

(No Model.)

4 Sheets—Sheet 1.

G. HAYES.

MACHINE FOR BENDING AND MOLDING SHEET METAL.

No. 304,001.

Patented Aug. 26, 1884.

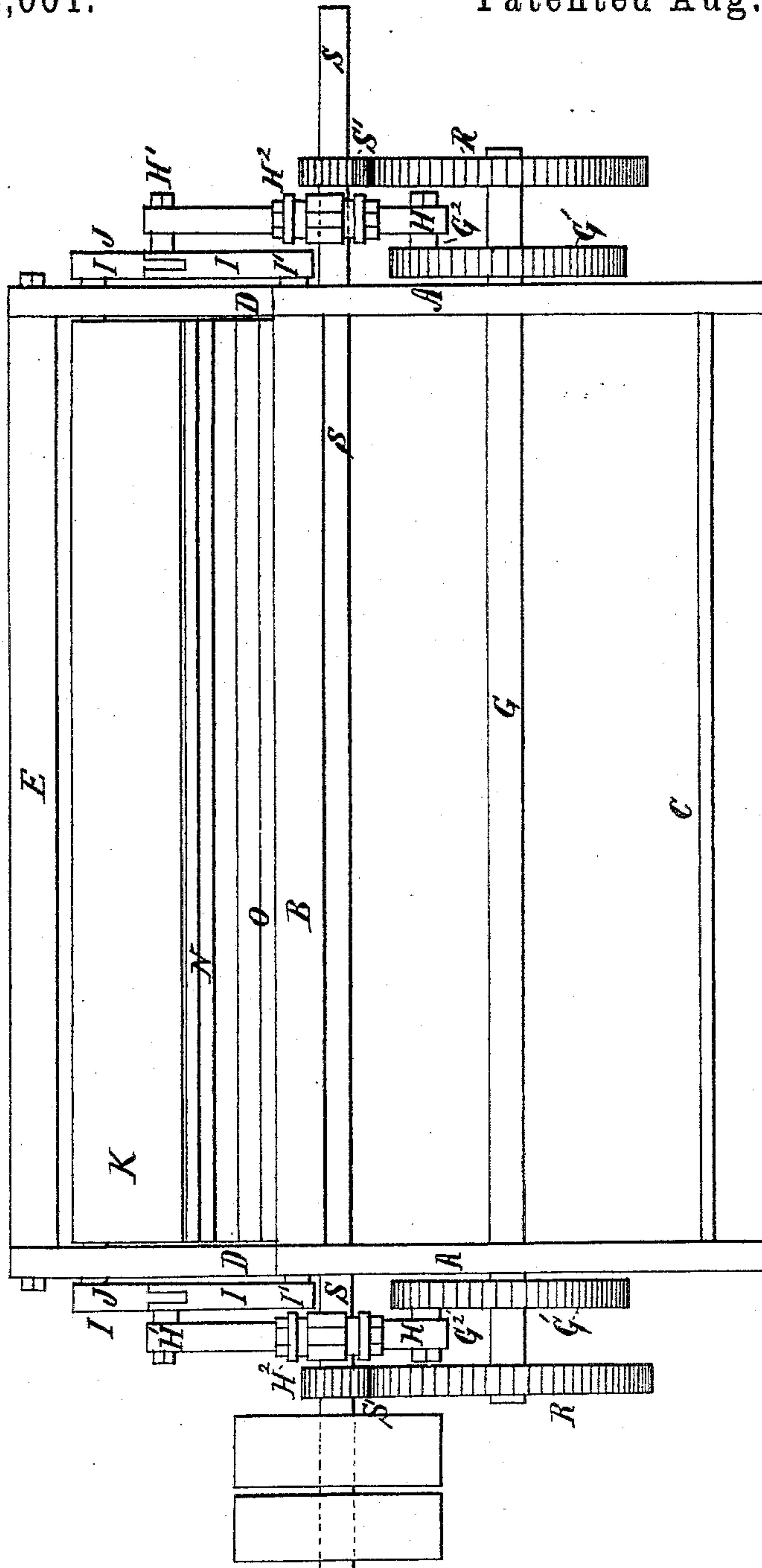


Fig. 1.

Witnesses:
Jacob Koch
Charles Hayes

Inventor:
G. Hayes.

4 Sheets—Sheet 2.

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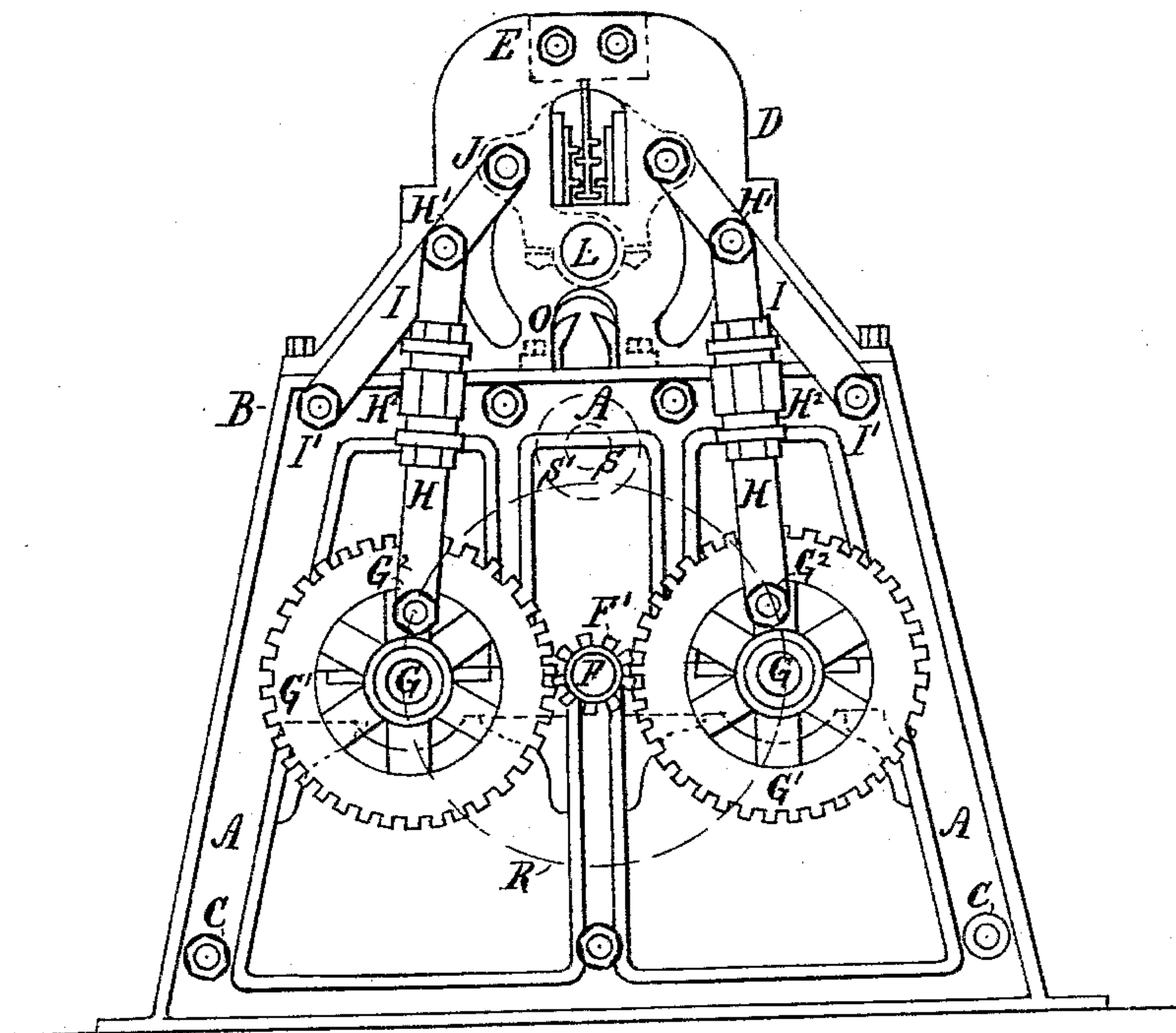


