

No. 706,946.

Patented Aug. 12, 1902.

L. HUPFELD.

MECHANISM FOR EFFECTING VARYING TOUCH OF KEY OR MUSICAL INSTRUMENTS.

(Application filed Jan. 8, 1901.)

(No Model.)

2 Sheets—Sheet 1.

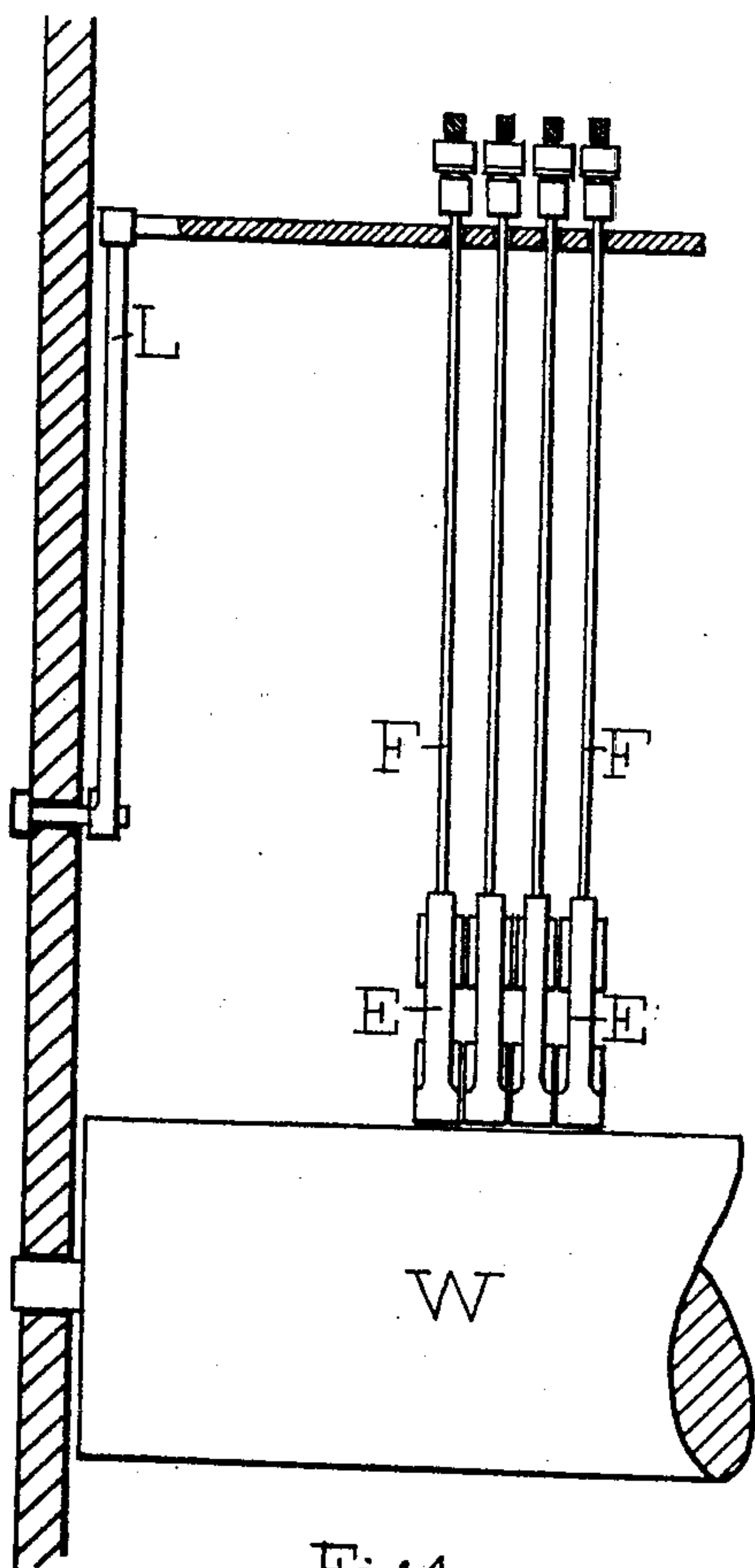


Fig. 1.

