G. H. DAVIS.

PERFORATING MACHINE.

APPLICATION FILED FEB. 3, 1908.

1,061,051.

Patented May 6, 1913.

4 SHEETS—SHEET 1.

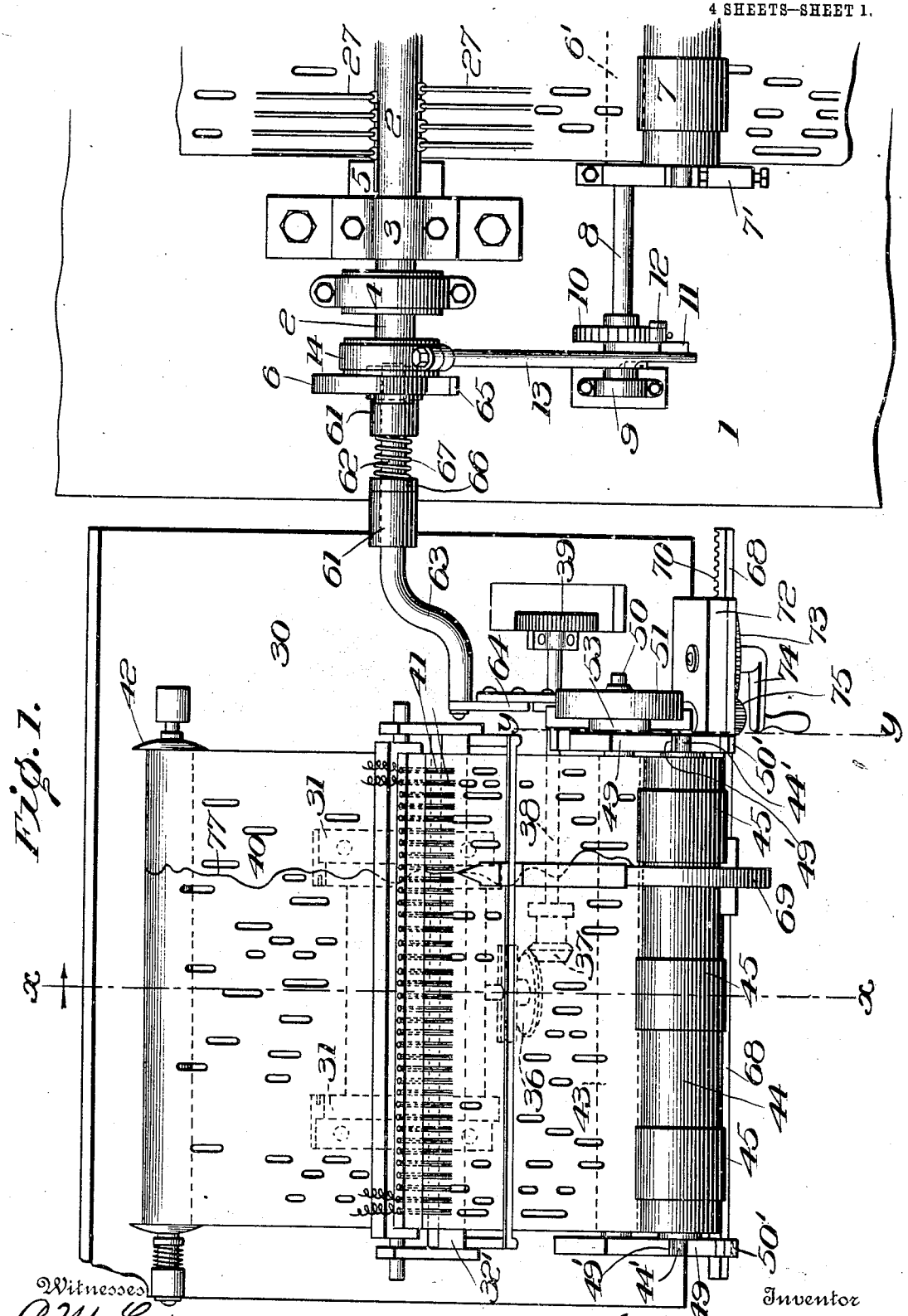


Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 3.

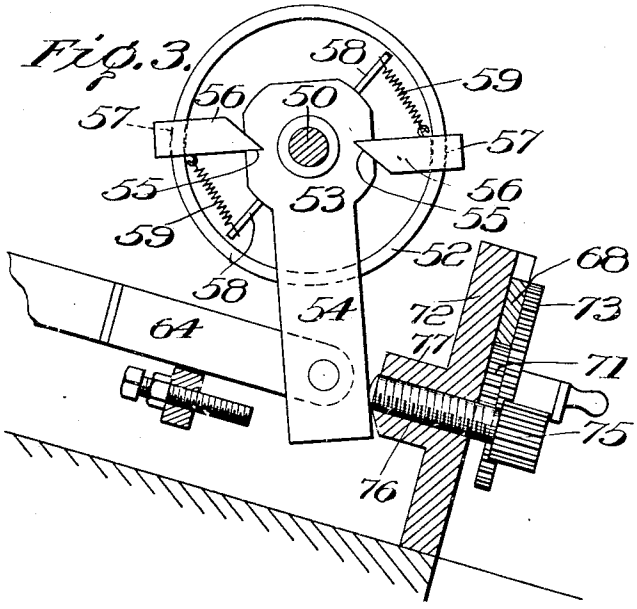
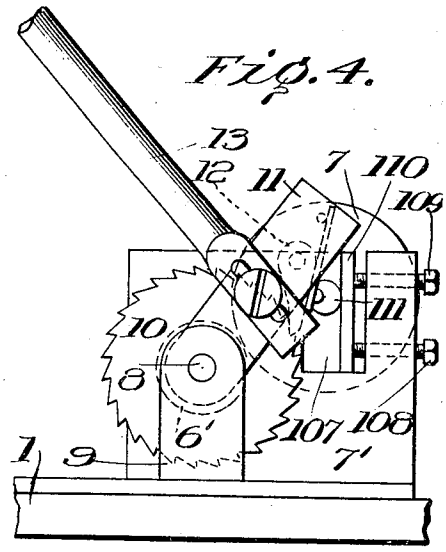


Fig. 4.



