

(No Model.)

6 Sheets—Sheet 1.

J. COCCHI & F. A. ZEITLER.  
MECHANICAL ATTACHMENT FOR MUSICAL INSTRUMENTS.

No. 467,572

Patented Jan. 26, 1892.

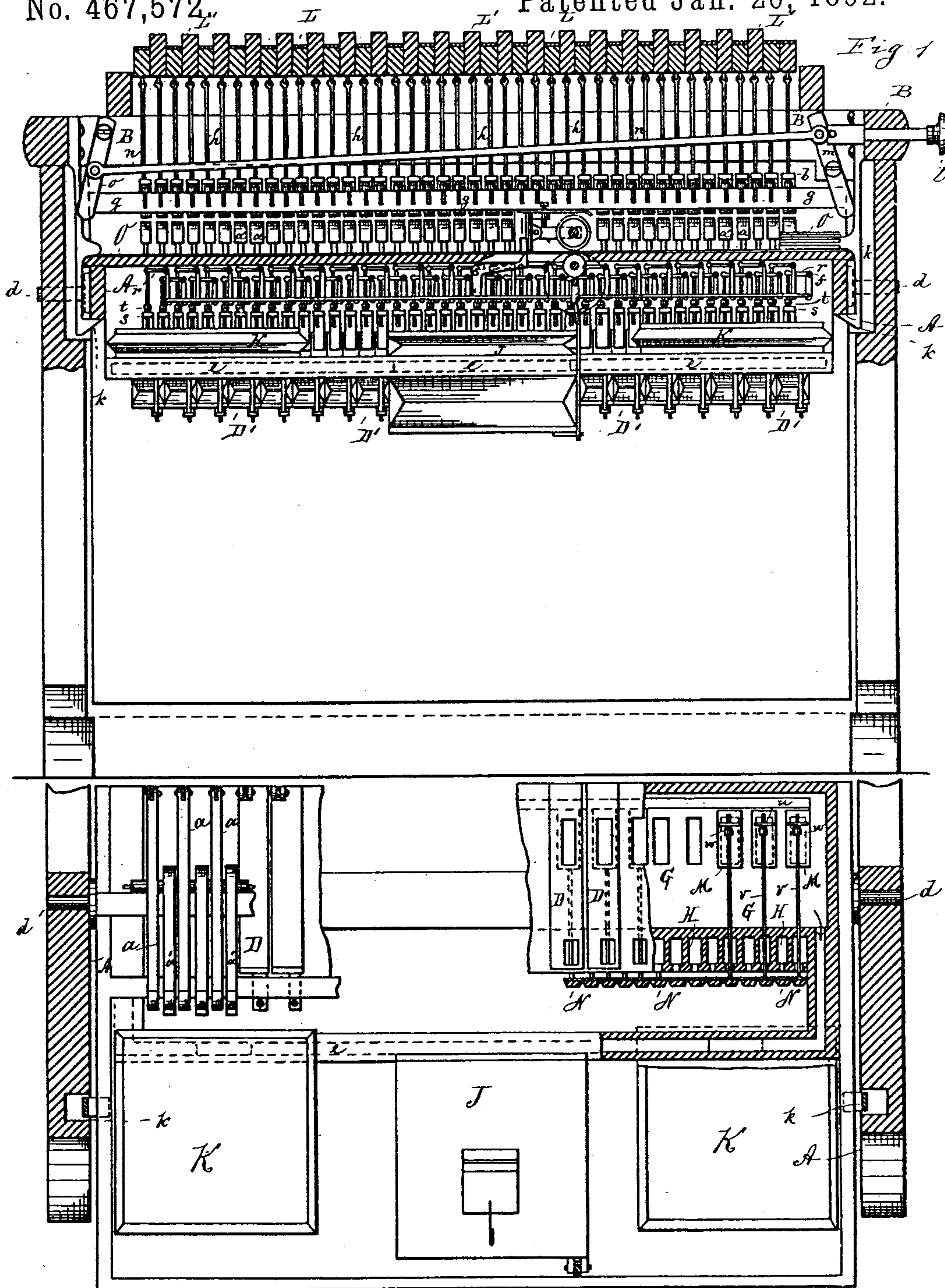


Fig. 3

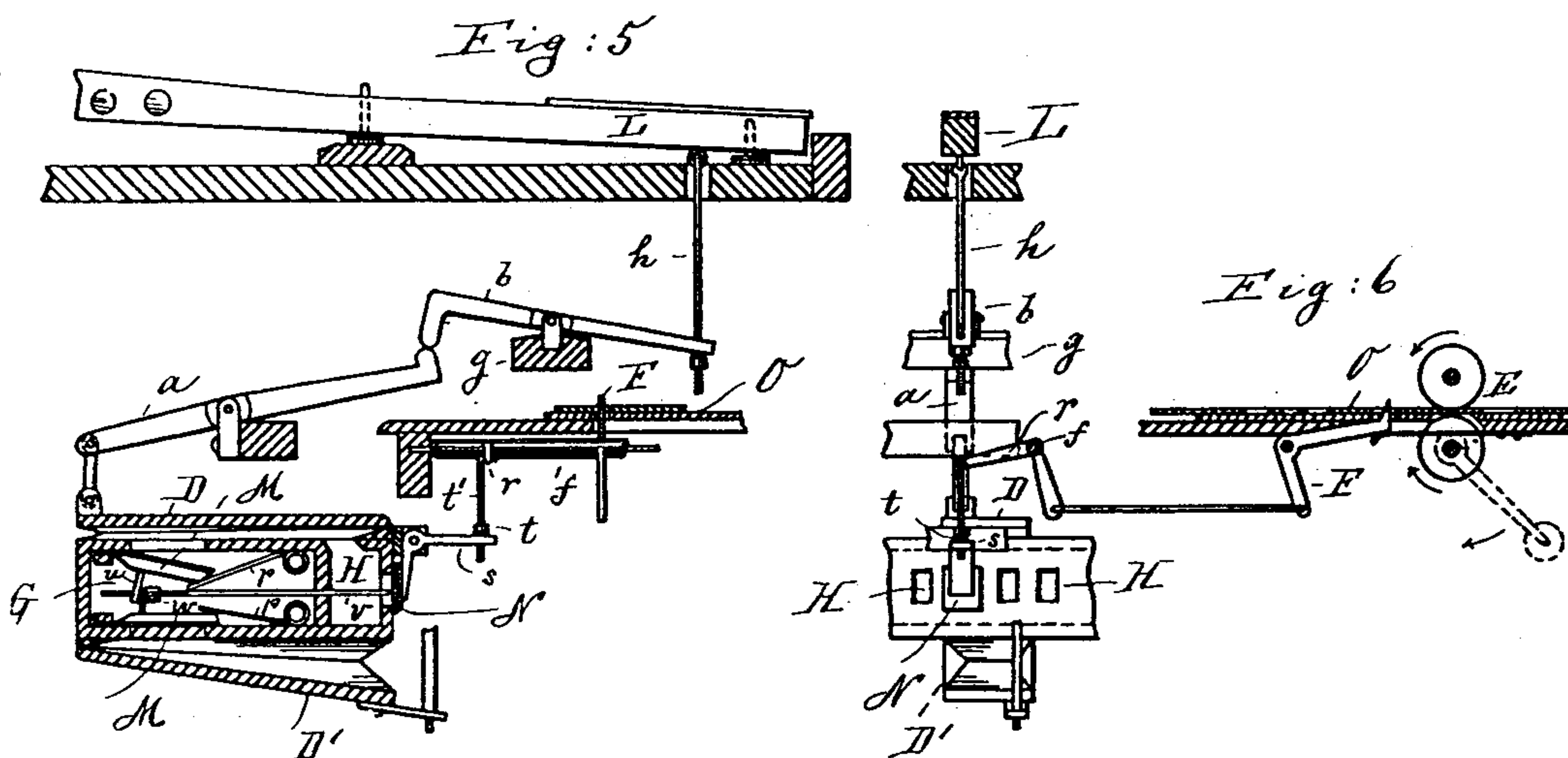
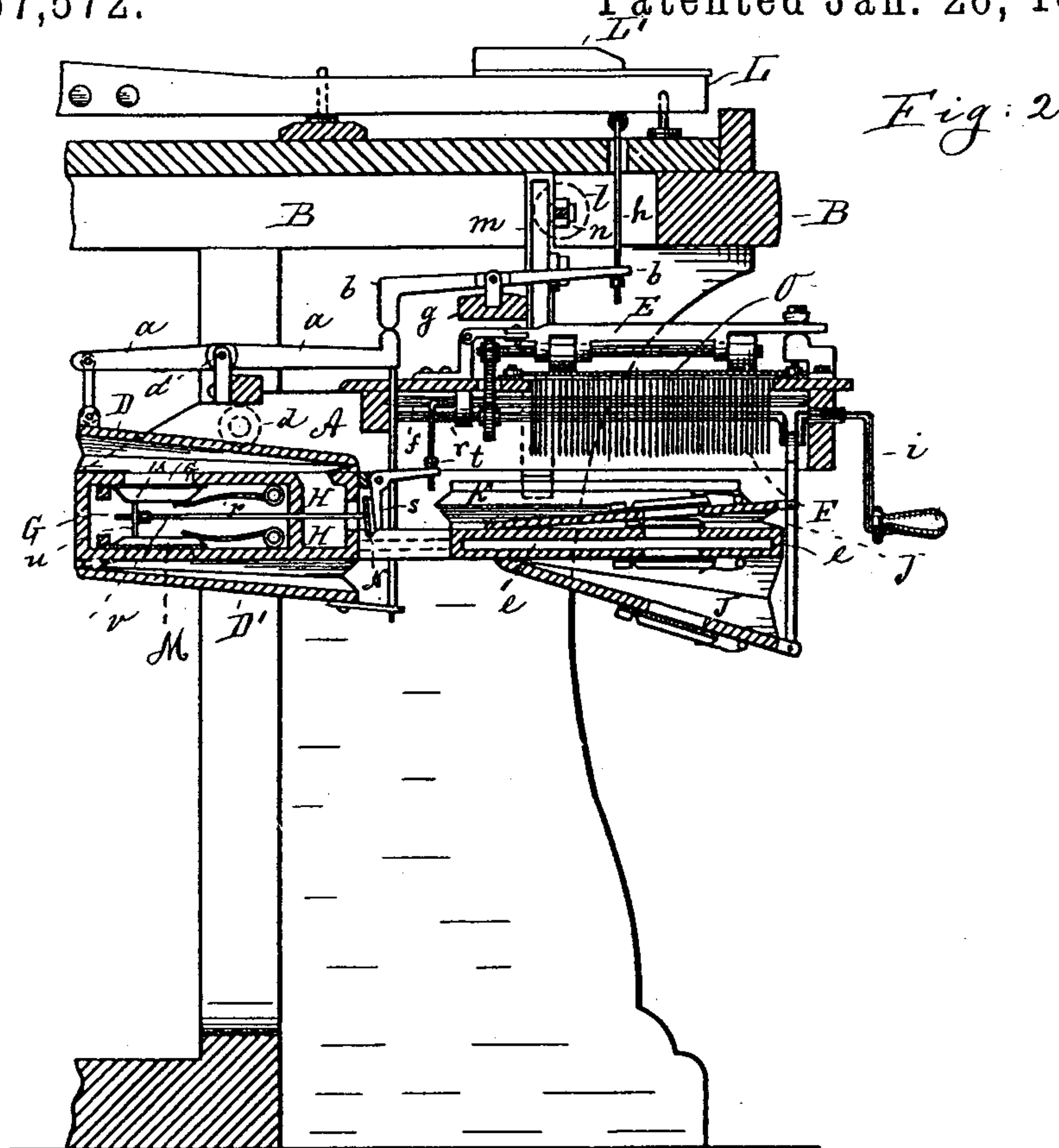
Witnesses:  
Wm. Schulz.  
A. Foughmans.