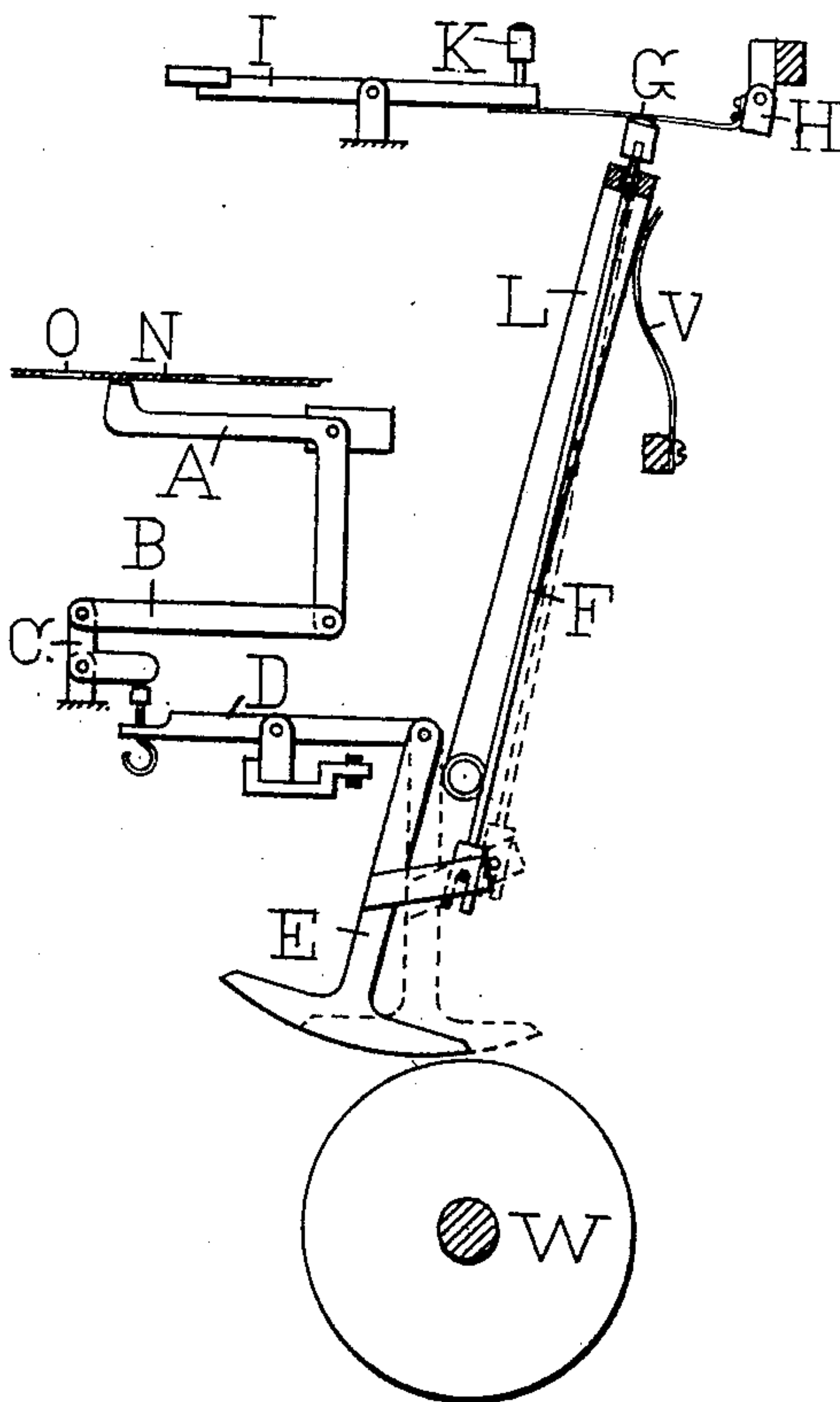


Fig. 2.