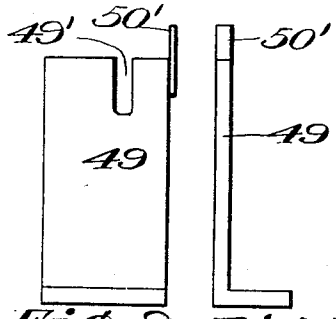


Fig. 9.

Fig. 10.

Fig. 2.

WITNESSES

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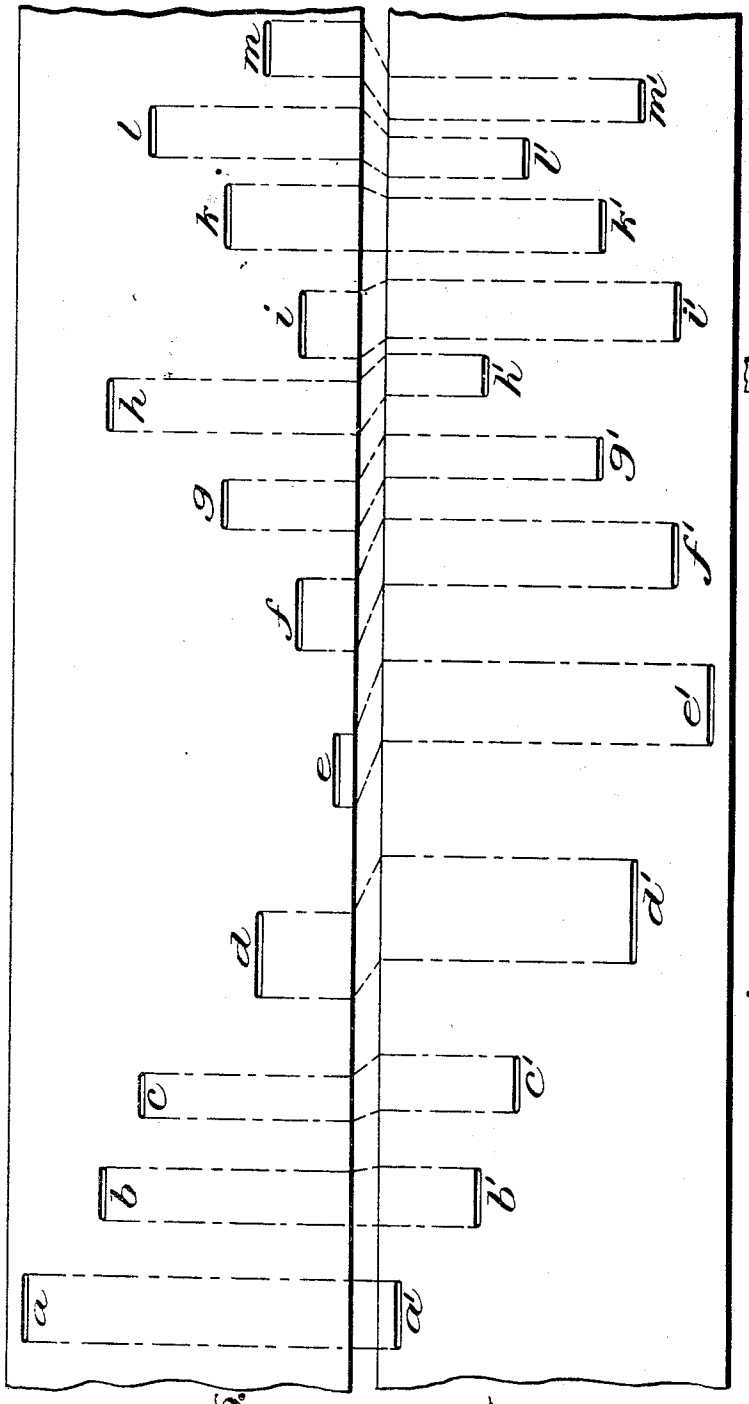


Fig. 6.

