E. DE KLEIST.

PERFORATING MACHINE.

APPLICATION FILED MAR. 16, 1907.

944,790.

Patented Dec. 28, 1909.

3 SHEETS—SHEET 1.

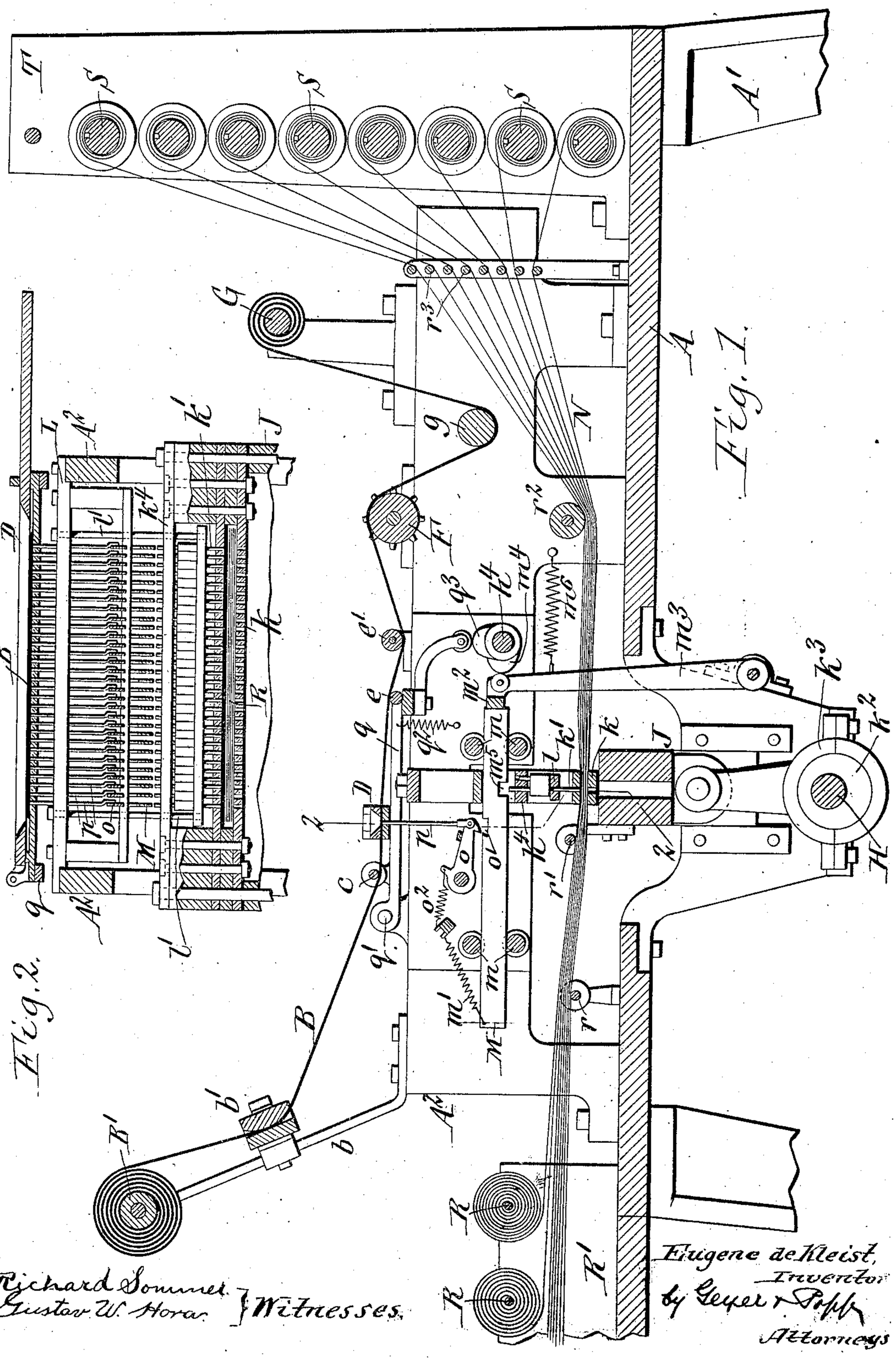

Fig. 1.

Fig. 2.

Witnesses:
Richard Sommer.
Gustav W. Hoar.

