No. 881,464. PATENTED MAR. 10, 1908.

J. W. DARLEY, JR.

EXPRESSION DEVICE FOR KEYBOARD MUSICAL INSTRUMENTS.

APPLICATION FILED DEC. 13, 1905. RENEWED AUG. 2, 1907.

4 SHEETS—SHEET 1.

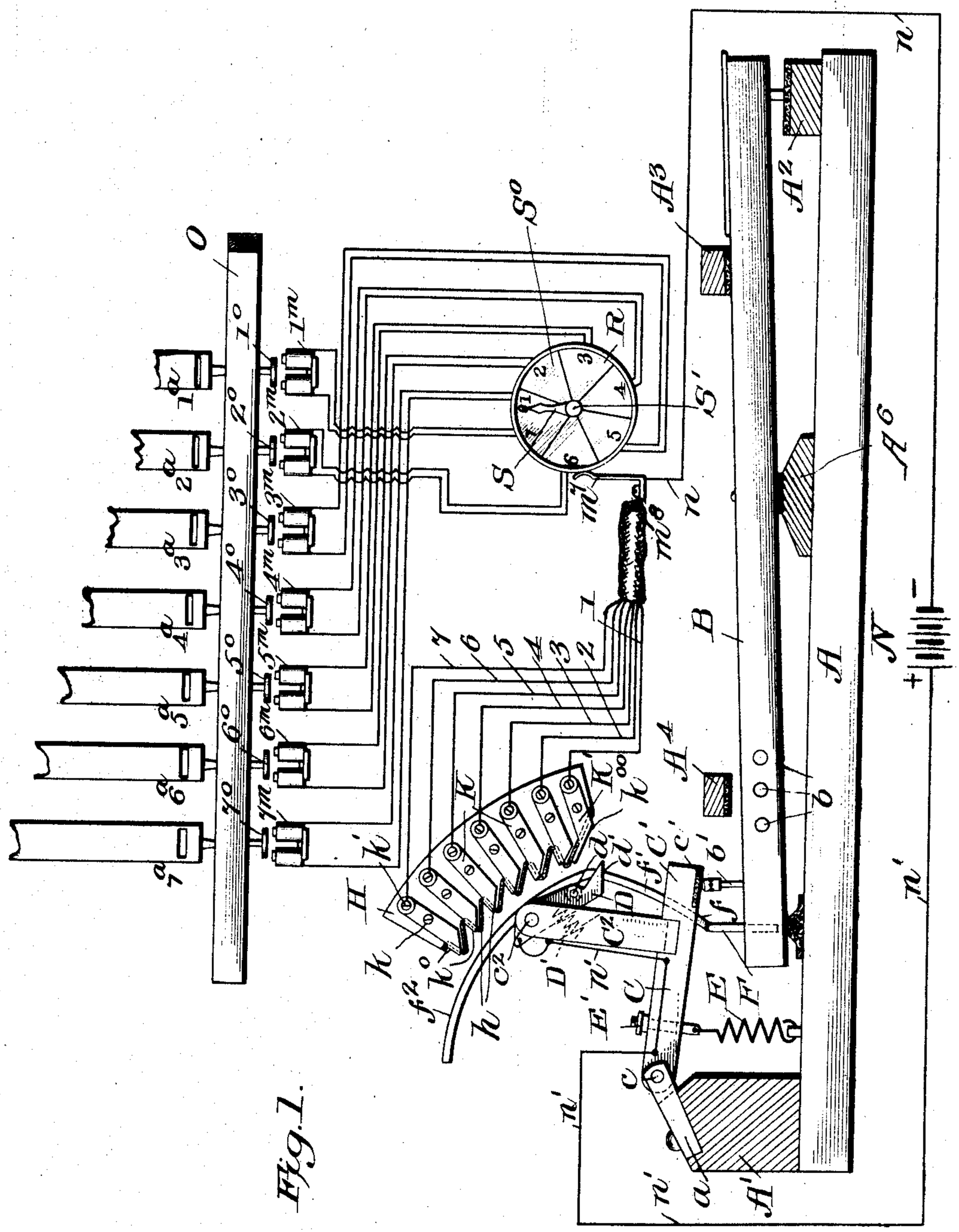

Fig. 1.

Witnesses
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4 SHEETS—SHEET 2.

Fig. 2.

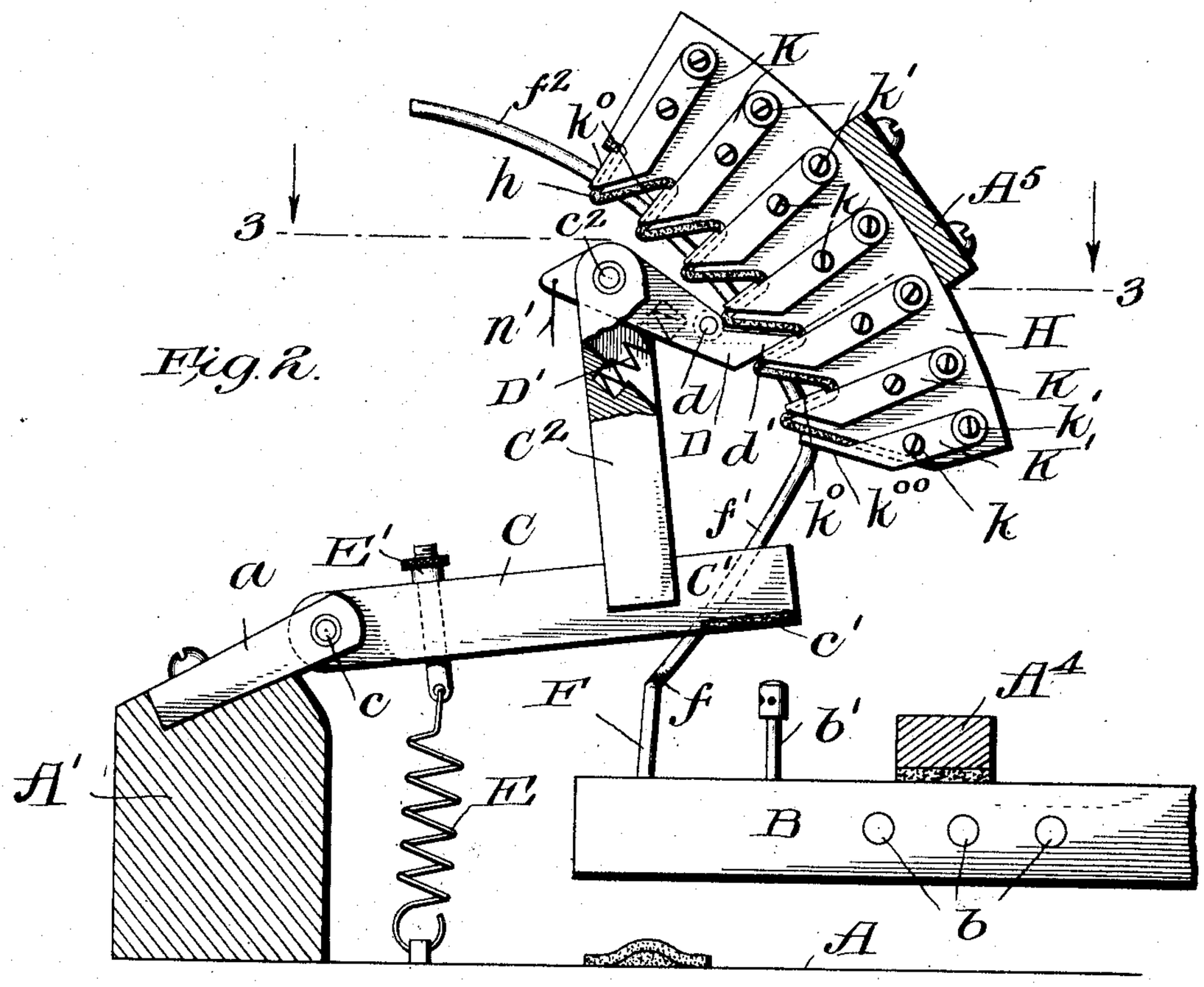


Fig. 3.

