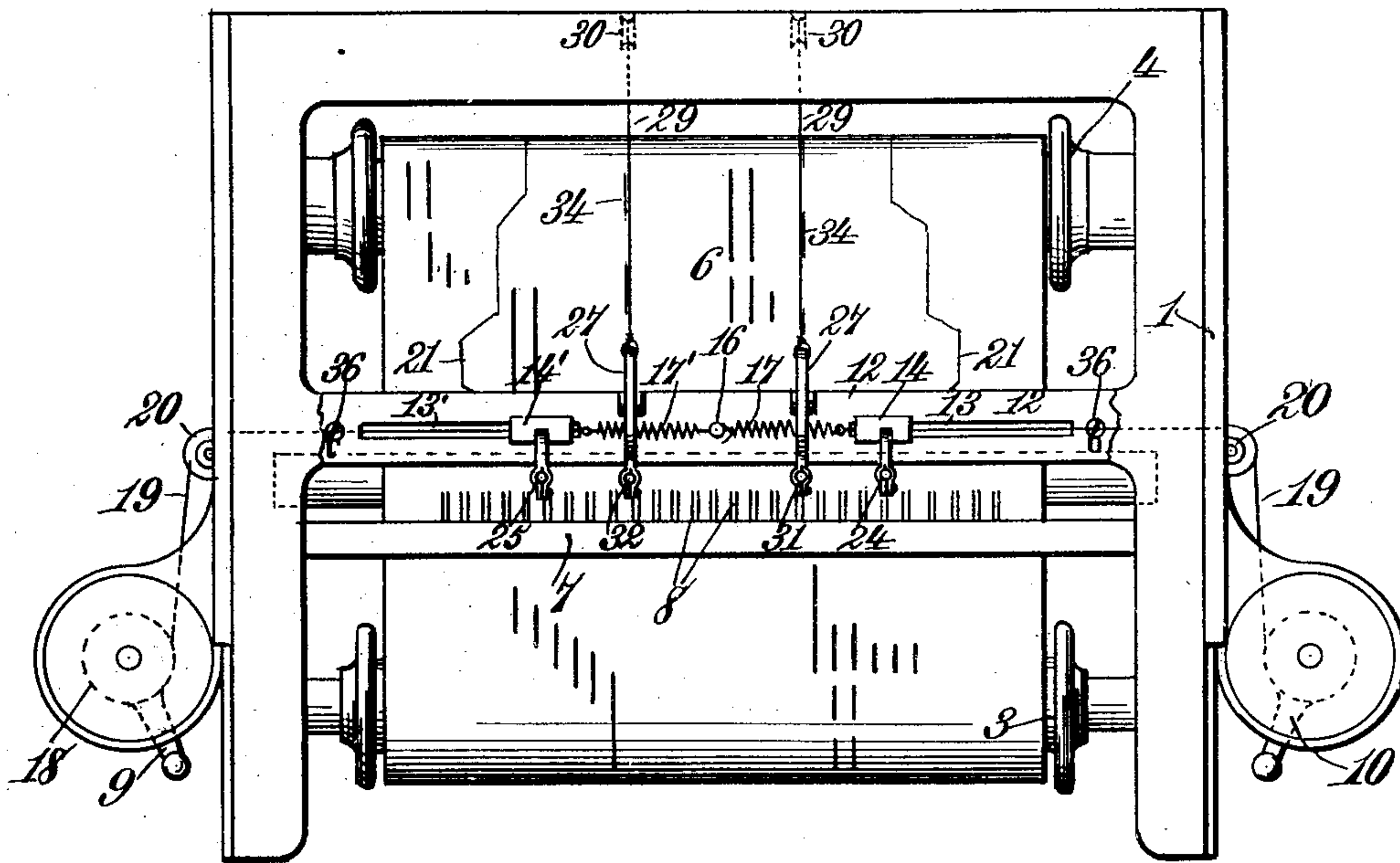
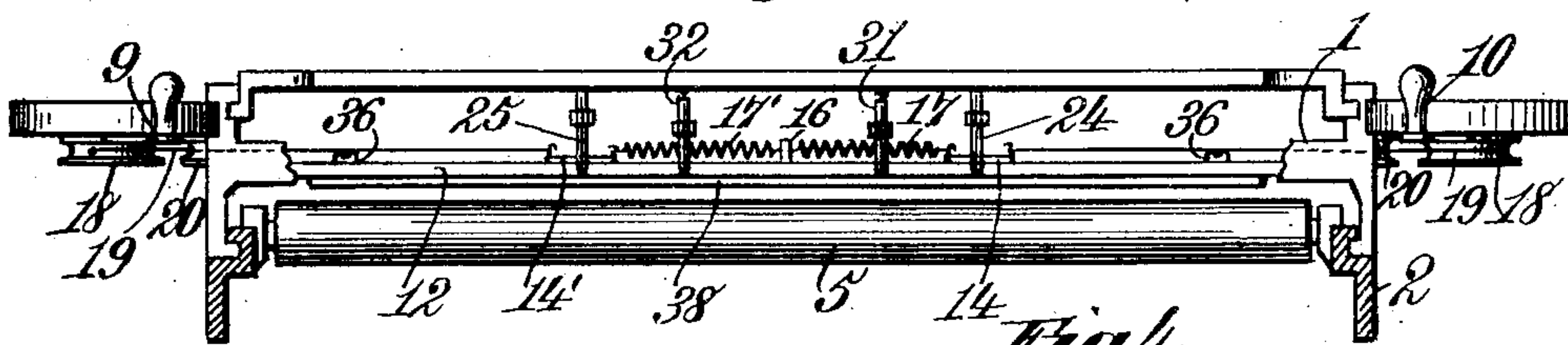