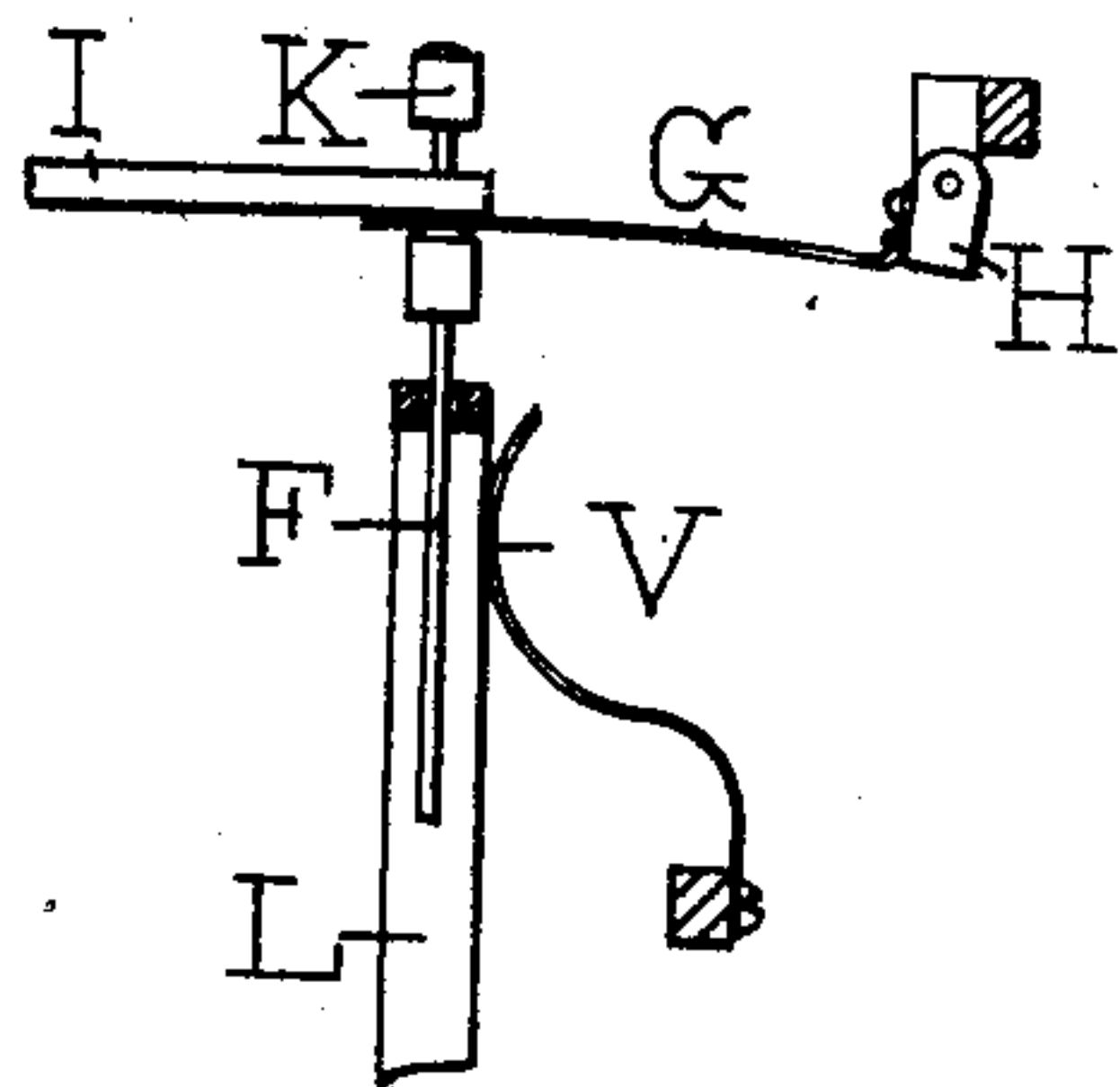


Fig. 3.

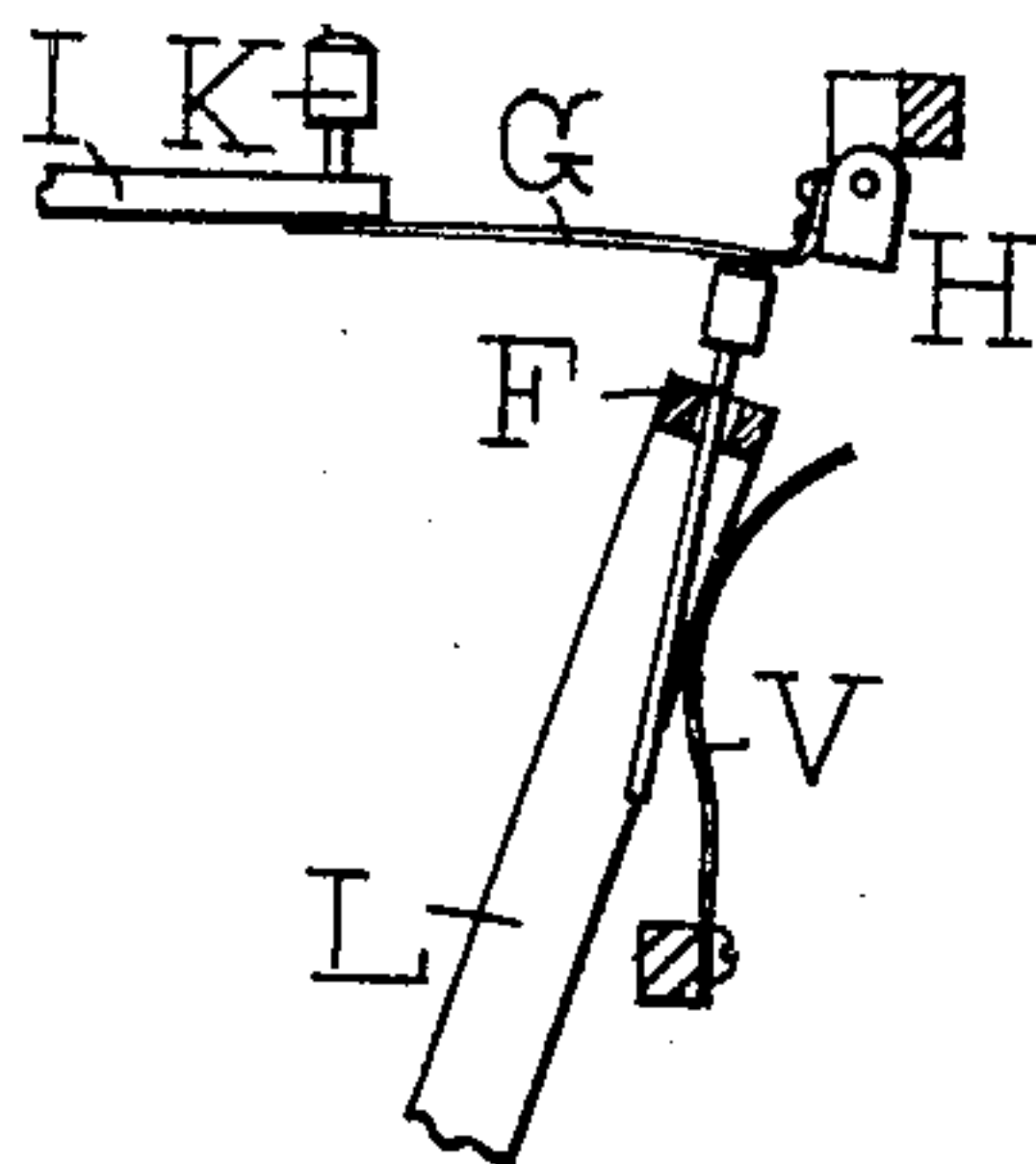


Fig. 4.