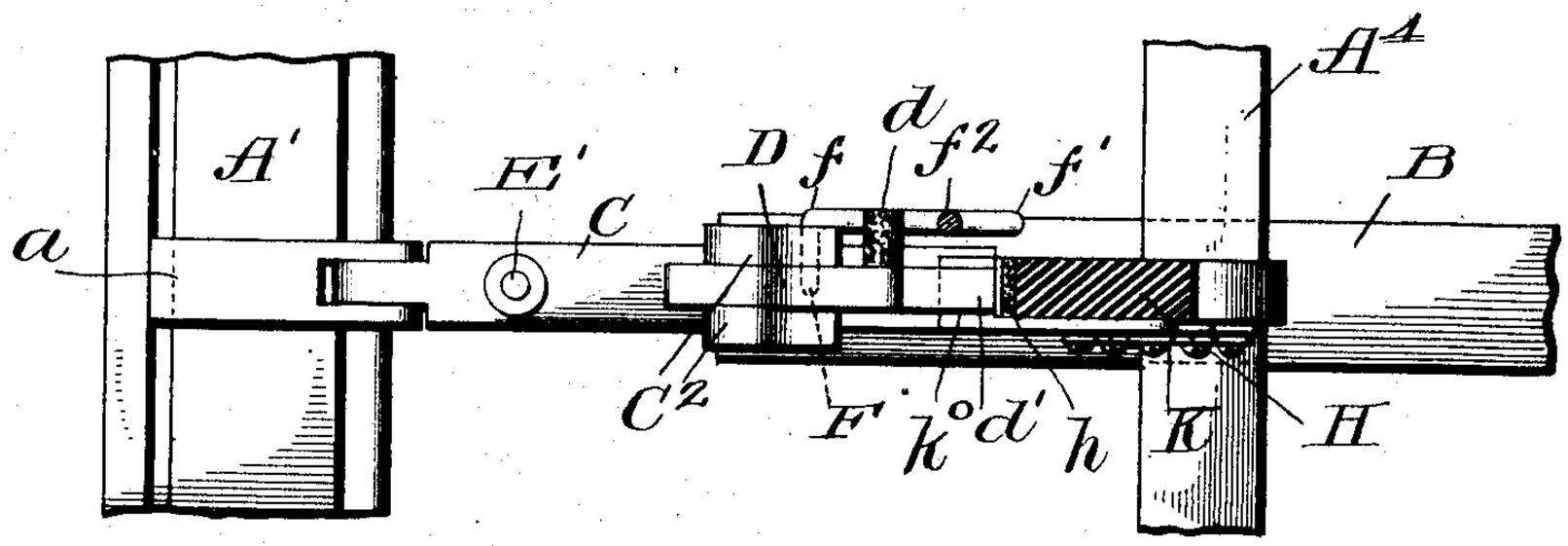
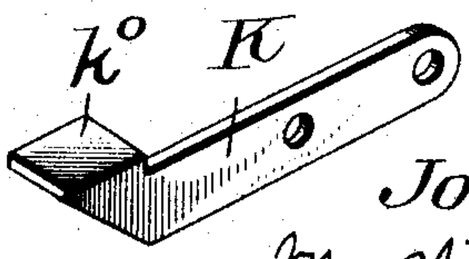


Fig. 4.



Witnesses
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4 SHEETS—SHEET 3.

Fig. 5.