Inventors:  
J. Cocchi & F. A. Zeitler  
by their attorneys  
Roeder & Bienen

(No Model.)

6 Sheets—Sheet 2.

J. COCCHI & F. A. ZEITLER.  
MECHANICAL ATTACHMENT FOR MUSICAL INSTRUMENTS.  
No. 467,572. Patented Jan. 26, 1892.



Witnesses:  
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(No Model.)

6 Sheets—Sheet 3.

J. COCCHI & F. A. ZEITLER.

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Patented Jan. 26, 1892.

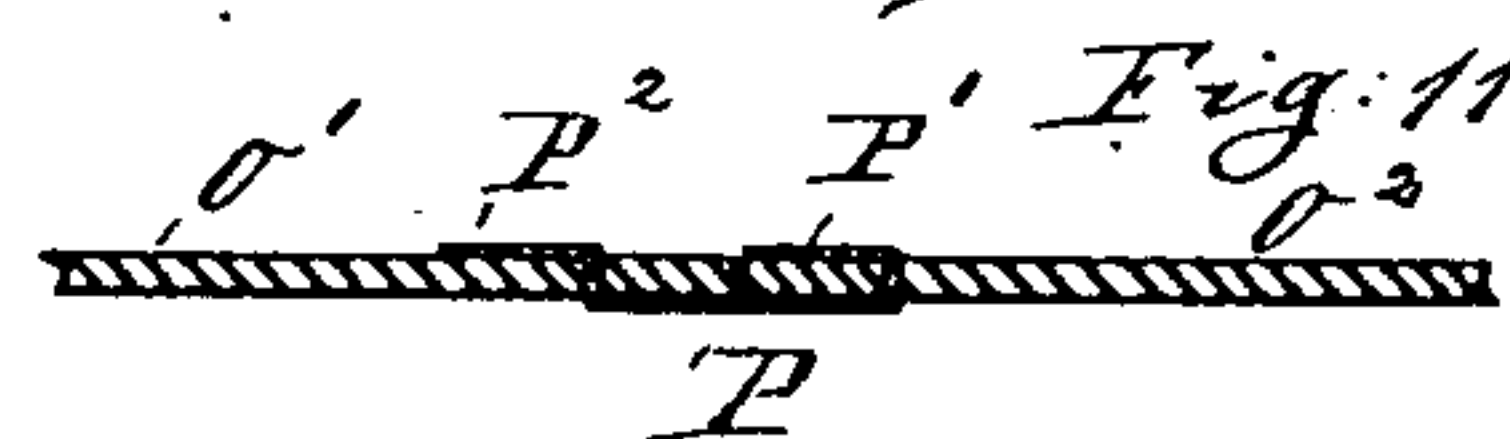
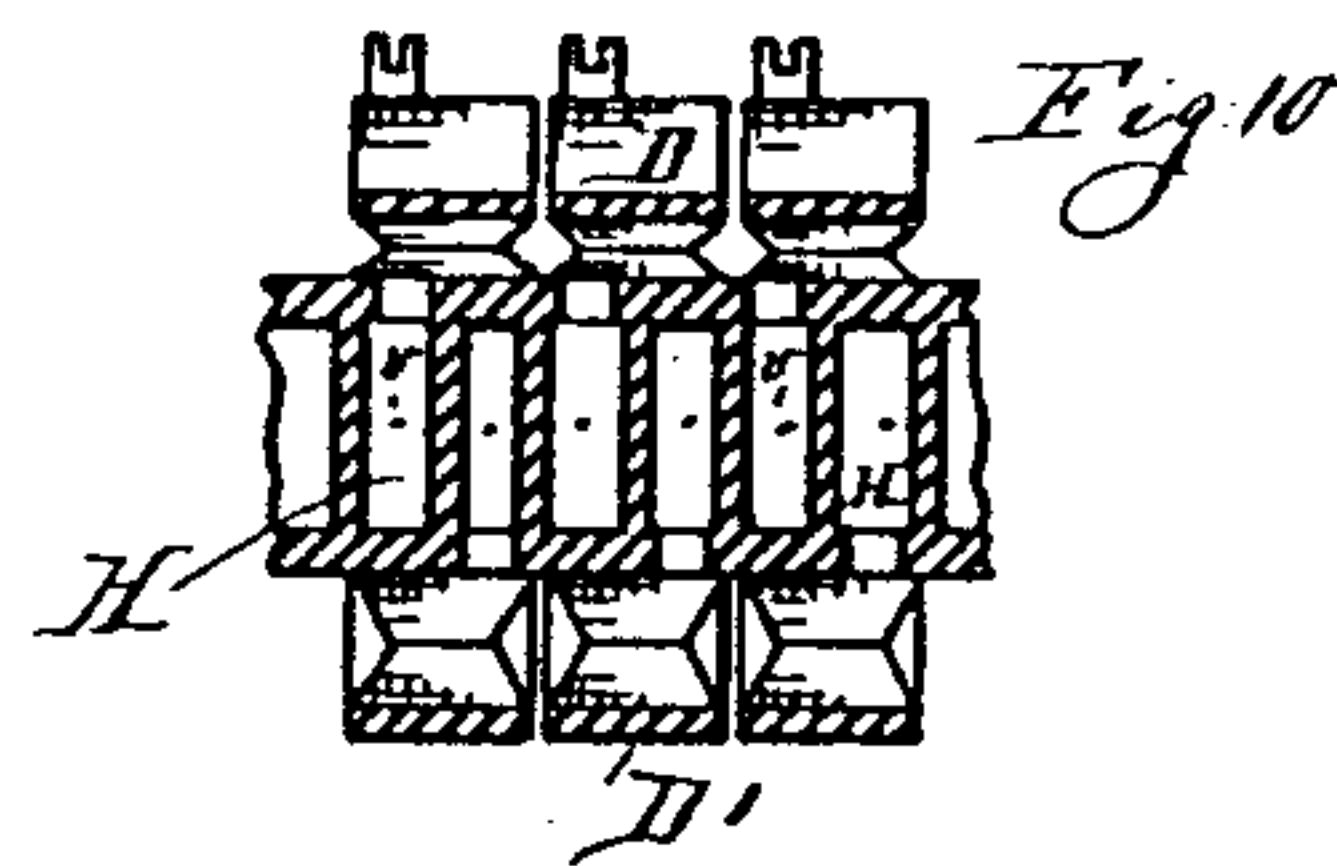
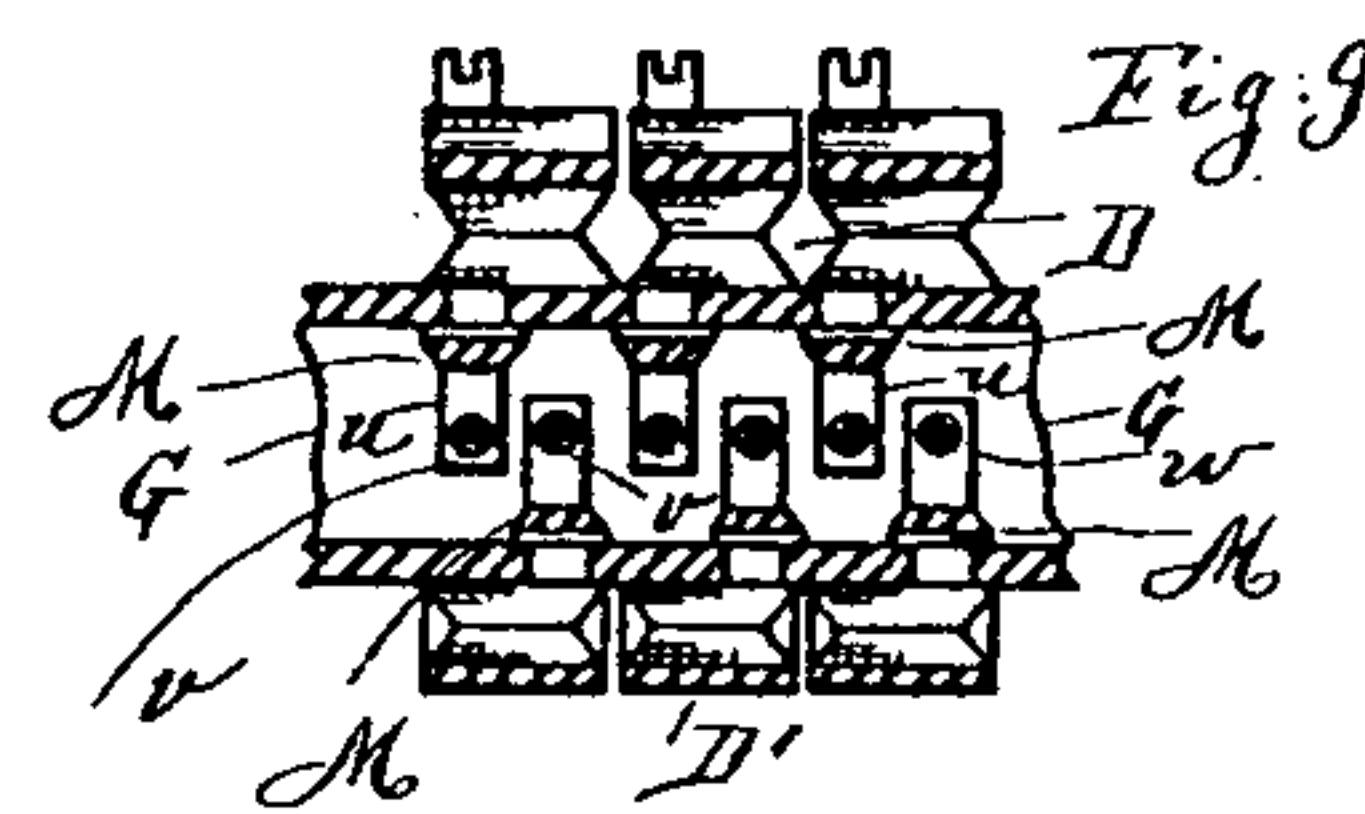
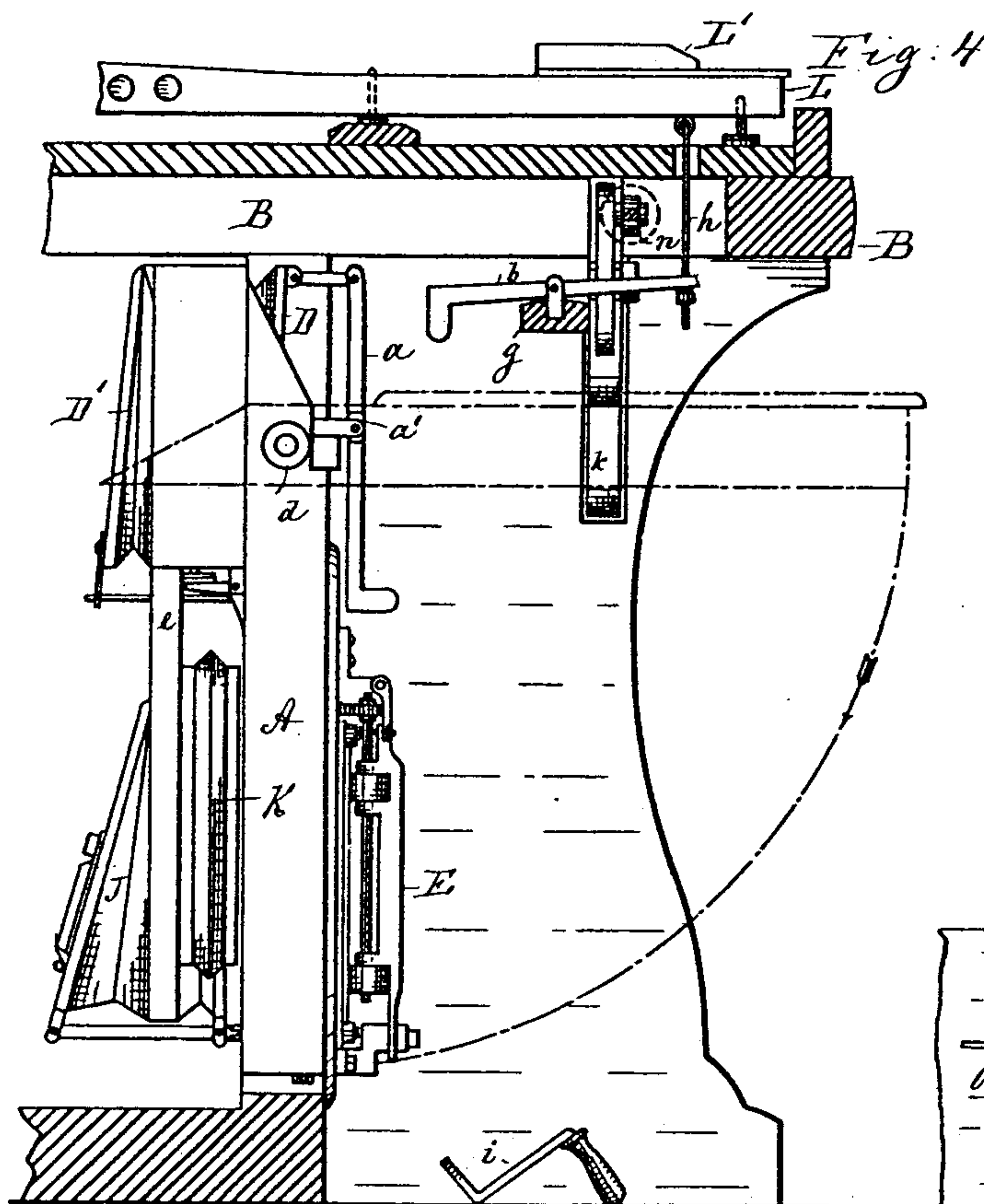
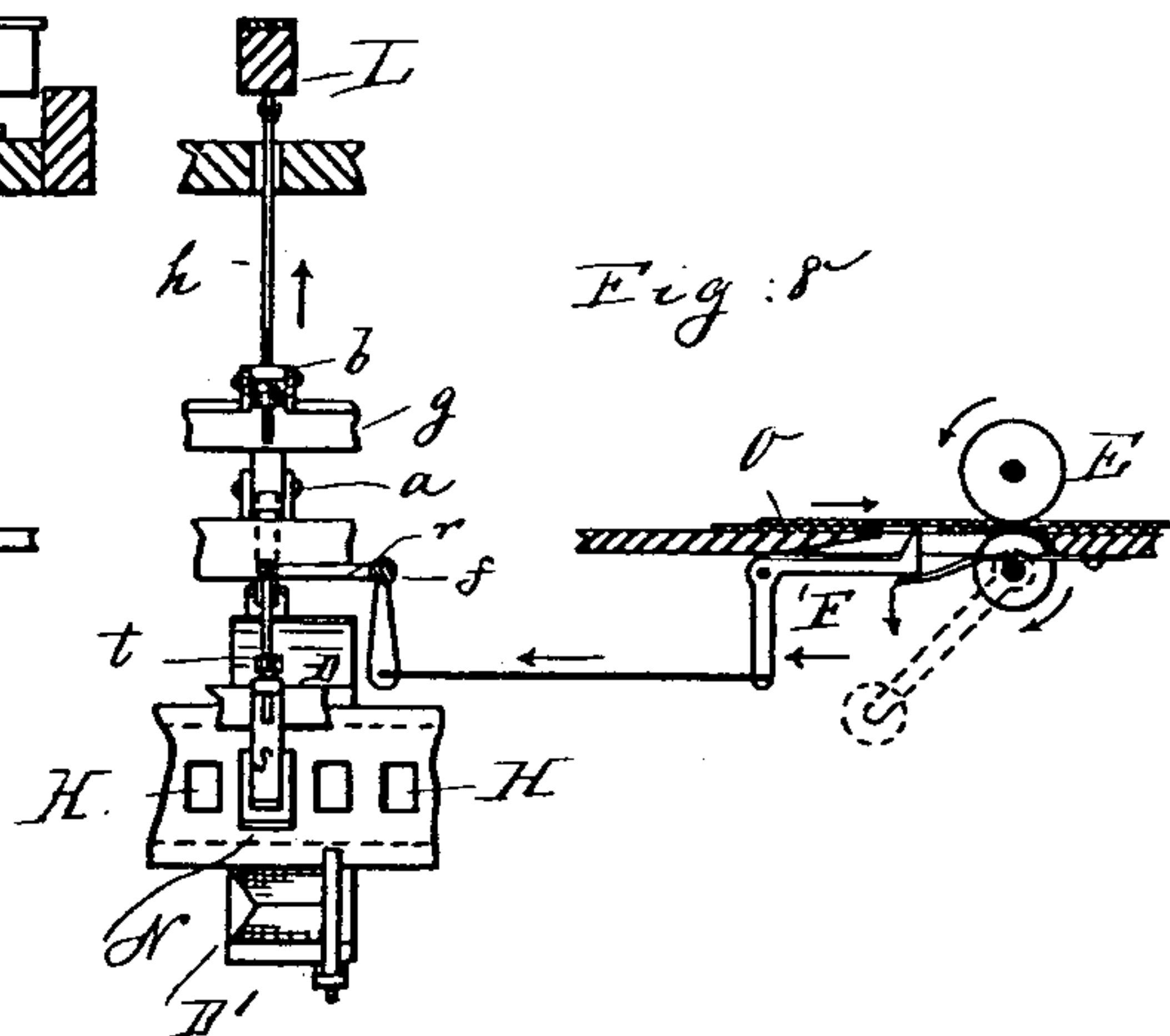
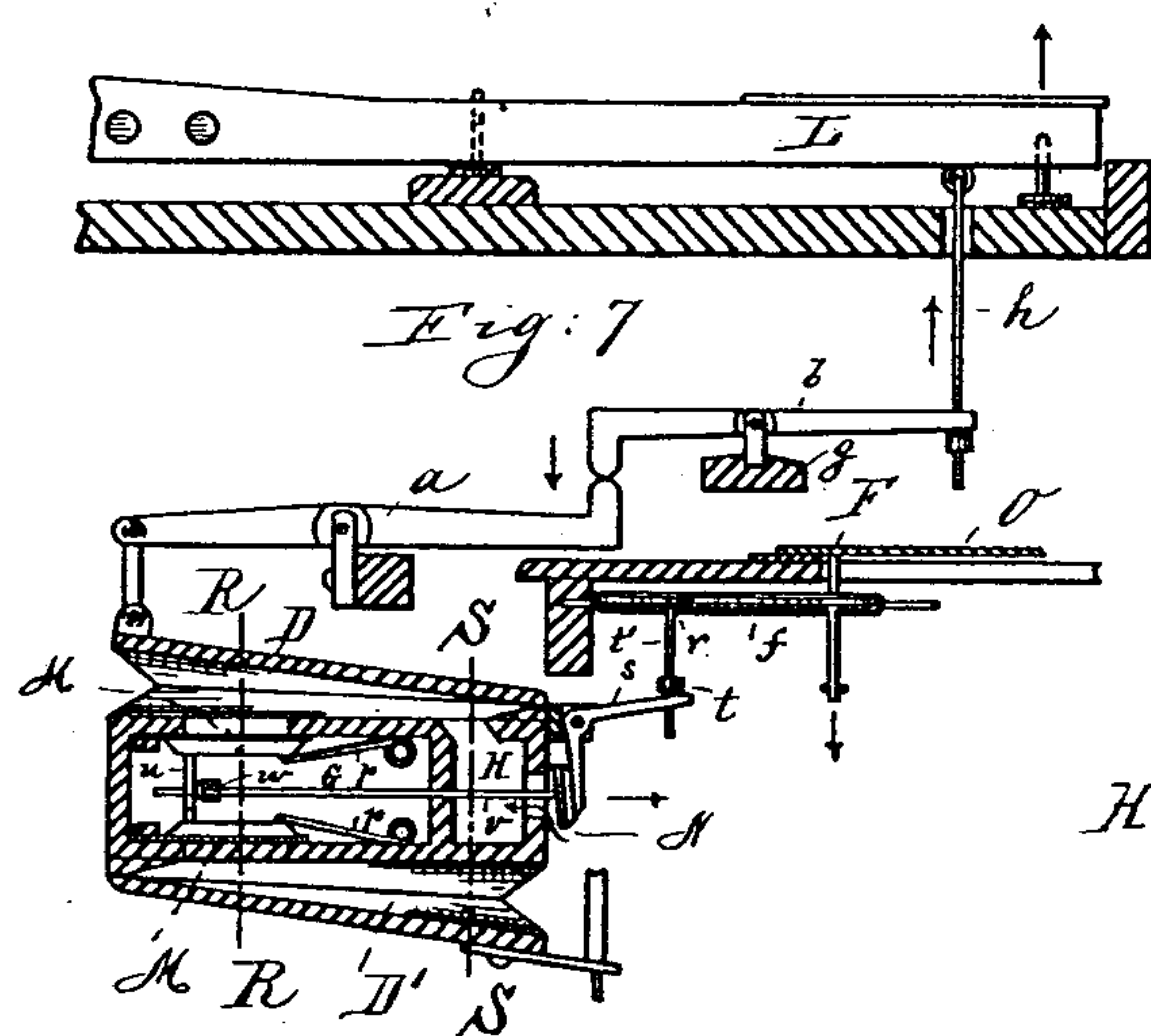
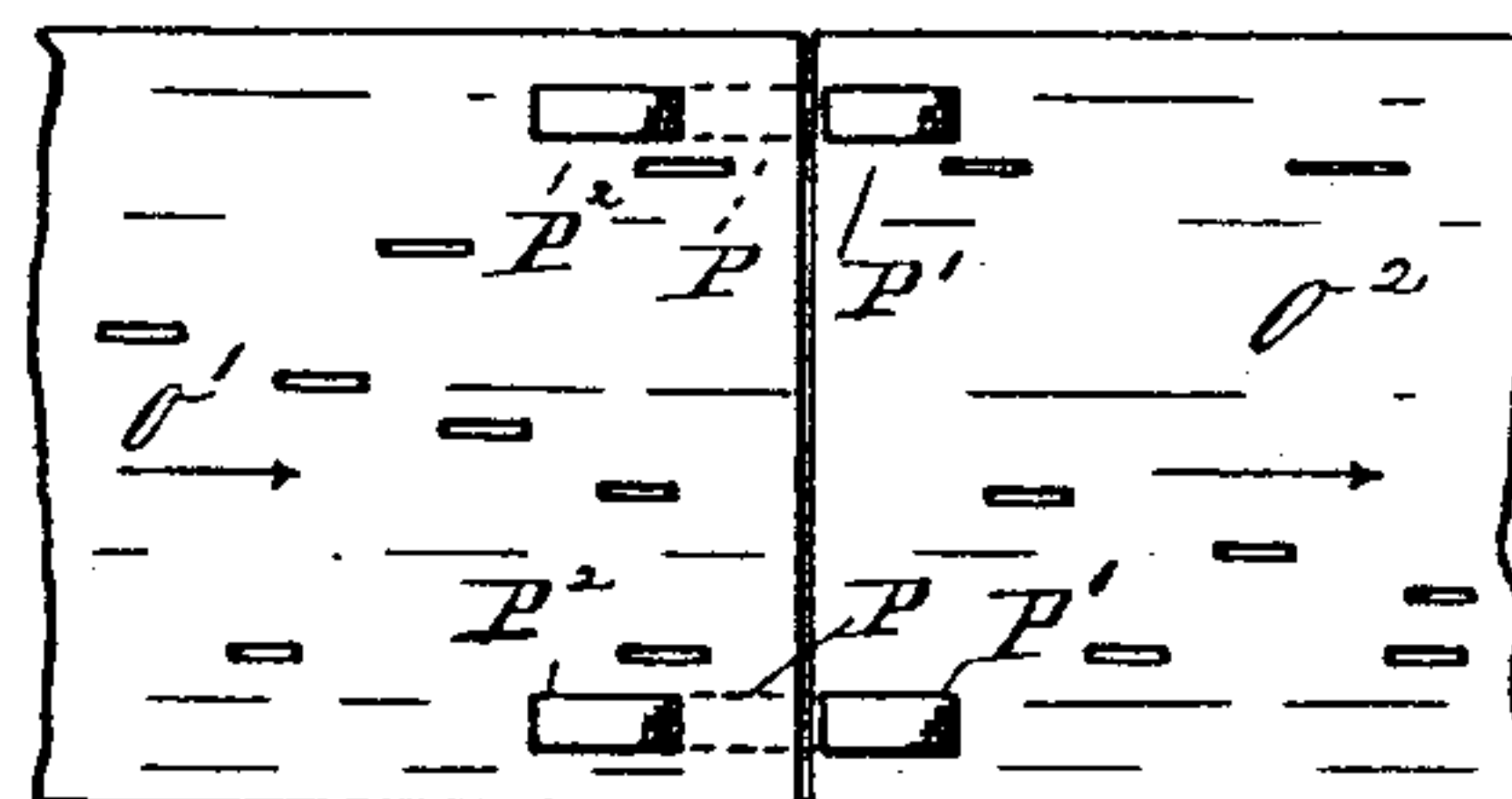