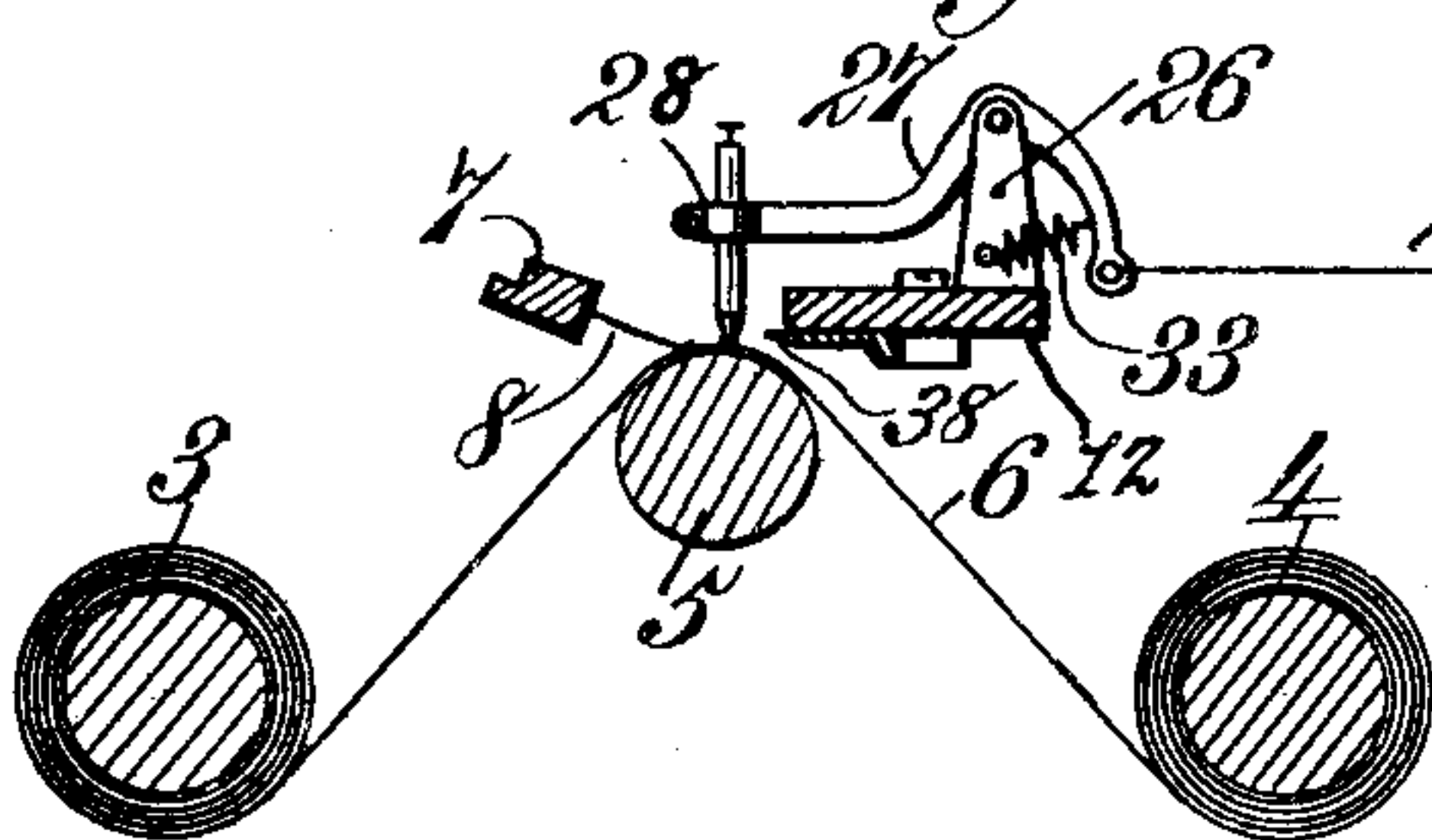
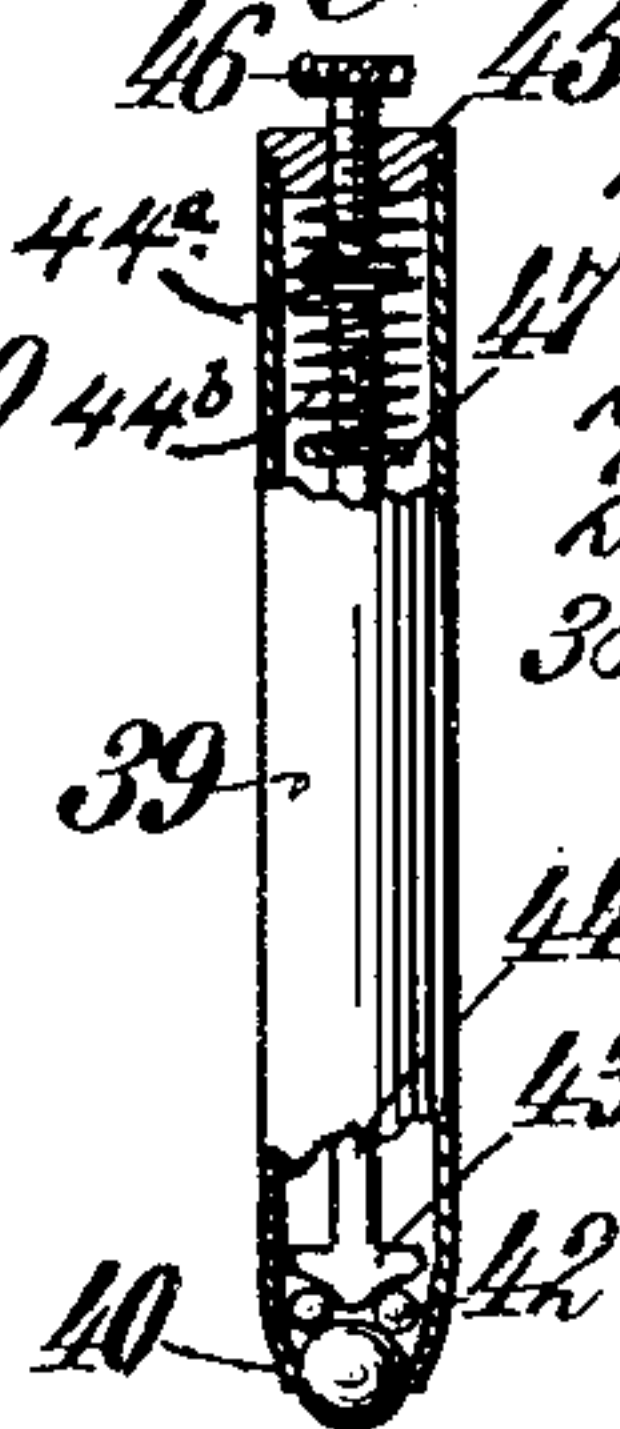