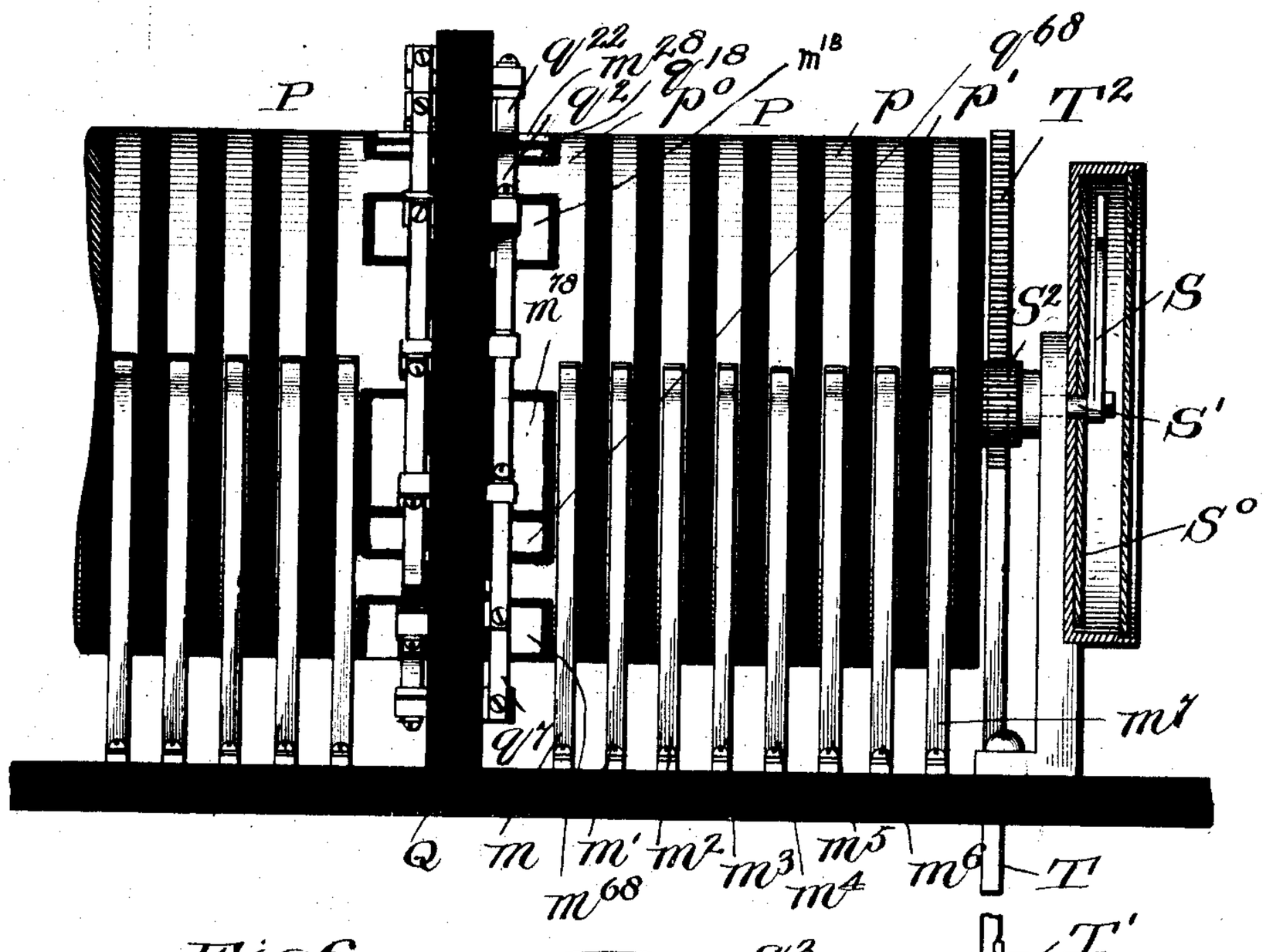
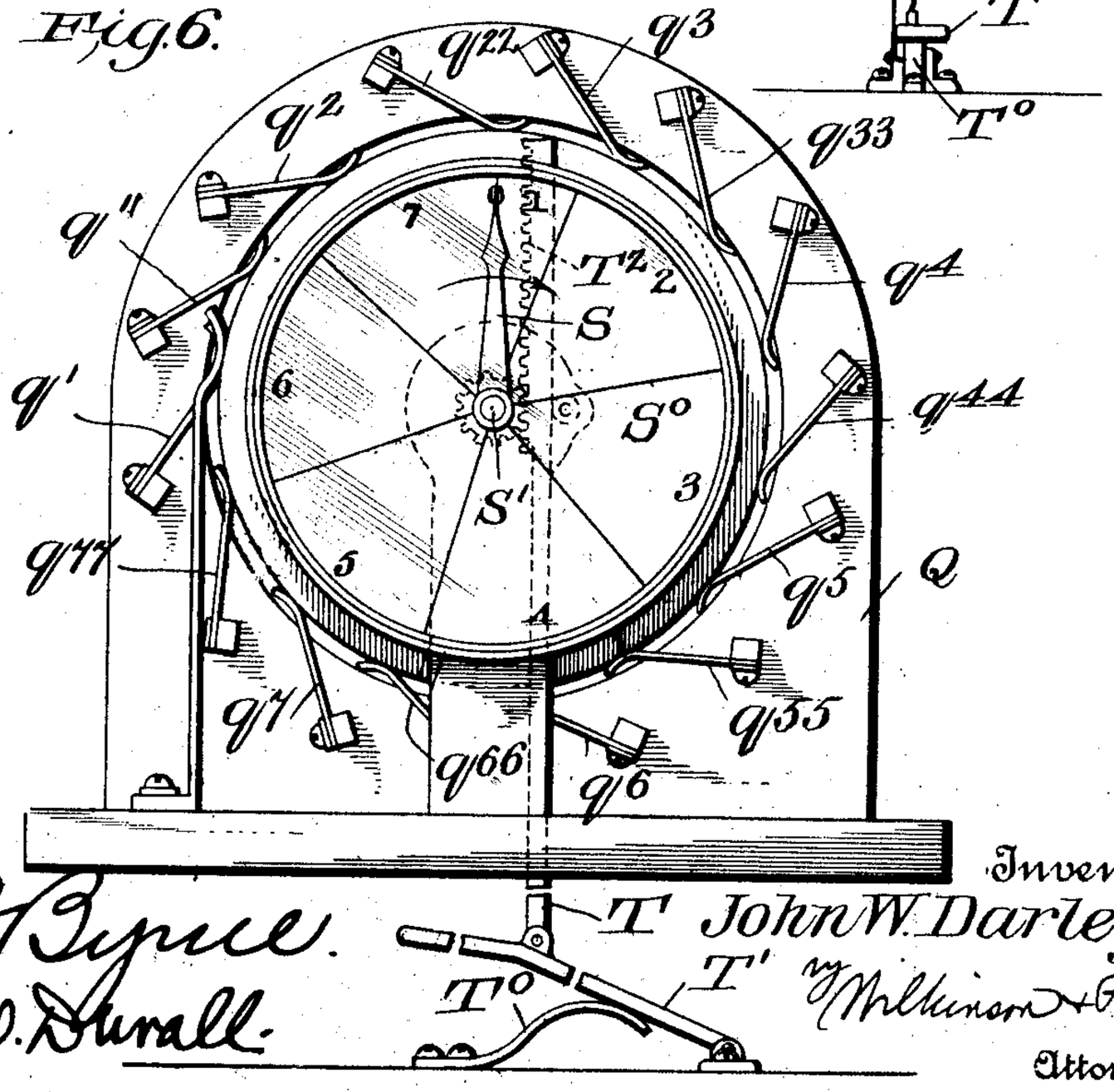


Fig. 6.



Witnesses,
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4 SHEETS—SHEET 4.

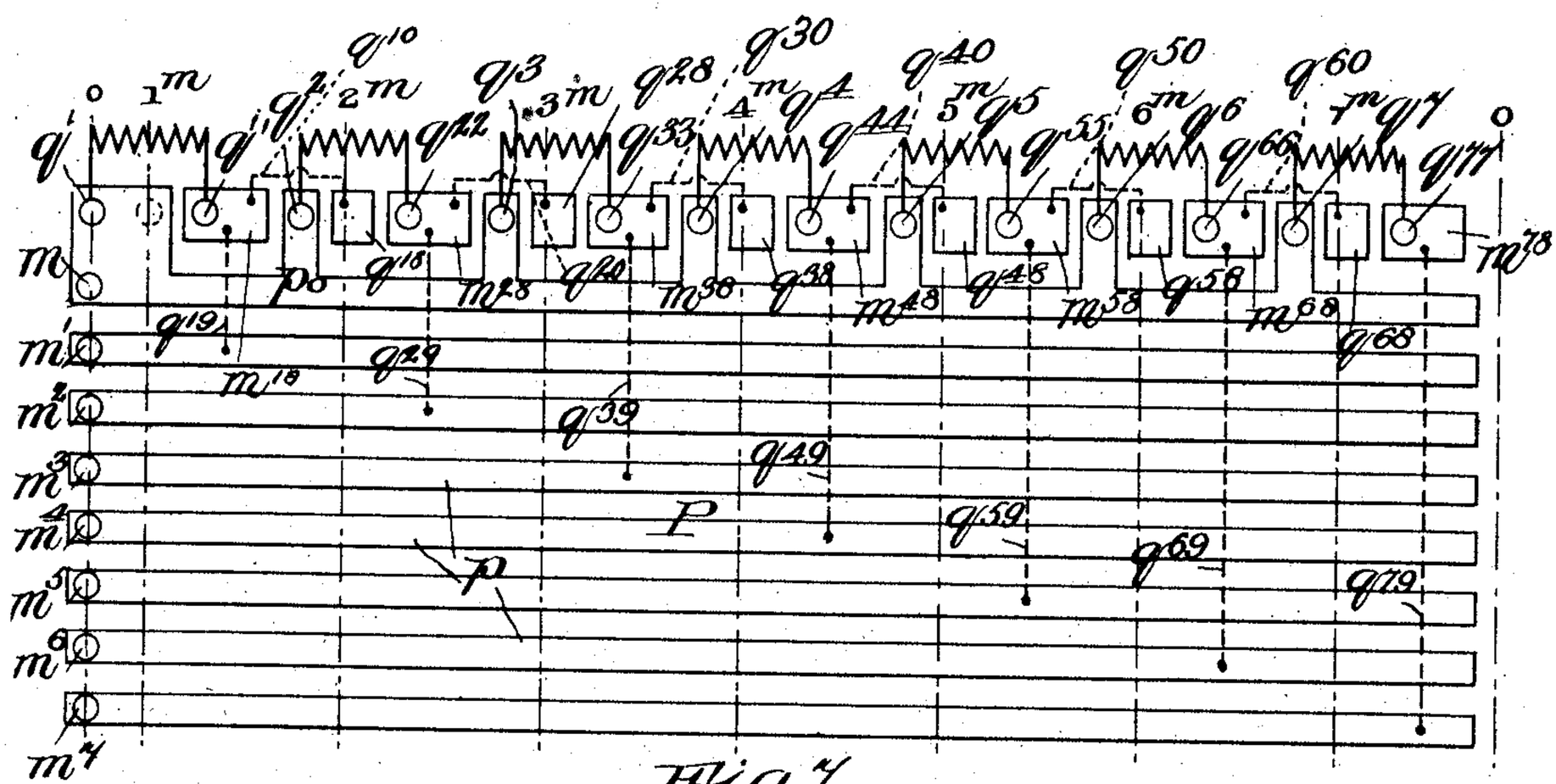


Fig. 7.