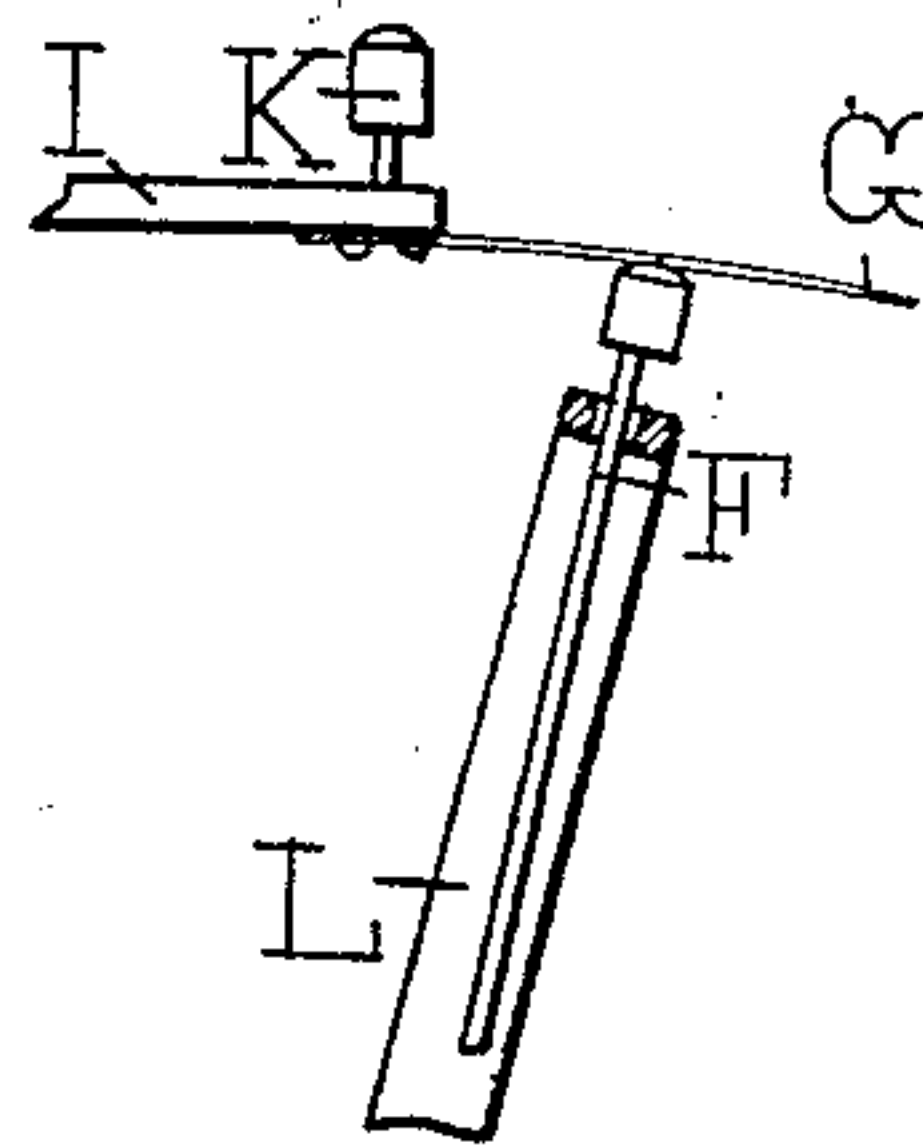


Fig. 5.