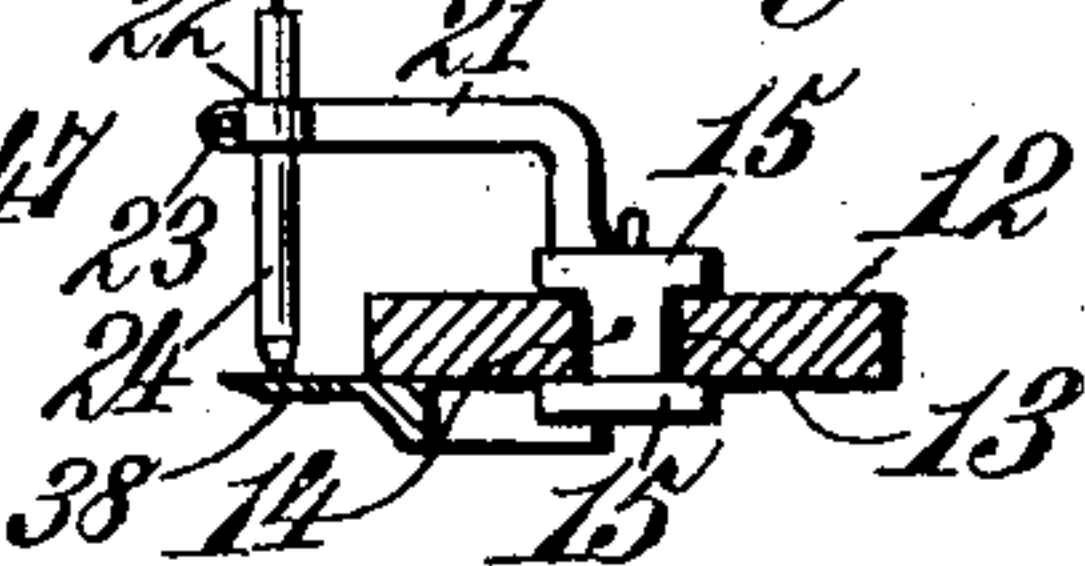
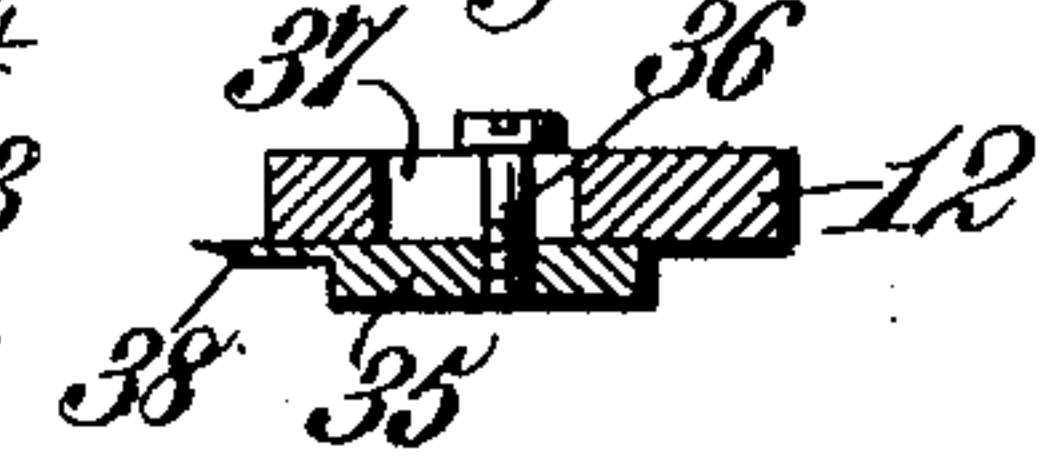