Fig. 12



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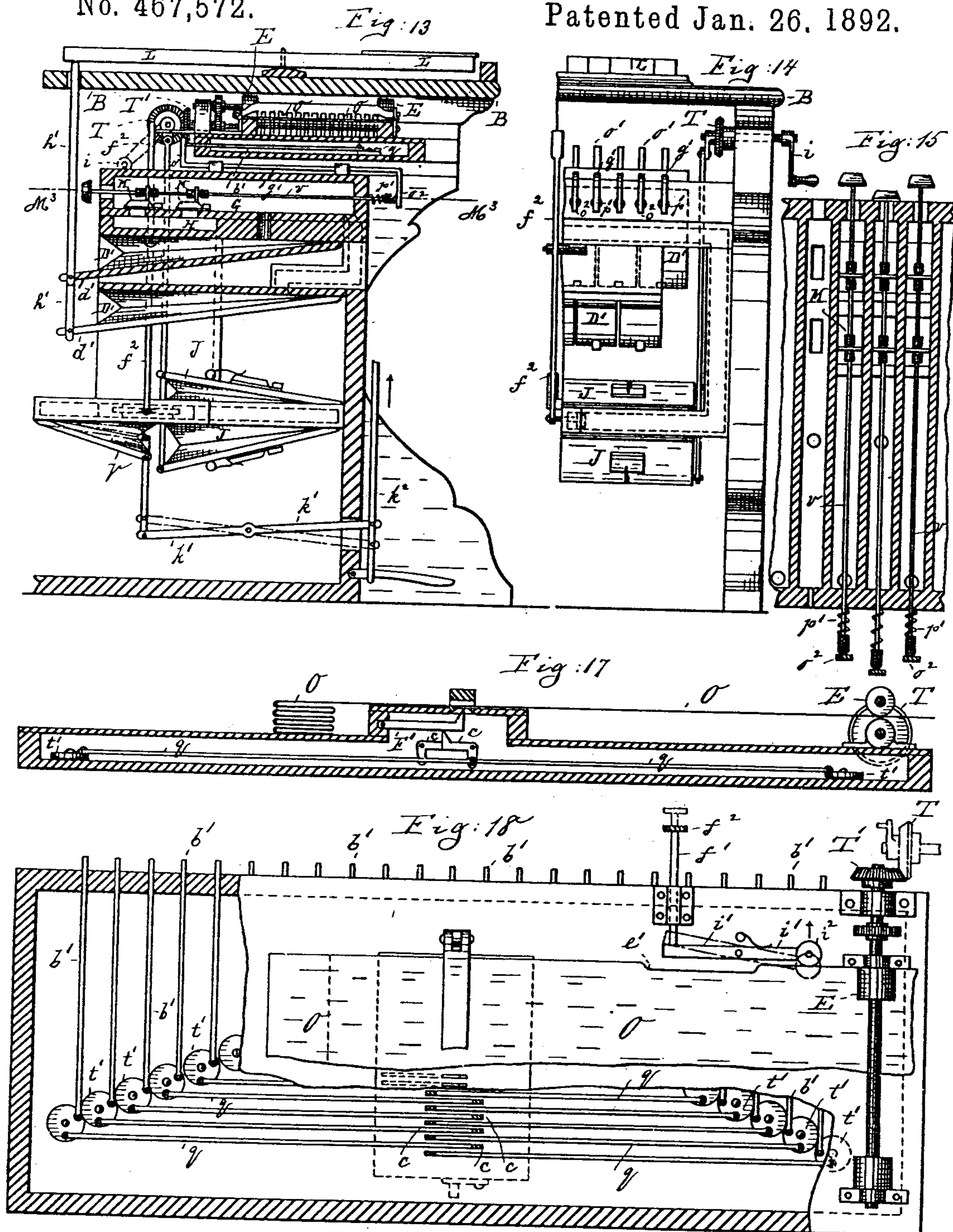
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6 Sheets—Sheet 4.