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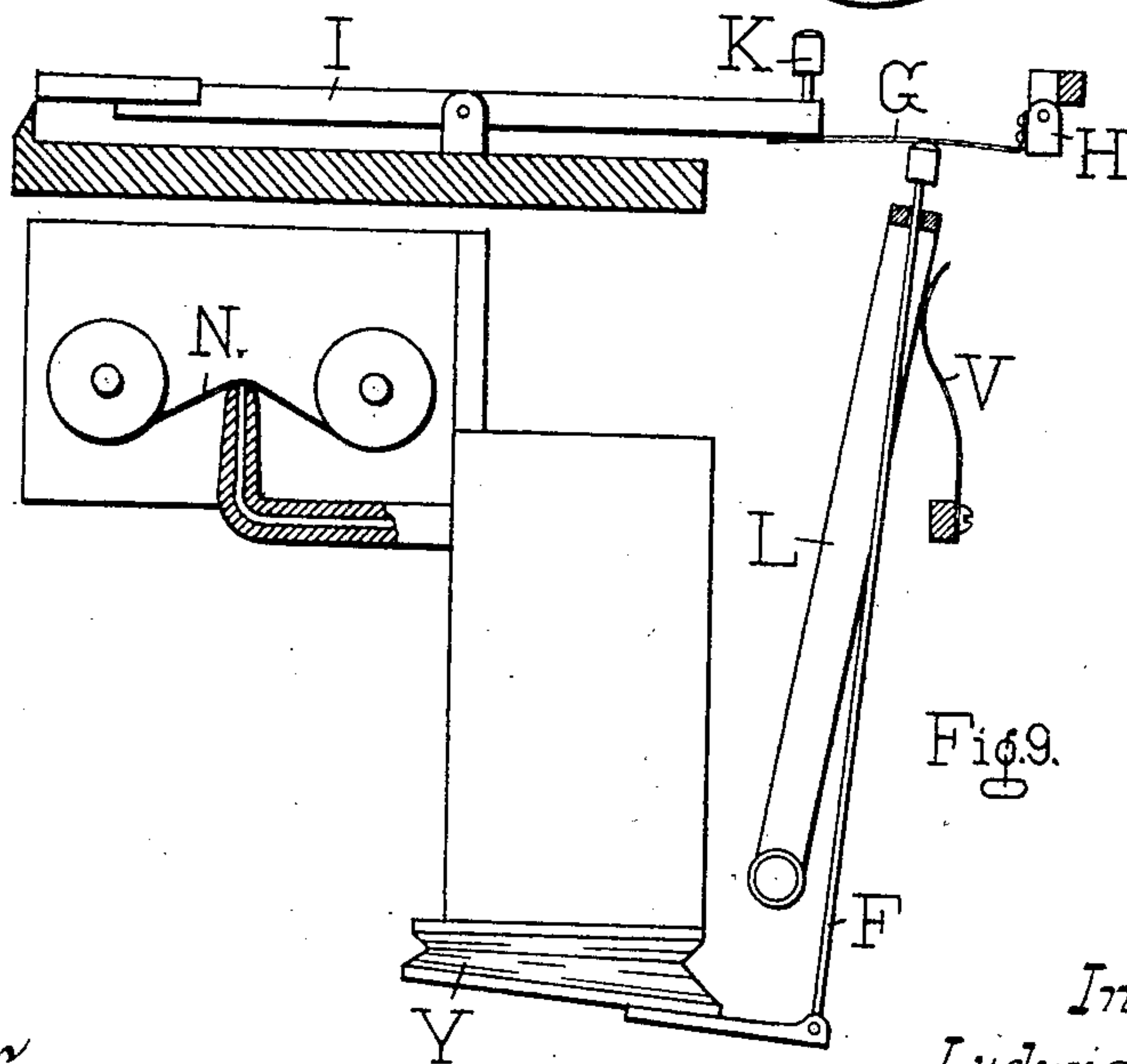
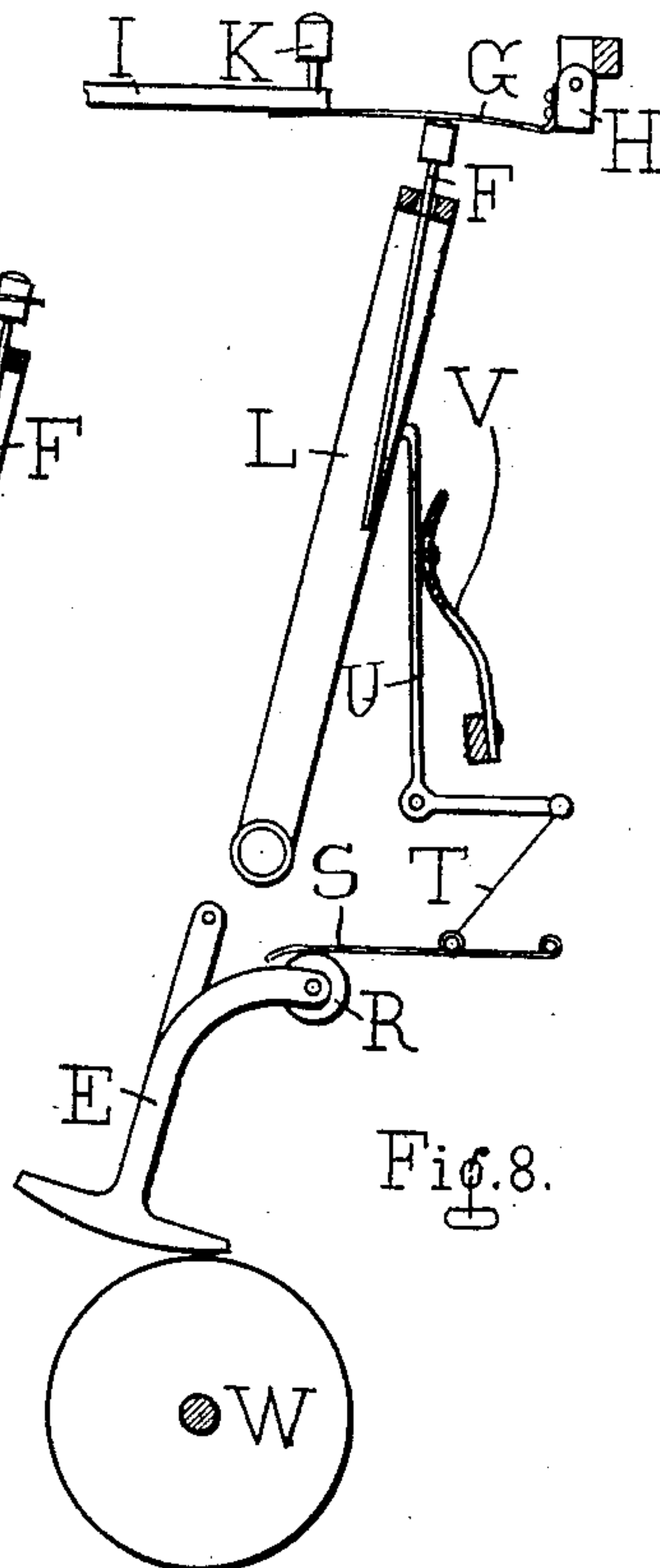
