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## AUTOMATIC MUSICAL INSTRUMENT.

No. 564,384. Patented July 21, 1896.

Fig. 8.

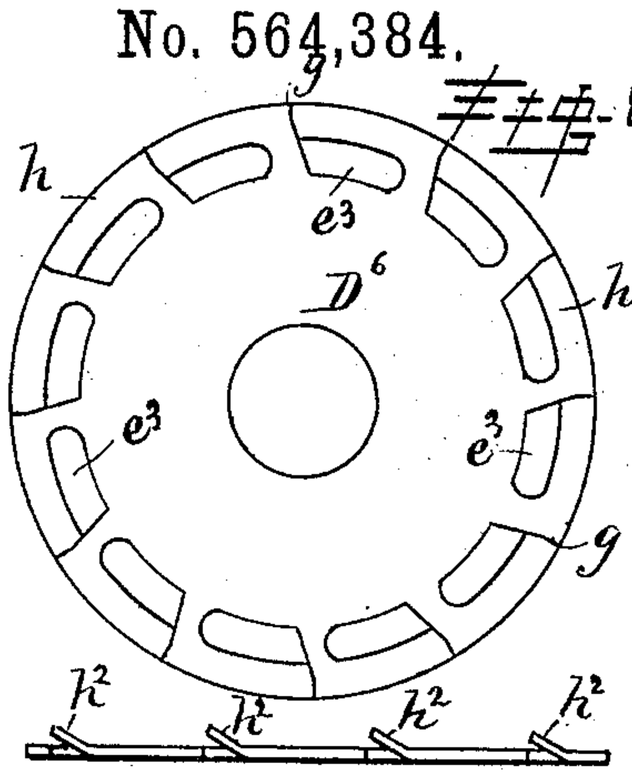



Fig. 4.

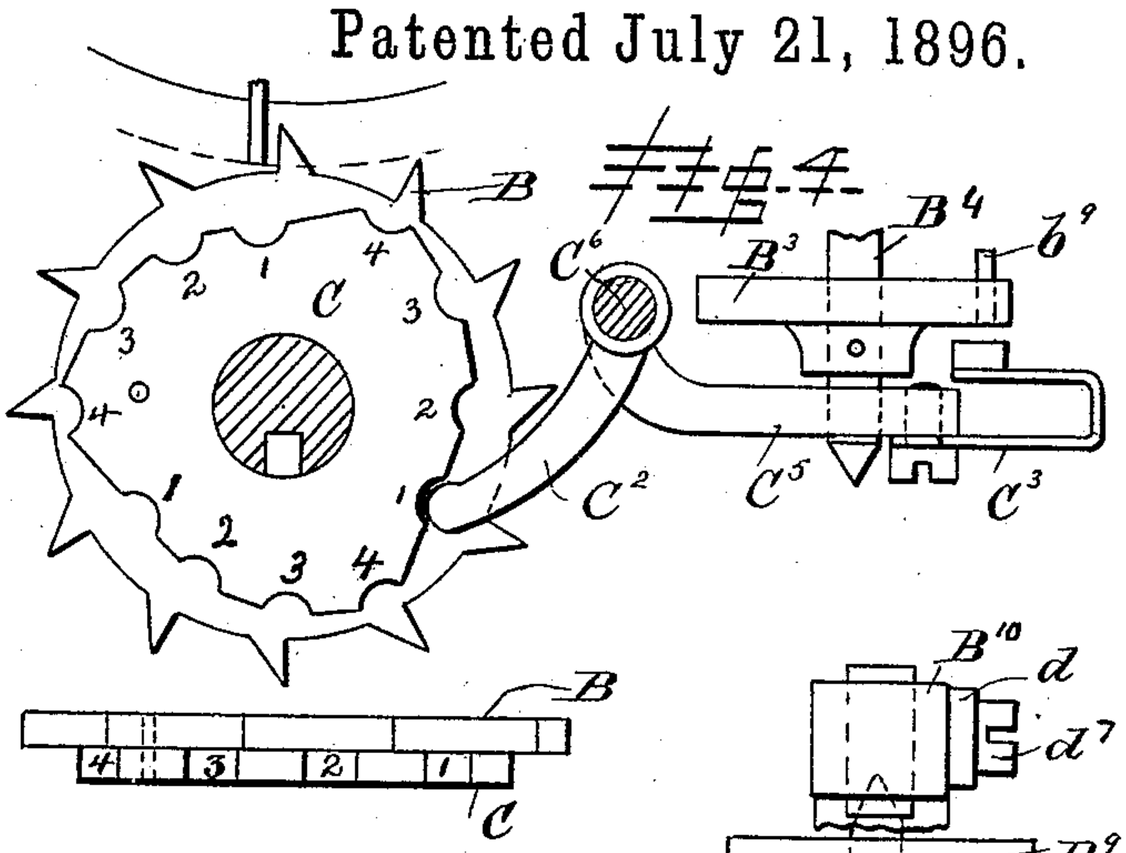



Fig. 13.

