

No. 725,598.

PATENTED APR. 14, 1903.

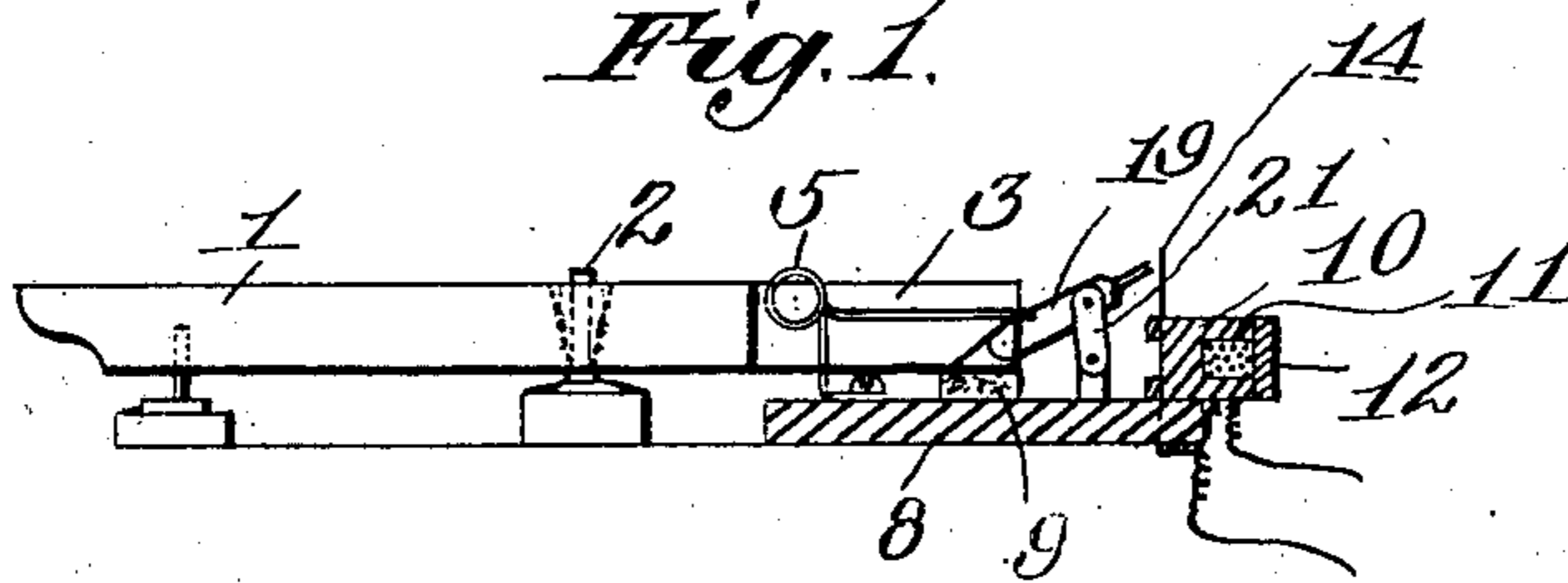
E. M. SKINNER.  
ELECTRIC CIRCUIT CLOSING MECHANISM FOR KEYED MUSICAL  
INSTRUMENTS.

APPLICATION FILED OCT. 1, 1902.