Fig. 2.

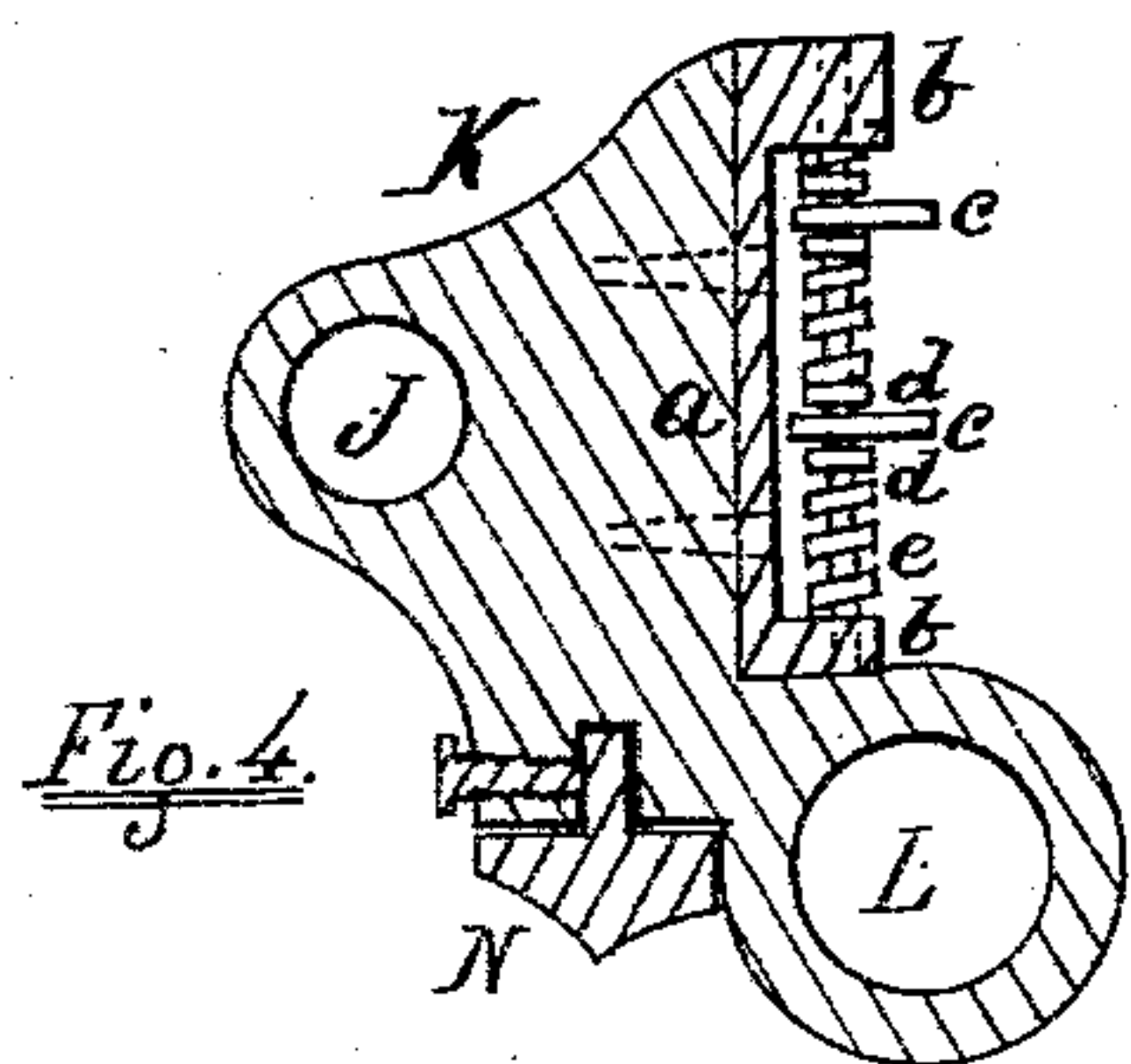


Fig. 4.