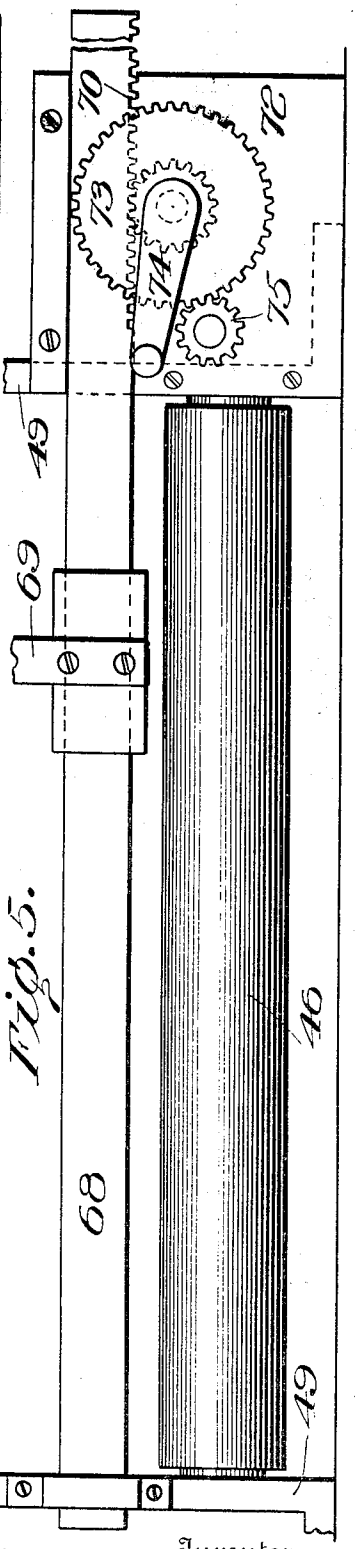


Fig. 5.

Fig. 7.

Witnesses

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4 SHEETS—SHEET 4.

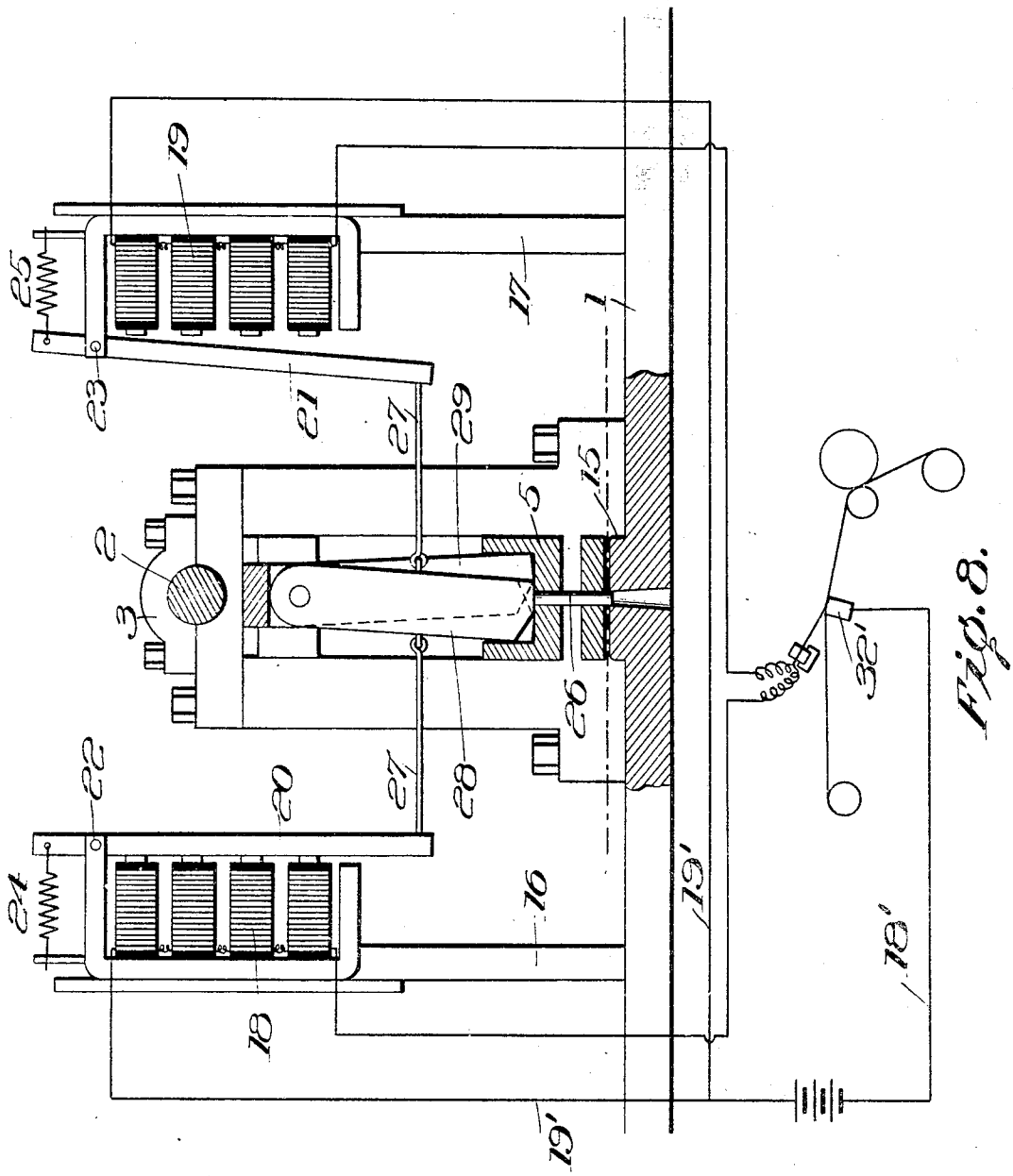


Fig. 8.

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UNITED STATES PATENT OFFICE.

GEORGE HOWLETT DAVIS, OF WEST ORANGE, NEW JERSEY, ASSIGNOR TO STANDARD MUSIC ROLL COMPANY, OF ORANGE, NEW JERSEY, A CORPORATION OF NEW JERSEY.

PERFORATING-MACHINE.