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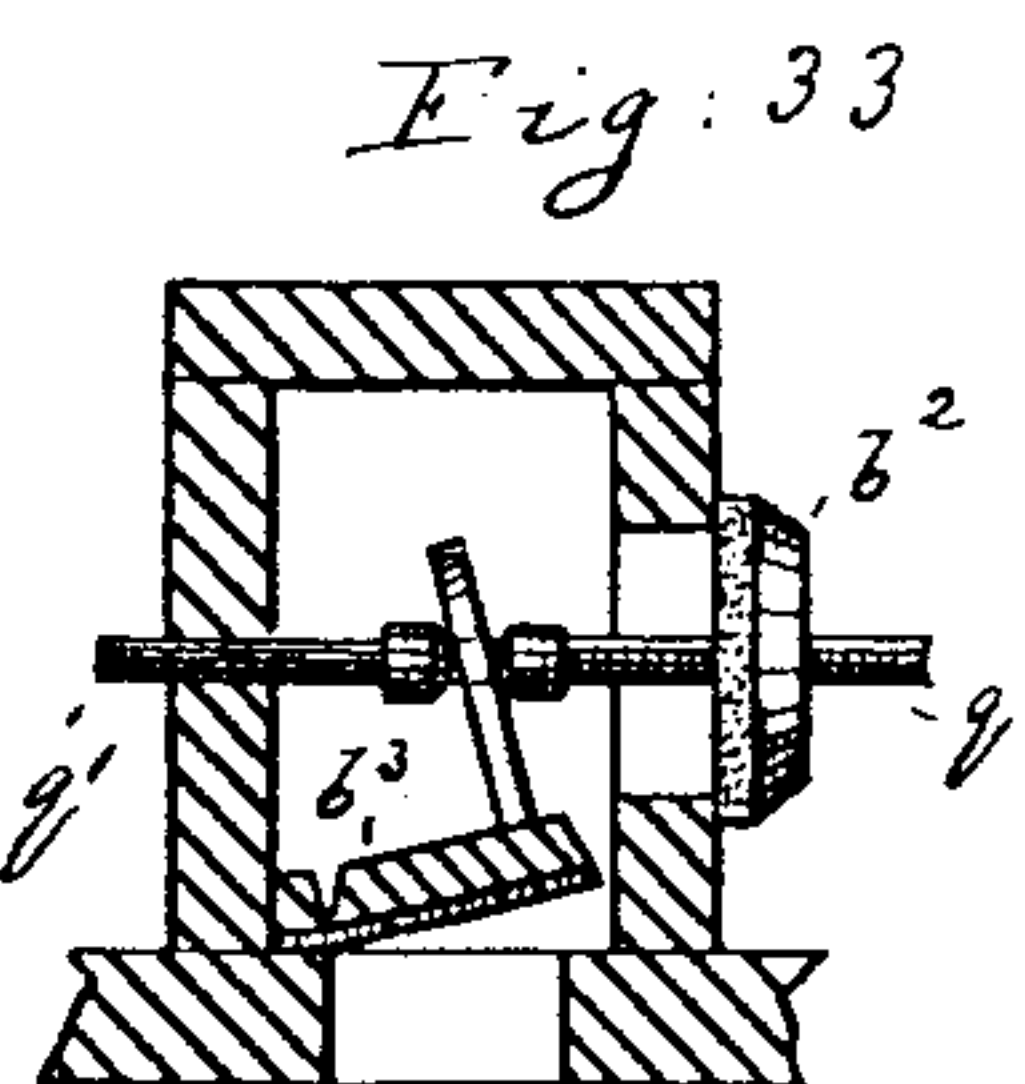
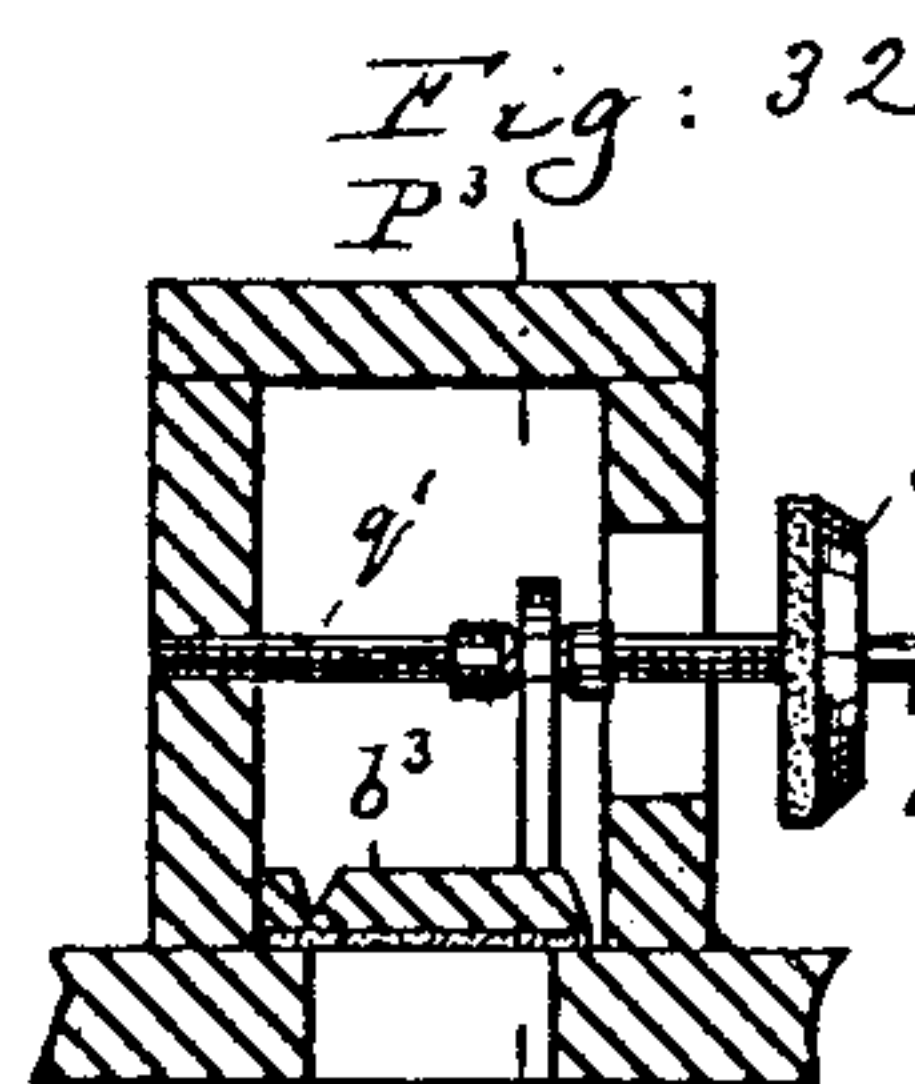
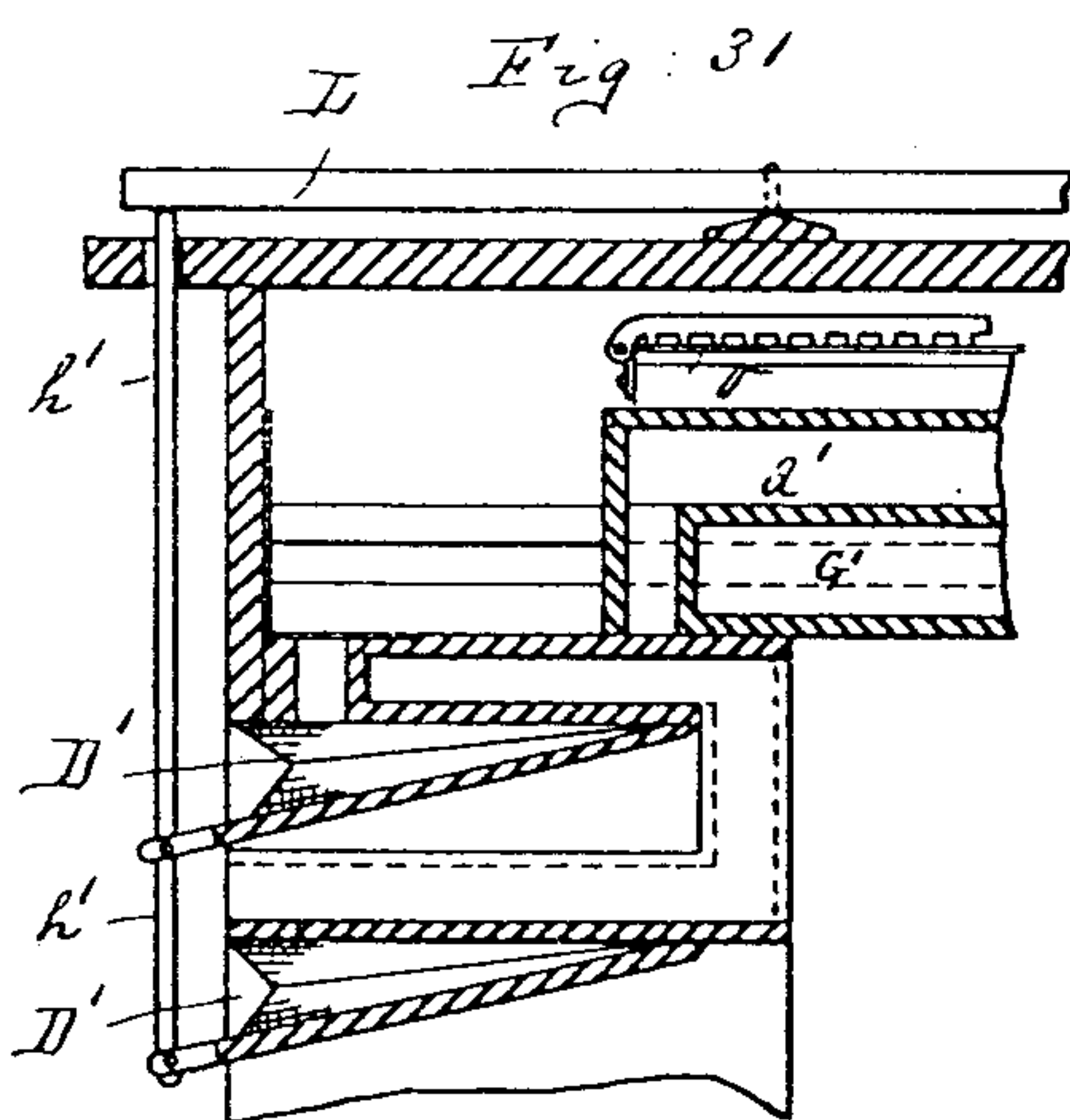