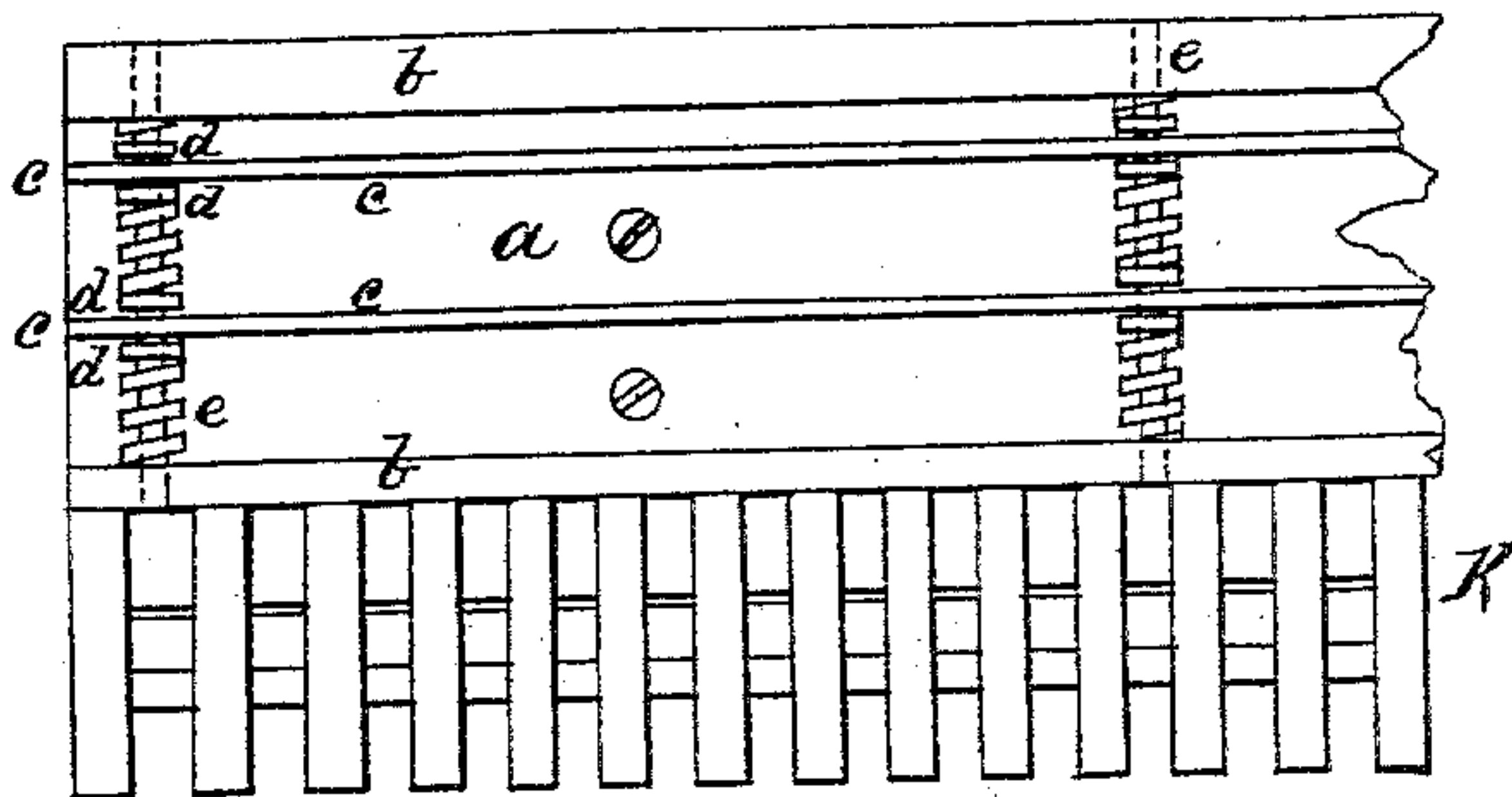


Fig. 5.

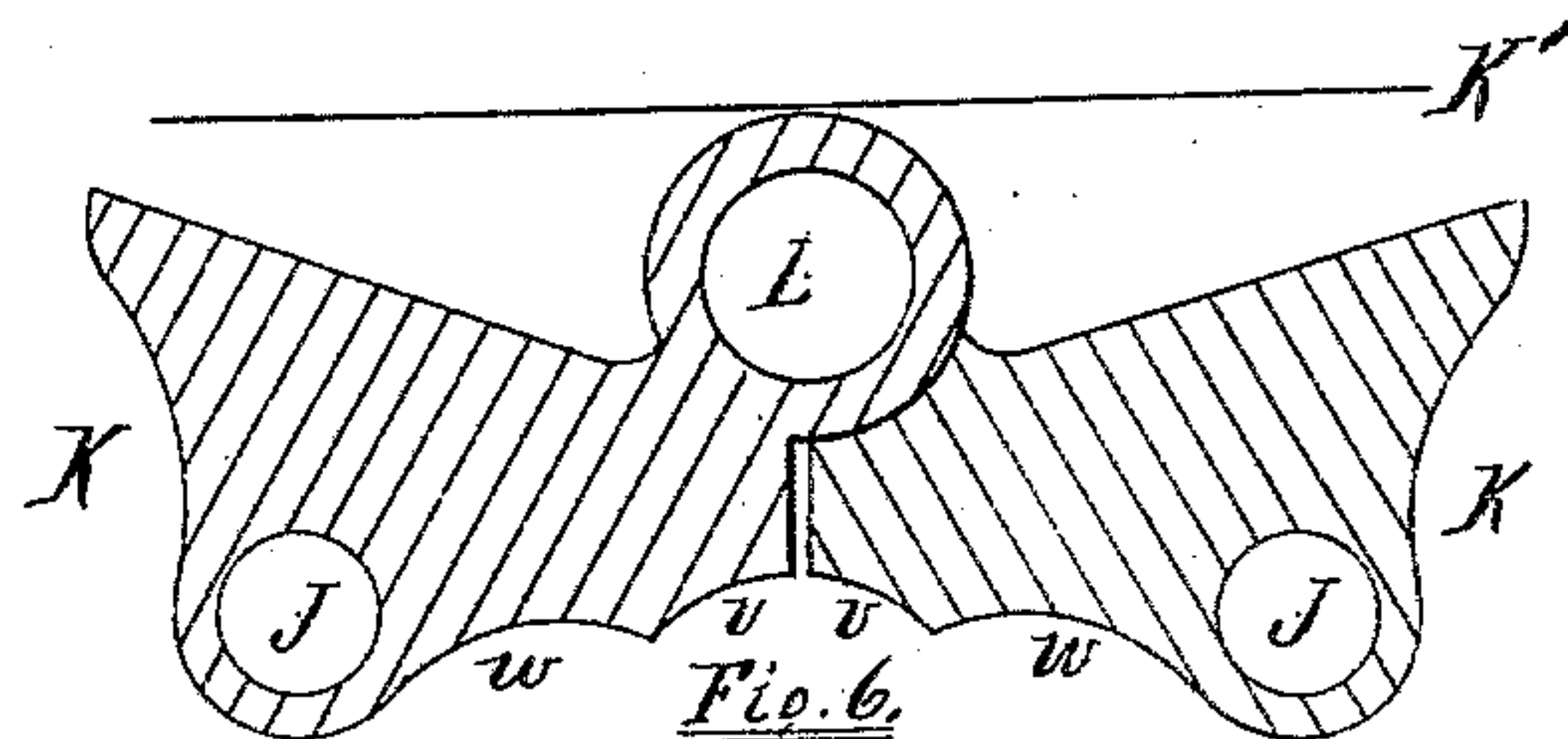


Fig. 6.

Witnesses

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Charles Hayes

Inventor 2

73
Curt Hayes

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4 Sheets—Sheet 3.