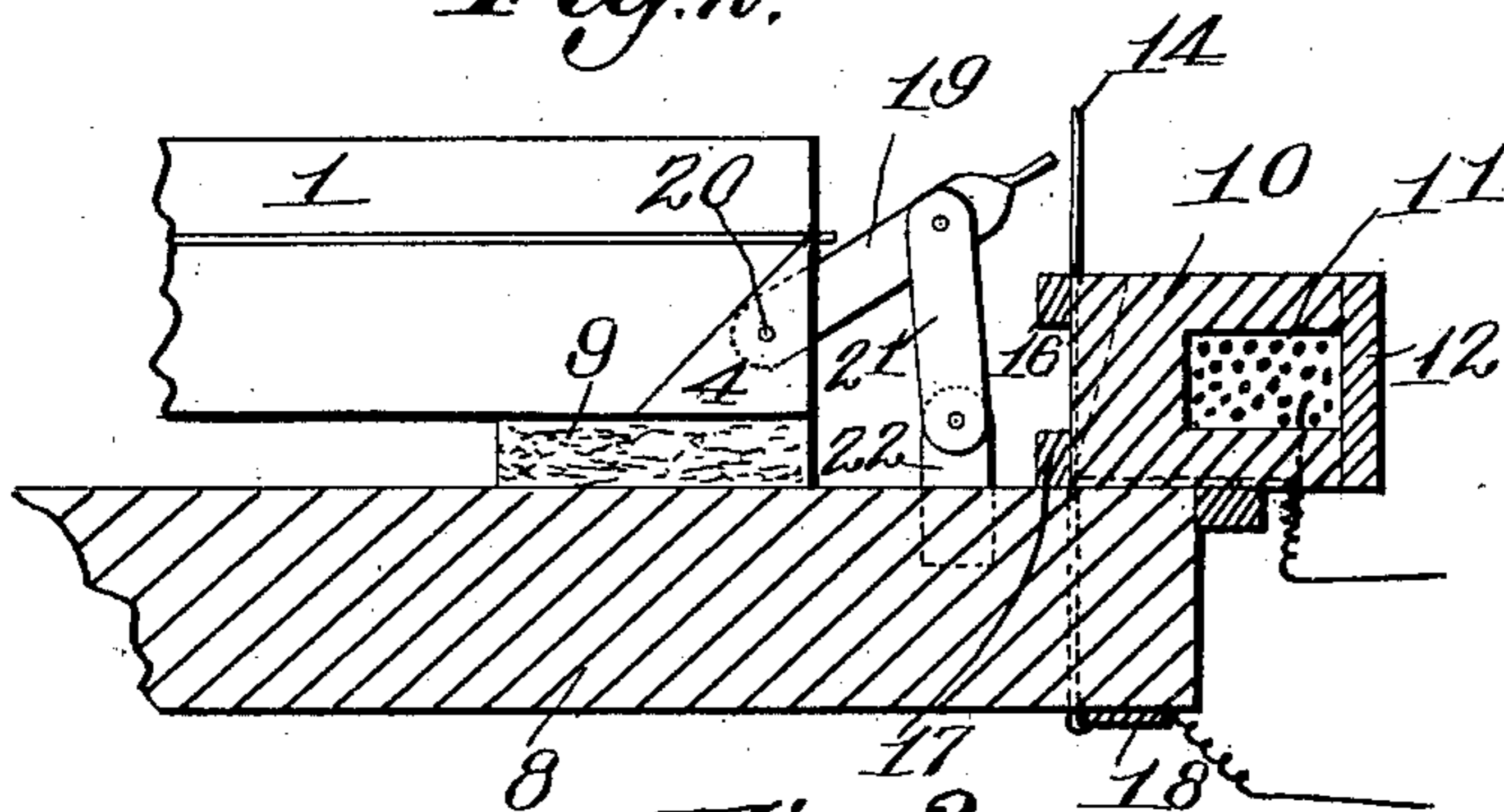
NO MODEL.