Inventor:
Eugene de Kleist,
by Geyer & Popp
Attorneys

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3 SHEETS—SHEET 2.

Fig. 9.

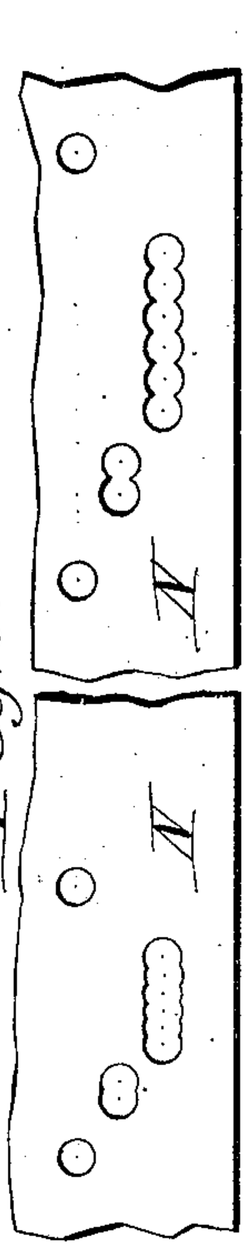
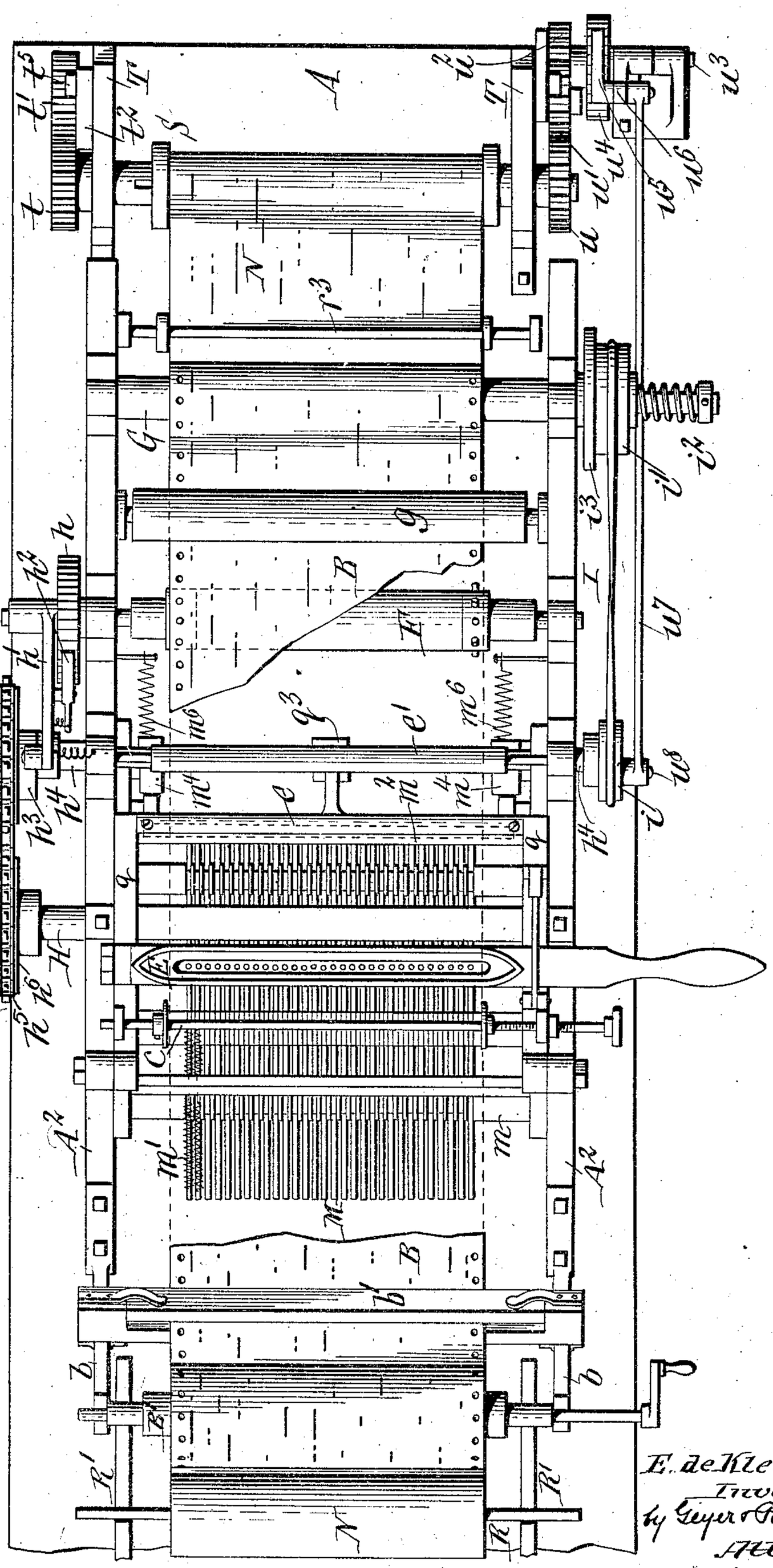