G. H. DAVIS.

APPARATUS FOR MARKING PERFORATED MUSIC SHEETS FOR
MECHANICAL MUSICAL INSTRUMENTS.

APPLICATION FILED MAR. 20, 1902.

NO MODEL.

Fig. 1.*Fig. 2.**Fig. 3.**Fig. 4.**Fig. 5.**Fig. 6.*Witnesses.
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George Howlett Davis,
By *H. L. Davis,**Att'y.*

UNITED STATES PATENT OFFICE.

GEORGE HOWLETT DAVIS, OF ORANGE, NEW JERSEY.

APPARATUS FOR MARKING PERFORATED MUSIC-SHEETS FOR MECHANICAL MUSICAL INSTRUMENTS.

SPECIFICATION forming part of Letters Patent No. 747,858, dated December 22, 1903.

Application filed March 20, 1902. Serial No. 99,102. (No model.)

To all whom it may concern:

Be it known that I, GEORGE HOWLETT DAVIS, a citizen of the United States, residing at Orange, in the county of Essex and State of New Jersey, have invented new and useful Improvements in Apparatus for Marking Perforated Music-Sheets for Mechanical Musical Instruments, of which the following is a specification.

This invention relates to apparatus for marking perforated music-sheets for self-playing musical instruments, and especially to mechanism for marking a line on the perforated music-sheet which will indicate an effect or effects the instrument is to be caused to produce in playing the music.

The object of the invention is to combine with the controlling mechanism which self-playing musical instruments are frequently provided with for giving to the music played certain effects—such, for example, as expression, tempo, forte, or pianissimo—means for applying a mark or line to the perforated music-sheet during its passage over the note-selecting device or other device for putting into action the mechanism for sounding the notes of the composition played on the instrument in their proper order, which mark or line will indicate the effect to be produced by manipulating the controlling mechanism when the musical composition is replayed. The music-sheet thus marked may afterward be employed as a pattern or stencil sheet from which other music-sheets having cut in them the same musical composition may be marked with the same line.