2 SHEETS—SHEET 1.

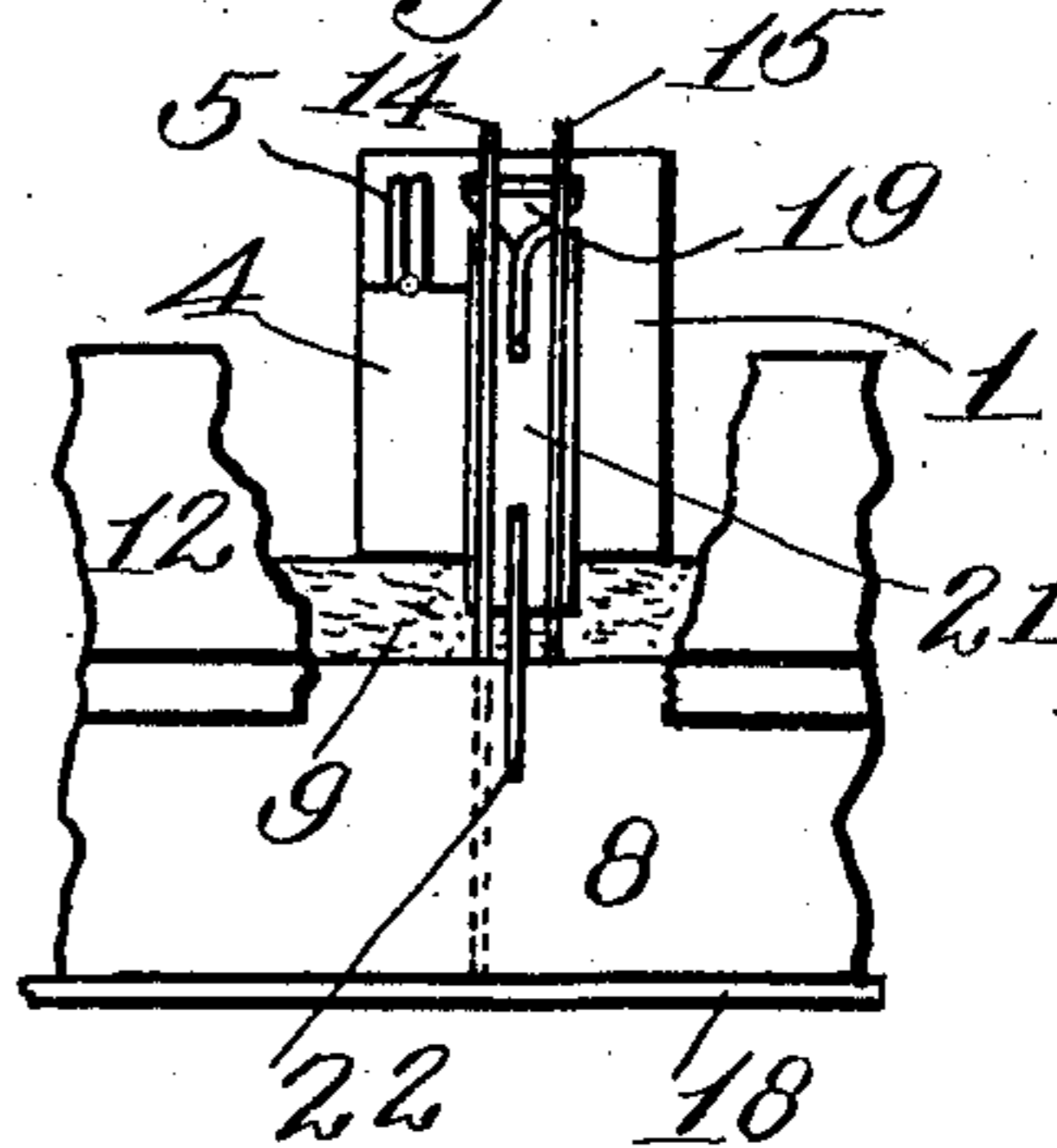
*Fig. 1.*



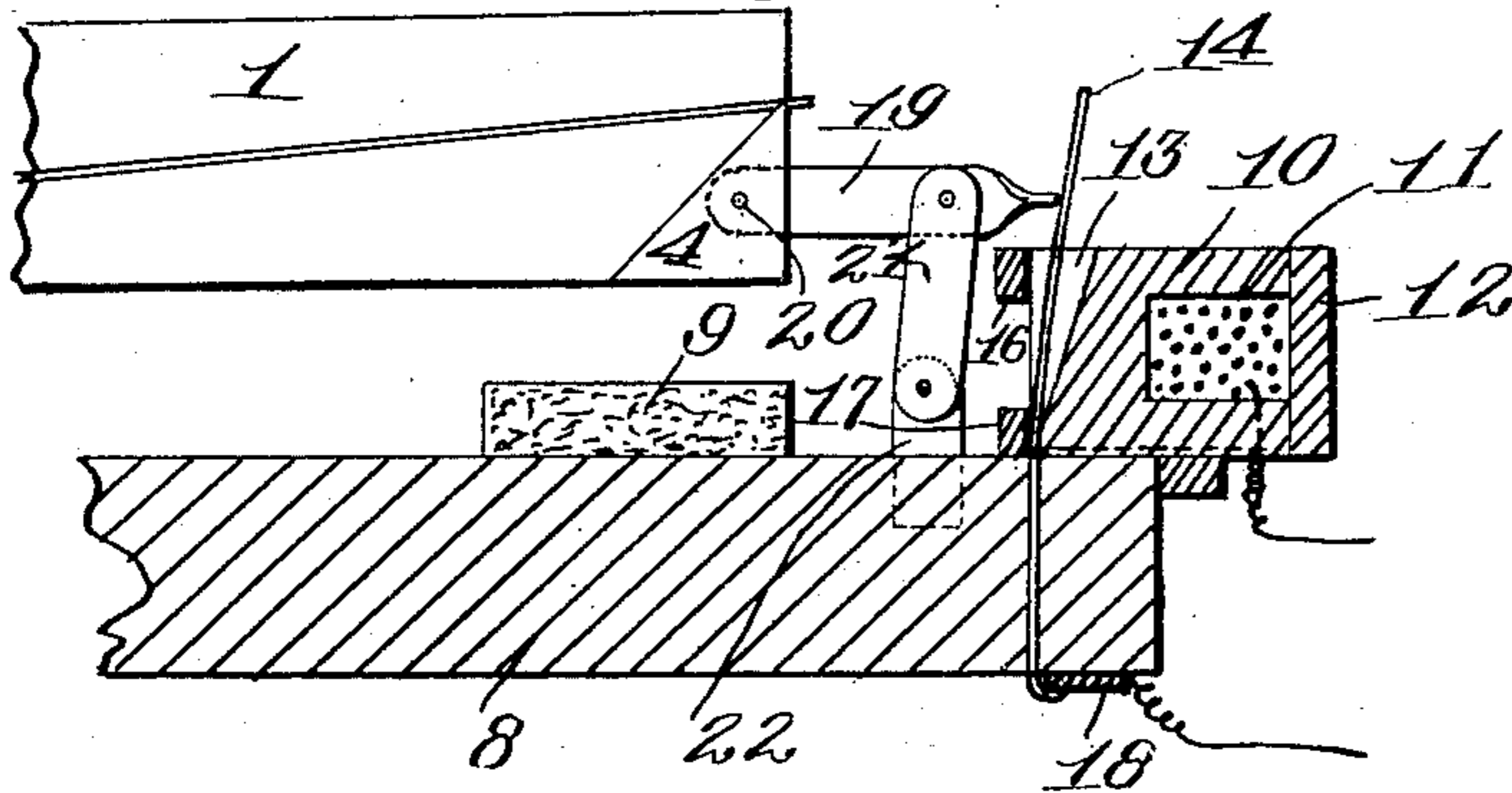
*Fig. 2.*



*Fig. 4.*