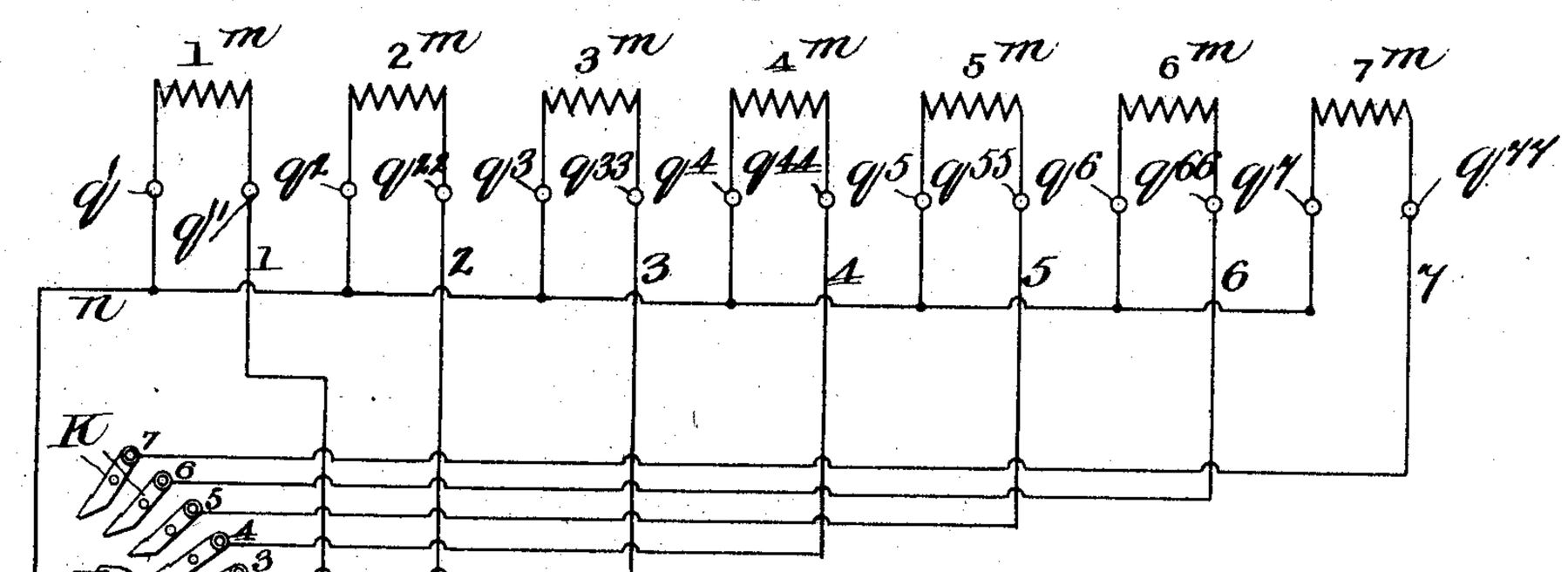
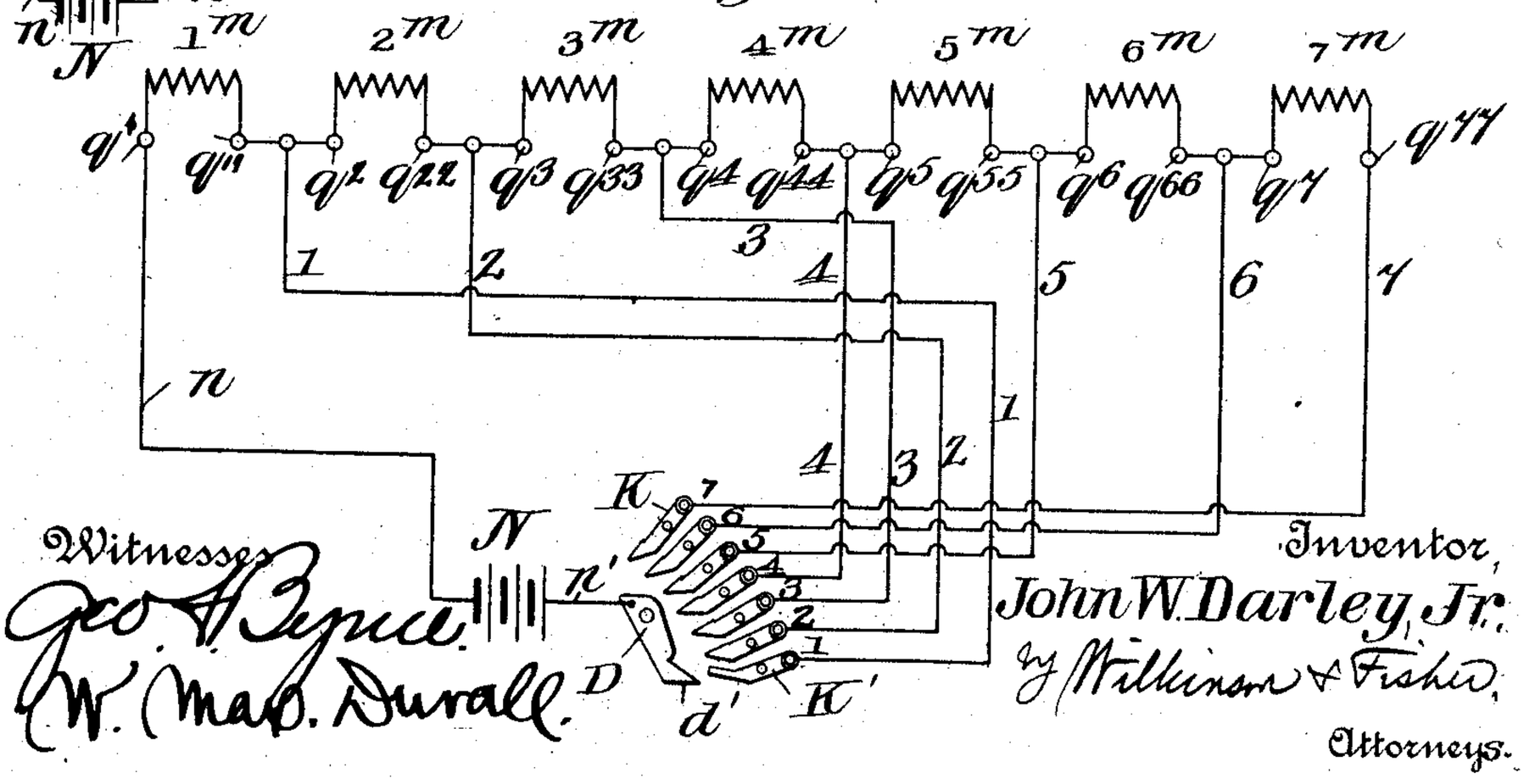


Fig. 8.

Fig. 9.



Witnesses
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UNITED STATES PATENT OFFICE.

JOHN W. DARLEY, JR., OF BALTIMORE, MARYLAND.

EXPRESSION DEVICE FOR KEYBOARD MUSICAL INSTRUMENTS.

No. 881,464. Specification of Letters Patent. Patented March 10, 1908.

Application filed December 13, 1905, Serial No. 291,621. Renewed August 2, 1907. Serial No. 386,763.