It has for a further object to provide such marking mechanism with a marking device that will freely move over the music-sheet in any direction with but little friction, and which will freely move over the perforations in the music-sheet without liability of getting caught therein and tearing the sheet.

It has for a still further object to provide means for simultaneously throwing out of operation all the marking devices.

To these several ends the 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 draw-

ings, forming a part of this specification, wherein—

Figure 1 is a top plan view of a portion of a self-playing musical instrument having my automatic marking mechanism applied thereto. Fig. 2 is a view in front elevation thereof, partly in section. Fig. 3 is a transverse sectional diagrammatic view. Fig. 4 is a detail sectional view of one of the markers. Fig. 5 is a detail sectional view illustrating the support for one of the markers, and Fig. 6 is a similar view illustrating the means for throwing the markers out of operation.

In the present instance I have shown my invention applied to an electrical self-playing attachment for pianos, which is well known to those skilled in the art, as the same is on sale on the market and in extensive use, and is shown and described in the application for patent which I filed on the 26th day of November, 1901, Serial No. 83,687, and such attachment need therefore only be briefly alluded to therein. Said attachment comprises two sliding frames 1 and 2, superposed and movable one upon the other, and both adapted to be slidably arranged beneath the keyboard or casing of a piano or similar keyed musical instrument. Journaled in the lower frame 2 is a delivery-roll 3, a take-up roll 4, and a metallic contact-roller 5, forming a part of the note-selecting device. The perforated music-sheet 6 is wound upon the delivery-roll 3 and passes over the selector or contact roller 5 and is removably attached at its other end to the take-up roll 4. Suitable means actuated by the music-playing apparatus are in practice provided for rotating the take-up roll to wind the music-sheet thereon and cause it to travel over the roller 5. Arranged parallel and in proximity to the roller 5 is a bar 7, to which are affixed a plurality of metallic fingers 8, the free ends of which rest on the roller 5 or on the music-sheet as the latter travels over said roller. The selector-fingers 8 are each connected to a separate wire, said wires forming parts of different electric circuits which control the mechanism for actuating the piano-keys, and another wire, forming the return portion of said circuits, is connected to the metallic roller 5, the arrangement being such that as the perforated music-sheet passes beneath the selector-fingers

8 each of said fingers whenever a perforated portion of the music-sheet passes under its free end will project through such perforation into contact with the roller 5, thereby closing the circuit and actuating the proper piano-key to sound the note corresponding to the perforation in the music-sheet through which the finger is projected. Two levers 9 and 10 are provided, by turning which by hand the expression and tempo of the music being played can be regulated and controlled through suitable mechanism. By turning the lever 9, termed the "expression-lever," the keys will be struck with greater or less force, according to the direction in and the extent to which said lever is turned, and the proper expression be thereby given to the music, and by turning the lever 10, termed the "tempo-lever," the speed at which the music-sheet is caused to move will in like manner be regulated, and the proper tempo be given to the music. So, also, by depressing either of the usual piano-pedals 11 with the feet the proper forte or pianissimo effect will be imparted to the music by throwing a damper into or out of engagement with the piano-strings in the usual manner. The electrical circuits and key-actuating mechanism and the mechanism controlled by the levers 9 and 10 for controlling the key-actuating mechanism are not herein shown, as they form no part of the present invention and are well known to those skilled in the art. Such, briefly, is the piano-playing attachment referred to in the prefatory portion of this description and to which my present invention is herein shown applied.

Forming a part of the upper frame 1 is a transverse bar 12, which is arranged parallel and in proximity to the contact or selector roller 5. Said bar has formed therein two longitudinal slots 13 and 13', in which are respectively movably-arranged sliding blocks 14 and 14'. Each of said blocks, as most clearly shown in Fig. 5 of the drawings, is of such width as to be freely movable in its slot, and is provided with flanges 15, which straddle the slot on the upper and lower sides of the bars and serve the twofold purpose of holding the block in place in its slot and cause it to move smoothly and easily therein without binding. Fixed in or on the bar 12 between the adjacent ends of the two slots is a pin or projection 16, to which are fastened the adjacent ends of two contractile springs, being respectively attached to the blocks 14 and 14'. Said springs normally operate to draw the two blocks toward each other to the inner or adjacent ends of the slots 13 and 13'. Fixed on the axis of each of the levers 9 and 10 is a pulley 18, and attached to the periphery of each of said pulleys is one end of a cord 19, said cords passing about guide-pulleys 20 and being attached at their other ends to the blocks 14 and 14', respectively. Attached to or formed with each of the blocks is an arm or bracket 21, which pro-

jects over and overhangs the selector-roller 5, said free end of the arm being forked, as at 22, and provided with a set-screw 23 to form a clamp for holding a marker 24 or 25. The markers may be either adjusted to bear lightly on the music-sheet at the point where said sheet passes over the roller 5 and then be fastened in their adjusted positions by tightening up the set-screws 23, or the latter may be so set as to cause the clamps to loosely hold the markers, so that the latter will rest by gravity on the music-sheet.