*Fig. 3.*



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2 SHEETS—SHEET 2.

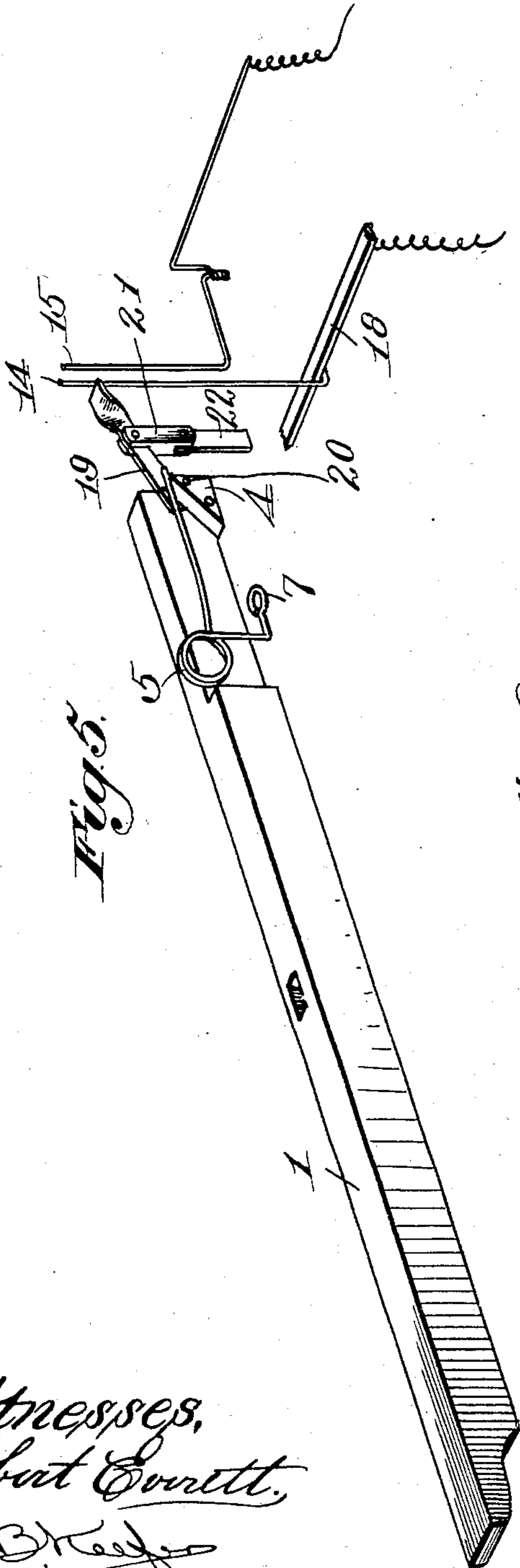


Fig. 5.