1,061,051. Specification of Letters Patent. Patented May 6, 1913.

Application filed February 3, 1908. Serial No. 413,968.

To all whom it may concern:

Be it known that I, GEORGE HOWLETT DAVIS, a citizen of the United States, residing in the town of West Orange, county of Essex, and State of New Jersey, have made certain new and useful Improvements in Perforating-Machines, of which the following is a full, clear, and exact description, such as will enable others skilled in the art to which it pertains to make and use the same.

Hitherto in the manufacture of perforated music rolls it has been the custom to variously mark the same in some significant manner to indicate to the operator the way in which the instrument upon which the roll is played is to be manipulated in order to produce artistic results. These methods of indication have taken various forms, as for example, the proper musical terms have been printed at various points along the web of the roll indicating to the operator that the mechanism of the instrument is to be so manipulated as to accelerate or retard the speed at which the roll is to be fed over the tracker board in order to produce the musical effects intended by the author of the composition. Other methods have been proposed but in each case much is left to the judgment and skill of the operator which can only be acquired by long practice and great familiarity with the particular musical instrument.

My invention contemplates the incorporation of these particular variations in tempo into the roll itself by varying the lengths of the perforations and the spaces between them to correspond to the exact tempo as given to the particular selection by a recognized master or artist, thereby permitting the roll to travel over the tracker board at a uniform speed without attention from the operator and yet reproduce the music in as artistic a manner as to tempo as if played by an artist. This permits the operator to give his entire attention to the expression lever of the instrument, if he so chooses. In the making of music rolls having this tempo method incorporated therein I use the perforator of substantially the same type and form as that illustrated in my prior Patent No. 964,403, dated July 12, 1910, upon which my improvements have been engrafted.

I have only shown in the accompanying drawings so much of the perforating machine proper as is necessary to convey a full understanding of the specific mechanism embodied in my present invention.

Figure 1 illustrates a plan view of my improvement. Fig. 2 a sectional view on line *x*—*x* of Fig. 1 looking in the direction of the arrow. Fig. 3 is a detail section on line *y*—*y* of Fig. 1. Fig. 4 is an end elevation of the blank feeding mechanism. Fig. 5 is a front view of a detail. Figs. 6 and 7 illustrate, by comparison, a music roll having the indications marked thereon, and a roll having the tempo incorporated therein as made by my improved machine. Fig. 8 illustrates a bar of units of the perforating machine proper.

In the drawings, 1 indicates the table of the perforator proper, 2 the main drive shaft for actuating the punches of the perforator, said shaft being mounted in bearings 3. This shaft extends outside of the bearing 3 to a considerable extent, as illustrated in Fig. 1 and carries just outside the bearing an eccentric 4, which is connected to the reciprocating punch block 5. At the extreme outer end of shaft 2 I secure the eccentric cam 6 for a purpose hereinafter to be described.

As a means for feeding the paper of which the completed roll is made through the perforator and beneath the punches thereof, I provide the feed rolls 6′ and 7, mounted in advance of the punch bar 5. The roll 6′ has the shaft 8 extending outwardly and supported in a bearing 9 which is secured upon the table 1 of the perforator. Rigidly secured upon the shaft 8 inside of the bearing 9 is a ratchet wheel 10.

11 is a rock arm loosely mounted upon the shaft 8 between the ratchet wheel 10 and the bearing 9. This arm 11 carries a spring pawl 12 for engagement with the teeth of the ratchet wheel 10. Adjustably connected to the rock arm 11 is a connecting rod 13 leading from an eccentric 14 on the shaft 2, said eccentric 14 being located between the punch bar operating eccentric 4 and the cam 6. It will thus be seen that the rotation of the shaft 2 will not only reciprocate the punch bar 5 but also through the mechanism just described rotate the said roll 6′, against which the larger feed roll 7 rests. The paper to be perforated being carried between the punch bar 5 and the punch

block 15 is led between the two feed rolls 6′ and 7 and positively drawn through beneath the punches. The bearing for the roll 7 is what may be termed a gravity bearing. It is composed of the block 7′ which also serves as a bearing for the feed roll 6′. This block 7′ is provided with a slot 107 of considerably greater width than the diameter of the journal 111 of the roll 7. Through the side of the block I locate the screw threaded bolts 108 and 109 the inner ends of which project into the slot 107. 110 is a bearing plate located in the slot 107 and forms an adjustable bearing for the journal of the roll 7. The distance between the plate 110 and the shaft 8 of the roll 6′ is so adjusted that the roll 7 will rest by gravity with its periphery bearing against the periphery of the roll 6′, so that there is a constant wedging tendency between the faces of the two rolls 6′ and 7. In threading the perforated paper between the two rolls 6′ and 7 it is only necessary to lift the roll 7 with its journals 111 from the slot 107 so as to separate the rolls 6′ and 7 and pass the paper over the roll 6′ when the roll 7 may be replaced as indicated in Fig. 4. It is understood that an exactly similar bearing block adjustment is provided for the opposite end of the roll 7.

The mechanism just described is substantially the same as that set forth in my pending application above referred to with the exception of the positive feed mechanism in connection with the rollers 6′ and 7.

Inasmuch as the operation of the punch setting devices has been fully set forth in my pending application above referred to, I have deemed it unnecessary to give more than a general description of its operation.