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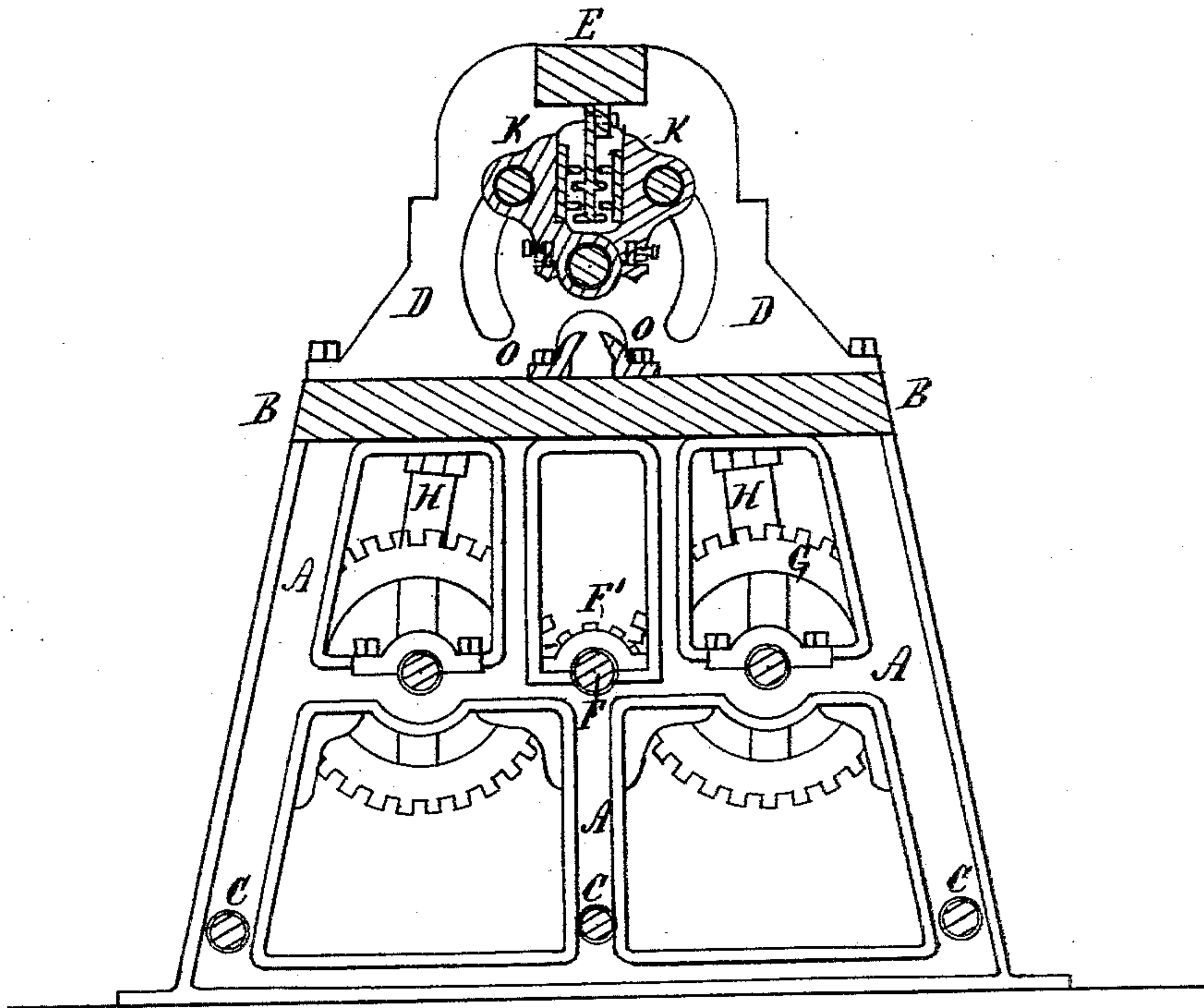


Fig. 3.

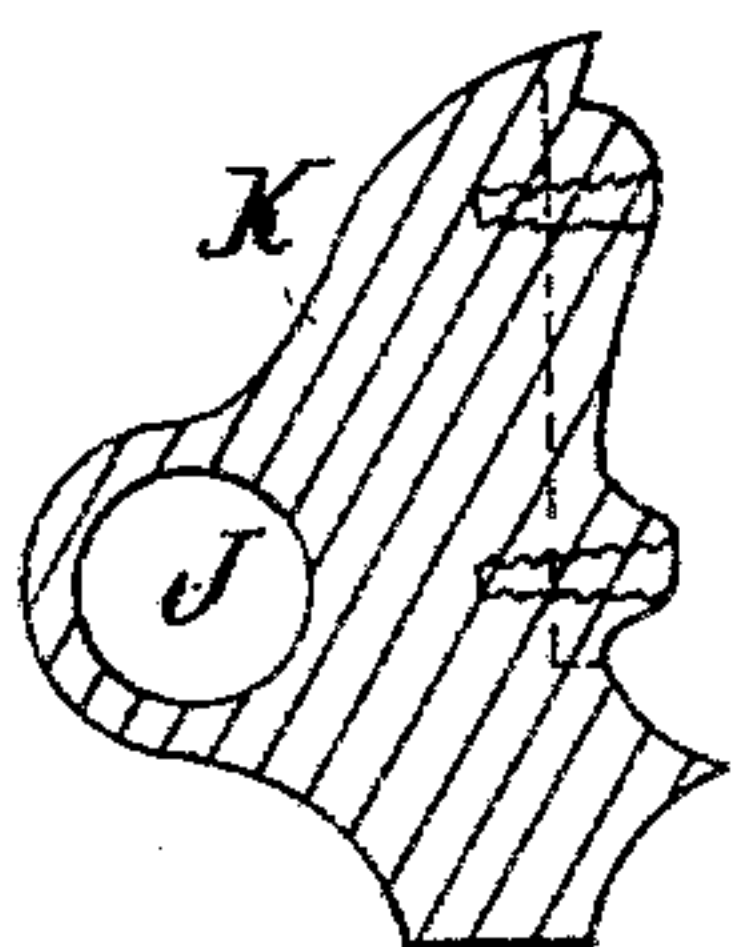


Fig. 8.