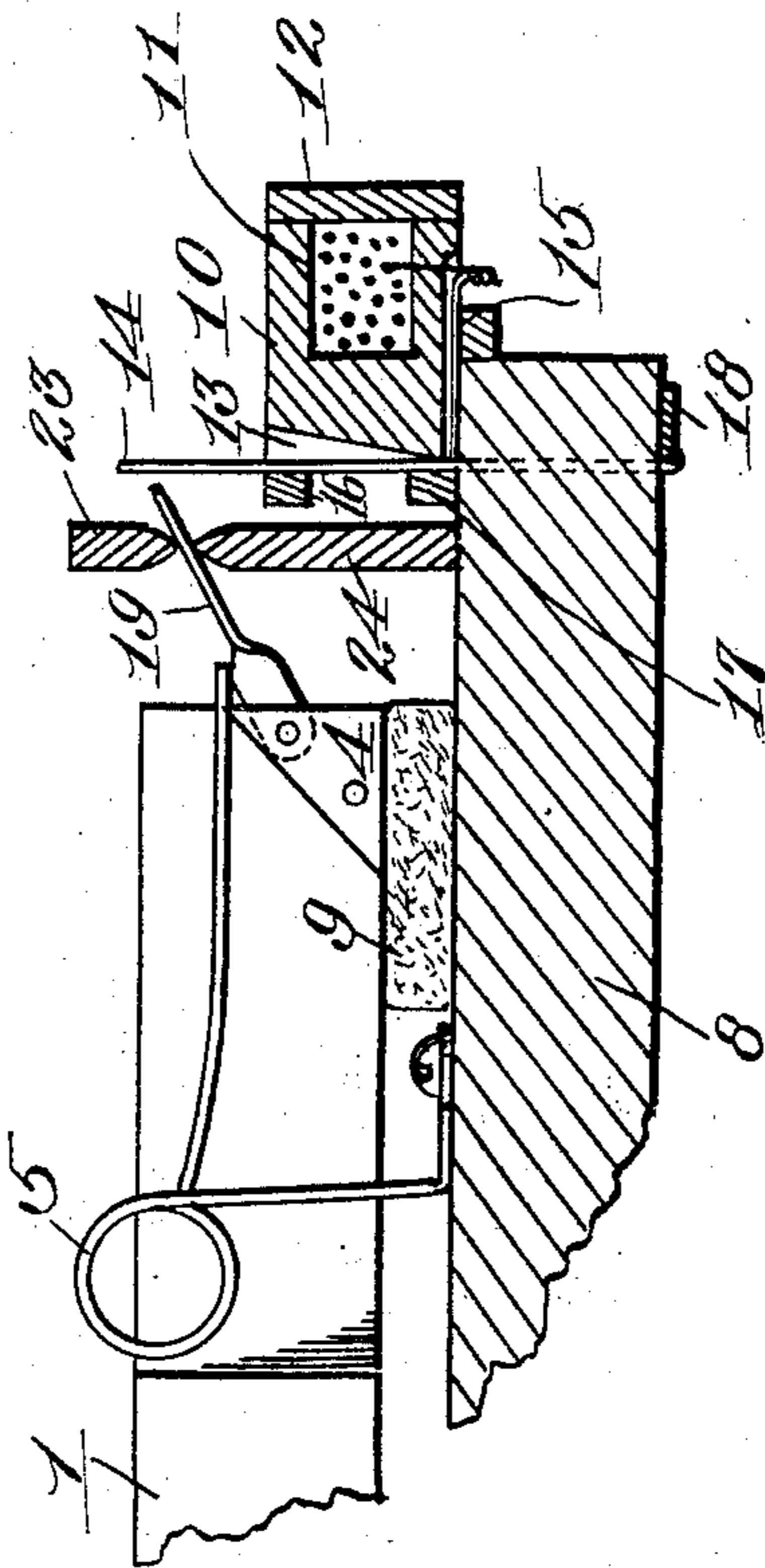


Fig. 6.

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# UNITED STATES PATENT OFFICE.