Referring to Fig. 8 I show a bar of punch setting devices consisting of the uprights 16 and 17 carrying at their upper ends the multiple magnets 18 and 19. The armatures 20 and 21 are suitably pivoted near their upper ends at 22 and 23 and normally kept in their retracted positions by the small coil springs 24 and 25. The punch block 5 carries the series of punches 26 each independent of the others and also operated independently. Connected to each of the armatures 20 and 21 through the rods or wires 27 respectively are the punch locking dogs or toggles 28 and 29. The lower end of each dog or toggle 28 and 29 is arranged to engage and lock into position one of the punches 26 which are loosely carried in the vertically reciprocated punch block 5, which also carries the dogs or toggles 28 and 29. The punches co-acting with the dies 15 form the perforations in the web of the paper to be punched, whether said web is the "master" or the final product of the machine. As fully set forth in the patent above referred to the armatures 20 and 21 are attracted to the magnets 18 and 19 whenever the electric circuit passing through them is closed by the reader mechanism hereinafter to be described.

The reference numeral 30 indicates a base plate rigidly secured in any desired manner to the table 1 at an incline as indicated in Fig. 2. Mounted upon this base plate is a pair of guides 31 between which is slidingly and adjustably mounted the reader frame or support 32 having a base 33 guided by the guides 31 and having depending therefrom a lug 34 provided with a screw threaded aperture in which a screw 35 passes. This screw 35 is mounted in a fixed bearing 35′ and has fixed to the forward end thereof a bevel gear 36 meshing with the bevel gear 37, the latter being fixed upon the horizontal shaft 38, which has at its free end a manual operable wheel or head 39.

It will be apparent from the foregoing explanation that the shaft 38 through manual operation will cause the rotation of the screw 35 which will result in a movement of the mechanism either forward or backward depending upon the direction of the movement given to the shaft 38. The upper face of the support 32 carries the return conductor 32′ of the electric circuit 18′ which passes through the magnets 18 and 19 heretofore referred to and over this return conductor passes the pattern or master roll 40, upon which rest the reader elements 41 which consist of a series of selector fingers each of which is in circuit with the corresponding magnet 18 or 19 upon the perforating table through individual wires 19′, it being understood that each one of the selector fingers has a corresponding electromagnet, which in turn has a corresponding punch 26 in the perforator mechanism. The pattern or master roll 40 is carried upon a delivery spool 42 mounted in suitable bearings upon the table or support 30 passing from the delivery spool directly to the upper face of the return conductor 32′ at the upper edge of the support 32 upon which rest the reader elements 41, the extreme outer ends of which rest upon the upper surface of the master 40.

From the upper face of the return conductor 32′ the web of the pattern or master 40 is led between the feed rolls 43 and 44, the first of which is positively driven and the latter, being provided with rubber bands 45 at intervals along its face, resting by gravity against the live roll 43 being held in position by its trunnions 44′ lying in the slots 49′ of the roll 49. The bearings for the trunnions 44′ are what I have heretofore called the gravity bearing in connection with the roll 7 and operates in substantially the same manner. When the roll 44 is lifted from its bearing slot 49′ during the process of threading the web of the master 40 it

may be permitted to rest upon the upper edge of the plates 49 against the stops 50′ provided upon the forward side of the plates 49 for that purpose.

From between the rollers 43 and 44 the web of the pattern or master is led to the take-up roller 46 upon which it is wound up as rapidly as it is drawn between the rollers 43 and 44. The reader elements 41 are carried in a rail 47, which in turn is supported by the arm 48 adjustably connected to the ends of the return conductor at the upper ends of the support 32, the adjustment being such that the reader elements 41 can be shifted along the return conductor to register with the perforations in the master 40. The roller 43 is mounted in suitable bearings in the plates 49 mounted upon the base 30. The end of the shaft 50 upon which the roller 43 is mounted extends beyond one of the bearings 49, as indicated in Fig. 1, and has rigidly mounted thereon the flanged friction wheel 51, said wheel being provided upon the edge, adjacent to the support 49, with a flange 52. Loosely mounted upon the shaft 43 between the friction wheel 51 and the support 49 is an oscillating head 53 having an arm 54 projecting downwardly therefrom. (See Fig. 3.)

At diametrically opposite points in the head 53 are the notches 55 into which extend the wedge-shaped clutch members 56. These clutch members 56 have near their outer extremities the slots or grooves 57 through which the flange 52 of the friction wheel 51 extends.

At diametrically opposite points and at an angle of about 45 degrees distant from the notches 55 are the pins 58, from the outer ends of which the springs 59 are connected to the clutch members 56, as clearly indicated in Fig. 3. This clutch mechanism just described is for the purpose of giving a positive feed to the feed roller 43.

It will be readily seen that any oscillation given to the arm 54 in the direction opposite the hands of a clock, as shown in Fig. 3, will result in causing the clutch members 56 to grip the rim or flange 53 and thus cause the rotation of the friction wheel 51, while an oscillation of the arm 54 in the direction of the hands of a clock will cause the clutch members 56 to release their grip upon the flange 52 and slide forward in position to take a new grip upon said flange when the arm 54 is again oscillated in the opposite direction.

In practice I find this friction mechanism to be capable of very minute and accurate movement—that is to say—the slightest oscillation given to the arm 54 will cause correspondingly small angular movements of the wheel 51 to produce an almost infinitesimal feed or rotation of the roller 43. As a means for oscillating the arm 54 I provide the following mechanism: Upon the side of the table 1 I secure a standard 60, (see Fig. 1), in the upper end of which are the shaft bearings 61 which carry the spring shaft 62 having upon its outer end a crank 63, to the lower end of which I connect the sectional bar 64, the opposite end of which bar 64 is connected with the lower end of the arm 54. Upon the inner end of the shaft 62 is rigidly secured the upwardly extending arm 65 which lies in the path of the eccentric cam 6.