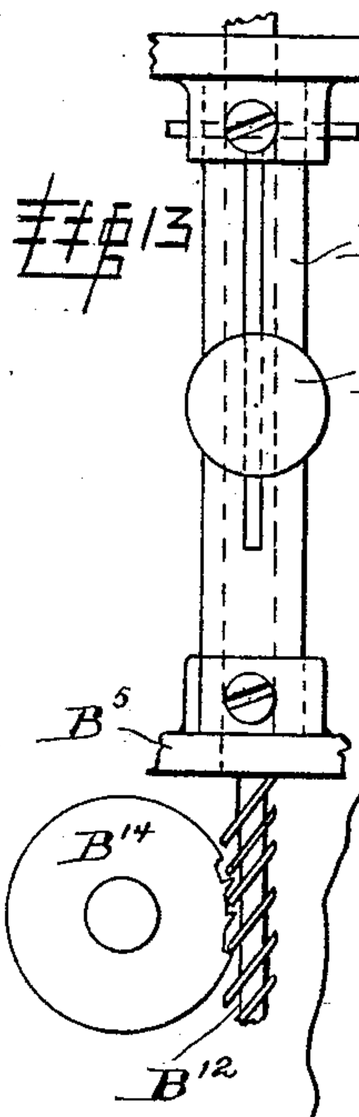
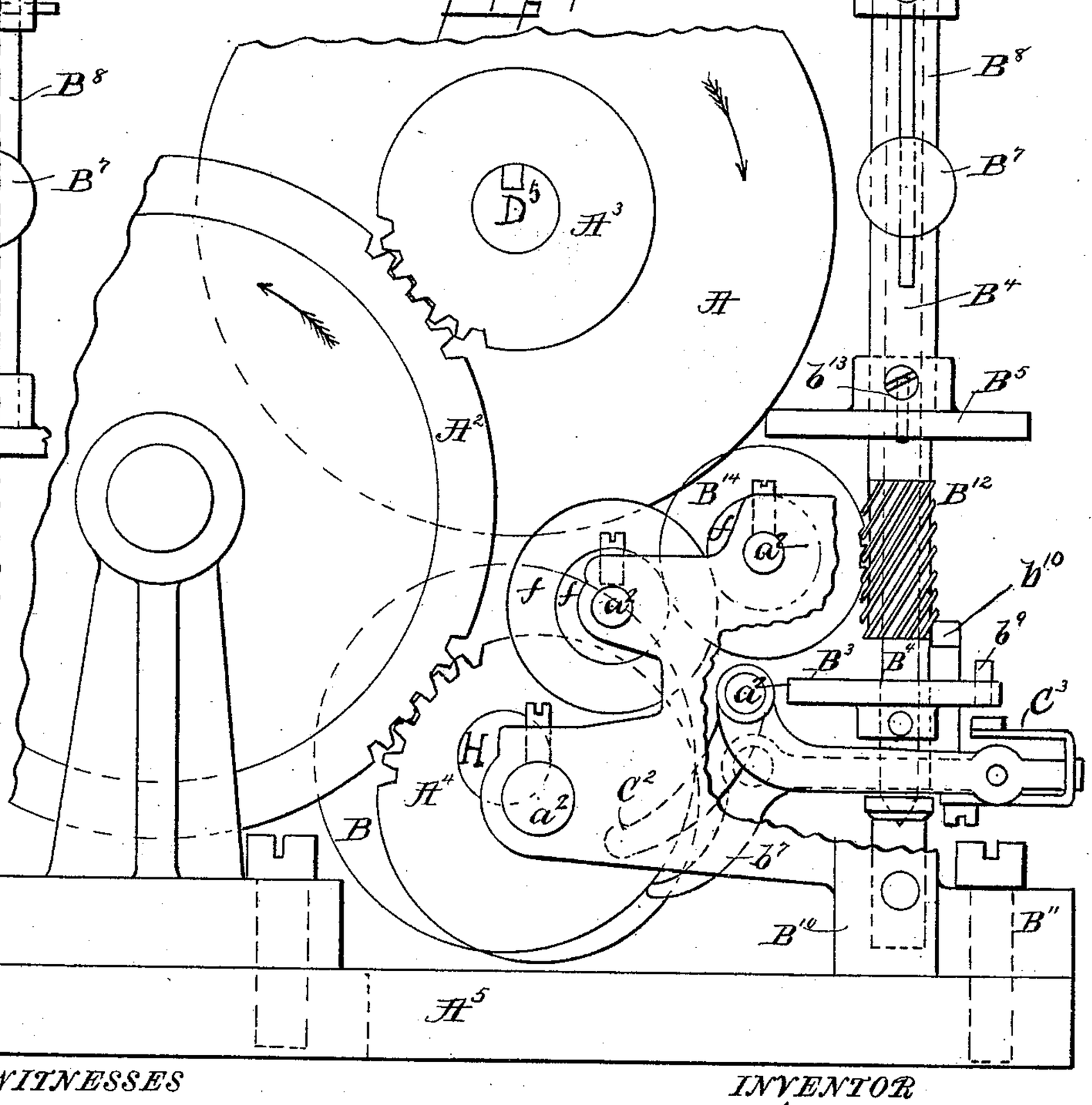



Fig. 7.