Fig. 3.



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Gustav W. Hoya

E. de Kleist,
Inventor
by Geyer & Popp
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3 SHEETS—SHEET 3.

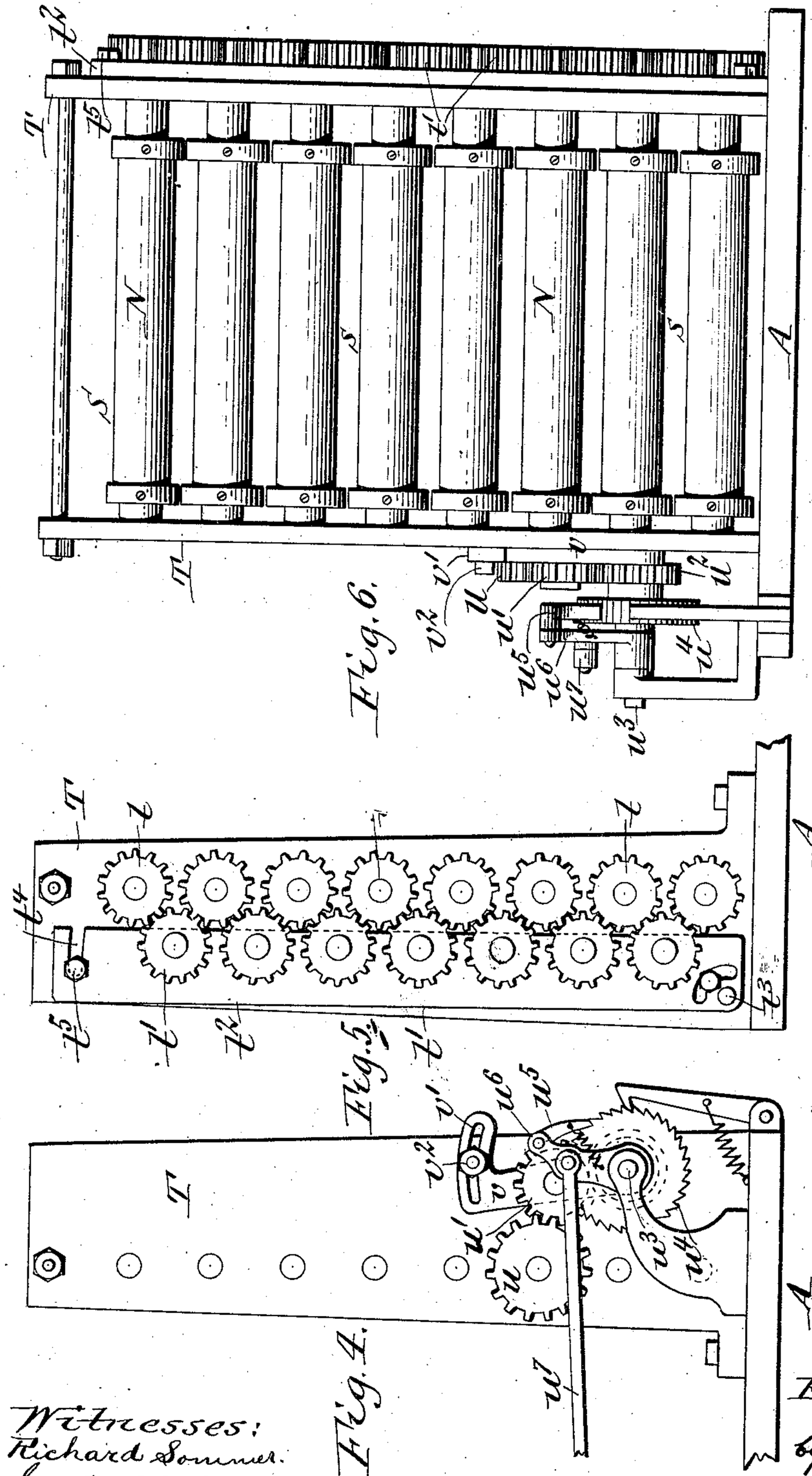

Fig. 6.

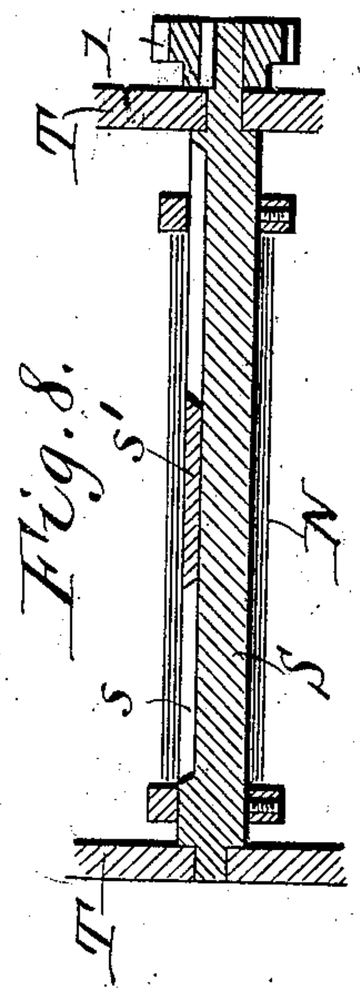

Fig. 8.

Fig. 5.

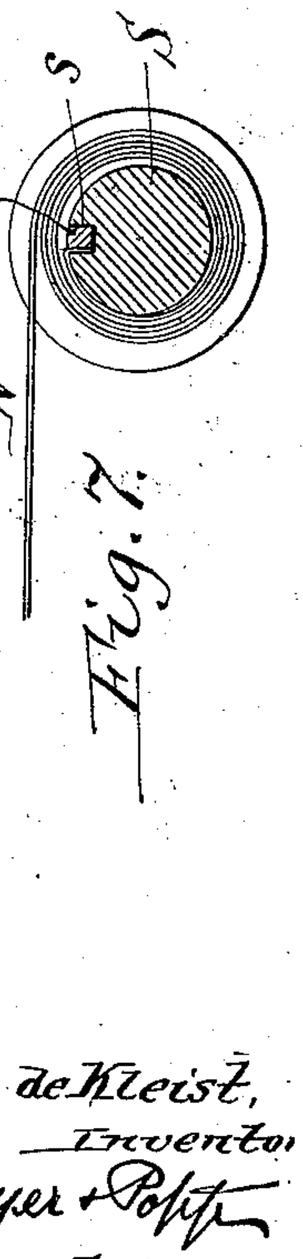

Fig. 7.

Fig. 4.

Witnesses:
Richard Sommer.
Gustav W. Hora.

Eug. de Kleist,
Inventor
by Geyer & Polst
Attorneys

UNITED STATES PATENT OFFICE.

EUGENE DE KLEIST, OF NORTH TONAWANDA, NEW YORK, ASSIGNOR TO THE RUDOLPH WURLITZER COMPANY, OF CINCINNATI, OHIO, A CORPORATION OF OHIO.

PERFORATING-MACHINE.

944,790. Specification of Letters Patent. **Patented Dec. 28, 1909.**

Application filed March 16, 1907. Serial No. 362,655.

To all whom it may concern:

Be it known that I, EUGENE DE KLEIST, a citizen of the United States, residing at North Tonawanda, in the county of Niagara and State of New York, have invented a new and useful Improvement in Perforating-Machines, of which the following is a specification.

This invention relates more particularly to machines employed for perforating the music sheets used in connection with automatic musical instruments.