The rotation of the shaft 2 and with it the cam 6 causes an oscillation of the shaft 62 through the contact of the arm 65 with said cam 6 and the oscillation of the shaft 62 will be communicated through the crank 63 to the arm 54 heretofore referred to. Rigidly mounted upon the shaft 62 I secure the collar 66 from which extends the coil spring 67, the opposite end being secured into one of the shaft bearings 61, the spring acting always to throw the arm 65 toward the shaft 2 and through the connections of the shaft 62 with the arm 54 to throw said arm 54 as far to the right, as indicated in Fig. 3, as possible, or until it is limited in its throw by the contact of the arm 65 with the cam 6. It will now be observed that if anything is located in the path of the arm 54 to limit the amplitude of its oscillation, the corresponding rotation of the shaft 43 will be limited, so that a correspondingly shortened step-by-step movement may be given to the roller 43. In order to interpose such an obstacle to the oscillation of the arm 54 I provide the following mechanism: Upon the forward side of the supports 49 I locate a rack bar 68, said rack bar having secured thereto an arm or indicator 69 which extends upward over the roller 44 to a point just above the position of the pattern or master roll 40, where it spans the space between the return conductor and the roll 43, the arm or pointer extending from that point to a point just in advance of the reader members 41, as clearly indicated in Figs. 1 and 2.

At the right-hand end of the rack bar 68 I provide a series of rack teeth 70 which mesh with a pinion 71 mounted on a shaft carried by a plate or support 72, which is in turn secured to the support 49. Upon the same shaft which carries the pinion 71 I mount the large spur gear 73, and the crank 74. Meshing with the spur gear 73 is a small, wide-faced spur gear 75 mounted upon a screw shaft 76, which is carried in a screw bearing 77 (see Fig. 3), which in turn is carried by the support 72. The inner end of the screw shaft 76 is located in the path of the arm 54.

From the above description it will be seen that the rotation of the crank 74 will simultaneously reciprocate the rack bar 68 and extend or withdraw the shaft 76 toward

or from the lower end of the arm 54. If the shaft 76 is extended toward the path of the arm 54 the amplitude of its vibrations will be diminished and as they are diminished the amount of rotation given to the roller 43 will be correspondingly diminished, thus retarding the rate of speed at which the master roll or pattern 40 is fed beneath the reader elements 41. If now a line, as the line 77, is previously marked out upon the pattern or master roll 40, the position of such line toward the right-hand margin of the paper indicating that the travel of the master or pattern is to be retarded and its deviation to the left indicating that its travel is to be accelerated, it is only necessary for the operator to so manipulate the crank 74 as to cause the pointer at the end of the arm 69 to follow such line 77, when it will be found that the master or pattern 40 will be drawn through beneath the reader elements 41 at exactly the same varying speed as indicated by the deviation of the line 77 to the right or left of a standard or zero line. While this variation in the speed with which the master is being fed through beneath the reader elements is taking place it is to be understood that the web of the paper being perforated by the punches 26 is being fed at a uniform speed by means of the feed rollers 6′ and 7 while at the same time the punches 26 are being vertically reciprocated at a uniform high speed. The result of this is that when any one or more of the reader elements 41, is caused to close the electric circuit through one of the perforations in the master roll 40 to the corresponding magnets 18 and 19, if the master roll 40 is retarded in the manner just described the length of the perforation in the paper passing beneath the punch bar 5 will be increased and correspondingly as the master 40 is fed through beneath the reader elements 41 at an accelerated rate of speed the lengths of the corresponding perforations in the paper passing beneath the punches 26 will be correspondingly shortened, so that if the line 77 is made to indicate the varying tempo at which a particular selection is to be rendered in order to produce the artistic results heretofore referred to, then, inasmuch as the completed roll has incorporated all of these variations into the lengths of the perforations and the spaces between them, then the roll turned out by the perforating machine will, when caused to pass over the tracker board of an instrument at a uniform speed, reproduce, so far as the tempo is concerned, all of the variations indicated by the line 77 of the master or pattern. In order that this point may be clearly set forth I have illustrated, in Figs. 6 and 7, a pattern and the product as produced by my improved machine and process. In Fig. 6 the perforations indicated are note perfect—that is to say—all of the notes of equal time value are of exactly the same length throughout the roll. In Fig. 7, inasmuch as the variations in tempo are incorporated into the roll itself through the perforations thereof, those perforations of equal note value will vary in accordance with the indicated tempo in which the selection is to be played in order to produce the artistic results. By comparison slot marked *a* in Fig. 6 would appear as *a′* in the temporizing roll illustrated in Fig. 7, the two slots being identically the same in length. If, however, at the end of the slot *a* the notes upon the instrument to be operated by the slot *b* were to be played in andante time it would appear in the temporizing roll as slightly longer than *b′* so that the roll 7 in traversing the tracker board at a uniform speed would take slightly longer to play the slot *b′* than it would to play the note *b*. This andante time continued through the notes *c*, *d*, *e*, *f*, and *g* would appear as notes *d*, *e*, *f*, and *g*, in the temporizing roll. From this point the notes in the roll in Fig. 6 are to be played in little faster time which will result in the shortening of the corresponding notes as *h′*, *i′*, *k′*, *l′*, and *m′* whereas, the corresponding notes in the roll illustrated in Fig. 7 would appear as *h*, *i*, *k*, *l*, and *m*, such notes being as above indicated, note perfect.