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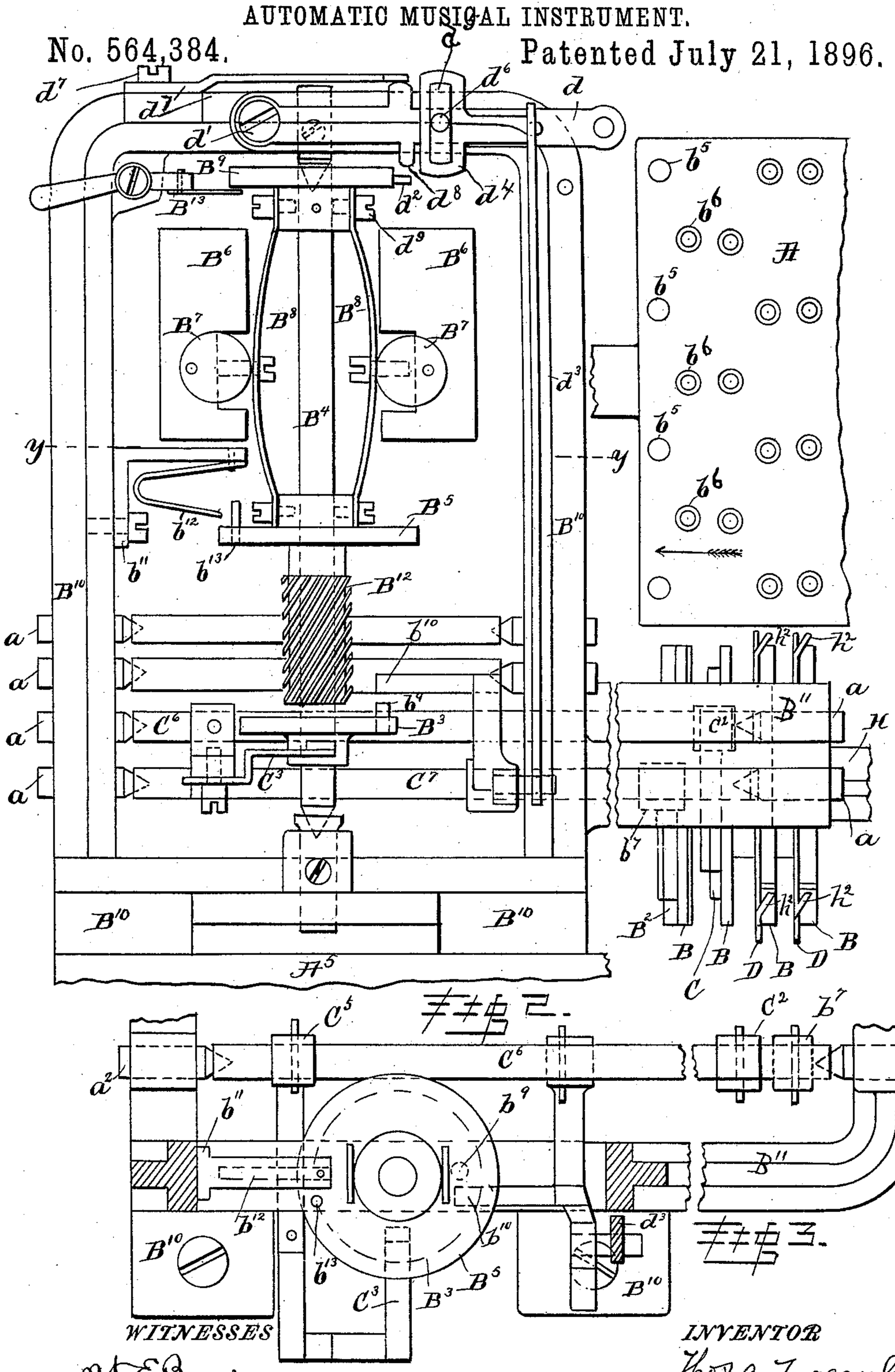


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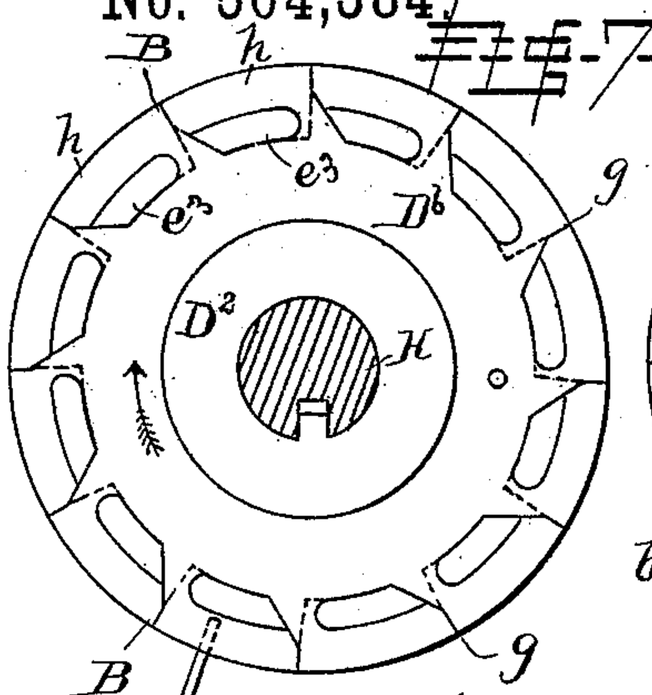
FIG. 7.



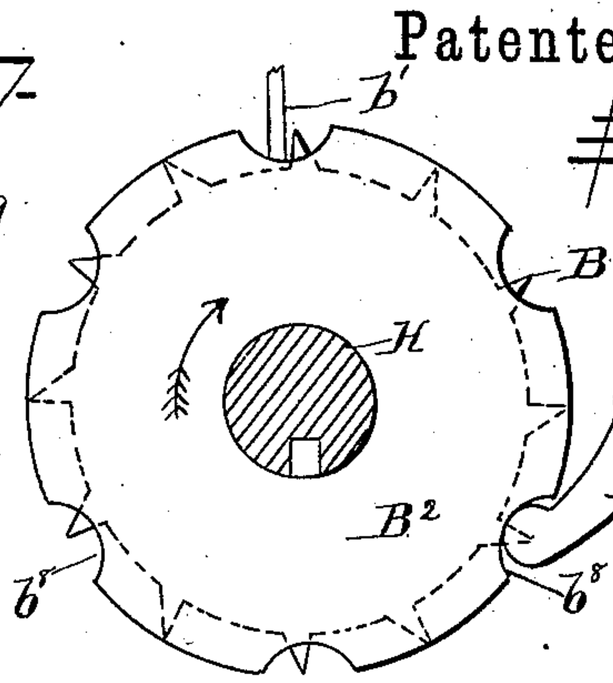




FIG. 6.