To all whom it may concern:

Be it known that I, JOHN W. DARLEY, Jr., a citizen of the United States, residing at Baltimore city, in the State of Maryland, have invented certain new and useful Improvements in Expression Devices for Keyboard Musical Instruments; 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 present invention relates to improvements in musical instruments, and it is intended to provide dynamic means operated by a key, whereby one or more sound producing means may be sounded by a single movement of said key, the particular sound producing means that is sounded, or the number of said sound-producing means that are sounded being determined by the speed impressed upon the key by the operator.

My invention is especially applicable to organs, harmoniums, or such like instruments where it is desired to sound either a single sound producing means, or a number of them of the same or different pitch and of the same or different timbre by a single movement of the key. In practice with organs this is now accomplished by means of a series of movable stops which have to be moved by hand from time to time, and interfere very materially with the playing of the performer, and also preclude the possibility of producing music having the variety of expression of that produced on the ordinary piano forte. The device may also be used to vary the force of the air applied to the sounding means and change the pitch of the sound as well as its loudness. The invention may also be adapted to striking one or more strings according to the will of the performer, and in fact, it might be applied to a large number of instruments.

My invention is shown as applied to a grand organ in which the velocity of movement of the key is caused to be the determining factor in selecting in electric circuit, the completion of which will operate one or more reeds or pipes of the organ, as will be hereinafter described.

Reference is had to the accompanying drawings, in which the same parts are indicated by the same letters and numerals throughout the several views.

Figure 1 is a sectional elevation showing the key and the electric circuits controlled by the movement of the key, with the pipes of the organ controlled by said circuits. In this view, the pipes are shown on a very much reduced scale, and are altogether out of proportion to the rest of the apparatus. Fig. 2 is an enlarged view of the inner end of one of the keys, with the electric contact making device operated thereby, the key being in the position it takes when pressed down by the player. Fig. 3 shows a section along the line 3—3 of Fig. 2, looking down. Fig. 4 is a detail showing one of the electrical contacts. Fig. 5 is an enlarged view of a portion of the controller drum operated by the pedal, parts being broken away. Fig. 6 is an end view of the device shown in Fig. 5 as seen from the right of said figure. Fig. 7 shows the development of one of the units of the controller drum. Fig. 8 is a diagram of the circuits when the indicator for the controller drum is set at the zero position, and Fig. 9 is a similar diagram showing the electric circuits when the indicator on the controller drum is at position number 1.

A represents a part of the frame of the keyboard, and A', A^2, A^3, A^4, A^5, and A^6 represent rails extending across the keyboard at right angles to the keys.

B represents one of the keys which is of the usual form, and weighted as at *b*. Near the inner end of the key is mounted an adjustable stepsil or capstan screw *b'* which engages the felt piece *c'* secured on the arm C' of the tee lever C, which is pivoted as at *c* to the flange *a* screwed to the rail A'. This tee lever C has an upwardly projecting arm C^2 provided with a pivot pin c^2 for the finger D. This finger is normally pressed outwards by means of the spring D', see Fig. 2, and carries a padded pin or roller *d* which engages the wire F, fast to the key B. This wire is bent laterally as at *f* to clear the tee lever C, and is then inclined upwards as at *f'*, and finally terminates in an arc shaped portion f^2, which is concentric with the pivot center *c* when the key is in the initial position, or before it has been struck by the player. The tee lever C is normally drawn downwards about its pivot *c* by means of the spring E which is adjusted by means of the thumb nut E'.

H represents one of a plurality of curved

insulating blocks to each of which the contact pieces K and K′ are secured. These contact pieces are preferably fastened to the block H by means of the screws k and the binding screws k', to which latter the conducting wires are connected as shown in Fig. 1. The lower face of the block H is dentated in the arc of a circle having c as the center, as shown in Fig. 2, and is faced with a felt or buck-skin strip h over which project the contact faces k^0 of the contact pieces K. The bottom contact piece K′ is provided with a contact face k^{00}.

It will be noticed that the contact pieces K do not extend radially inward as far as does the buckskin, and hence the finger D will not make contact therewith as the tee lever rises; hence no pipe will sound as the said lever rises. This is true also of the contact K′, for when the tee lever C rises suddenly the inertia of the finger D prevents it from moving outwardly with sufficient rapidity to touch the contact K′. Only a slow rising of the tee lever C, will cause the finger D to make contact with K′. As the tee lever C starts to descend the spring D′ brings the finger D swiftly into one of the notches h where it makes contact with the corresponding contact face k^0. It is intended to have one block H, with its corresponding contacts, and one tee lever and finger, for each key of the organ or other instrument.

The energy of any moving mass as is well known, is $\frac{Mv^2}{2g}$, and if this energy were resisted by a constant force the travel of the finger would normally vary as the square of the velocity at which the inner end of the key B swings upward, but by constructing the spring E so that its tension varies as its flexure throughout its movement, this motion upwards of the finger D may be caused to vary approximately as the velocity instead of as the square of the velocity, and therefore, a series of equal steps may be provided on the block H for the end d' of the finger to engage in when the tee lever has been thrown up under the influence of the blow given to the key. In the position shown in Fig. 2, the parts are in the position that they would assume when the key has been struck a moderate blow sufficient only to throw the tee lever up far enough to cause the finger to engage the third contact piece on the block H. If the key were pressed down very softly by the player, the finger would make contact with the lower contact face k^{00} on the contact piece K′. If the key is struck a little harder, the finger would engage in the first tooth of the block H, while if it is struck quite hard, the finger will pass clear beyond the block, and will engage against the face k^0 of the upper contact piece. Thus it will be seen that the finger may be thrown in any desired position by a performer, by simply striking the key with a varying speed in the same manner as keys are struck by pianists. It will be seen that the note will be sustained as long as the finger is held in engagement with the contact piece for closing the electric circuit, and the finger will so remain as long as the key is pressed down by the player. As soon as this key is released, however, the inner weighted end will fall of its own weight, causing the curved portion f^2 of the wire F to strike the padded pin d, thus knocking the finger out of engagement with the contact piece against the action of its spring D′. This will break the circuit, and the parts will be restored to the initial position. When the key is struck again, the curved portion f^2 of the wire F will be swung clear of engagement with the finger D.

The wires 1, 2, 3, 4, 5, 6, and 7 are connected to their respective contact pieces, and then lead to spring contacts m' to m^7 respectively, see Fig. 5, which spring contacts press against the conducting rings p on the unit P of the controller drum, the contact rings p being separated by insulating material p'.

In Fig. 1, the wires 1 to 7 are shown as bunched into a cable m^8 near the contact spring m^7, but of course the various wires are insulated from each other.

The controller drum is made up of a number of units P, one for each key, but all of these units are mounted on a single shaft S′ carrying a pointer S, and this shaft carries a pinion S^2 engaging the rack T^2 carried by the rod T, which is operated by the pedal T′, which pedal is normally held in the raised position by means of the spring T^0, as shown in Fig. 6. It will be noted that by simply pressing on the pedal T′ the pointer may be set to any one of eight positions. The arm S is thus caused to move over a dial S^0 for reasons hereinafter to be described. The electric current is carried from the battery N, or other source of electricity, to the finger D by means of the wire n', and the other terminal of the battery is connected by the wire n to the spring contact m. The last contact segment p^0 of each unit P of the controller is adapted to make contact with a series of spring contacts q', q'', q^2, q^{22}, etc., and is itself connected by means of the spring contact m to one pole of the battery N. Of these contacts, q' and q'', close the circuit through the first magnet 1^m; q^2 and q^{22} close the circuit through the magnet 2^m; q^3 and q^{33} close the circuit through the magnet 3^m, etc. Each of these magnets operates an armature 1^0, 2^0, etc., see Fig. 1, and this armature when attracted to the magnet, operates a valve which admits air from the trunk O to the corresponding pipe 1^a, 2^a, 3^a, etc. The trunk O is supplied with air under pressure in any approved manner, and the air is to be admitted to the pipes 1^a, 2^a, etc., by valves operated by the armatures 1^0, 2^0, etc., in any

approved manner. The means for supplying the trunk with air, and the construction of the valves for the pipes not being a part of this invention will not be further illustrated or described.