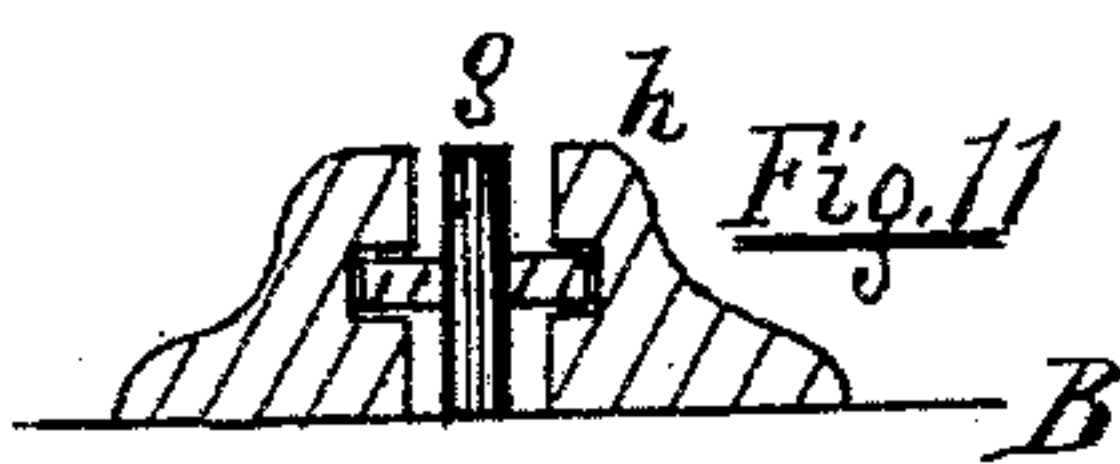


Fig. 11

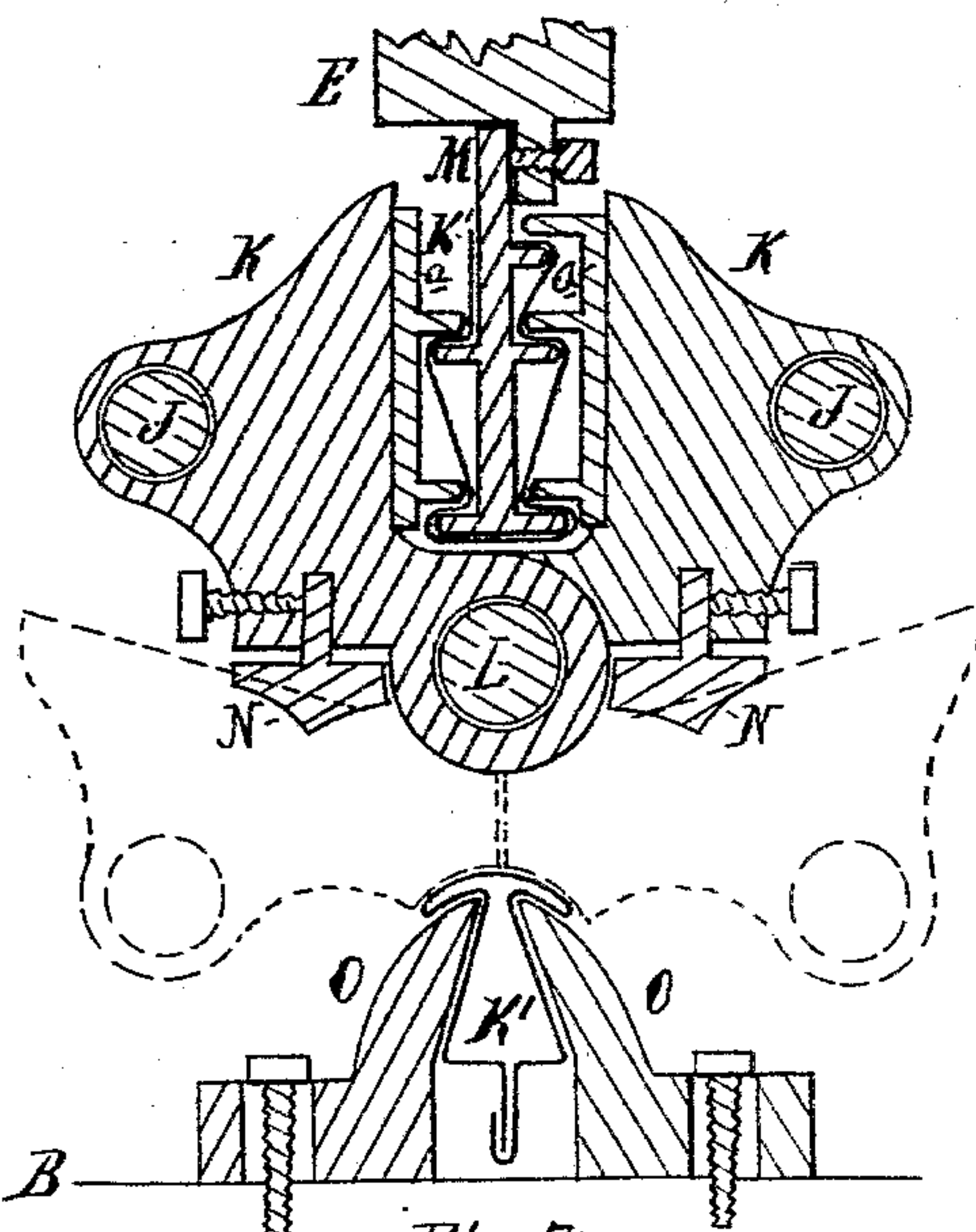


Fig. 7.

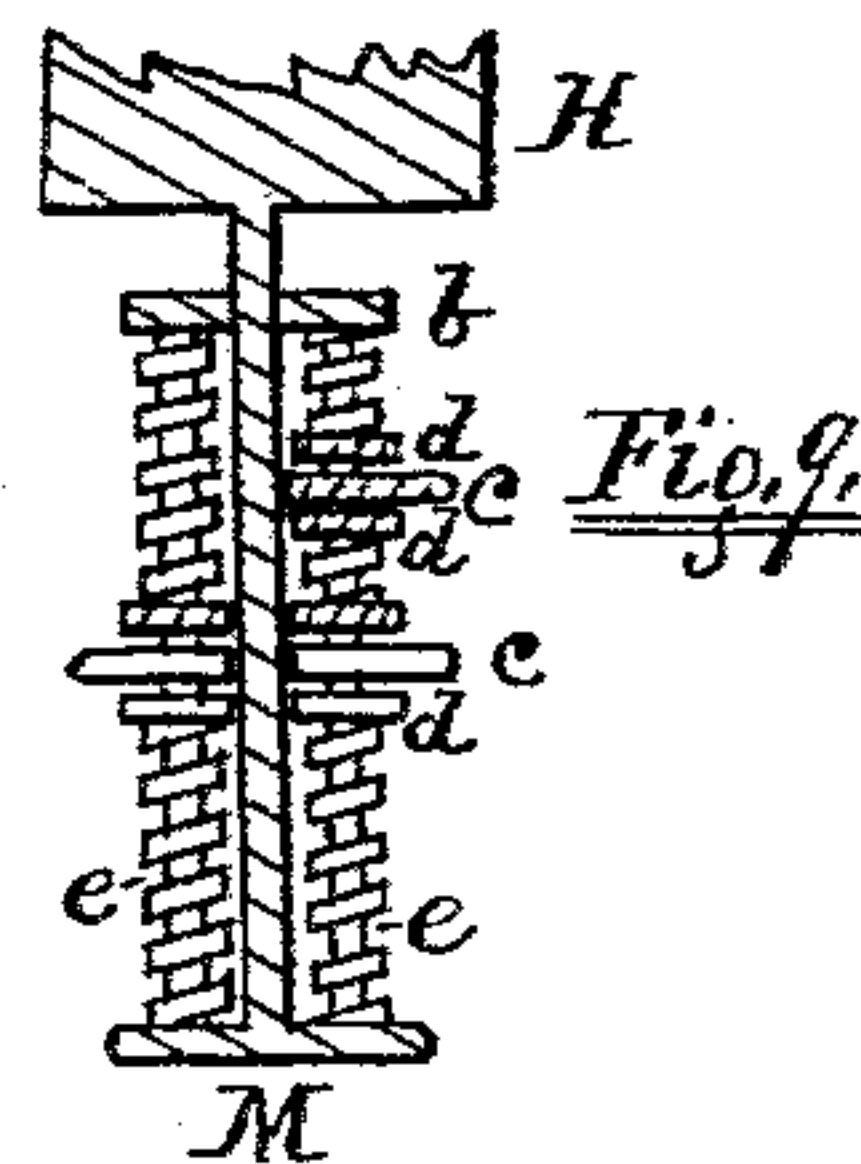


Fig. 9.