In machines of this kind as ordinarily constructed, the web or blank music sheet passes between feed rollers which are rotated intermittently at a constant speed, thus advancing the sheet by uniform steps from its front to its rear end and spacing the perforations with corresponding uniformity. When the music sheet is placed in the musical instrument and its front end attached to the take-up roll in the customary manner, this roll gradually increases in diameter as it takes up the sheet, causing the same to be fed past the tracker board with increasing speed and correspondingly accelerating the tempo of the music, particularly toward the end of the sheet. This is especially objectionable when such instruments are used in dancing schools and skating rinks where a steady and invariable tempo must be maintained.

The object of my invention is to provide such perforating machines with simple means for feeding the blank music sheets past the punches or perforating devices at a variable or gradually increasing speed corresponding to the accelerated speed with which the sheet is caused to travel when applied to a musical instrument. The perforations of the sheet are by this means punched farther and farther apart from the front toward the rear end of the sheet and the accelerated travel of the sheet when in the instrument is compensated for by the correspondingly increased spacing of the single perforations and the increased spacing and length of the slots or elongated perforations, thus playing the music at a steady and uniform tempo from beginning to end.

In the accompanying drawings consisting of 3 sheets; Figure 1 is a fragmentary vertical longitudinal section of a perforating machine embodying the invention. Fig. 2 is a transverse section in line 2—2, Fig. 1. Fig. 3 is a fragmentary top plan view of the machine. Figs. 4 and 5 are elevations of opposite sides of the sheet-feeding mechanism. Fig. 6 is a rear view of said mechanism. Fig. 7 is a cross section and Fig. 8 a longitudinal section of one of the feed or take-up rollers of the machine. Fig. 9 is a fragmentary plan view of the front and rear portions of a music sheet perforated by the improved machine, showing in an exaggerated manner, the increased spacing of the perforations and the lengthening of the slots toward the rear end of the sheet.

Similar letters of reference indicate corresponding parts throughout the several views.

A indicates the bed of the machine supported by legs A^1, and A^2 the side frames rising from the bed.

B indicates the usual perforated master-sheet which controls the perforating or punch mechanism hereinafter described. This sheet is wound upon the customary supply roller B^1 which is carried by brackets b secured to the side frames A^2. From this roller the master-sheet passes through a guide and tension device b^1 carried by the bracket b and under a guide rod c; thence through the customary transverse vertically-movable bar D and over and under guides e, e^1; thence over a feed roller F having pins which engage holes in the margins of the master sheet; and thence around a guide roller g to the take-up roller G to which latter it is suitably fastened. The feed roller F is intermittently rotated from the main driving shaft H by any suitable means, the mechanism shown in the drawings consisting of a ratchet wheel h secured to the shaft of said roller and a vibrating arm h^1 carrying a pawl h^2 which engages said wheel. This arm is actuated by a cam h^3 secured to a counter shaft h^4 driven from the main shaft by a sprocket chain h^5 and sprocket wheels h^6, h^7.

The take-up roller G of the master-sheet is driven from the counter shaft h^4 by a belt I running around pulleys i, i^1 on said shaft and the roller shaft. The pulley i^1 is loose on the shaft of the take-up roller, and a spring i^2 holds it in frictional engagement with a disk i^3 fixed to said shaft, by which construction the pulley i^1 slips on its shaft whenever the slack in the master sheet is fully taken up.

The punch or perforating mechanism may be of any suitable or well known construction. Its particular construction forms no part of my present invention and a brief description of the same will therefore suffice.

J is the vertically reciprocating cross head carrying the perforated die plate k with which the punches k^1 coöperate, the cross head receiving motion from the main shaft H by an eccentric k^2 and strap k^3. The punches are guided in openings in the die-plate, a cross bar k^4 carried by the cross head J and a fixed stripper bar l connected by bolts l^1 with a cross piece L secured to the side frames A^2, as best shown in Figs. 1 and 2.