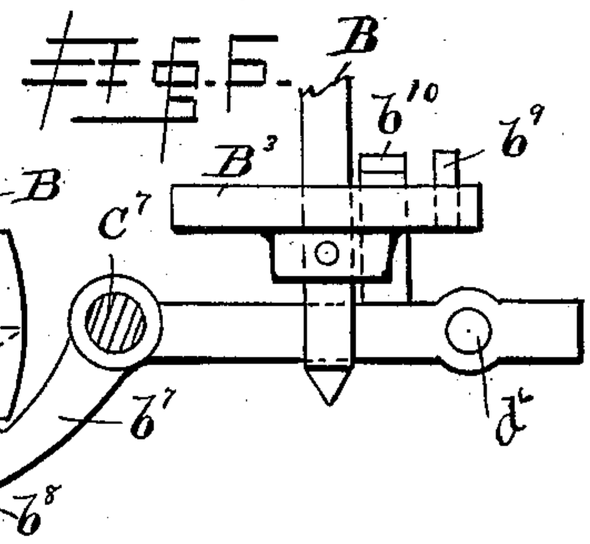
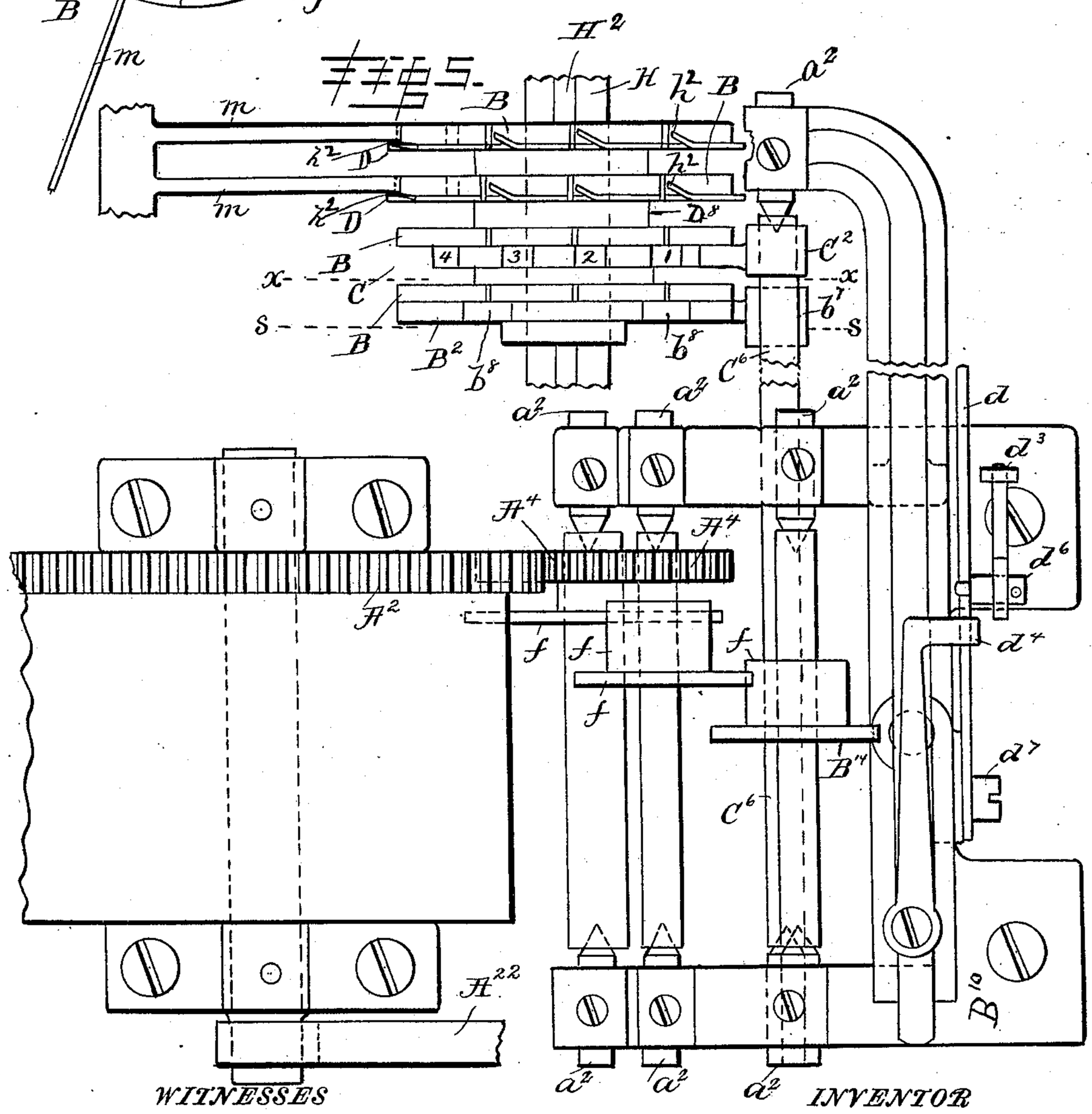



FIG. 5.