The operation of the marking mechanism, so far as above described, is as follows: A music-sheet is put in place in the music-playing attachment and the music-playing mechanism put in operation, causing the music-sheet to travel over the selector-roller 5. The operator, who should either be familiar with the composition to be played, and hence knows the proper points at which either the expression or tempo levers, or both, should be turned to give the desired expression and tempo to the music at the proper periods, or who should be a skilled musician and have the score of the composition to be played before him, places his hands on the expression and tempo levers and during the progress of the music moves said levers at the proper periods and in the proper direction and distance to impart to the music the desired expression and tempo. When either of said levers is turned for the purpose stated—say the tempo-lever, for example—the corresponding pulley 18 will also be turned and will wind or unwind the cord 19. If the tempo-lever be turned for a certain distance in a direction to increase the speed of travel of the music-sheet, and hence increase or hasten the "time" of the music, the cord 19 will be wound up on the pulley 18 and will draw the block 14 toward the outer end of the slot 13. As the block is thus moved the marker 24 will move with it and will move across the music-sheet toward the right a distance corresponding to the extent to which the tempo-lever is turned. When the tempo-lever is turned in a reverse direction to decrease or retard the time of the music, the cord will be unwound from the pulley and the spring 17 will draw the block 14 toward the inner end of the slot 13, thus moving the marker in the same direction across the music-sheet a distance corresponding to the extent of movement of said lever. The music-sheet, however, is continuously traveling over the roller 5, and hence the marker when the tempo-lever is stationary will make a straight line on the music-sheet; but as the tempo-lever is turned in opposite directions from time to time to increase or diminish the time of the music played the marker will be correspondingly moved to the right and left of an imaginary or actual longitudinal line on the music-sheet, and hence the line delineated by the marker will be deflected to either side of said imaginary or actual longitudinal line, as indicated at 21 in

Fig. 1 of the drawings. In the same manner the marker 25 will automatically indicate on the music-sheet the different movements given to the lever 9 by the operator for imparting the desired expression to the music.

For automatically indicating on the music-sheet the proper points at which the "loud" and "soft" or forte and pianissimo pedals of the piano should be depressed I provide the following means: Fixed to or formed with the bar 12 are two uprights or brackets 26, to the upper end of each of which is pivoted a bell-crank lever 27, (see Fig. 3,) the forward end of which overhangs the selector-roller 5 and is provided with a clamp 28, similar to the clamps 22, before described, and carrying a marker. To the other end of said lever 27 is attached one end of a cord 29, which passes rearwardly over a pulley 30 and thence down to one of the piano-pedals 11, to which it is fastened. It will be understood, of course, that the two levers 27 will be connected by cords 29 to the forte and pianissimo pedals, respectively, and markers 31 and 32 will be inserted in the respective clamps 28 of said levers, the marker 31 being carried by the lever connected with the forte-pedal and the marker 32 being carried by the lever connected with the pianissimo-pedal. Coiled springs 33 are attached to the rear ends of the levers 27 and to the brackets 26 and operate to normally hold the markers out of contact with the music-sheet. The operation of this part of the invention is as follows: During the progress of the music the operator at the proper periods depresses either the forte or pianissimo pedal to impart a loud or soft tone to the music, and when either of said pedals is depressed it will through the medium of its cord 29 oscillate the corresponding lever 27 about its pivot and move the marker into contact with the music-sheet and as the latter travels over the roller 5 will mark a straight line thereon, as indicated at 34 in Fig. 1, corresponding in length to the duration of the depression of the pedal.

When a music-sheet has been employed in the manner above described to play the composition, the lines 21 and 34 will be automatically marked on the music-sheet by the mere act of the operator in giving the proper effects to the music, and such lines will accurately indicate to a performer who afterward employs the music-sheet to play the composition the proper points at which to operate the expression or tempo levers or the piano-pedals to reproduce the effects of the original composition, or the music-sheet having the marks thus applied to it may be employed as a pattern or stencil for duplicating the composition. The straight portions of the lines 21 indicate the duration which the expression and tempo levers should be held in any given position, while the oblique portions thereof indicate the direction in and extent to which the said levers should be turned. In like manner the straight lines 34 indicate the points

or periods at which the pedals should be depressed and the duration of their depression.