ERNEST M. SKINNER, OF DORCHESTER, MASSACHUSETTS.

ELECTRIC-CIRCUIT-CLOSING MECHANISM FOR KEYED MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 725,598, dated April 14, 1903.

Application filed October 1, 1902. Serial No. 125,566. (No model.)

*To all whom it may concern:*

Be it known that I, ERNEST M. SKINNER, a citizen of the United States, residing at Dorchester, in the county of Suffolk and State of Massachusetts, have invented new and useful Improvements in Electric-Circuit-Closing Mechanism for Keyed Musical Instruments, of which the following is a specification.

This invention relates to electric-circuit-closing mechanism for keyed musical instruments. In such musical instruments—as organs, for example—it is now the preferred practice to actuate the music-playing mechanism by electromagnets, which are included in electric circuits that are controlled by the organ-keys, and the present invention relates to the mechanism that is actuated by the keys for closing the circuits when a key is depressed to sound a note corresponding to such key.

The invention has for its object, first, to provide improved circuit-closing contacts so constructed and arranged that but slight pressure on the keys will be required to close the circuits with certainty; second, to provide circuit-closing mechanism of the class described which will operate to maintain the contacts polished and clean, so as to always insure perfect electrical contact.

Third, it has for its object to so construct and arrange the circuit-closing mechanism that the impact or mechanical resistance encountered in bringing the contacts into engagement will not be appreciable to the “touch” of the operator or performer.

Finally, it has for its object to improve and simplify the construction and render more efficient and certain the operation of this class of devices generally.

To these ends my invention consists in the features and in the construction, combination, and arrangement of parts hereinafter described, and particularly pointed out in the claims following the description, reference being had to the accompanying drawings, forming a part of this specification, wherein—

Figure 1 is a view in side elevation of an organ-key provided with my improved circuit-closing device, the keyboard and the support for the terminals being shown in section. Fig. 2 is a similar view, on an enlarged scale, a

portion of the key and keyboard being shown broken away, the parts being shown in their normal position. Fig. 3 is a view similar to Fig. 2, showing the position the parts assume when the key is depressed to close the circuit. Fig. 4 is an end view. Fig. 5 is a detail perspective view, the contacts being shown diagrammatically; and Fig. 6 is a view similar to Fig. 2, illustrating a modification.

Referring to the drawings, the numeral 1 indicates one of the keys of a musical instrument—such as an organ, for example—said key being fulcrumed intermediate its ends on a pin 2 in a usual and well-known manner. The inner end of the key is mortised or reduced in thickness at its inner end, as at 3, to afford space to accommodate a spring for holding the outer end of the key elevated. To the mortised side of the inner end of the key is fixed a block 4, which forms a shoulder against which the free end of said spring bears, and said shoulder is recessed on its inner side for the reception of one end of a contact-lever presently to be described. The spring referred to consists of a resilient wire bent intermediate its ends to form a coil 5, one of said ends being bent vertically downward to provide at its extremity a loop 7. It is attached to the keyboard 8 of the instrument by a screw or similar fastening, as shown in Fig. 1, and the other end of the spring is bent horizontally and rests on the block 4 and operates to hold the inner end of the key depressed and the outer end thereof elevated. A piece of felt 9 is fixed to the keyboard beneath the inner end of the key to receive the impact of the latter and render the depression of said end of the key noiseless. In the drawings I have shown but a single key; but it will of course be understood that a plurality of keys will be provided, the latter being arranged side by side, as is usual in organs, pianos, and similar musical instruments. Fixed to the keyboard, in proximity to the inner end of the keys, is a bar 10, which may conveniently consist of a wooden strip rectangular in cross-section and channeled or recessed upon its rear side, as at 11, to form a receptacle for one-half of the terminals of the contacts presently to be described, said recess being closed