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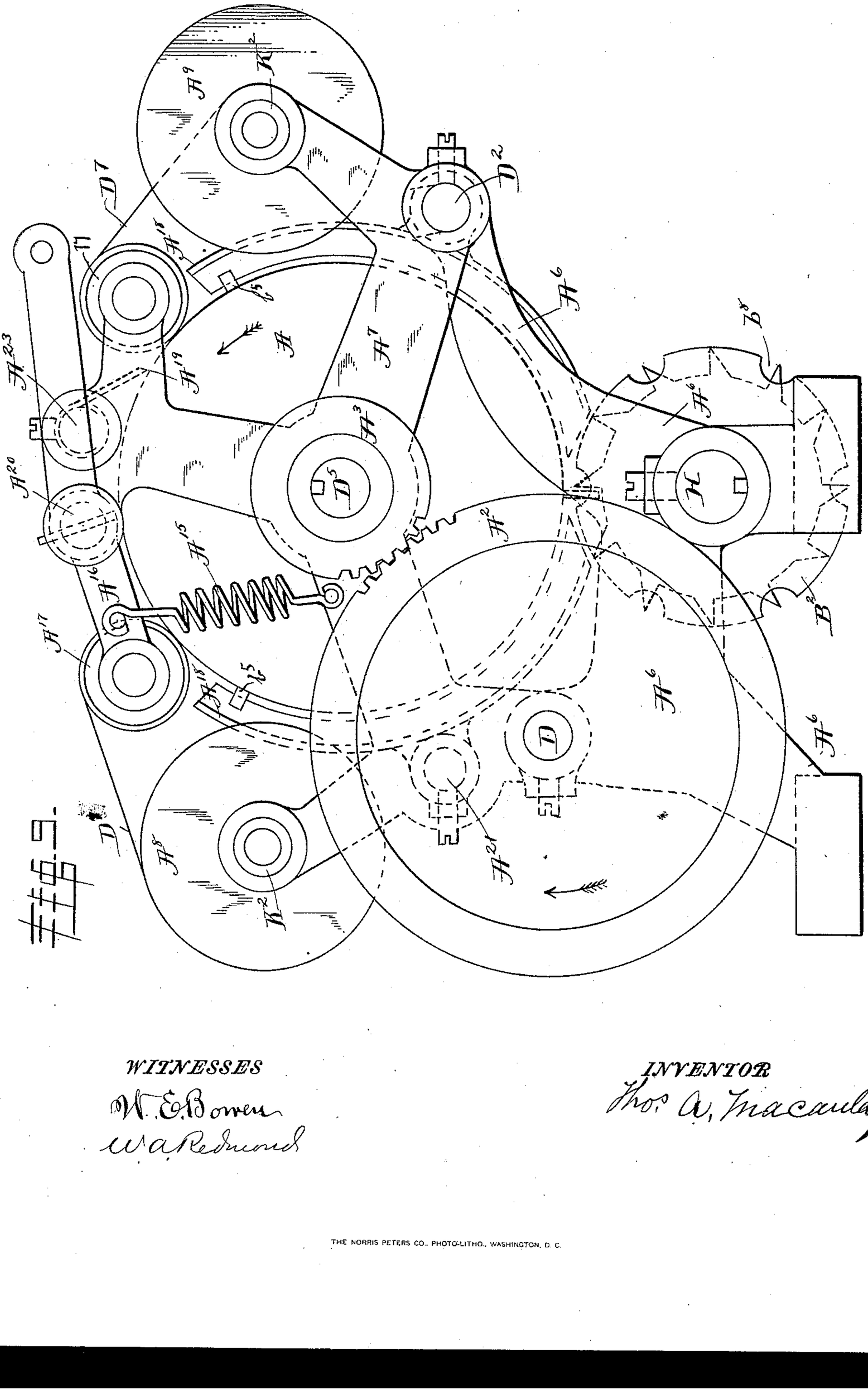

FIG. 5.

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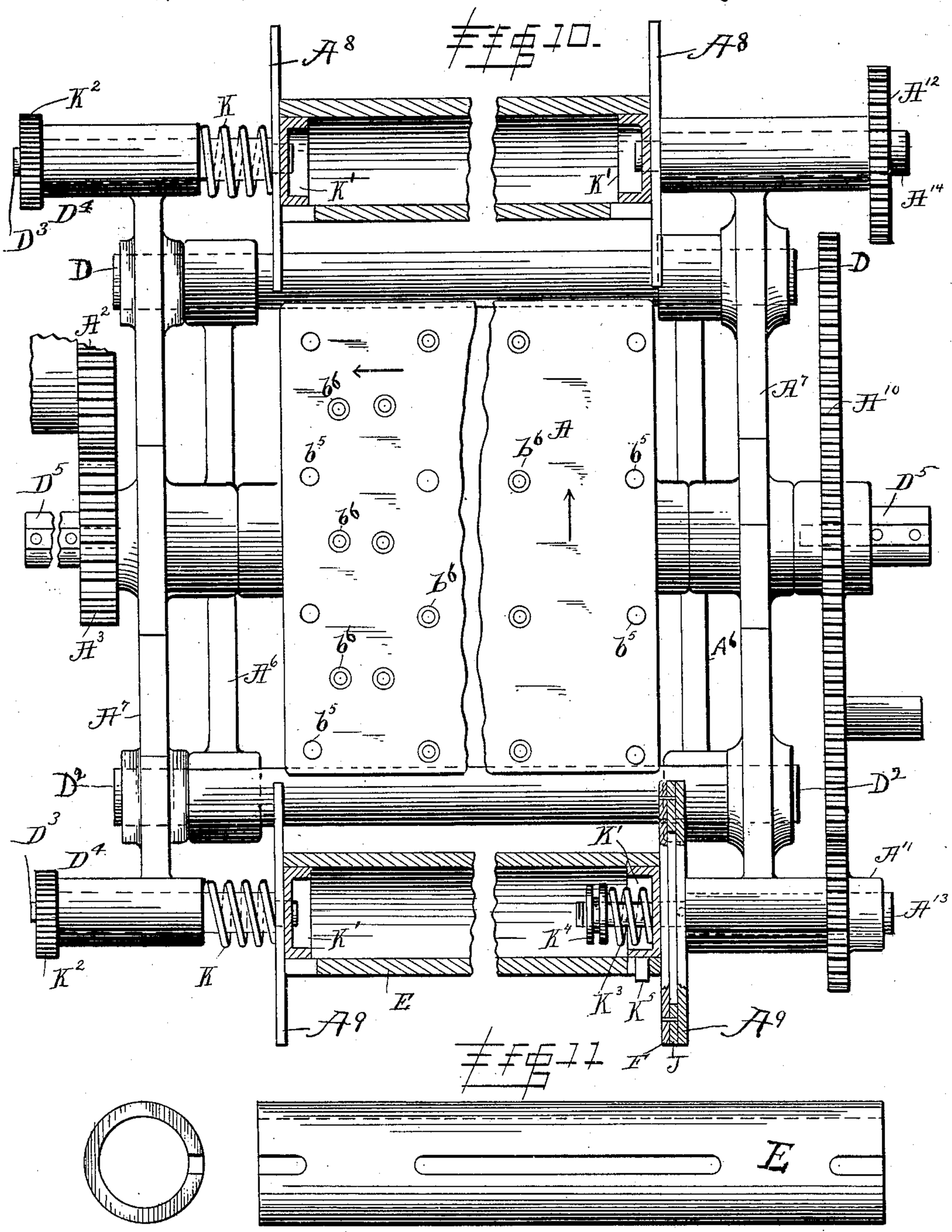