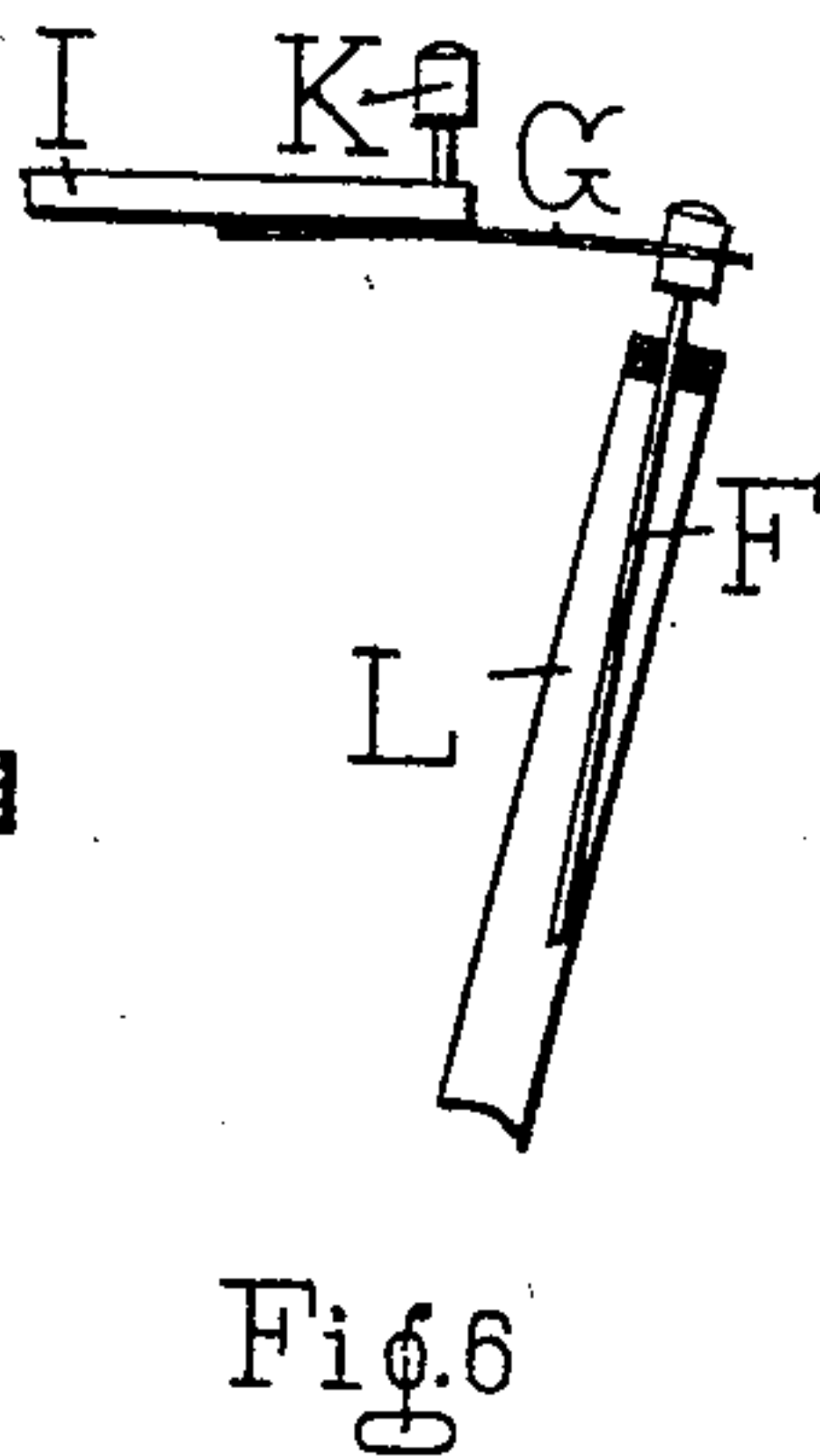
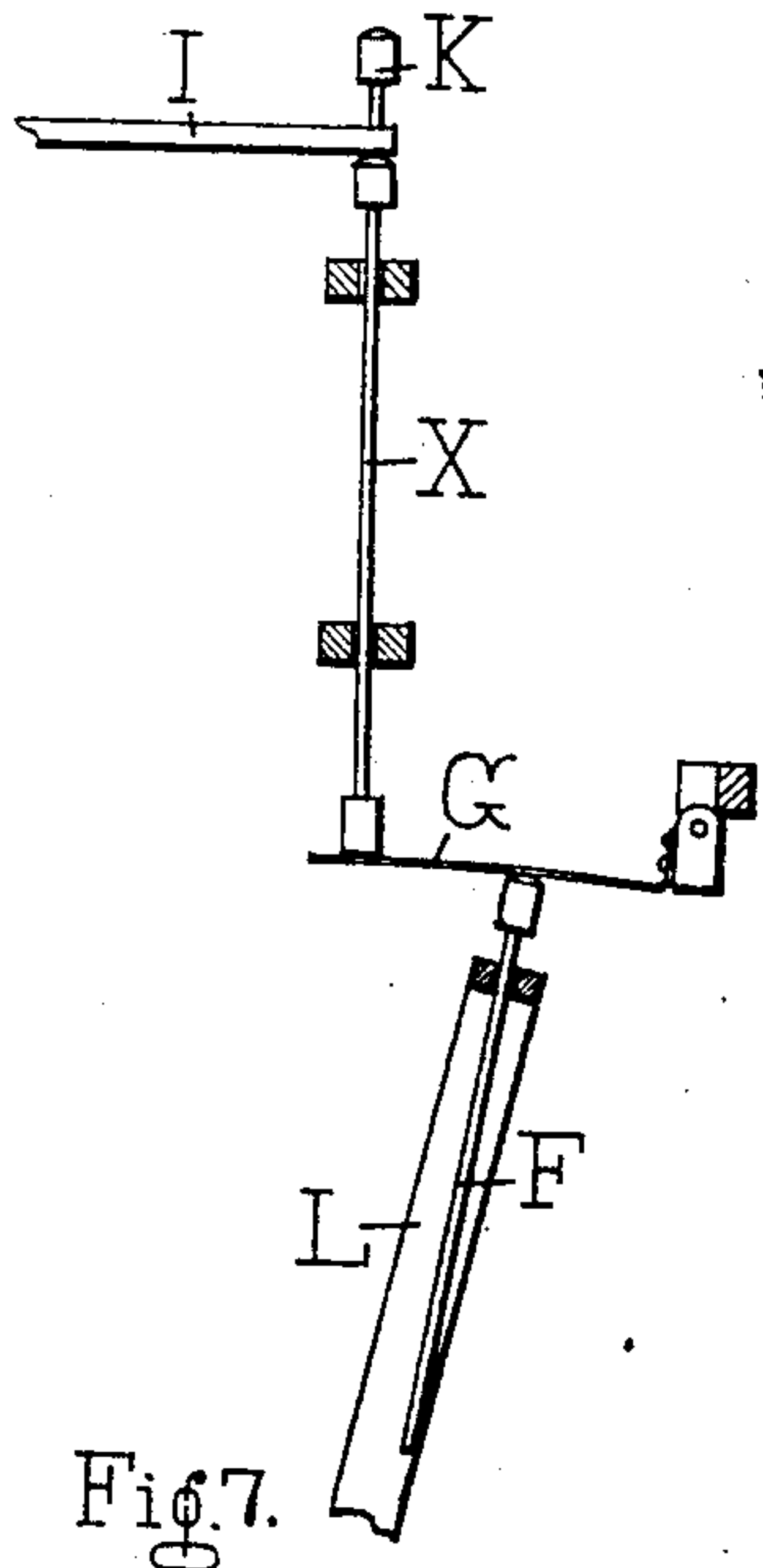
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