M indicates the gang of longitudinally-movable stop bars arranged above the punches respectively and controlling their action. These bars, which are arranged between horizontal guides m, are urged forward by individual springs m^1 and returned by a universal bar m^2 carried by rock arms m^3 acted on in one direction by cams m^4 on the shaft h^4 and in the opposite direction by springs m^6. Each of these stop bars is provided in its underside with a notch m^5 which in the normal retracted position of the bar, shown in Fig. 1, registers with the upper end of the corresponding punch, allowing the latter to recede into the notch when the die plate rises and preventing the punch from perforating the music sheet or sheets N which pass through the horizontal slot of the die plate. When, however, one of said bars is allowed to move to its forward position under the action of its spring m^1, its notch m^5 breaks register with the punch, thus resisting or stopping the upward movement of the punch and perforating the music sheet or sheets by the next upward stroke of the die-plate.

The stop bars M are normally locked in their retracted position by individual vertically-swinging catches o which are adapted to interlock with notches o^1 in the upper edges of the bars and which are urged upward out of engagement with the same by springs o^2. The downward or locking movement of these catches is controlled by pins p extending upwardly therefrom through openings in the cross bar D and coöperating with the master-sheet. The bar D is carried by a vertically swinging frame q pivoted at q^1 to the side frames A^2 and vibrated in one direction by a spring q^2 and in the opposite direction by a cam q^3 on the shaft h^4. When an imperforate portion of the master-sheet is opposite a given pin p and the bar D descends, the corresponding catch o is depressed into engagement with the notch o^1 of the companion stop bar M, locking the latter against forward movement, keeping its notch m^5 in register with the corresponding punch and rendering the latter inoperative. When, however, a perforation in the master-sheet registers with said pin p, the latter remains in its elevated position and the descending bar D and master sheet slide idly over the pin, leaving the corresponding stop bar M unlocked and permitting it to advance under the action of its spring m^1, thus moving the lower notch m^5 of the bar out of register with the corresponding punch, blocking the upward movement of the latter and compelling it to perforate the music sheets when the die plate ascends, as before described.

The webs or blank sheets N to be perforated are wound upon the usual supply rollers R journaled in standards R^1 and pass thence over and under guides r, r^1 through the die plate k, under guide rollers r^2, under or over a vertical series of similar rollers r^3 and thence to individual take-up rollers S to which the front ends of the sheets are fastened so that they are wound upon them in the same manner as when attached to the take-up roll of an automatic musical instrument. Any suitable fastening means may be employed for this purpose, but each roller is preferably provided in its face with a longitudinal groove s in which the end of the sheet is clamped by a key or feather s^1, as shown in Figs. 7 and 8. The several take-up rollers S are journaled in standards T mounted on the bed of the machine on the rear side of the punching-mechanism, and an intermittent rotary movement is imparted to these rollers by any suitable driving mechanism. In the construction shown in the drawings, each roller is provided at one end with a gear wheel t, and the wheels of adjacent rollers are connected by idler gears t^1 journaled on an upright supporting bar or frame t^2 movable toward and from the gear wheels t, so that the idler gears may be collectively moved out of gear with said wheels to permit the several rollers to be turned by hand individually in attaching the sheets of paper thereto. The supporting bar t^2 is pivoted to the adjacent standard at one end, preferably its lower end, as shown at t^3 while its upper end has a notch t^4 which receives a clamping bolt t^5 carried by the adjacent standard, as shown in Fig. 5.

One of the take-up rollers is provided at the end opposite that to which the gear t^1 is fastened, with a driven gear u which is connected through an idler gear u^1 with a gear wheel u^2 secured to a short transverse shaft u^3 to which is also fixed a ratchet wheel u^4. The latter is intermittently turned by a feed pawl u^5 carried by an oscillating arm u^6 pivoted on the shaft u^3 and connected by a rod u^7 with a wrist u^8 on the pulley i. As shown in Fig. 4, the arbor of the idler gear u^1 is carried by an adjustable arm v pivoted upon the shaft u^3 and having a slotted seg-

ment v^1 through which passes a clamping bolt v^2. This construction permits different-sized gears to be substituted for the gear u for rotating the take-up rollers at different speeds and causing the music sheets to advance with shorter or longer steps according to the length of the bars in the piece of music which is being cut; or in other words in accordance with the tempo of the composition.