by a strip 12, attached to the inner side of the bar. Said bar is provided on its front edge at a point directly opposite the inner end of each of the keys 1 with two vertical  
 5 kerfs 13, which are disposed parallel to each other and in relative close proximity to one another. Arranged in each pair of said kerfs are two contacts 14 and 15, consisting of resilient wires normally standing erect and extending at their upper ends above the top of  
 10 the bar 10. The contacts 14 and 15 are free to be moved rearwardly in the kerfs 13 by means hereinafter described, and when released, owing to their resiliency, will spring  
 15 back to a vertical position and are held in such position by strips 16 and 17, attached to the front edge of the bar. The wires forming the contacts 15 are led into and collected in the recess 11 in the bar, said wires being  
 20 insulated from one another, and each of said wires is conducted off from one end of said bar and is connected to one terminal of an electromagnet. The other terminal of said magnet is connected to one pole of an  
 25 electric battery. The wires constituting the contacts 14 are connected to a metallic connecting-bar 18, that is common to all of said wires, and said connecting-bar is electrically connected to the other pole of the battery.  
 30 Each of the electromagnets mentioned controls mechanism for playing an individual note of the instrument. The electromagnets, battery, and mechanism controlled by said magnets is not herein shown, as the same  
 35 forms no part of the present invention and is well understood by those skilled in the art. It will be obvious that if any single pair of the terminals 14 and 15 be electrically connected the circuit of which said contacts form  
 40 the terminals will be closed and will energize an electromagnet included in said circuit and will actuate the mechanism to sound the note corresponding to said mechanism. I will now describe the mechanism by means of which  
 45 said contacts are connected through the instrumentality of the key.

Pivotaly attached to one end of the key is a contact-lever 19, which may conveniently consist of a metallic strip one end of which  
 50 is inserted between the block 4 and the adjacent face of the key 1 and is loosely secured in place by means of a pivot-pin 20. The other end portion of the contact-lever is twisted torsionally or given a one-quarter  
 55 turn in order that the free end of said contact-lever may be so presented to the contacts 14 and 15 as to straddle or bridge both the latter. Intermediate its ends said contact-lever is pivoted to the upper end of a  
 60 link 21, the lower end of which is pivoted to a support 22, fixed in or to the keyboard 8. The link 21 is of such height and the end of the contact-lever is pivoted to the key at such point that when the key is in its normal  
 65 position—that is to say, when the inner end of the key is depressed—the contact-lever will

stand at an angle or inclination, as shown most clearly in Fig. 2 of the drawings, and when in such position the free end of said  
 contact-lever will be separated from and rest  
 70 out of engagement with the contacts 14 and 15. When, however, the outer end of the key is depressed, the inner end thereof will of course be elevated and will raise the pivoted  
 end of the contact-lever 19. The said con-  
 75 tact-lever and the key form a species of toggle-joint, and hence when the inner end of the key is raised the contact-lever will be thrust outward in an endwise direction and will engage both the contacts 14 and 15, thus  
 80 closing the electric circuit, causing the electromagnet to actuate the music-playing mechanism to sound the note corresponding to the key struck. It will of course be evident that owing to the contact-lever and the key forming  
 85 a species of toggle-joint in the manner before set forth the contact-lever will be free to move endwise when the key is depressed, and such movement is permitted by supporting  
 90 the contact-lever on the swinging link in the manner before described. By supporting the contact-lever in such manner, however, when said lever is thrust forward by the  
 upward movement of the inner end of the key the free end of said lever is caused to  
 95 oscillate as well as to move forward, and during such oscillating movement it has a rubbing contact with the terminal contacts 14 and 15, and such rubbing contact operates  
 to keep said terminal contacts and the con-  
 100 tact end of the lever clean and polished, so as to insure perfect electrical contact between said parts whenever they shall be brought into engagement. When the key has been  
 released, the spring will operate to restore  
 105 the parts to their normal position, or to the position shown in Fig. 2 of the drawings, thus withdrawing the end of the contact-lever from engagement with the terminal contacts 14 and 15, thereby breaking the circuit.  
 110

In all of the circuit-closing devices of this character with which I am acquainted the impact or resistance encountered in closing the circuit is transmitted to the key and is distinctly felt by the performer and affects  
 115 his touch. In the arrangement herein shown the resistance encountered in closing the circuit is transmitted in an endwise direction to the key. This strain or resistance is absorbed or sustained by the pivot-pin 2, before  
 120 described, and is thus prevented from being communicated to or rendered appreciable by the performer, and hence his touch will be unaffected.

In Fig. 6 of the drawings I have illustrated  
 125 a slight modification wherein all the parts excepting the support for the contact-lever are identically the same as those before described. In the arrangement shown in said figure the pivoted link is dispensed with and  
 130 in lieu thereof I employ two stationary supports, which may conveniently consist of

strips 23 and 24, which are fixed one above the other, the adjacent edges of said strips being preferably beveled, as shown, to permit of the free oscillatory movement of the contact-lever 19. The operation of the device thus constructed is the same as that before described. When the key is struck or depressed so as to elevate its inner end, the contact-lever will be thrust forward and at the same time it will move downwardly and have a rubbing contact with the terminal contacts 14 and 15.