LUDWIG HUPFELD, OF LEIPSIC, GERMANY.

MECHANISM FOR EFFECTING VARYING TOUCH OF KEY OR MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 706,946, dated August 12, 1902.

Application filed January 8, 1901. Serial No. 42,521. (No model.)

To all whom it may concern:

Be it known that I, LUDWIG HUPFELD, a subject of the King of Saxony, residing at Leipsic, in the Kingdom of Saxony, German Empire, have invented new and useful Improvements in Mechanism for Effecting Varying Touch of Key or Musical Instruments, of which the following is a specification.

To overcome the monotonous effect of mechanical key instruments, arrangements are sought which vary the strength of touch according to the notation on the sheet barrel or disk of a mechanically, electrically, or pneumatically actuated musical instrument. According to this invention this is to be attained by each pusher acting not directly on the hammer-action of the key instrument, but on a spring-arm, by the spring-power of which the pushing action is to be transmitted. According as the spring-arm is longer or shorter (the spring being the same) the resulting increased or decreased elasticity of the spring causes the stroke to be transmitted with greater or less intensity onto the hammer mechanism. To attain a tone effect of varying strength, it is thus only necessary to vary the relative position of the pusher to the power-transmitting spring-arm or contrariwise by means of a mechanical arrangement. This invention is set forth in the following specification and claims and illustrated in the annexed drawings, in which—

Figure 1 is a longitudinal section of a key instrument embodying this invention. Fig. 2 is a cross-section of the instrument. Figs. 3 and 4 show the two extreme positions of the pusher. Figs. 5 and 6 show a modification of the spring-arm. Fig. 7 shows another modification of the device. Fig. 8 shows a setting device for the pusher-arm. Fig. 9 shows a cross-section of a pneumatically-actuated key instrument. Fig. 10 is a side elevation showing a lever mechanism for moving the pusher-frame against the action of the spring. Fig. 11 shows a modified arrangement of lever and spring.