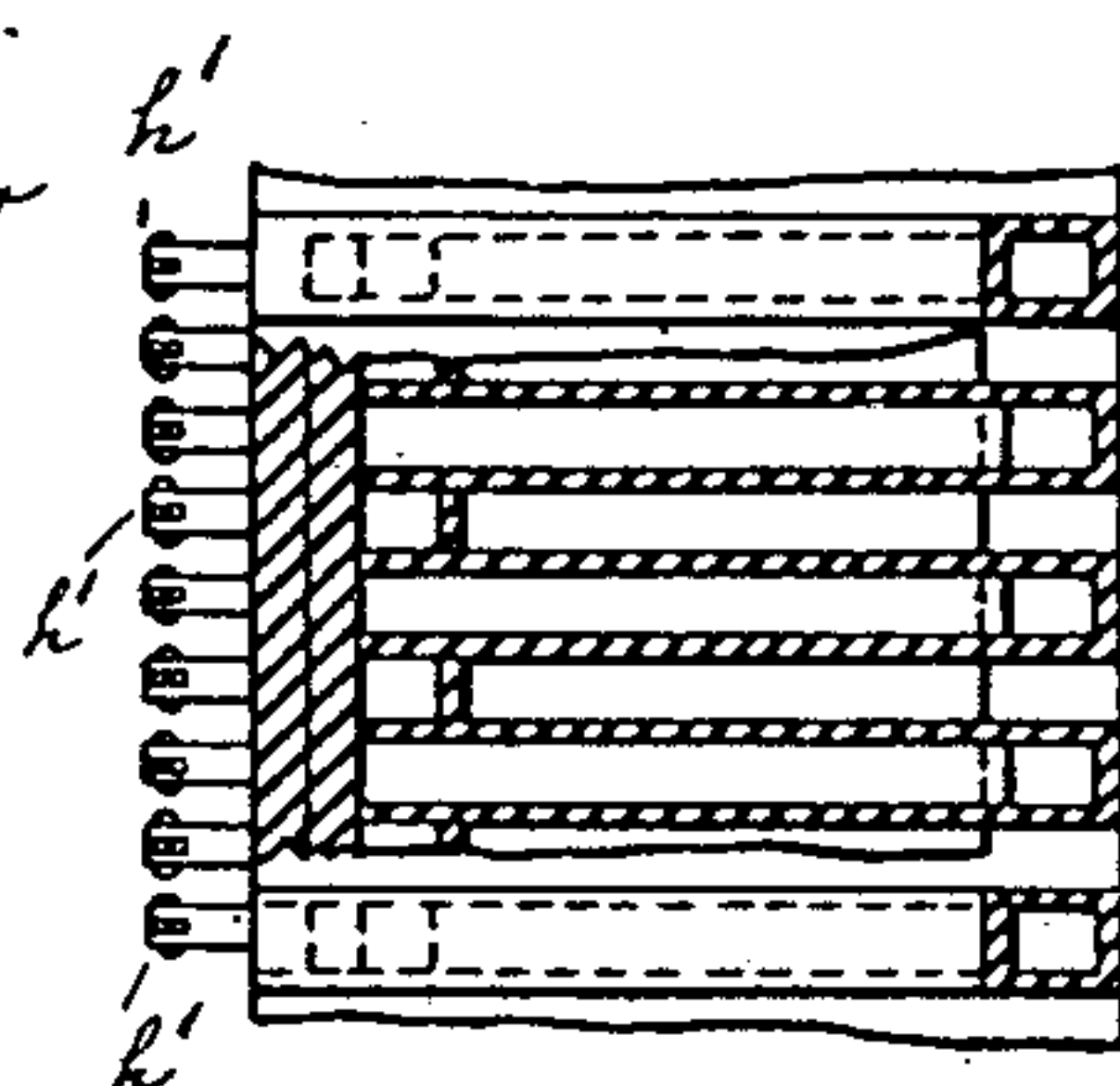
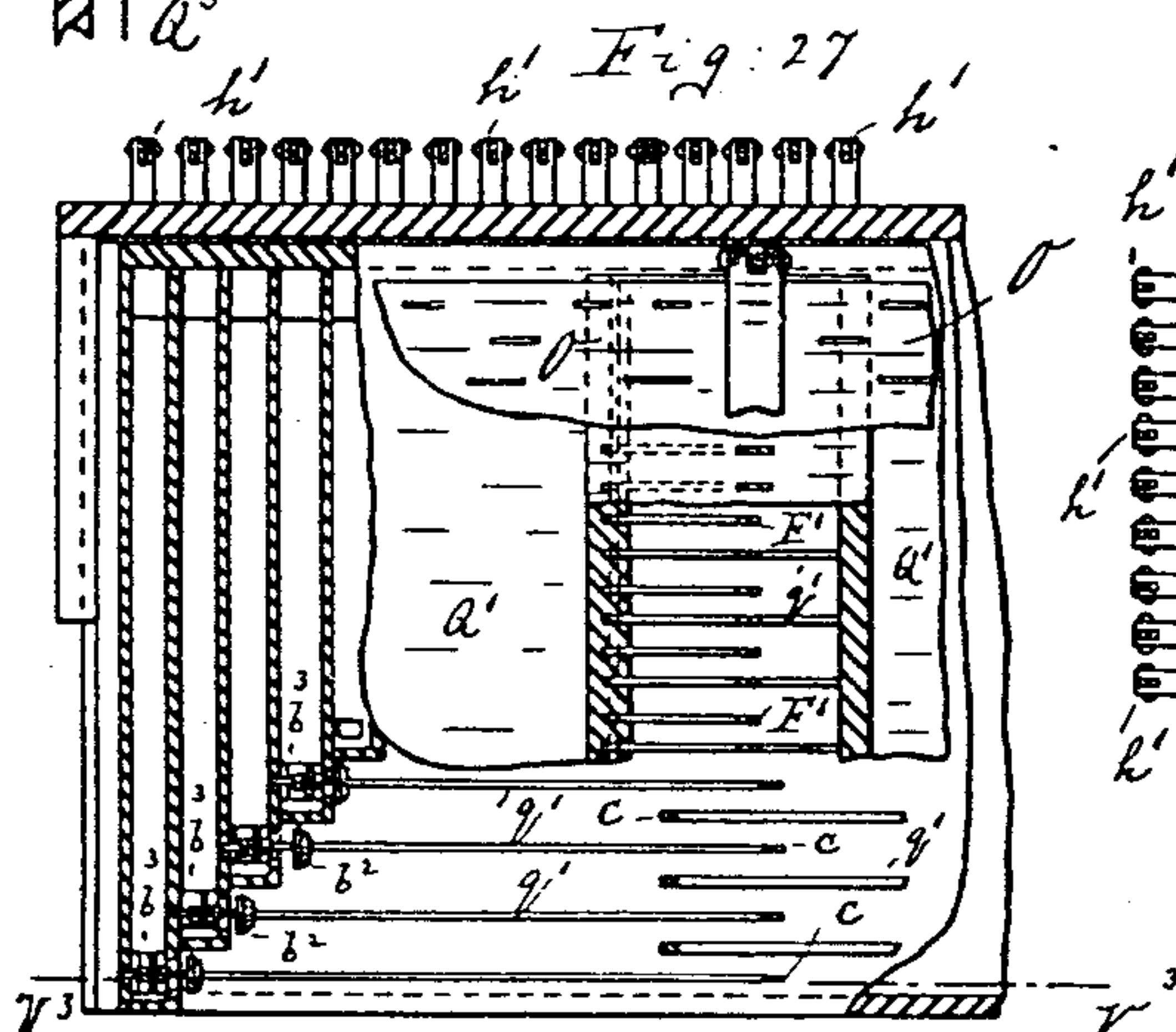
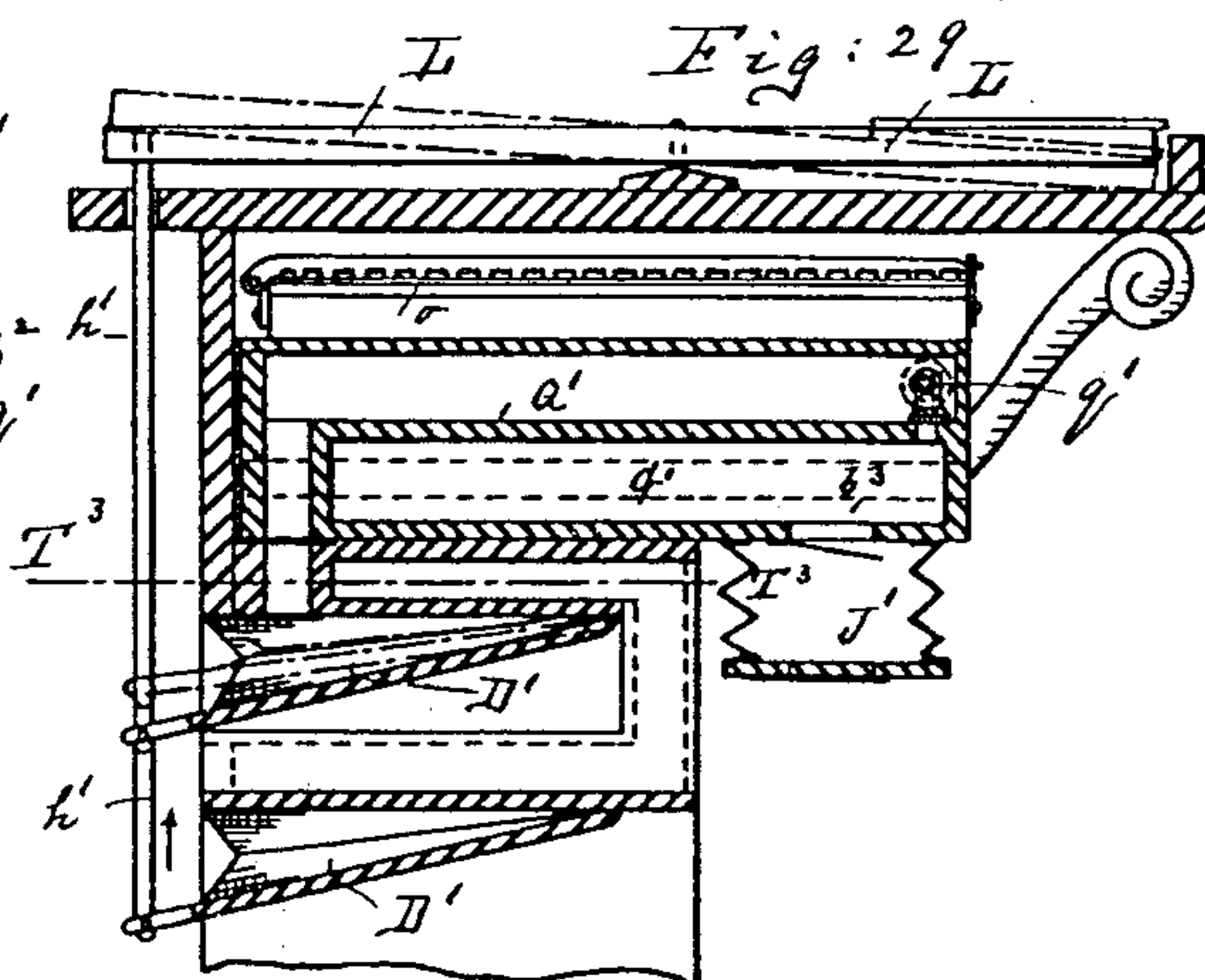
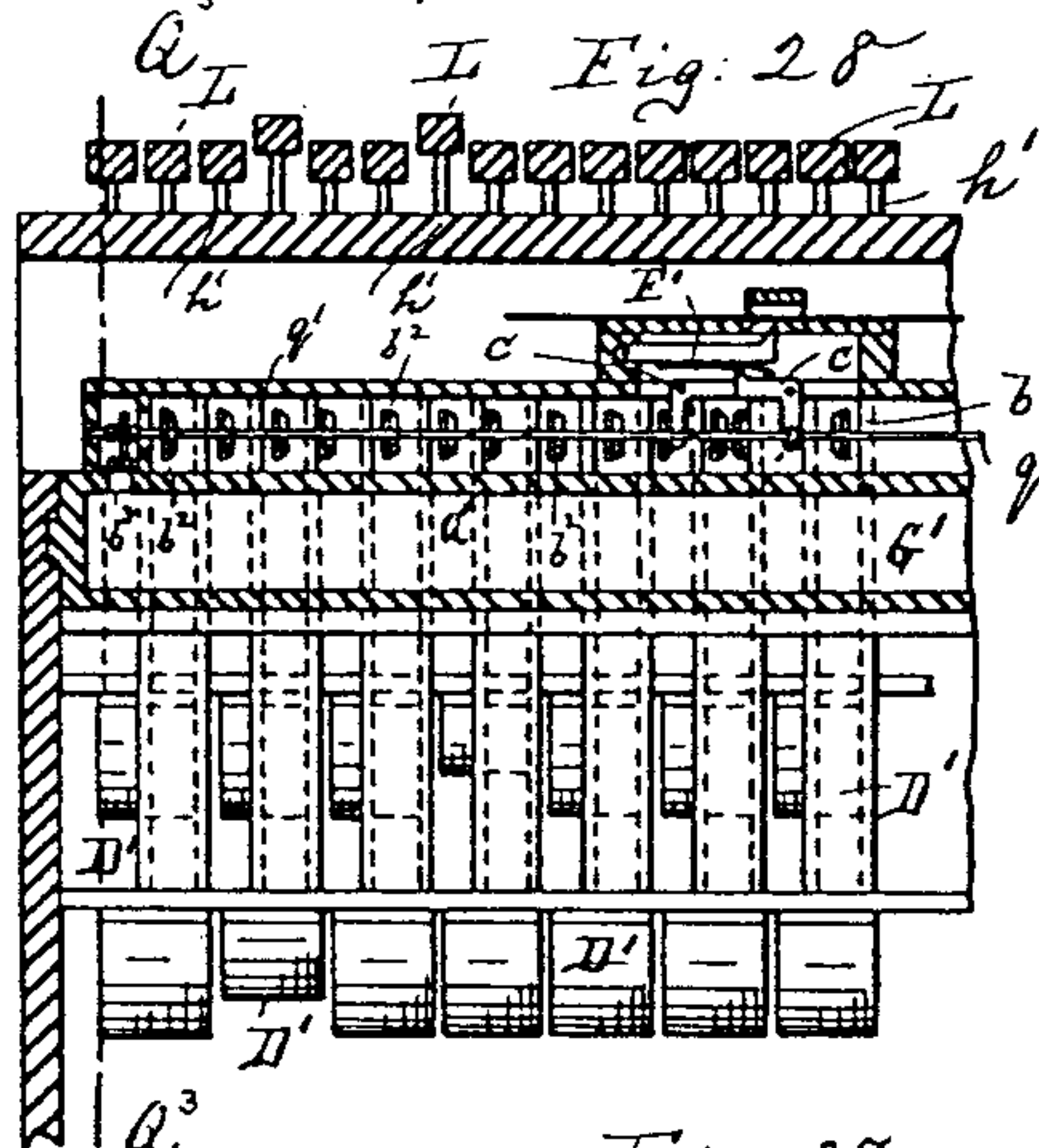
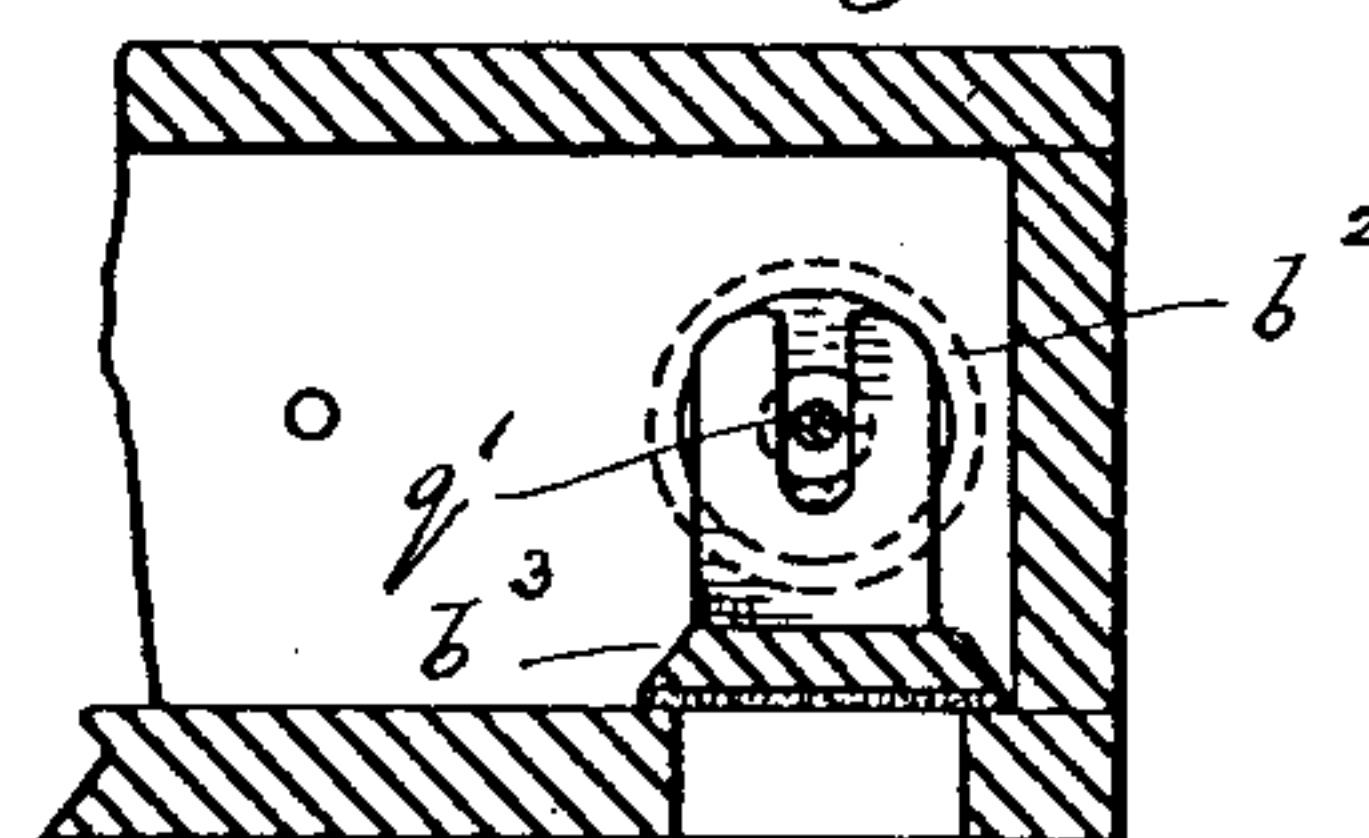