The development of one of the units of the controller drum is shown in Fig. 7, the plates m^{18}, m^{28}, m^{38}, m^{48}, m^{58}, m^{68}, and m^{78}, being connected by wires to the contact rings on which bear the springs m', m^2, m^3, m^4, m^5, m^6, and m^7, respectively, and also to the contact plates q^{18}, q^{28}, q^{38}, q^{48}, q^{58}, and q^{68}, respectively. The wires by which these connections are made are sunk in the insulating drum which supports the contact rings so as to be insulated from said rings, and said wires are bent radially outwards at the proper points and pass through holes in the contact plates and rings and are soldered therein, and afterwards cleaned off flush on the outside. These wires are represented in Fig. 7 by dotted lines terminating in a round dot, which latter represents the soldered part. This is the well known method of illustrating the internal connections of a controller drum.

When the pointer S is on the zero mark of the scale S^0, the circuits will be arranged as in Fig. 8, the magnets being in parallel branches and it will only be possible to sound one pipe at a time, the speed impressed upon the key by the operator determining which pipe is to sound. For instance, if the key is slowly depressed, the finger D will make contact with the contact piece K', and the pipe 1^a will sound; if the key is depressed slightly faster, the finger D will make contact with the first of the series of contacts K, and pipe 2^a will sound. Still further increases in the speed of depression of the key will cause pipes 3^a, 4^a, etc., to be sounded, but at no time can any key sound more than one pipe at a time.

When the pointer S points to the division 1 on the scale S^0, the circuits will be arranged as in Fig. 9. The said pointer may be moved to any position on the dial S^0 by means of the pedal T', and thus changes the arrangement of the electric circuits as will be hereinafter explained: thus it will be evident by referring to Fig. 9, which shows the magnets in series that if the pointer is at the position 1 on the scale S^0, and if the finger D closes the circuit through the wire 1, the magnet 1^m only will be energized and its corresponding pipe 1^a will sound. If the finger closes the circuit through the wire 2, both of the magnets 2^m and 1^m will be energized, and pipes 1^a and 2^a will sound. If the finger closes the circuit through the wire 7, all of the magnets 7^m to 1^m will be energized, and all the pipes will sound. When the pointer is at position 1, to connect the magnets 1^m, 2^m, etc., in series the contact rings and plates will be moved relatively to the contacts, so that q' and the contact plates m to m^7 will be central with the first dotted line to the right of said contacts: Then q^{11} still engages m^{18} but at its right hand side, q^{22} to q^{77} still engage the contact plates m^{28} to m^{78} respectively but at their right hand sides, q' will engage the upward extension of p^0, and q^2 to q^7 will engage the contact plates q^{18} to q^{68} respectively; this will connect together q^{11}, q^2 and m' through the wires q^{10} and q^{19}, the rest of the contacts q^{22} to q^{66}, q^3 to q^7 and m^3 to m^6 inclusive, being connected together by similar wires, and q^{77} and m^7 will be connected by the wire q^{79} and as m which the contact ring p^0 connects to q', is connected by wire n with the battery, and as the connections from m', m^2, m^3, m^4, m^5, m^6, and m^7 are connected to the wires 1, 2, 3, 4, 5, 6 and 7, respectively, and as the connection to the finger D remains unchanged, it is evident we have the scheme of connections shown in Fig. 9, which is obtained when the pointer is opposite 1 on the dial. The scheme of connections for the remaining positions on the dial is the same as for position 1, except that the pipes are arranged to sound in different groupings.

The connections for positions zero and 1 have been explained, and it will be remembered that when the pointer is at position 1, that pipe 1^a could either be sounded alone, or pipe 2^a, pipes 2^a and 3^a, pipes 2^a, 3^a and 4^a, etc., could be sounded simultaneously with pipe 1^a, and thus a solo could be played on the series of pipes 1^a, and the other pipes could be brought into play as desired, to sound with the series of pipes 1^a. By series of pipes 1^a, 2^a, or 3^a, etc., is meant the pipes of a certain tone or timbre, one of which of the proper pitch is connected for operation by each key. Thus if the series of pipes 1^a were the flute pipes, there would be one of the proper pitch for each key; hence if there were 88 keys in the manual, it being remembered that with this construction only one manual is required, there would be 88 flute pipes, and a slow depression of any key would sound the flute pipe corresponding thereto; likewise the series of pipes 2^a might represent the clarinet pipes, of which there would also be 88, and by striking the keys slightly faster the clarinet pipes could be sounded in unison with the flute pipes, and so on for any number of pipes of different tones. Now as the ability to play the solo parts on different toned pipes would be desirable, the connections corresponding to the other dial positions are provided, and the different combinations are tabulated below.

Position 0. Either 1^a, 2^a, 3^a, 4^a, 5^a, 6^a, or 7^a can be sounded, but only one at a time.

Position 1. 1^a solo; 2^a, to 7^a sounding simultaneously.

Position 2. 2^a solo; 3^a to 7^a and 1^a sounding simultaneously.

Position 3. 3^a solo; 4^a to 7^a and 1^a to 2^a sounding simultaneously.

Position 4. 4^a solo; 5^a to 7^a and 1^a to 3^a sounding simultaneously.

Position 5. 5^a solo; 6^a to 7^a and 1^a to 4^a sounding simultaneously.

Position 6. 6^a solo; 7 and 1^a to 5^a sounding simultaneously.

Position 7. 7^a solo; 1^a to 6^a sounding simultaneously.

Thus it will be seen that the solo part can be played on any series of pipes and the other pipes made to come in any order desired by having the dial at the proper one of the positions 1 to 7, while by having the dial at position 0, the solo part can be played on any series of pipes, the series being dependent upon the speed with which the key is depressed.

While I have stated that the pipes for each key have the same pitch, but different timbres, I have merely mentioned this as the ordinary construction; for special cases the instrument may be constructed so that the first pipe to sound would be the fundamental tone for that key; by striking the key slightly harder the next pipe would sound, which could be the fifth above the fundamental tone, but of the same timbre, and so for the other pipes for that key which could give tones that are upper partials of the fundamental, and so alter, by merely changing the speed with which the key is struck, not only the volume of sound, but also its timbre. Moreover, while I have shown seven pipes for each key, the number of these pipes may be increased or diminished, the number of teeth on the sector H being correspondingly varied, the only limitation being the ability of the operator to differentiate by his touch. Thus it will be seen that a single pedal may be used to control the tone, and each key may be used to sound either a single pipe or a number of pipes simultaneously and thus vary not only the loudness of the tone, but also its quality. This invention, therefore, when applied to organs does away with a large number of stops, pedals, and other devices used to control the expression, but which do not give the performer the ability to produce the effects due to sudden or graded differences in the loudness or timbre of tone.

While the apparatus is illustrated as applied to an organ, it will be obvious that a finger may be operated by a key, and control strings, or other musical apparatus as well as organ pipes or reeds. It will furthermore be evident that the finger may be used to operate pneumatic valves, which pneumatically control pipes or reeds of organs, or strings of instruments or other like musical devices as is well known in the art. I do not mean to limit my invention to the specific form of device, or to the application of the finger for closing electric circuits, except when so specifically stated in the claims.