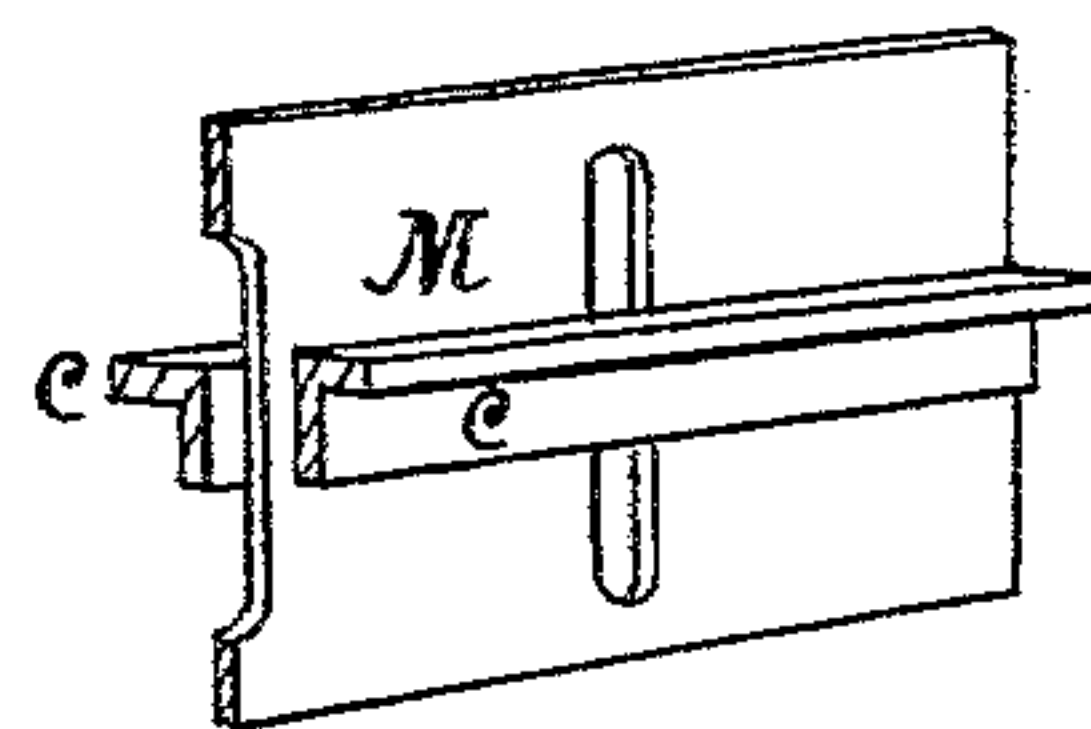


Fig. 10.

Witnesses
Jacob Koch
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(No Model.)

4 Sheets—Sheet 4.

G. HAYES.

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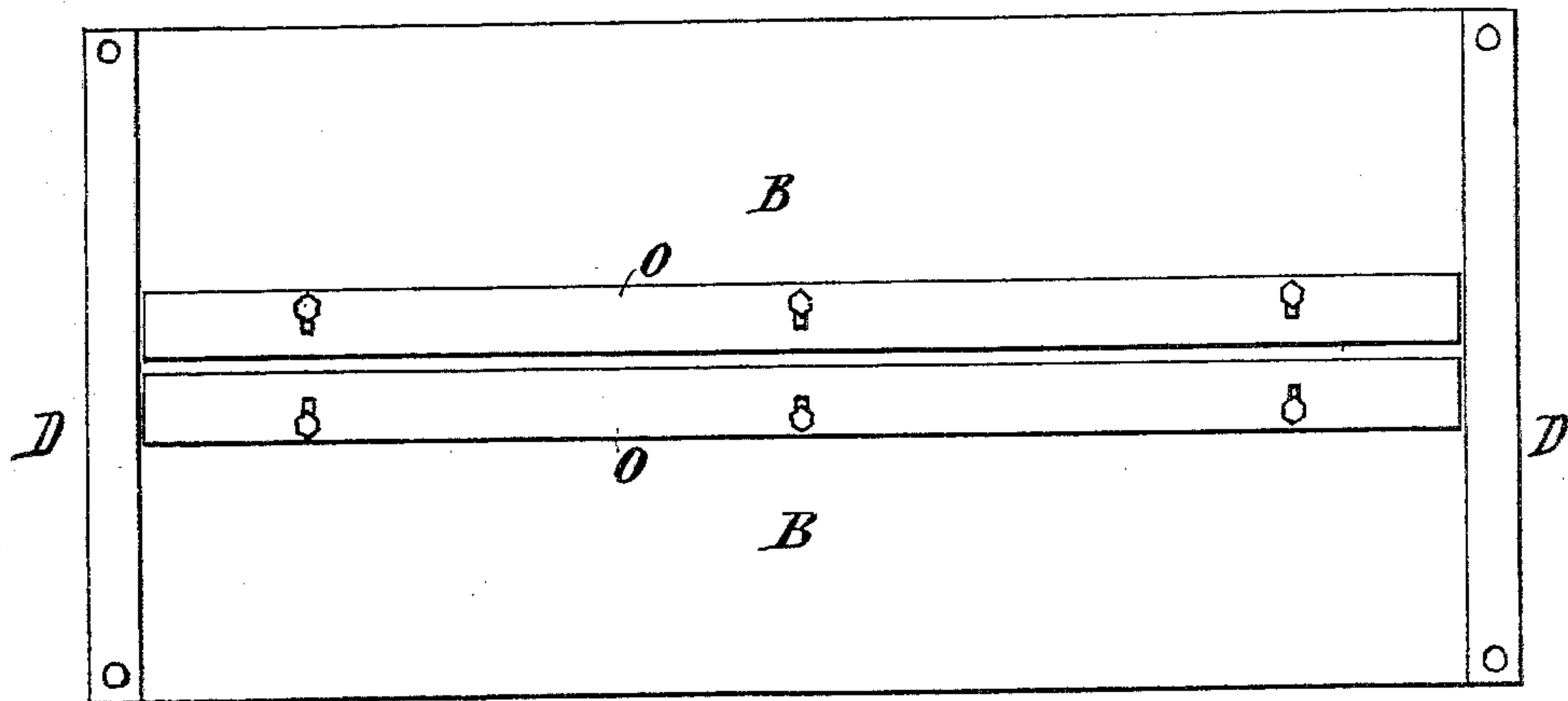


Fig. 12.