Fig. 34



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# UNITED STATES PATENT OFFICE.

JOHN COCCHI AND FRIEDRICH AUGUST ZEITLER, OF BERLIN, GERMANY.

## MECHANICAL ATTACHMENT FOR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 467,572, dated January 26, 1892.

Application filed September 9, 1891. Serial No. 405,161. (No model.) Patented in Germany August 6, 1889, No. 51,235, and January 23, 1890, No. 55,710; in England April 17, 1890, No. 5,862, and in Spain May 31, 1890, No. 10,872.

*To all whom it may concern:*

Be it known that we, JOHN COCCHI and FRIEDRICH AUGUST ZEITLER, both residents of Berlin, Germany, have invented an Improved Mechanical Attachment for Musical Instruments, (for which we have obtained the following patents: in Germany, No. 51,235, dated August 6, 1889, and No. 55,710, dated January 23, 1890; in England, No. 5,862, dated April 17, 1890, and in Spain, No. 10,872, dated May 31, 1890,) of which the following is a specification.

This invention relates to an attachment for musical instruments—such as pianos, harmoniums, &c.—by means of which a perforated music-sheet is made to operate the keys and produce the sound. The music-sheet by means of suitable lever connections operates upon a set of bellows that by expanding or contracting in turn operate upon the keys, and consequently upon the hammers.

Our attachment is such that it may be applied to the existing construction of musical instruments without requiring alterations of the actions.

In upright pianos and similar instruments where the attachment is placed under the keyboard it may be made entirely removable.

In the accompanying drawings, Figure 1 is a vertical longitudinal section of an upright piano provided with our improvement; Fig. 2, a vertical transverse section with the lid A raised; Fig. 3, a longitudinal section of the piano; Fig. 4, a vertical transverse section with the lid A lowered; Figs. 5 and 6, sectional, side, and end views of the mechanism operated by the music-sheet, showing lever F engaging a perforation of such sheet. Figs. 7 and 8 are similar views with the lever F out of line with a perforation. Fig. 9 is a section on line R R, Fig. 7; Fig. 10, a section on line S S, Fig. 7; Fig. 11, a vertical longitudinal section through Fig. 12; Fig. 12, a top view of a modified form of the music-sheet; Fig. 13, a vertical transverse section of a piano provided with a modification of our invention; Fig. 14, a front view of part thereof; Fig. 15, a longitudinal section on line M<sup>3</sup> M<sup>3</sup>, Fig. 13; Fig. 16, a section through the bellows, ports, and valves; Fig. 17, a vertical lon-

gitudinal section through Fig. 18; Fig. 18, a top view, partly in section, of the mechanism beneath the music-sheets; Fig. 19, a longitudinal section through the pedal-operating mechanism; Fig. 20, a section on line O<sup>3</sup> O<sup>3</sup>, Fig. 19; Fig. 21, a section through the valve-box; Fig. 22, a modification of the connection between the parts b' q shown in Fig. 18; Fig. 23, a section through a modification of the valve-operating mechanism; Fig. 24, a section through a further modification; Fig. 25, a plan of a modification of the pedal-operating mechanism; Fig. 26, a section on line U U, Fig. 25. Fig. 27 is a sectional plan of a further modification of the actuating mechanism; Fig. 28, a section on line V<sup>3</sup> V<sup>3</sup>, Fig. 27; Fig. 29, a section on line Q<sup>3</sup> Q<sup>3</sup>, Fig. 28; Fig. 30, a section on line T<sup>3</sup> T<sup>3</sup>, Fig. 29; Fig. 31, a longitudinal section through the drawer Q'. Figs. 32 and 33 are details of the valve b<sup>3</sup>, showing it, respectively, closed and open; and Fig. 34 is a section on line P<sup>3</sup> P<sup>3</sup>, Fig. 32.