Any device for producing music that has several sound producing means and that has means by which the speed of the part controlled by the operator determines which sound producing means shall sound or the number of them which shall sound, also any musical instrument in which the timbre of the tone is varied in a predetermined order depending upon the speed impressed upon the operating part by the operator, except that class of instruments in which the sound producing means is struck, I consider within the scope of my invention.

I claim broadly as new:—

1. In a device for producing vibrations, a plurality of vibration-producers, controlling means therefor, and means for operating a greater or less number of said vibration-producers, depending only on the speed of the controlling means.

2. A musical instrument, comprising operating mechanism, sound-producing means, and means for varying the quality of the tone in a predetermined order with the speed of the operating mechanism, without changing the pitch.

3. A musical instrument, comprising operating mechanism, sound-producing means, and means for causing the loudness of the sound produced to vary by predetermined gradations with the speed of the operating mechanism, without changing its pitch.

4. A musical instrument, comprising operating mechanism, a plurality of sound producing means, and means for causing the loudness of the sound produced to vary by predetermined gradations with the speed impressed upon the operating mechanism, without changing the pitch.

5. A wind musical instrument, comprising operating mechanism, sound producing means, and means for causing the loudness of the sound produced to vary from a predetermined degree with the speed of the operating mechanism, without changing the pitch.

6. A wind musical instrument, comprising operating mechanism, and means for causing the timber to vary by predetermined variations with the speed of the operating mechanism, without changing the pitch.

7. In an instrument for producing vibrations, a plurality of vibration-producers, means for operating said vibration-producers, means for controlling the operation of said vibration-producers, the number of said vibration-producers which operate depending only upon the speed impressed upon said controlling means.

8. A wind musical instrument, comprising operating mechanism, a plurality of sound producing means, and means for sounding any number of said sound producing means, said number varying only with the speed of the operating mechanism.

9. In a musical instrument, the combination with a key and a plurality of sound producing devices, of means controlled by said key for sounding any one of said devices, the device sounded being determined by the velocity of said key, substantially as described.

10. In a musical instrument, the combination with a key and a plurality of sound producing devices, of means controlled by said key for sounding one or more of said devices, the device or devices sounded being determined by the velocity of said key, substantially as described.

11. In a musical instrument, the combination with a key and a plurality of sound producing devices, of means controlled by said key for sounding any one of said devices, the device sounded being determined by the velocity of movement of said key the said sounding means continuing to sound while the key is held down, and means for automatically operating said controlled means to cut off the sound when said key is released, substantially as described.

12. In a musical instrument, the combination with a key and a plurality of sound producing devices, of means controlled by the said key for sounding one or more of said devices, the device or devices sounded being determined by the velocity of movement of said key, the said sounding means continuing to sound while the key is held down, and means for automatically operating said controlled means to cut off the sound when said key is released, substantially as described.

13. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member, the extent of movement of which varies with the velocity of said key, and means controlled by the moving member for sounding any one of said devices, substantially as described.

14. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member, the extent of movement of which varies with the velocity of said key, and means controlled by the moving member for sounding one or more of said devices, substantially as described.

15. In a musical instrument, the combination with a pivoted key and a plurality of sound-producing devices, of a moving member, the extent of movement of which varies with the velocity of said key, engaging means carried by said member, and means controlled by said engaging means for sounding any one of said devices, the device sounded being determined by the extent of movement of the engaging means, substantially as described.

16. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member, the extent of movement of which varies with the velocity of said key, engaging means carried by said member and means controlled by said engaging means for sounding any one of said devices, substantially as described.

17. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member the extent of movement of which varies with the velocity of said key, engaging means carried by said member, and means controlled by said engaging means for sounding one or more of said devices, the device or devices sounded being determined by the extent of movement of the engaging means, substantially as described.

18. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member actuated by the said key, engaging means carried by said member, and means controlled by said engaging means for sounding any one of said devices, the said sounding means continuing to sound while the key is held down, substantially as described.

19. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member actuated by the said key, engaging means carried by said member, means controlled by said engaging means for sounding one or more of said devices, the said sounding means continuing to sound while the key is held down, and means for automatically operating said engaging means to cut off the sound when said key is released, substantially as described.

20. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever actuated by the said key, engaging means carried by said lever, and means controlled by said engaging means for sounding any one of said devices, the device sounding being determined by the speed of said key, substantially as described.

21. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever actuated by the said key, a finger carried by said lever, and means controlled by said finger for sounding one or more of said devices, the device or devices sounding depending upon the speed of said key, substantially as described.

22. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever actuated by the said key, engaging means carried by said lever, and means controlled by said engaging means for sounding any one of said devices, the said sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, substantially as described.

23. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever actuated by the said key, a finger carried by said lever,

means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, and means automatically operating said finger to cut off the sound when said key is released, substantially as described.

24. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by said key, a spring for regulating the movement of said lever when operated by said key, engaging means carried by said lever, and means controlled by said engaging means for sounding any one of said devices, the device sounding being determined by the speed of said key, substantially as described.

25. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by the said key, a spring for regulating the extent of movement of said lever when operated by said key, engaging means carried by said lever, and means controlled by said engaging means for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, substantially as described.

26. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by the said key, a spring for opposing the movement of said lever when operated by said key, engaging means carried by said lever, and means controlled by said engaging means for sounding any one of said devices, the device sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, substantially as described.

27. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by the said key, a spring for regulating the extent of movement of said lever when operated by said key, a finger carried by said lever, means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, and means for automatically operating said finger to cut off the sound when said key is released, substantially as described.

28. The combination with a plurality of devices for producing vibrations in a transmitting medium, of means for controlling said devices, the vibrations produced by a variable number of said devices being simultaneously communicated to said transmitting medium, the number depending upon the speed of said controlling means.

29. In a musical instrument, the combination with a key, a plurality of sound producing devices and a plurality of contact plates, of a lever actuated by said key, a finger carried by said lever, a spring normally tending to press said finger toward said plates, and means controlled by said plates for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, substantially as described.

30. In a musical instrument, the combination with a key, a plurality of sound producing devices and a plurality of contact plates, of a lever actuated by the said key, a finger carried by said lever, a spring normally tending to press said finger toward said plates, and means controlled by said plates for sounding any one of said devices, the device sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, substantially as described.

31. In a musical instrument, the combination with a key, a plurality of sound producing devices and a plurality of contact plates, of a lever actuated by said key, a finger carried by said lever, a spring normally tending to press said finger toward said plates, and means controlled by said plates for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, substantially as described.

32. In a musical instrument, the combination with a key, a plurality of sound producing devices and a plurality of contact plates, of a lever operated by the said key, a spring for regulating the extent of movement of said lever when operated by said key, a finger carried by said lever, a spring normally tending to press said finger toward said plates, and means controlled by said plates for sounding any one of said devices, the device sounding being determined by the speed of said key, substantially as described.

33. In a musical instrument, the combination with a key, a plurality of sound producing devices and a plurality of contact plates, of a lever operated by said key, a spring for regulating the movement of said lever when operated by said key, a finger carried by said lever, a spring normally tending to press said finger toward said plates, and means controlled by said plates for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, substantially as described.

34. In a musical instrument, the combination with a key, a plurality of sound producing devices and a plurality of contact plates, of a lever operated by the said key, a spring for regulating the movement of said lever when operated by said key, a finger carried by said lever, a spring normally tending to press said finger toward said plates, and means controlled by said plates for sounding

any one of said devices, the device sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, substantially as described.

35. In a musical instrument, the combination with a key, of an electric circuit having a plurality of sections, a plurality of sound-producing devices, one in each section, means for connecting said sections in series or in parallel branches at will, means actuated by said key for completing the circuit through one or more of said sections, the section or sections through which the circuit is completed being determined by the velocity of the key, substantially as described.