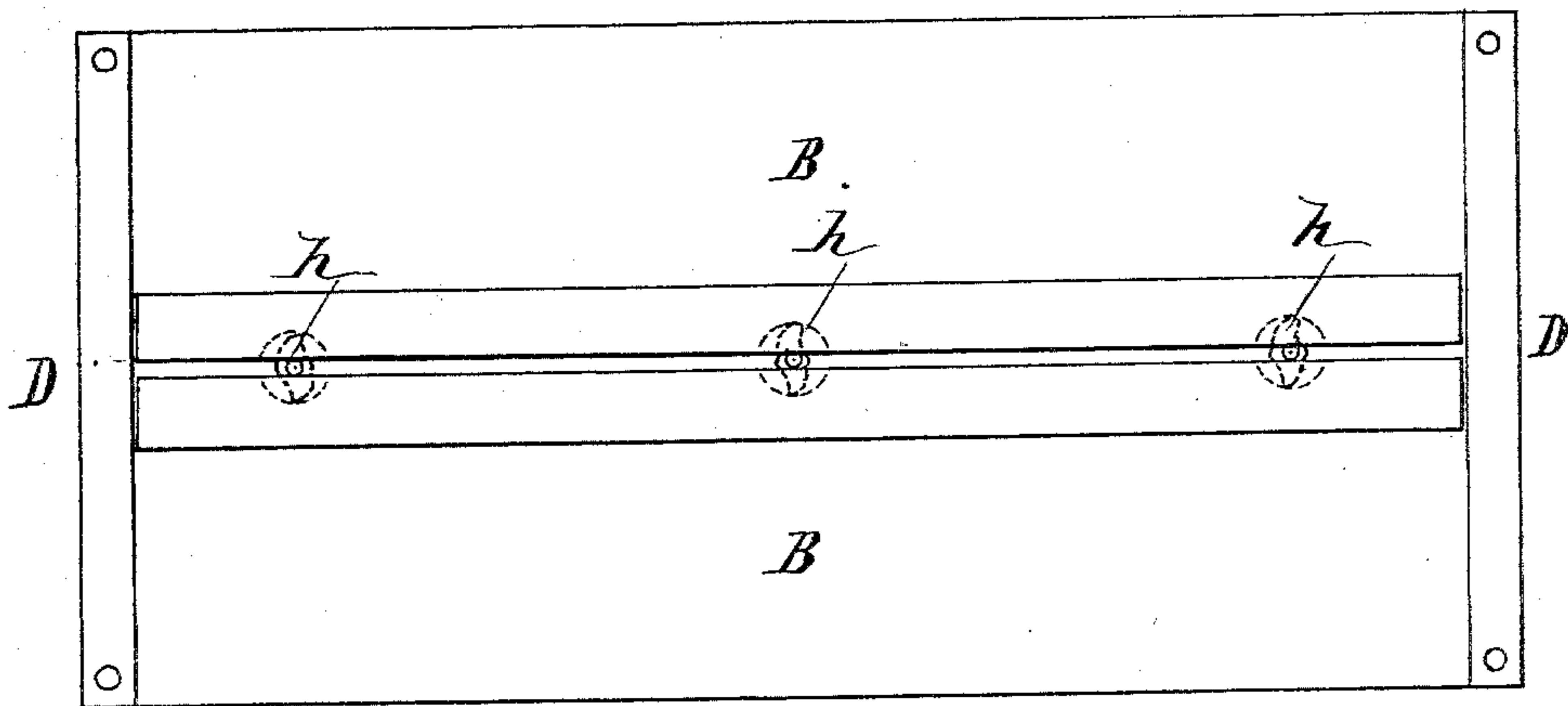


Fig. 13.

Witnesses

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Richard H. Reilly.

Inventor

George Hayes.

UNITED STATES PATENT OFFICE.

GEORGE HAYES, OF NEW YORK, N. Y.

MACHINE FOR BENDING AND MOLDING SHEET METAL.

SPECIFICATION forming part of Letters Patent No. 304,001, dated August 26, 1884.

Application filed June 6, 1883. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HAYES, a resident of the city, county, and State of New York, have invented a new and useful Machine for Bending, Molding, and Folding Sheet Metal into Shapes for Architectural and Building Purposes, of which the following is a specification.

The object of this machine is to construct or "form up," by bending, molding, and folding sheet metal into skylight and other sash-bars, rafters for glazed roofs, posts for turrets, cornices, moldings, casings, &c.

Figure 1 is a front elevation of the machine; auxiliary shaft and gearing are also shown, illustrating the position when used. Fig. 2 is an end elevation of the machine, showing the gearing, levers, and connections with the dies, also auxiliary shaft and gearing. Fig. 3 is a vertical cross-section of the machine, illustrating the position of die holders or jaws when closed above. Fig. 4 is a cross-section of one jaw, showing adjustable dies therein. Fig. 5 is an interior face elevation of the die-holder and its rings, giving one-half of the joint and also the die-bars with adjusting-screws. Fig. 6 is a sectional view of the two die-holders alone joined, but without the rod through the joint or other connections. This view illustrates how they may be thrown backward and a sheet of metal laid thereon. A line drawn across shows the position of the sheet. Fig. 7 is a cross-section of the die-holders with dies therein. The dies of the bed are also shown in section. The jaws in this view are shown closed toward the tongue suspended from the cross-head of the machine. A sheet of metal is shown therein as when bent thereby for a skylight-bar. The dies of the bed are also shown as having a sheet of metal therein, being the same which had first been pressed into shape (as shown) by the upper dies, being herein placed to receive a finishing bend as the die-holders are brought backward and downward thereon. Thus the gutters of the skylight-bars (pressed first by the upper dies into the shape as shown therein) are shaped herein to a proper curve. Dotted lines in this view show the position of the die-holders when thrown backward. The removable or

adjustable dies are not so shown to prevent confusion of lines. At the heel of the die-holders, instead of an extra die being added, as shown by the full lines, the die-holder at the lower back part may be so shaped as to give the necessary bend, when in proper position therefor, about as shown by the dotted lines. Fig. 8 shows in cross-section a die-holder faced with or having added thereto (in place of the adjustable dies, as before shown) molded facing or die, illustrating how varieties of moldings may be made by closing jaws thus provided upon a tongue also similarly provided. Fig. 9 shows in cross-section the upper tongue provided with adjustable dies, illustrating the manner of adjusting the dies belonging thereto. Fig. 10 shows cross-section and a portion, in perspective, of the tongue provided with dies adjustable by slots and bolts. Fig. 11 shows in cross-section a die for the bed adjustable by another means than that of Fig. 7, pins being inserted downward into the bed, and each pin provided with an eccentric-wheel shaped like a button, turning in grooves formed in the dies, which when turned will increase or diminish the distance of the dies from or toward each other. Fig. 12 represents a plan of the bed of the machine with the dies thereon, the same being shown in section, Fig. 7, adjustable as to their distance apart by screws through slots in the dies. Fig. 13 represents the same bed of the machine and dies, the dies shown as adjustable by means of an eccentric or button, shown sectionally in Fig. 11.

A represents the side standards, being the main standards of the machine and supports for the working parts, gearing, running shafts, &c.

B represents the bed of the machine, and C brace-rods connecting the end standards. There may be as many of these brace-rods as requisite for strength.

D represents the superstandards, and E the main cross-head.

F represents the main or central shaft, which may or may not be provided with pulleys and used for the driving-shaft; or other auxiliary or counter-shafts may be added, making up a compound gearing to gain power or diminish

speed, as shown in Figs. 1, 2, in which case the shaft above becomes the driving-shaft, and is provided with pulleys, and arranged to gear, by a gear-wheel thereon, with the other gear-wheels there shown. The central shaft, F, is provided with a gear-wheel, F', at each end, and is journaled to the main standards A centrally.