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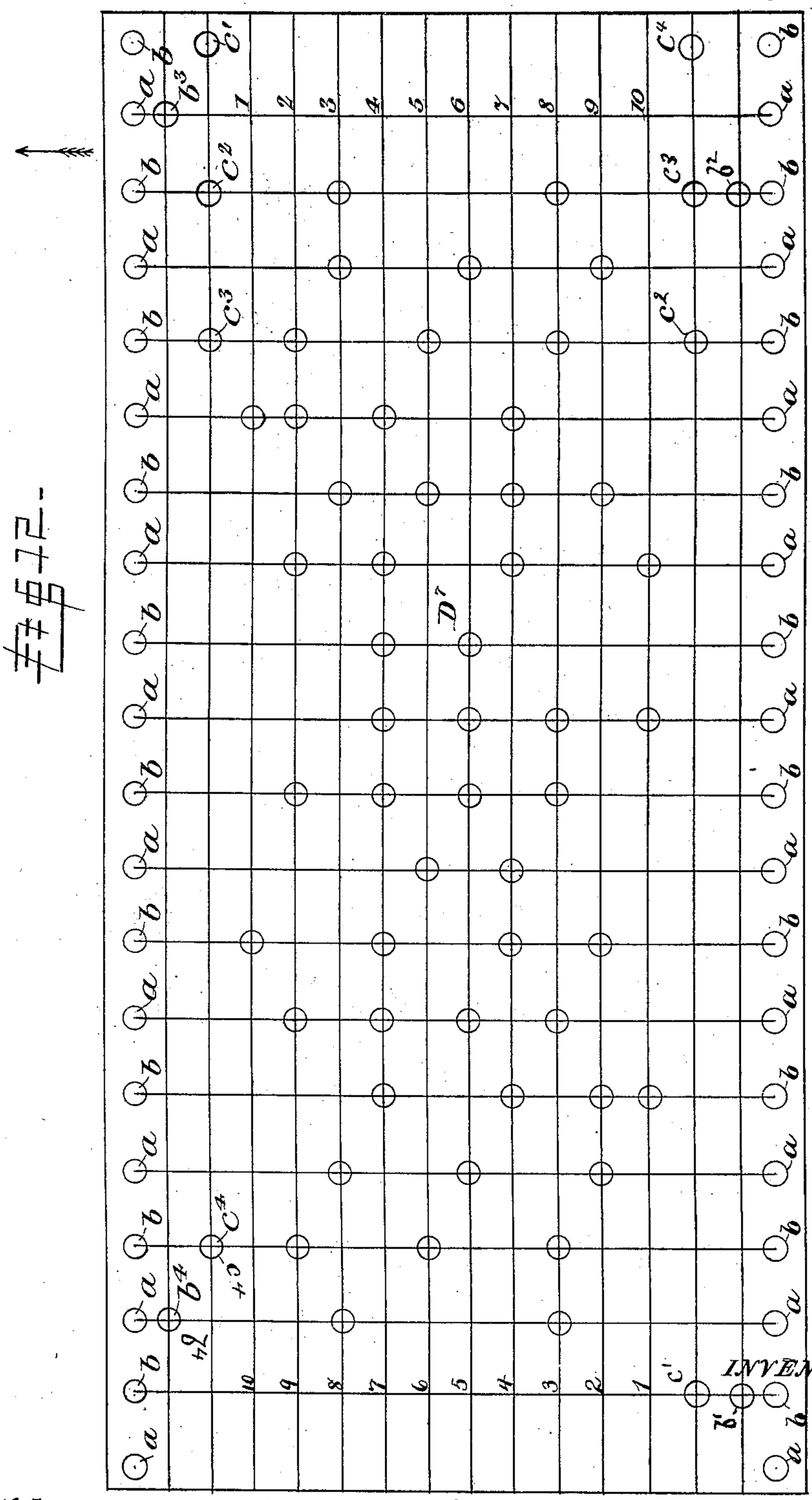

