which I have illustrated in my drawings.

N is the driving-shaft journaled in bearings secured to the frame-work of the machine, and N′ the driving-pulley carrying a belt from a main or counter shaft.

N^2 is a belt-carrying pulley rigid upon the driving-shaft.

O is a crank-shaft journaled in the same manner as the driving-shaft, but above it.

O′ is a loose belt-pulley journaled upon the wrist O^2 of the crank-shaft.

P is a belt, the end of which is attached to the floor by a clamp, P^2, and which extends up over pulley O′, to which it is attached, as at P′, then back under slide C, and is attached to the front end of slide D.

Q is a strap attached to the under side of slide D, and extending back and partially around a pulley, R, secured to a journaled shaft, R′, under slide D.

S is a strap coiled around shaft R′, and having a weight, S′, at its lower end, which acts to draw slide D and the spring-carrying plate back to their normal position, as shown, after they have been moved forward. The exact position of slide D depends upon the adjustment of belt P, as will be more fully explained.

T is a belt, which passes loosely around pulleys N^2 and O′, when the latter is in the position shown, so that no motion will be imparted to pulley O′.

U is an operating-rod attached to the crank-shaft, by which the crank-shaft may be partially rotated, thus raising pulley O′ and tightening belt T, which causes the rotation of pulley O′. As pulley N^2 rotates from right to left, pulley O′ must move in the same direction and carry belt P, which is attached thereto, with it, thus moving slide D forward until it comes in contact with slide C. I preferably place rubber cushions D′ upon one or both slides, to prevent their striking together too forcibly.

The operation is as follows: The spring as coiled is placed over the mandrel, with the base of the spring resting on plate G within the flange. Lever L is then pressed down by the foot, overcoming the power of weight M′ and moving the bumper up against the mandrel, the pin at the end of the mandrel engaging the rotating plate upon the bumper.

To set the spring, it is simply necessary to press down upon the operating-rod U, which acts to partially rotate the crank-shaft, thus lifting the loose belt-pulley O′ upon the wrist of the crank-shaft until belt T is tightened, which then transmits the motion of pulley N^2 to the loose pulley. As soon as pulley O′ begins to rotate it carries belt P forward, thus drawing slide D and the spring-carrying plate forward until further movement is stopped by the contact of the two slides, at which instant the spring will have been compressed until the base and the apex are in the same vertical plane. It will of course be understood that this compression of the spring will tend to unwind the inner coils.

In order to permit a natural unwinding of the coils, thus giving the best possible shape to the spring when set, I have so arranged both the point of the mandrel and the plate upon the bumper, with which it engages, that both may rotate freely, as fully explained above. When slide D is drawn forward, that portion of belt P which is carried over pulley O′ will drop loosely to the floor. This action, however, is instantaneous only, as the moment the hand is removed from the operating-lever the weight of pulley O′ will cause it to drop down, which slackens belt T and allows weight S′ to draw slide D and the spring-carrying plate back to their normal position. Slide C and the bumper are likewise drawn back to their normal position by weight M′ the instant the foot is lifted from lever L. A single compression of the spring gives it the proper "set." The instant the foot is removed from lever L and the hand is removed from the operating-rod both slides move back to their normal position. The spring may then be removed from the mandrel and another placed on it, when the operation is repeated as before. The only adjustment required in changing to longer or shorter springs is to lengthen or shorten belt P, which is readily accomplished by loosening clamp P^2, when the belt may be moved until slide D and the spring-supporting plate are properly adjusted.

I do not desire to limit myself to the exact details of construction shown and described, as it is apparent that they may be varied within reasonable limits without departing from the spirit of my invention.

I claim—

1. The combination, with a stationary mandrel and a spring-carrying plate adapted to slide over said mandrel, of a bumper adapted to be moved against the point of the mandrel, and mechanism for moving said plate against the bumper, whereby the spring may be compressed until its coils are in the same plane.

2. The combination, with a stationary mandrel having a point which is adapted to ro-

tate, and a spring-carrying plate adapted to slide over said mandrel, of a bumper adapted to be moved against the mandrel, and provided with a plate which is free to rotate and is adapted to engage the point of the mandrel, and mechanism for moving said plate against the bumper.

3. The combination, with a stationary mandrel consisting of radial wings which taper toward the apex and are firmly joined together at the center of the mandrel, and a plate adapted to slide over said mandrel, and provided with radial slots corresponding with said wings, and solid bearing-points between said slots, of a bumper adapted to be moved against the point of the mandrel, and mechanism for moving said plate against the bumper, whereby when a spring is compressed the inner as well as the outer coils are supported by said plate.

4. The mandrel and a bumper adapted to slide against its apex, in combination with a movable slide carrying a plate which slides over the mandrel, a belt attached to said slide, which passes over a loose pulley journaled on a crank-shaft and is attached to the floor, a belt passing over the driving-pulley and said loose pulley, and an operating-rod attached to the crank-shaft, which is adapted to raise the loose pulley and tighten the driving-belt, whereby said slide and plate are moved forward against the bumper.

5. The mandrel, the bumper, the spring-carrying plate, and slide D, in combination with belt P, pulleys N^2 and O′, the crank-shaft, belt T, and strap and weight S S′.

6. The mandrel having wings E′, the plate carried by slide D, and having slots corresponding with said wings, and the bumper carried by slide C, in combination with belts P and I, and mechanism acting in connection with said belts to actuate the slides.

7. In a spring-setting machine, slide D, carrying plate G, and belt P, attached to said slide, to pulley O′, as at P′, and adjustably attached to the floor by a clamp, P^2, and bumper H, in combination with a pulley on the driving-shaft, a belt connecting said pulley with pulley O′, and mechanism for raising pulley O′ to tighten the belt.

8. In a spring-setting machine, slide D, carrying plate G, said slide being actuated by belt P, as described, and returned to its normal position by belts Q and S and a weight, in combination with slide C, carrying the bumper, which is actuated by belt I and a foot-lever, and returned to its normal position by belt M and weight M′.

9. Slide D, carrying plate G, and actuated by belt P, shaft R′, carrying pulley R, belts Q S, and weight S′, in combination with slide D, carrying bumper H, pulley K, belts I M, weight M′, and the foot-lever.

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

HUGO BORCHARDT.

Witnesses:
A. M. WOOSTER,
A. B. FAIRCHILD.