G represents shafts or journaled gearing, one each side of the central shaft, F; also journaled to the main standards A, on a level with central shaft, F, and provided at each of their ends with a gear-wheel, G', used as a crank-wheel, of larger diameter than the gear-wheel F' of shaft F, with which they are arranged to engage, and to each of these wheels G' is pivoted, at G², the lower end of a connecting-rod, H, so that the wheel G' serves as a crank-wheel thereto. The rods H extend upward, and at H' the upper end of each is pivoted to lever I. The rods H are in two sections or lengths. Upon the two approaching ends of each length a sleeve, H², is threaded, so that the rod H may be shortened or lengthened by the turning of the sleeve thereon. At I are shown toggle-levers in two sections, pivoted to the main standards of the machine at I' as the fulcrum therefor, and the two sections of toggle-lever are also connected to rod H. Each upper end thereof at J is also pivoted or hinged to a die-holder, K. The die-holders K are double, and are hinged at L together by a hinge-joint, a series of rings being cast upon each, which intersect when in place, and through which is passed a rod, serving to connect the die-holders. The ends of the rod are journaled to the superstandards D, so that the die-holders may swing thereon by forward and backward motion as the toggle-levers I are forced upward and downward, thereby bringing the jaws together and opening them again. These die-holders are each provided on their interior faces with a plate, *a*, having an upper and lower flange, *b*, between which are arranged dies *c*, rendered adjustable and changeable by means of permanent screws passed through the flanges, and also through the dies, upon the threads of which the dies are traversed by turning the jam-nuts *d*.

Between the die holders or jaws is arranged a stationary plate, M, suspended from the cross-head E, forming, with regard to the swinging die-holders, a tongue, and upon each side of which are arranged dies, rendered adjustable and changeable also by threaded rods *e* and jam-nuts *d*. This tongue serves as a mandrel and is stationary. The swinging die-holders K are closed upon this tongue M like jaws, folding, bending, and pressing the sheet of metal K', which has been placed thereon, into shape between the dies of the jaw and the tongue.

The heel or each of the die-holders K is adapted to and provided with adjustable and changeable dies N, secured by thumb-screws, which, by the backward or downward action of the die-holders, will engage or come into

conjunction with stationary, adjustable, and changeable dies O, secured to the bed B of the machine by thumb-screws (single or double) or other suitable device, which dies O form with regard to the swinging dies or jaws N, a tongue or mandrel over and around which the sheet metal is bent, molded, or folded, as the lower jaws are closed thereon, about as shown in Fig. 7. All of the jaws may have their working-faces molded, as in Fig. 8, to shape the sheet of metal in conjunction with the tongues or mandrels, also faced to correspond instead of the adjustable dies, if desired. The facings may be a part of the same or separately added thereto; also the dies or die-faces of the one side jaws and tongues may be adapted to form one shape in sheet metal, while those of the other side may form another, so that different forms, moldings, or devices may be made in the same machine at the same time from the same sheet. By distending or shortening one of the arms or rods H, operating the toggles in moving the jaw, one jaw may be brought down and form and clamp the molding on one side, while the other, coming down afterward, will bend the other portion of the sheet into shape, which is a great advantage in making some forms of moldings, wherein the necessity arises of one portion being held while the other portion undergoes forming.

In Figs. 4 and 5, *a* represents a plate fastened to the die-holder K by screws or other suitable means.

b represents flanges thereto through which is a traversing screw, *e*.

c represents die-bars, and *d* jam-nuts threaded on the screws. By turning the jam-nuts the die-bars are forced upward or downward so as to increase their distances apart or diminish the same, so as to bring the die-bars to the exact point required to bend the metal sheet.

In Fig. 9, the tongue M is shown as provided with screw *e*, die-bars *c*, and jam-nuts *d*, for adjusting the die-points to the required place for their effective operation on the sheet of metal.

In Fig. 10 a means is shown of adjusting die-bars to the tongue M. Slots are formed in the tongue at proper distances, and through said slots and proper holes in a flange of the die-bars, bolts (not shown) are provided, which may be tightened by any of the usual means. This admits of the bars being raised or lowered when desirable.

In Fig. 7 the dies upon the bed B are shown in section adjustable by means of screws passing downward through slots in the dies and entering the bed when tightened, rendering the dies secure.

In Fig. 11 another means is shown for adjusting dies upon the bed B. At suitable points a pin, *g*, is passed down into the bed-plate, and upon the pin is arranged a button, *h*, which, upon being turned, will cause the dies to spread apart or bring them together, as desired.

I do not confine myself to these methods of

attaching dies to the bed, or to the shape shown, as other methods and other forms of dies may be used in this machine.

In Fig. 6 the die-holders are shown in section as thrown backward, and a line, K', drawn above gives the position of the sheet of metal as placed thereupon for bending within the upper jaws. When in this position, the lower dies, in conjunction with dies upon the bed, operate upon the sheet metal between them, and the curves in Fig. 6 marked *v* and *w* may either or both be used upon corresponding dies on the bed to shape metal as desired. The backs of the die-holders K may also be shaped in various forms, or faced or provided with adjustable bars, and used to form up an endless variety of moldings suitable for casings, cornices, hand-rails, sash-bars, &c.

I do not herein claim auxiliary shafting or compound gearing, (shown in Figs. 1 and 2 of the drawings,) as they are included in and claimed in application No. 121,910, with additional improvements on this same machine, consisting of other devices in combination or to operate in conjunction with those herein described.

What I claim as new, and desire to secure by Letters Patent of the United States, is—

1. A machine for bending, molding, and folding sheet metal, constructed with end standards, A, bed B, provided with adjustable and changeable mandrel-dies O, super standards D, cross-head E, provided with tongue or die-holder M, shafts F G, geared together, rods H, adjustable by sleeve H², toggle

arms or levers I, and die-holders or jaws K, all arranged and combined substantially as shown and described.

2. The geared shafts F G, rods H, toggle-levers I, and jaws or die-holders K, hinged or jointed together, all combined to operate on sheet metal, substantially as shown and described.

3. In combination with jaws K, the tongue or mandrel die-holder M, faced or provided with adjustable dies, and suspended from a cross-head, E, essentially as shown and described.

4. In combination with jaws K, constructed as described, and hinged together, the adjustable dies N, connected to the heels of the jaws K, essentially as shown and described.

5. The combination of die-holders K, dies N, tongue or mandrel M, and dies O, the die-holders being faced or provided with dies and adapted to be operated essentially as shown and described.

6. The plate *a*, having flanges *b*, and provided with die points or bars *c*, threaded rods *e*, and jam-nuts *d*, essentially as shown and described.

7. In combination with die-holders K and dies N, the dies O upon bed B, adjustable and changeable, essentially as shown and described.

GEO. HAYES.

Witnesses:

RICHARD H. REILLÉ,
E. T. CLARK, Jr.