From the above description it will be clear that if desired the finished product of the perforating machine, when made in accordance with a pattern as 40, having thereon the line 77 to indicate tempo, may be used as a pattern or master and caused to pass through either the machine of the character just described in order to produce new rolls, or it may be used as a pattern upon a machine not having this mechanism. If used upon a machine as just described then it will be understood that the tempo mechanism must be set with the indicator pointer at the extremity of the arm 69 at the zero line and there permitted to remain quiescent, under which circumstances it will be understood that the perforating machine proper will reproduce an exact copy of the pattern itself with all of the variations in the lengths of the perforations.

Regarding not only the mechanism itself, but the process and the product as being radically new in the art of reproducing perforated music rolls, I desire to claim the same in the broadest language possible.

I claim:

1. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line thereon, mechanism for simultaneously feeding said pattern sheet and a blank or unperforated sheet through said machine, a pointer for following said line and means connected with said pointer for

varying the relative rates at which said sheets are fed through said machine, in accordance with the deviations of said pointer in following said sinuous tempo line.

2. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line running longitudinally thereof, feeding mechanism for feeding said pattern sheet through said machine, feeding mechanism for feeding a blank or unperforated sheet through said machine, a pointer for following said line and means connected with said pointer for varying the speed of one of said feeding mechanisms relative to the feeding of the other, in accordance with the deviations of said pointer in following said sinuous tempo line.

3. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line thereon, automatic feeding mechanism for feeding said sheet through said machine, a pointer for following said line, manually operated means interconnecting said pointer and said feeding mechanism for varying the rate of speed of said feeding mechanism, in accordance with the deviations of said pointer in following said sinuous tempo line.

4. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line thereon with automatic feeding mechanism for feeding said sheet through said machine at a normal uniform rate of speed, a pointer for following said line and manually operated means connected with said pointer for varying said rate of speed to correspond to the deviations of said pointer in following said sinuous tempo line.

5. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line delineated thereon throughout its length, automatic step by step feeding mechanism for feeding said sheet through said machine, a pointer for following said line, manually operated means connected with said pointer for accelerating or retarding said rate of speed to correspond with the deviations of said pointer in following said sinuous tempo line.

6. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line delineated thereon throughout its length, automatic means for perforating a blank sheet to correspond with the perforations in said pattern sheet, a pointer for following said line, manually operated means connected with said pointer for varying the lengths of the perforations in said blank from the corresponding perforations in said pattern sheet, in accordance with the lateral deviations of said pointer in following said sinuous tempo line on said pattern sheet.

7. In a perforating machine, the combination of a perforated pattern sheet having a sinuous tempo line delineated thereon throughout its length, automatic perforating mechanism for perforating a blank sheet to correspond with the perforations in said pattern sheet, a pointer for following said line and means connected with said pointer for varying the length of perforations in said blank, from those in the corresponding perforations in said pattern sheet, in accordance with the lateral deviations of said said pointer in following said sinuous line upon the pattern sheet.

8. In a perforating machine, the combination of a perforated pattern sheet having a sinuous tempo line delineated thereon, perforating mechanism automatically controlled by said pattern sheet for perforating a blank sheet to correspond with the perforations in said pattern sheet, feeding mechanism for normally feeding said pattern sheet and said blank at uniform rates of speed through said machine, a pointer for following said line and manually operated means connecting said pointer and said feeding mechanism for varying the rate of speed of said pattern sheet to produce corresponding variations in the lengths of the perforations in said blank, in accordance with the deviations of said pointer in following said sinuous tempo line.

9. In a perforating machine, the combination of a perforated pattern sheet, perforating mechanism automatically controlled by said pattern sheet to perforate a blank sheet to correspond with the perforations in said pattern sheet, feeding mechanism for normally feeding said pattern and said blank through said machine, an undulating indicator line upon said pattern sheet, manually operated means for following said line and for varying the rate of speed of said pattern sheet to correspond with the undulations of said indicator line, whereby the lengths of perforations in said blank will correspondingly vary from the perforations in said pattern sheet.

10. In a perforating machine, the combination of perforating mechanism, a perforated pattern sheet for controlling said perforating mechanism, a tempo line delineated upon said pattern sheet throughout the length thereof, automatic means for normally feeding said sheet at a uniform speed and manually operated means for following said tempo line and for varying said speed.

11. In a perforating machine, the combination of perforating mechanism a perforated pattern sheet having a sinuous tempo-line thereon, automatic means for feeding said pattern sheet at a uniform speed and manually operated means interposed in said feeding means for following said tempo line and for varying said speed in accordance with said sinuous tempo-line.

12. In a perforating machine, the combi-

nation of perforating mechanism, means for feeding a blank at a uniform speed through said perforating mechanism, a perforated pattern sheet for controlling said perforating mechanism, a sinuous tempo line delineated throughout said pattern sheet, means for normally feeding said pattern sheet at a uniform speed and means for following said tempo line and for varying the feed of said pattern sheet whereby the lengths of perforations made in said blank sheet will vary from the corresponding perforations in said pattern sheet.