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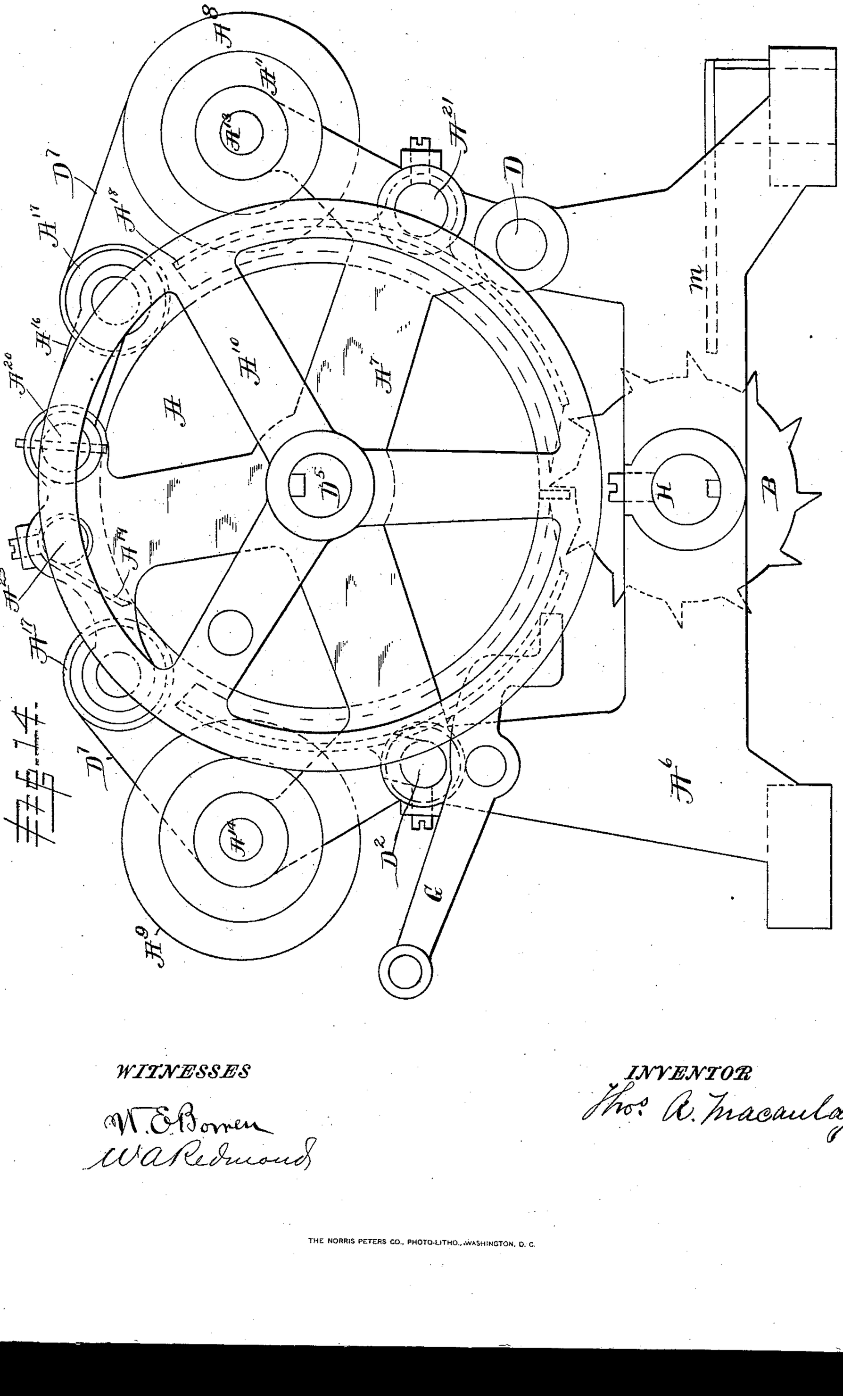


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THOMAS A. MACAULAY, OF NEW YORK, N. Y.; DANIEL McCAULEY ADMINISTRATOR OF SAID THOMAS A. MACAULAY, DECEASED.

## AUTOMATIC MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 564,384, dated July 21, 1896.

Application filed May 14, 1891. Serial No. 392,918. (No model.)

*To all whom it may concern:*

Be it known that I, THOMAS A. MACAULAY, of the city, county, and State of New York, have invented certain new and useful Improvements in Automatic Musical Instruments, of which the following, with the accompanying drawings, is a specification.

My invention relates to that class of automatic musical instruments for which I obtained patents dated April 9, 1889, Nos. 401,187 and 401,188, in which a perforated flexible sheet controls intermediate cooperating devices for operating sounding devices; and it consists of the means and devices hereinafter more fully described and claimed.

In the drawings, Figure 1 is an end view showing the spring-motor and a train of gearing of the usual kind for operating the speed-regulator and pin-cylinder. Fig. 2 is a side view of the speed-regulator, showing part of the pin-cylinder, and a partial view of the regulator-controlling cams, operated by pins in the cylinder. Fig. 3 is a view of part of Fig. 2, partly in section, through the line *y y*. Fig. 4 is a view of part of Fig. 5 through line *x x*, partly in section, showing the devices by which the speed is regulated. Fig. 5 is a top view of Fig. 1, excluding the pin-cylinder A, showing the spring-motor $A^2$, the train of gearing *f f f*, part of spur-wheel shaft H, with spur-wheels B, separating-washers $D^8$, and dampers D, regulating-cams $B^2$ and C. Fig. 6 is a detail view of part of Fig. 5 through the line S S, partly in section, showing also the stopping devices. Fig. 7 is a view showing the damper-wheel $D^6$, the separating-washers $D^8$, the spur-wheel B, and the reeds *m m*. Fig. 8 shows side and top views of the damper-wheel and its damper-springs $h^2$. Fig. 9 is a front end view of the instrument, showing the spring-motor, the frame, the pin-cylinder, the sheet-rollers, and other parts hereinafter referred to. Fig. 10 is a partial top view of Figs. 9 and 14, showing the pin-cylinder, the take-up roll operating-gear, the sheet-rollers, the devices for interchanging them, and the compensating frictional device. Fig. 11 is a top and end view of the tube sheet-roller. Fig. 12 is the perforated music-sheet having two tunes and two sets of marginal feed-holes. Fig. 13 is a modification of part of Fig. 1, showing the tangent-wheel operating the regulator-spindle directly. Fig. 14 is an end view of the instrument, the opposite end being here shown to that shown in Fig. 9.