36. In a musical instrument, the combination with a key, of an electric circuit having a plurality of sections in series, a plurality of sound producing devices, means varying in its extent of movement as a function of the velocity of said key for completing the circuit through one or more of said sections, and means controlled by each of said sections for sounding one of said devices.

37. In a musical instrument, the combination with a key, an electric circuit provided with a plurality of sections in series and a plurality of sound producing devices, of means actuated by said key for completing the circuit through one or more of said sections, and means controlled by each section for sounding one of said devices, the device or devices sounding being determined by the speed of said key, the said sounding device continuing to sound while the key is held down, substantially as described.

38. In a musical instrument, the combination with a key, an electric circuit having a plurality of sections in series and a plurality of sound-producing devices, each provided with a controlling device located in one of said sections of a lever actuated by said key, and a finger carried by said lever for closing the circuit through one or more of said sections and thus operating said controlling device or devices sounding one or more of said sound producing devices, the device or devices sounding being determined by the speed of said key, substantially as described.

39. The combination with a key, and a plurality of sound-producing devices, of a lever operated by said key, a spring for regulating the extent of movement of said lever when operated by said key, and means controlled by said lever for sounding said devices, the device or devices sounding being determined by the speed of said key, substantially as described.

40. The combination with a key, and a plurality of sound-producing devices, of a lever operated by said key, a spring for regulating the extent of movement of said lever when operated by said key, and means controlled by said lever for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, substantially as described.

41. The combination with a key, and a plurality of sound producing devices, of a lever operated by said key, a spring for opposing the movement of said lever when operated by said key, and means controlled by said lever for sounding any one of said devices, the device sounding being determined by the speed of said key, substantially as described.

42. The combination with a key, and a plurality of sound producing devices, of a lever operated by said key, a spring for opposing the movement of said lever when operated by said key, and means controlled by said lever for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, substantially as described.

43. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member operated by said key, engaging means carried by said member, means controlled by said engaging means for sounding any one of said devices, the device sounding being determined by the speed of said key, and additional means for modifying the operation of said controlled means, substantially as described.

44. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member operated by the said key, engaging means carried by said member, means controlled by said engaging means for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, and additional means for modifying the operation of said controlled means, substantially as described.

45. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member operated by said key, engaging means carried by said member, means controlled by said engaging means for sounding any one of said devices, the device sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, means for automatically operating said engaging means to cut off the sound when said key is released, and additional means for modifying the operation of said controlled means, substantially as described.

46. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a moving member operated by the said key, engaging means carried by said member, means controlled by said engaging means for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key,

the said sounding means continuing to sound while the key is held down, and additional means for modifying the operation of said controlled means, substantially as described.

47. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by said key, a finger carried by said lever, means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, and independent means for modifying the operation of said finger controlled means, substantially as described.

48. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by the said key, a finger carried by said lever, means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, and additional means for modifying the operation of said finger controlled means, substantially as described.

49. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by the said key, a finger carried by said lever, means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, and additional means for modifying the operation of said finger controlled means, substantially as described.

50. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by said key, a finger carried by said lever, means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, the said sounding means continuing to sound while the key is held down, and additional means for modifying the operation of said finger controlled means, substantially as described.

51. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by said key, a spring for regulating the extent of movement of said lever when operated by said key, a finger carried by said lever, means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, and independent means for modifying the operation of said finger controlled means, substantially as described.

52. In a musical instrument, the combination with a key and a plurality of sound producing devices, of a lever operated by said key, a spring for regulating the extent of movement of said lever when operated by said key, a finger carried by said lever, means controlled by said finger for sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, and independent means for modifying the operation of said finger controlled means, substantially as described.

53. The combination with a key, and selective means operated thereby, of a plurality of vibration producers, said selective means controlling the operation of any one of said vibration producers, the selection of the producer to be operated depending only upon the speed of the key, substantially as described.

54. The combination with a key, and a selective means operated thereby, of a plurality of vibration producers, said selective means controlling the operation of one or more of said vibration producers, the selection of the producer or producers to be operated depending only on the speed of the key, substantially as described.

55. In a device for producing vibrations, a plurality of vibration producers, controlling means therefor, and means for determining solely by the speed of said controlling means as to which vibration producer shall emit vibrations.

56. In a device for producing vibrations, a plurality of vibration producers, controlling means therefor, and means for determining solely by the speed of said controlling means the number of said vibration producers which shall emit vibrations.

57. A wind musical instrument, comprising controlling mechanism, sound producing means, and means for causing the loudness of the sound produced to vary in a predetermined order with the speed of the controlling mechanism, without changing the pitch, substantially as described.

58. A wind musical instrument, comprising controlling mechanism, and means for causing the timbre to vary in a predetermined order, with the speed of the controlling mechanism, without changing the pitch, substantially as described.

59. In a musical instrument, the combination with a key, an electric circuit having a plurality of sections in series and a plurality of sound producing devices, of means operated by the said key for completing the circuit through one or more of said sections, means included in each of said sections for sounding one of said devices, the device or devices sounding being determined by the speed of said key, and additional means for varying the order in which the circuit through said sections may be completed, substantially as described.

60. In a musical instrument, the combination with a key, an electric circuit having a plurality of sections in series, a contact for each section, and a plurality of sound pro-

ducing devices, of a lever operated by said key, a spring for regulating the extent of movement of said lever when operated by said key, a finger carried by said lever coacting with said contact, said finger closing the circuit through one or more of said sections and thus sounding one or more of said devices, the device or devices sounding being determined by the speed of said key, and additional means for varying the order of closure of the circuit through said sections, substantially as described.

61. In a musical instrument, the combination with a key, an electric circuit having a plurality of sections in series and a plurality of sound producing devices one for each section, of means operated by said key for completing the circuits through one or more of said sections, means controlled by said sections for sounding said devices, the section or sections through which the circuit is completed being determined by the speed of said key, operating mechanism, and mechanism operated thereby for varying the order of closure of said branch circuits, substantially as described.

62. In a musical instrument, the combination with a key, an electric circuit having a plurality of sections in series a contact for each section, and a plurality of sound producing devices one for each section, of a lever operated by said key, a finger carried by said lever, for closing the circuit through one or more of said sections and thereby sounding one or more of said devices, the said finger coacting with said contact the device or devices sounding depending upon the speed of said key, a pedal, and mechanism operated thereby for varying the order of closure of the circuits through said sections, substantially as described.

63. The combination of a plurality of vibration producers, and means for operating a greater or less number of said vibration producers, the determination of the number of said producers which shall operate depending only on the speed of a part of said operating means.

64. In a musical instrument, the combination with a key and a plurality of sound producing devices, of means operated by said key and devices between said means and said sound producing devices for sounding simultaneously a plurality of said devices, the number of devices sounding being determined by the velocity of said key, substantially as described.

65. The combination of a key, sounding means, means for varying by the speed of the key the loudness of sound produced by said sounding means, without changing the pitch, said sound continuing at the loudness so determined as long as the key is held in the operated position, substantially as described.

66. The combination of a key, sounding means, means for varying by the speed of the key the volume of sound produced by said sounding means, without changing the pitch, said sound continuing at the volume so determined as long as the key is held in the operated position, substantially as described.

67. The combination of a key, sounding means, means for varying by the speed of the key the timbre of sound produced by said sounding means, without changing the pitch, said sound continuing at the timbre so determined as long as the key is held in the operated position, substantially as described.

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

JOHN W. DARLEY, JR.

Witnesses:

JNO. H. STEVERS,

J. FRED KNOBLOCK.