13. In a perforating machine, the combination of a perforating mechanism, means for feeding a blank therethrough, a perforated pattern or pattern sheet for controlling said perforating mechanism, a sinuous tempo line delineated thereon, means for normally feeding said pattern sheet at a uniform speed, and manually operated means for following said tempo line and for varying said pattern sheet feed in accordance with a predetermined rule or law.

14. In a perforating machine, the combination of a perforating mechanism, means for feeding a blank sheet, therethrough to be perforated thereby, a perforated pattern sheet for governing or controlling said perforating mechanism, a sinuous speed indicator line running throughout said pattern sheet, means for following said tempo line and for moving or feeding said pattern sheet at a speed varying in accordance with the deviations of said indicator line.

15. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line thereon, mechanism for simultaneously feeding said pattern sheet and for feeding a blank or unperforated sheet through said machine, a pointer for following said sinuous tempo line, connections between said pointer and said pattern sheet feeding mechanism, and manually operated means for causing said pointer to follow said sinuous tempo line, whereby to cause said pattern sheet to be fed through said machine at a varying rate of speed in accordance with the variations indicated by said sinuous tempo line.

16. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line running longitudinally thereof, feeding mechanism for feeding said pattern sheet through said machine, feeding mechanism for feeding a blank or unperforated sheet through said machine, means for varying the speed of one of said feeding mechanisms relative to the other comprising an index pointer designed to follow said sinuous tempo line, and connections between said pointer and one of said feeding mechanisms to cause a variation in their relative rates of feed in accordance with the deviations of said pointer in following said line.

17. In a perforating machine, the combination of a pattern sheet having a sinuous tempo line thereon, automatic feeding mechanism for feeding said sheet through said machine, an index pointer for following said sinuous tempo line, connections between said index pointer and said feeding mechanism for varying the rate of speed of said feeding mechanism, in accordance with the deviations of said pointer in following said sinuous tempo line, and means for simultaneously perforating a blank sheet, said means being governed by the perforations in said pattern sheet.

18. In a perforating machine, the combination of a perforated pattern sheet having a sinuous tempo line thereon, automatic feeding mechanism for feeding said sheet through said machine at a uniform rate of speed, feeding and perforating mechanisms for feeding a blank sheet through said machine, and simultaneously perforating the same, an index pointer located over said pattern sheet, manually operated means for causing said index pointer to follow said sinuous tempo line, connections between said index pointer and said pattern sheet feeding mechanism for causing the latter to vary the rate of speed of said pattern sheet in accordance with the deviations of said pointer in following said sinuous tempo line.

19. In a perforating machine, the combination of a perforated pattern sheet having a sinuous tempo line delineated thereon throughout its length, automatic step by step feeding mechanism for feeding said sheet through said machine at a normal uniform rate of speed, perforating mechanism for perforating a blank sheet, step by step feeding mechanism for feeding said blank sheet through said machine, mechanism for controlling said perforating mechanism actuated by said pattern sheet, a pointer for following said line, manually operated means for accelerating or retarding the rate of speed of said pattern sheet, in accordance with the deviations of said pointer in following said sinuous tempo line.

20. In a perforating machine, the combination of a perforated pattern sheet having a sinuous tempo line delineated thereon throughout its length, automatic means for perforating a blank sheet to correspond with the perforations in said pattern sheet, said means being governed by the perforations in said pattern sheet, feeding mechanisms for feeding said pattern sheet and said blank sheet through said machine, a pointer for following said line, manually operated means connecting said pointer and one of said feeding mechanisms for varying the lengths of the perforations in said pattern sheet, in accordance with the lateral deviations of said sinuous tempo line on said pointer in following said pattern sheet.

21. In a perforating machine, the combination of a perforated pattern sheet having a sinuous tempo line delineated thereon throughout its length, automatic perforating mechanism for perforating a blank sheet to correspond with the perforations in said pattern sheet, an index pointer for following said sinuous tempo line, feeding mechanisms for simultaneously feeding said pattern and said blank sheets through said machine, connections between said index pointer and said pattern sheet feeding mechanism for varying its rate of feed, in accordance with the lateral deviations of said sinuous tempo line upon the pattern sheet.

22. In a perforating machine, the combination of a perforated pattern sheet, perforating mechanism automatically controlled by said pattern sheet for perforating a blank sheet to correspond with the perforations in said pattern sheet, feeding mechanism for normally feeding said pattern sheet and said blank sheet at a uniform rate of speed through said machine, an index pointer located over said pattern sheet contiguous to said sinuous tempo line, connections between said index pointer and the pattern sheet feeding mechanism, manually operated means for causing said index pointer to follow said sinuous tempo line to cause an acceleration or retardation of said pattern sheet feeding mechanism, in accordance with the deviations of said pointer in following said sinuous tempo line.

23. In a perforating machine, the combination of a perforated pattern sheet, perforating mechanism automatically controlled by said pattern sheet to perforate a blank sheet to correspond with the perforations in said pattern sheet, feeding mechanism for normally feeding said pattern and said blank sheets through said machine, an undulating indicator line running throughout said pattern sheet, an index pointer located contiguous to said indicator line, connections between said pointer and said pattern sheet feeding mechanism for causing said pointer to follow said indicator line and for varying the rate of speed of said pattern sheet to correspond with the undulations of said indicator line, whereby the lengths of the perforations in said blank sheet will correspondingly vary from the lengths of perforations in said pattern sheet.

This specification signed and witnessed this first day of February, 1908.

GEORGE HOWLETT DAVIS.

Witnesses:
R. O. EVANS,
WM. A. HUNTER.