The take-up rollers S are of the same diameter as the take-up rolls of the automatic musical instruments with which the music sheets or rolls are to be used and said rollers are driven at a uniform speed. It follows that the blank music sheets in the perforating machine are moved past the punches at a gradually increasing speed owing to the growing diameter of the take-up rollers S in the same manner and with the correspondingly accelerated speed at which the music sheet is moved past the tracker-board of an automatic musical instrument. The result is that the single perforations representing notes of the shortest duration are spaced farther and farther apart from the front toward the rear end of the sheets in a corresponding measure and the length as well as the spacing of the elongated openings or slots produced by a succession of two or more connected or overlapping punch holes is likewise gradually increased, so that notwithstanding the accelerated travel of the music sheet in the instrument, the music is rendered at a steady and uniform tempo throughout the length of the composition or compositions on the sheet.

From an inspection of Fig. 9, the relative spacings of the single perforations and the lengths of the slots in opposite end-portions of a music sheet will be observed, the spacing and length being greater in the right hand portion of the figure which represents the rear portion of the sheet.

In the drawings, eight take-up rollers S are shown, but a greater or less number may be employed.

The means for guiding and feeding the master sheet and for guiding the blank music sheets past the punching mechanism may be of any ordinary construction, the essential feature of the invention being the provision of a take-up roller for the music sheet which is the counterpart of the take-up roll of the instrument in which the sheet is afterward used and upon which the blank sheet is wound, so that by the increasing diameter of said roller the sheet is fed with an accelerated speed corresponding to that of the music sheet when in use.

Musical compositions written in different tempos, require the sheets to be fed at different speeds, and to permit of this changeable drive, different sized gears as u are employed, as hereinbefore described.

I claim as my invention:

1. In a machine for perforating music sheets, the combination of a perforating mechanism and sheet-feeding means constructed to move the sheet past the perforating mechanism at a predetermined gradually increasing speed corresponding to the accelerated speed imparted to a perforated music-sheet by the take-up roll of a musical instrument, whereby the perforations of the sheet are punched farther and farther apart from the front toward the rear end of the sheet and the accelerated travel of the sheet when in the instrument is compensated for by the increased spacing of the perforations.

2. In a machine for perforating music sheets, the combination of a perforating mechanism, and a take-up roller for feeding the sheet past the perforating mechanism, said roller having the same diameter as the take-up roll of the musical instrument upon which the perforated sheet is subsequently wound, and means for rotating said take-up roller at a uniform speed, whereby the perforations of the sheet are punched farther and farther apart from the front toward the rear end of the sheet and the accelerated travel of the sheet when in the instrument is compensated for by the increased spacing of the perforations.

3. In a machine for perforating music sheets, the combination of a perforating mechanism, a take-up roller for feeding the sheet past the perforating mechanism, said roller having the same diameter as the take-up roll of the musical instrument upon which the perforated music sheet is subsequently wound, whereby the perforations of the sheet are punched farther and farther apart from the front toward the rear end of the sheet and the accelerated travel of the sheet when in the instrument is compensated for by the increased spacing of the perforations, and means for driving said take-up roller at different speeds corresponding to different tempos.

4. In a machine for perforating music sheets, the combination of a perforating mechanism, a take-up roller for feeding the sheet past the perforating mechanism, said roller having the same diameter as the take-up roll of the musical instrument upon which the perforated music sheet is subsequently wound, whereby the perforations of the sheet are punched farther and farther apart from the front toward the rear end of the sheet and the accelerated travel of the sheet when in the instrument is compensated for by the increased spacing of the perforations, and driving mechanism for intermittently rotating said take-up roller, including means for driving said roller at different speeds.

5. In a perforating machine, the combination of a perforating mechanism, individual take-up rollers for a plurality of sheets to be perforated, each of said rollers having a

gear wheel, a support movable toward and from the gear wheels of said rollers, and idle gears mounted on said support and each meshing with the gear wheels of a pair of adjacent rollers, substantially as set forth.

6. In a perforating machine, the combination of a perforating mechanism, individual take-up rollers for a plurality of sheets to be perforated, each of said rollers having a gear wheel, a support pivoted at one end to swing toward and from the gear wheels of said rollers, means for clamping the opposite end of said support in place, and idler gears mounted on said support and each meshing with the gear wheels of a pair of adjacent rollers, substantially as set forth.

Witness my hand this 11th day of March, 1907.

EUGENE DE KLEIST.

Witnesses:
F. L. STETT,
L. HOWELL.