Having described my invention, what I claim is—

1. In a device of the character described, the combination with a key, of two contacts forming the terminals of an electric circuit, and a contact-lever pivotally attached at one end to the inner end of the key and movably supported intermediate its ends, whereby said contact-lever engages the contacts with a rubbing action when the key is depressed, substantially as and for the purpose specified.

2. In a device of the character described, the combination with a key, of two yielding contacts forming the terminals of an electric circuit, and a contact-lever pivotally attached at one end to the inner end of the key and movably supported intermediate its ends, whereby said contact-lever engages the contacts with a rubbing action when the key is depressed, the free end of the contact-lever normally resting in proximity to but out of engagement with said contacts, substantially as and for the purpose specified.

3. In a device of the character described, the combination with a key, of two yielding contacts forming the terminals of an electric circuit, a contact-lever pivotally attached at one end to the inner end of the key and movably supported intermediate its ends, and means for normally holding the key and contact-lever out of alignment with each other, the free end of the contact-lever normally resting in proximity to but out of engagement with said contacts, substantially as and for the purpose specified.

4. In a device of the character described, the combination with a key, of two yielding contacts forming the terminals of an electric circuit, and a contact-lever pivotally attached at one end to the inner end of the key, and movably supported intermediate its ends, said contact-lever consisting of a flat metallic strip twisted to cause its free end to bridge both contacts when thrown into contact with the latter by the key, substantially as described.

5. In a device of the character described, the combination with a key, of two parallel yielding contacts forming the terminals of an electric circuit, and a contact-lever pivotally attached at one end to the inner end of the key and movably supported intermediate its ends, the free end of said contact-lever normally resting in proximity to but out of contact with the contacts and constructed to

bridge said contacts with a rubbing action and close the circuit when thrown into engagement with the contacts by the key, substantially as described.

6. In a device of the character described, the combination with a pivoted key, of two yielding contacts forming the terminals of an electric circuit, a contact-lever pivotally connected at one end to the inner end of the key, said contact-lever being constructed at its free end to bridge said contacts when thrown into contact therewith by the key, means for holding the inner end of the key normally depressed, and means for guiding the end of the contact-lever in a curved line to cause it to move over the contacts with a rubbing movement when thrown forward by the elevation of the inner end of the key, substantially as described.

7. In a device of the character described, the combination with a key, of two contacts forming the terminals of an electric circuit, a contact-lever pivotally attached at one end to the inner end of the key and constructed at its other end to bridge the two contacts to close the circuit, means for normally holding the contact-lever out of engagement with said terminals, and a shifting fulcrum for movably supporting said lever between its ends, substantially as described.

8. In a device of the character described, the combination with a key, of two contacts forming the terminals of an electric circuit, a contact-lever pivotally attached at one end to the inner end of the key and constructed at its other end to bridge the two contacts to close the circuit, means for normally holding the contact-lever out of engagement with said terminals, and a link pivotally attached at one end to a fixed support and at its other end to the contact-lever intermediate the ends of the latter substantially as described.

9. In a device of the character described, the combination with an oscillatory key pivoted upon a fixed pin intermediate its ends, a spring normally holding the inner end of said key depressed, two contacts forming the terminals of an electric circuit, a contact-lever pivotally attached at one end to the inner end of the key and constructed at its other end to bridge the two contacts and close the circuit, a spring for normally holding the contact-lever out of engagement with said terminals, and means for movably supporting the free end of the contact-lever, substantially as described.

10. In a device of the character described, the combination with a key, of a lever pivotally attached at one end to the inner end of the key and movably supported intermediate its ends, whereby the free end of the key has a combined reciprocatory and oscillatory movement when the key is depressed, and a normally open electric circuit arranged to be closed by said lever when the key is depressed, substantially as described.

11. In a device of the character described,  
the combination with a key, of a lever pivot-  
ally attached at one end to the inner end of  
the key and loosely fulcrumed near its other  
5 end, and an electric circuit arranged to be  
closed by said lever when the key is de-  
pressed, substantially as described.

In testimony whereof I have hereunto set  
my hand in presence of two subscribing wit-  
nesses.

ERNEST M. SKINNER.

Witnesses:

VINTON COOMBS,

CLAUDE D. KESLER.