The letter A represents a lid beneath the key-board B and turning on trunnions d, journaled in the frame of the instrument. This lid carries on its face the levers a a', operated by the bellows, and the lever F, acted upon by the perforated music-sheet and the note-leaf motor E. At its back the lid carries the bellows D D', with the posts G H, and the bellows J K and connecting-ports e, Fig. 4. The levers a a', which are operated by the bellows, in turn operate the keys L L' of the piano by means of intermediate levers b, Fig. 2. These levers are pivoted to a rail g, and at one end are adapted to be engaged by the levers a, while at the other end they operate pull-downs h, that in turn act upon the keys.

The bellows D D', levers a a', and levers b extend horizontally from side to side of the piano-case beneath the keys, as will be readily understood. The levers F, however, together with the music-leaf feed E, extends from the front to the rear of the instrument, Fig. 2.

When the mechanism is to be put into action, the lid A is swung into its horizontal position, in which it will be maintained by catches k, Fig. 1. These catches may be disengaged (when the lid is to be swung down)



by means of a push-button *l*, acting upon a pair of levers *m o*, connected by a rod *n*, and in turn acting upon the catches *k* to spread the same.

5 O represents the perforated music-sheet that is fed by feed mechanism E, operated by crank *i*, over the face of the lid A. This sheet acts in the well-known manner upon the levers F to oscillate the same. When the lever  
10 F is out of line with a perforation, Figs. 7 and 8, its shaft *f* is rocked to vibrate an arm *r*, secured to the shaft. This arm in turn raises a downwardly depending pin *t*, carrying a button *t*. The button *t* being thus  
15 raised, releases an elbow-lever *s*, acting against the valve N of a double port H G, that communicates with the bellows D D' by valves M. These bellows are arranged beneath one another to economize space, one operating a  
20 black and the other a white key. The valve M will now be free to be closed by spring *p*. In closing, the valve N by pin *u* will push against a button *w* on valve-rod *v* to open valve N. Through the port or cell H atmospheric air  
25 will now enter either of the collapsed bellows D or D'. The bellows in expanding will oscillate lever *a* (or *a'*) to cause it to recede from lever *b*. Thus the key is free to swing into its position of rest. As soon as the lever F  
30 is brought into engagement with one of the perforations of the music-sheet O, Figs. 5 and 6, the pin *t* is lowered to lower the button *t* upon the elbow-lever *s*. The valve N will thus be closed and the rod *v* will be pushed  
35 back to open valve M by the engagement of button *w* with the pin *u*. The opening of the valve M will cause the bellows D D' to be exhausted and to collapse. Thus the lever *a*  
40 will be oscillated to oscillate lever *b*, that in turn causes the pull-down *h* to act upon the key and to sound the note. Thus by the use of but a single operating-lever F the vertical valve N, as well as the horizontal valve M, is acted upon.

45 In Figs. 13 to 18 we have shown a modification of the mechanism for operating the bellows. The music-sheet O operates in this modification the one-armed levers F', Fig. 17. These levers act upon angle-levers *c*, placed  
50 beneath them, and which, when tilted, revolve disks *t'* by the intermediate rods *q*. The disks *t'* are connected to rods *b'*, that engage sliding rods *g'*, Fig. 16, having bent ends *o'* *o''*. The bent end *o'* rests against the end of rod  
55 *b'*, while the bent end *o''* engages the valve-rod *v*, surrounded by the coiled spring *p'*. When the lever F' is brought into alignment with one of the perforations of music-sheet O, the disk *t'* is so revolved as to cause the  
60 rods *b'* to be drawn back to release rod *g'*. Thus the spring *p'* is free to push valve-rod *v* outward to open the outlet-valves M M and close the inlet-valve. This will cause the bellows D' to be exhausted by ports H G, and  
65 thus the cheek *d'* of the bellows will be moved upward to operate the key L or the hammer by means of the lifter *h'*, Fig. 16.

In Fig. 22 the connection between the parts *b' q* is shown to be made by a short elbow-lever *t'*, which replaces the disk *t'*. 70

In Fig. 23 the valve-rod *v* is bent, as at *v'*, to engage the rod *b'* directly.

In Fig. 24 the connection between the parts *b' v* is established by means of an intermediate two-armed lever *w'*, which of course  
75 causes a reverse action of the parts. An engagement of the lever F' by the music-sheet will cause rod *g'* to be moved backward and the spring *p'* to be compressed until the next perforation is reached. 80

To permit the piano and forte passages to be properly played, the music sheet O is provided at its edge or edges with notches *e'*. (Shown in Fig. 18.) These notches engage a friction-roller *z* at the end of a lever *i'*. The  
85 lever *i'* acts upon a lifter *f'*, that in turn operates a lever *f''*, Figs. 19 and 20. The lever *f''* operates a valve V, which sets into action the pedal levers *k' k''*, Fig. 13. These levers  
can also be operated by the foot. 90

In Figs. 25 and 26 we have shown the pedals to be operated by a mechanism similar to that which operates the keys. In this modification a perforation *o* in the music-sheet O will  
95 operate the lever F', which in turn, by the parts *e q t'*, will operate the pedal-lifter *f'*.

The arrangement of the parts shown in Figs. 13 to 18, and also in Figs. 21 to 24 is such that the entire mechanical attachment  
100 may be independently drawn out for the introduction of a new music-sheet O. The bevel-gear T T', that transmits the motion from the crank, Fig. 18, will also by the shifting be readily put into and out of engagement.

In Figs. 27 to 34 still another modification  
105 of the actuating mechanism is shown. The levers F' act, as in Fig. 17, upon the angle levers *c*. These levers impart motion to rods *q'*, carrying the air-inlet valves *b''* and operating the air-outlet valves *b'*. In this modification the ducts between the bellows D' and the port G' are placed within reach of  
110 the rods *q'*. If the valve *b''* is opened, the atmospheric air *a*, air comparatively under pressure enters bellows D' and draws plunger *h'* back. This occurs whenever the lever  
115 F' is brought out of line with one of the perforations of the music-sheet, and the note is not to be sounded. When, however, the lever F' is engaged by a perforation, the rod *q'*  
120 is moved to open valve *b''* and close valve *b'*. This causes communication to be established between the port G' and bellows J', with the bellows D'. The bellows D' is thus emptied, and the lifter *h'*, secured thereto, will cause  
125 the key L to sound the note. The valves, operating levers, port G', and bellows J' are contained within a drawer Q', that may be drawn in and out for the introduction of a new sheet O, as indicated in Fig. 31. 130

This construction, as well as that shown in Figs. 13 to 24, is particularly applicable when the attachment is to be entirely removable from the instrument.



Of course the mechanism above described may be readily reversed, so that the notes are not sounded by contraction, but by expansion of the bellows. As the surface of the lid A for the entire width of the instrument may be utilized for the support of the sheet O, such sheet may be made in the form of a band, or it may be made endless or sectional. When sectional sheets are employed, we prefer to connect the sections by the joint shown in Figs. 11 and 12. Here the sections  $O' O^2$  of the music-sheet are connected in such a manner that the motion of the music-sheet will not have a tendency to injure the joint, but that such motion will, on the contrary, have the effect to bind the sections more closely together. To this effect the sections  $O' O^2$  are connected by strips P in the following manner: The strip P is placed below the joint of sections  $O' O^2$ , and is then bent upwardly at both ends to pass through such sections. The ends are then flattened out upon the surface of the sections  $O' O^2$ , both flattened ends  $P' P^2$  extending in the direction of the motion of the sheet. Thus the ends will be kept out of contact and an even feed of the sheet may be had.

What we claim is—

1. The combination of a musical instrument with a folding lid A, a set of levers secured thereto and adapted to be engaged by a music-sheet, a set of bellows acted upon by the levers, and a set of lifters operated by the bellows and adapted to act upon the keys, substantially as specified.
2. The combination of bellows D D' with inlet and outlet valves, valve-rods  $v$ , operating both of said valves, and a set of levers for operating the valve-rods, substantially as specified.
3. The combination of bellows D D' with ports G H, valves M N, and with valve-rods  $v$ ,

having buttons  $w$ , that are adapted to engage valves M, and levers adapted to operate the valve-rods, substantially as specified.

4. The combination of bellows D D' with inlet and outlet valves, ports G H, a valve-rod  $v$ , and levers  $a b$  and lifter  $h$  for operating the sound-producing keys, substantially as specified.

5. The combination of levers  $F' c$  with rods  $q$ , disks  $t'$ , rods  $b'$ , valve-rods  $v$ , operated thereby, valves M, operated by the rods, and bellows D D', substantially as specified.

6. The combination of levers  $F' c$  with rods  $q'$ , valves  $b^2 b^3$ , operated thereby, and the bellows D', substantially as specified.

7. The combination of bellows D D' with drawer  $Q'$ , and the valves  $b^2 b^3$  and levers  $F'$ , contained within such drawer, the drawer being adapted to be partly or completely withdrawn, substantially as specified.

8. The combination of lever  $i$  with lifter  $f'$ , lever  $f^2$ , valve V, and pedal-levers  $k' k^2$ , substantially as specified.

9. The combination of music-sheet O, having perforation  $x$ , with levers  $F' c$ , rods  $q$ , disks  $t'$ , lifters  $f'$ , levers  $f^2$ , and pedal-levers  $k' k^2$ , substantially as specified.

10. The combination of a sectional music-sheet  $O' O^2$ , with connecting-strip P, passing through the same and having its ends  $P' P^2$  upset on the same side of the music-sheet, so as to extend in the same direction, substantially as specified.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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FRIEDRICH AUGUST ZEITLER.

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