It will be noted that the hands are employed for giving to the music played the proper expression and tempo, while the feet are employed for depressing the pedals to give the forte and pianissimo effects, this being the method employed by a musician in manually performing on the piano, and hence being most natural and readily acquired by a musician, and, furthermore, that all the different effects can either be produced singly or any number of them desired simultaneously.

When the attachment is employed for merely playing a composition, the music-sheet having been previously marked to indicate the effects or when it is not desired to indicate the effects, on the music-sheet, it is desirable to throw the markers out of operation, and for this purpose I provide the following means: Arranged beneath the fixed bar 12 is a movable bar 35, which is slidably connected to the bar 12 by headed screws 36. The heads of the screws rest on the upper side of the bar 12, and said screws project through slots 37, formed transversely in the bar 12, and are screwed into the bar 35. The bar 35 is provided on its forward edge with a reduced and beveled extension 38, and when said bar is moved forward over the roller 5 said beveled extension is projected beneath all the markers and between the latter and the music-sheet and simultaneously lifts the markers and holds them out of contact with the music-sheet, thus throwing the markers out of operation.

The markers are preferably constructed as follows: Referring to Fig. 4 of the drawings, illustrating one of said markers, the numeral 39 indicates a hollow cylinder, the lower end of which is tapered or slightly contracted, as at 40. Loosely arranged in said contracted end is a ball 41, which partially protrudes through the opening in said contracted end. Resting on said ball is a plurality of anti-friction-balls 42, and resting on and between the latter is a cone 43, provided with a rod or stem 44, which extends to near the upper end of the cylinder or casing 39, where it terminates in a head-piece 44^a. The casing 39 is closed at its upper end by a cap 45, centrally through which is tapped an adjusting-screw 46, which may be caused to bear at its inner end against the end of the stem 44. By turning said screw the pressure of the cone on the balls may be regulated and the ball 41 caused to seat itself more or less tightly in the contracted end of the casing. The stem 44 is provided with a transverse pin 47 below the head-piece 44^a, and a spring 44^b is arranged to bear on said pin and operates to yieldingly hold the cone 43 and balls 42 upon the ball 41, the ink being contained in the casing between the ball and said stem. As the ball 41 is moved over the sheet it rolls freely in every direction on said sheet, and as it rotates in its casing every portion of said

ball is being constantly furnished with a fresh supply of ink, which it transfers to the sheet as it travels on the latter. The marking device thus constructed moves with exceeding
 5 ease smoothly and freely and without almost any friction over the sheet and marks a well-defined line thereon. Moreover, the contact of the ball with the sheet is a rolling one, and hence as the perforated music-sheet
 10 passes beneath the marker the latter cannot catch in the perforations and tear the sheet.

I have shown and described my invention applied to an electrical attachment for self-playing pianos; but it will be obvious that it
 15 may be applied to other types of attachments—such as pneumatic, for example—and to other instruments than pianos, and I wish it to be distinctly understood that it may be employed in connection with any type or
 20 class of musical instruments controlled by a music-sheet without departing from the spirit of my invention.

Having described my invention, what I claim is—

25 1. In combination with the tempo mechanism of a mechanical musical instrument having a lever for controlling the same, a perforated music-sheet movable over the tracker range of the musical instrument, and a marking
 30 device operated by the lever of the tempo mechanism for applying a tempo-line to the music-sheet as it moves over the tracker range.

35 2. In a mechanical musical instrument, the combination of a perforated music-sheet, means for moving said music-sheet, a plurality of independent controllers for mechanisms comprised in said musical instrument,
 40 marking devices operated from said controllers for delineating lines upon the music-sheet which correspond to characteristics in the playing to be produced by the mechanisms of said controllers, and means for simultaneously throwing all of said marking de-
 45 vices out of operation.

3. The combination with a perforated music-sheet, of means for moving said sheet, means for marking a line thereon during the movement of said sheet to indicate effects to
 50 be produced in playing, and a movable obstruction adapted to be interposed between the music-sheet and the marking means and prevent said marking means from marking the music-sheet.

55 4. In a mechanical musical instrument, the combination with the pedal mechanism of the instrument, of a perforated music-sheet movable over the note-selecting device of the instrument, and marking devices operated by
 60 the pedals for delineating upon the music-sheet lines to indicate the forte and pianissimo effects to be produced in playing.

5. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of a controlling-lever for a mechanism comprised in said musical instrument, a
 65 sliding carriage arranged to move transversely

of the music-sheet, a spring operating to move the carriage in one direction, means actuated by the controlling-lever for moving
 70 the carriage in the opposite direction, and a marker carried by said carriage and arranged to mark a line on the music-sheet during the movement of the latter to indicate effects to be produced in playing.

75 6. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of a controlling-lever for a mechanism comprised in said musical instrument, a sliding carriage arranged to move transversely
 80 of the music-sheet, a spring arranged to move the carriage in one direction, means actuated by the controlling-lever for moving the carriage in the opposite direction, a bracket-arm movable with said carriage, and a marker car-
 85 ried by said arm and adapted to rest on the music-sheet to mark a line thereon during the movement of the music-sheet, substantially as described.

90 7. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of a controlling-lever for a mechanism comprised in said musical instrument, a pulley rotated by the movement of said controlling-lever, a sliding carriage arranged to
 95 move transversely of the music-sheet, a spring arranged to move the carriage in one direction, a cord attached to said carriage and to the said pulley and operating to move the carriage in the opposite direction when the controlling-lever is moved, and a marker carried
 100 by said carriage and resting on the music-sheet to mark a line thereon during the movement of the music-sheet, substantially as described.

105 8. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of a controlling-lever for a mechanism comprised in said musical instrument, a longitudinally-slotted support, a block slid-
 110 ably arranged in said slot and provided with flanges straddling the slot, a pulley rotated by the movement of said controlling-lever, a cord attached to said pulley and to the block and operating to move the latter in one direc-
 115 tion when the controlling-lever is moved in a given direction, said pulley operating to slacken the cord when the controlling-lever is moved in the opposite direction, a spring arranged to move the block in a direction op-
 120 posite to that in which it is moved by the cord, and a marker carried by the block and resting on the music-sheet to mark a line thereon during the movement of the sheet, substantially as described.

125 9. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of controlling-levers for mechanisms comprised in said musical instrument, a longitudinally-slotted support, blocks slid-
 130 ably arranged in said slots, springs arranged to move the blocks toward each other, means actuated by the controlling-levers for moving the blocks away from each other, markers

carried by said blocks and arranged to mark lines on the music-sheet during the movement of the latter, and a bar movably supported by said support and adapted to be moved between the markers and the music-sheet to throw said markers out of operation, substantially as described.

10. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of controlling-levers for mechanisms comprised in said musical instrument, a support, carriages movable on said support transversely to the music-sheet, means actuated by the controlling-levers for moving the carriages in one direction, springs for moving said carriages in an opposite direction, markers carried by the carriages for marking lines on the music-sheet during the movement of the latter, and a bar movably connected to the said support and provided at its forward edge with a reduced and beveled extension adapted to be projected between the markers and the music-sheet to simultaneously throw said markers out of operation, substantially as described.

11. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of pedals for controlling the dampers of the musical instrument, pivoted bell-crank levers, markers carried by said levers and resting above the music-sheet, means actuated by said pedals for rocking the levers to move the markers into contact with the music-sheet, and means for normally holding the markers out of contact with the music-sheet, substantially as described.

12. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of pedals for controlling the dampers of the musical instrument, pivoted bell-crank levers, markers carried by said le-

vers, cords attached to said pedals and to said levers arranged to rock the latter and throw the markers into contact with the music-sheet when the pedals are depressed, and springs arranged to rock the levers in the opposite direction and normally hold the markers out of contact with the music-sheet, substantially as described.

13. In a mechanical musical instrument, the combination with a perforated music-sheet, of means for moving the sheet, a marker, a foot-pedal, and a connection between the marker and the foot-pedal of the musical instrument, the arrangement being such that the marker will be brought into contact with the music-sheet whenever the pedal is depressed to mark a line on said sheet.

14. In a mechanical musical instrument, the combination with a traveling perforated music-sheet, of pedals for controlling the dampers of the musical instrument, pivoted bell-crank levers, markers carried by said levers and resting above the music-sheet, and means actuated by said pedals for rocking the levers to move the markers into contact with the music-sheet, substantially as described.

15. In a mechanical musical instrument, the combination with a perforated music-sheet, of means for moving the sheet, a marker normally held out of contact with the sheet, a pedal, and a connection between the marker and the pedal, the arrangement being such that the marker will be brought into contact with the music-sheet whenever the pedal is depressed to mark a line on said sheet.

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

GEORGE HOWLETT DAVIS.

Witnesses:

JOSEPH EVANS,

ELIZABETH EVANS.