The mechanical key instrument, Figs. 1 to 7, is controlled, as known, by the note disk or plate N being actuated, while at the same time the driving-barrel W is rotated. If the tooth or free end of the lever A rises into a

hole in plate N, the vertical arm of said lever, with link B, moves to the left, and the vertical arm of lever C also moves to the left. The horizontal arm of said lever C rises and allows the left end of lever D to also rise, while the right end or arm of lever D drops with the segment E, so that said segment falls into contact with the continuously-rotating driving friction roller or barrel W. The segment is thus carried by the barrel to the position shown by dotted lines until the tooth or free end A again leaves the hole of the note-plate. The pusher F is thus also raised and a push action exerted on the hammer-action.

The pusher F, according to this invention, is not to act directly on the hammer-action, but on a springing or elastic arm G. In the examples shown in Figs. 2 to 4 this spring-arm is suspended from a joint H, and its free end engages under the key I, on which is secured lifter K, acting on the hammer-action. A key I, which can be used not only mechanically, but also for playing by hand, is applied to such instruments. According as the pusher F acts on the spring-arm G nearer to or farther from its point of suspension the force or push exerted by the spring-arm G on the hammer-action must become weaker or stronger; and thereby the tone or stroke correspondingly varied. It is therefore necessary to vary the position of the pusher F relatively to the spring-arm G if a stroke of varying strength is to be obtained, and this can be accomplished in various ways.

In the examples of construction illustrated the position of the pusher varies with relation to the spring-arm. Contrariwise, also, the pusher may be fixed in adjustment and the position of the spring-arm, or rather of its engaging point with the hammer mechanism, be changed. If the position of the pusher relatively to the spring-arm is to be made variable, the same can be done by either rectilinearly moving the pusher-frame or, as shown by the example illustrated, by arranging the pusher-frame L so that it will swing. In the intermediate position of the pusher-frame L, Fig. 8, the pusher F strikes about at the center of the spring-arm G between its point of suspension and its engag-

ing or resistance point. This position would be the normal position for playing. As the stroke is to become stronger the pusher-frame must assume a more vertical position, until finally in fortissimo play it assumes vertical position, Fig. 3, and eventually acts on the hammer mechanism direct. On the other hand, for pianissimo effect the pusher-frame L is moved farthest outward, Fig. 4, and the pusher acts on the spring-arm G in proximity to its point of suspension.

The segment or barrel-contacting arm E carries a roller R, Fig. 8, against which rests an arm S, which by link-rod T connects with a bell-crank lever U. The free arm of the latter rests against or connects with pusher-frame L and presses or moves the same against the action of its spring V from middle position, Fig. 2, into the outermost position, Fig. 3, said spring being loosely connected to the lever to pull or swing the latter away from the key. A like arrangement can also be employed for moving the pusher in the opposite direction from the center position into the other outermost position, Fig. 4.

The spring-arm G need not necessarily have a special suspension device H, as it could sit directly on key I, Fig. 5, or the spring-arm G could be secured directly to the end of the pusher F, Fig. 6, without requiring an intermediate member. On the other hand, also, the spring-arm need not act directly on key I; but, as seen in Fig. 7, a pusher X could be arranged beneath the key I to serve as intermediate member and moving in fixed guides, while the pusher proper, F, is applied to an adjustable pusher-frame L and acts on pusher X by means of the spring-arm G.

The device can be applied to use for varying strength of tone in connection with pneumatic instruments as well as mechanical. The note-plate N, Fig. 9, in this case serves for the actuation of the bellows Y, and the latter moves the pusher F, guided in the pusher-frame L. The pusher acts on the hammer-action through the spring-arm G.

What I claim as new, and desire to secure by Letters Patent, is—

1. A musical instrument embodying a key, an arm free at one end, said free end bearing against the key, a pivotally-supported frame, means to control the position of the frame,

and a pusher for engaging said arm, guided toward the said arm by said frame.

2. A musical instrument embodying a key, a spring-arm free at one end, said free end bearing against the key, a pivotally-supported frame, means to control the position of the frame, and a pusher for engaging said arm, guided toward the said arm by said frame.

3. A musical instrument embodying a key, a yieldable arm one end free and said free end bearing against the key, a swinging frame, a spring bearing against said frame, means to move the frame in opposition to its spring, and a pusher to engage the arm, guided by said frame.

4. A musical instrument embodying a key, a yieldable arm bearing against the same, a swinging frame, a pusher for said arm guided by said frame a spring bearing against said frame, two operatively-connected levers one of which is attached to said frame, and a note-disk controlling the other lever.

5. In a musical instrument, the combination with the note-striking mechanism, of a spring through the medium of which said striking mechanism is actuated; and means to vary the operative length of such spring.

6. In a musical instrument, the combination with the note-striking mechanism; of a spring through the medium of which the said striking mechanism is operated, a striker arranged to operate on such spring and actuate the note-striking mechanism through the medium thereof; and means for altering the position of the striker relatively to the spring so as to vary the strength thereof.

7. In a musical instrument, the combination of a note-striking mechanism; a spring through the medium of which said striking mechanism may be operated; a mechanical striker arranged to operate on said spring and actuate the note-striking mechanism through the medium thereof; and means for shifting the striker relatively to the spring so as to vary the operative length and consequent strength of the latter.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

LUDWIG HUPFELD.

Witnesses:

GEORG MEZGER,
RUDOLPH FRICKE.