A is the cylinder, having fixed feed-pins $b^5$ and movable pins $b^6$, which are controlled by perforations in the sheet, and which operate the intermediate spur-wheels B.

$A^2$ is a spring-motor operating-gear.

$A^3$ is a pinion operating the pin-cylinder.

$A^4$ is a pinion operating the speed-regulator through a train of gearing *f f f* of the usual kind.

$A^5$ is a bed-plate, to which the lower frame $A^6$ and the speed-regulator frame $B^{10}$ are secured.

$A^7$ is the upper frame pivoted to the lower frame at D.

$A^6$ is the lower frame, having the spur-wheel shaft H.

$A^8$ is the music-roller retaining-flange.

$A^9$ is the take-up roller retaining-flange.

$A^{10}$, Fig. 14, is a gear on the pin-cylinder shaft $D^5$, which operates the take-up roller.

$A^{11}$ is a pinion on the take-up roller-shaft $A^{13}$, meshing into the gear $A^{10}$.

$A^{12}$ is a pinion on the music-roller shaft $A^{14}$.

$A^{15}$ is a spring which exerts a pressure on the music-sheet through the roller $A^{17}$.

$A^{16}$ is a lever fixed to a shaft $A^{20}$, to which the pressure-rollers $A^{17}$ are pivoted.

$A^{21}$ and $A^{23}$ are brace-bars connecting the front and rear end of the top frame $A^7$.

$A^{22}$ is a motor-winding lever.

$A^{18}$ are guides for conducting the sheet around the cylinder.

$A^{19}$ is a deflecting-plate to direct the sheet over the roller 17 to the roller $A^9$.

$a^2$ $a^2$ $a^2$ are pivots supporting the regulator gearing-shafts.

B are spur-wheels mounted on the shaft H and operate the sounding devices and cam-wheels.

$B^2$ is a cam-wheel fixed to a spur-wheel which operates the automatic stopping device.

$B^3$ is a wheel fixed to the spindle $B^4$, and having a stop-pin $b^9$.

$B^5$ is a spiral wheel loosely mounted on the spindle $B^4$, so as to move longitudinally and having the spiral $B^{12}$ and stop-pin $b^{13}$.

$B^6$ $B^6$ are fan-plates fixed to balls or weights $B^7$, the balls being adjustably fixed to flexible flat spring-plates centrally of their length $B^8$ $B^8$. The springs are rigidly fixed to the longitudinally-movable spiral wheel $B^5$, and to the wheel $B^9$, which is rigidly fixed to the spindle $B^4$.

$B^{10}$ is the speed-regulator frame.

$B^{11}$ is an extension of $B^{10}$.

$B^{12}$ is a spiral fixed to the wheel $B^5$, and is operated by the tangent wheel $B^{14}$.

Fig. 13 is a view showing the spiral integral with the spindle $B^4$.

$b'$ $b^2$ $b^3$ $b^4$ are special holes in the music-sheet.

$b^5$ $b^5$ $b^5$ are fixed feed-pins in the pin-cylinder.

$b^6$ $b^6$ $b^6$ are movable pins in the pin-cylinder A.

$b^7$ is an arm fixed to a rock-shaft $C^7$ and operated by the cam $B^2$.

$b^{10}$ is an arm fixed to the rock-shaft $C^7$ for engaging with the pin $b^9$ in the wheel $B^3$.

$b^{11}$ is a bracket secured to the speed-regulator frame $B^{10}$, and having a bent spring $b^{12}$.

$b^{13}$ is a stop-pin on $B^5$.

C, Fig. 4, is the speed-controlling cam fixed to the spur-wheel B, and having varying degrees of eccentricity 1 2 3 4 and provided with recesses into which the arm $C^2$ drops.

$C^2$ $C^5$ are arms fixed to the rock-shaft $C^6$ and operated by the cam C; $C^5$ has a light spring $C^3$ at its rear end.

$C^7$ is a rock-shaft having arms $b^7$ $b^{10}$.

D is a bar connecting the upper and lower frames $A^6$ $A^7$.

$D^2$ is a bar connecting the front and rear ends of the top frame $A^7$ and resting in slotted bearings in the lower frame $A^6$.

$D^5$ is the pin-cylinder shaft.

$D^6$ is the damper-wheel, of thin spring metal, having spaces $e^3$ cut out at regular intervals near its periphery and cut or pressed apart at regular intervals $g$, having a wing $h^2$, which forms a damper-spring.

$D^7$ is the perforated sheet.

$D^8$ are separating-washers.

$d$ is a lever pivoted to the upper end of the speed-regulator frame to which a slight pressure is applied by a spring-washer.

$d^2$ is a pin in the wheel $B^9$.

$d^3$ is a connecting-rod having a cross-piece $d^4$ and a slot $d^5$.

$d^7$ is a spring fixed to the top of the speed-regulator frame and acting on the lever $d$.

$d^8$ is a spur on the lever $d$.

E is a hollow tube-roller of paper or other suitable material slotted midway of its length and having notches in its ends.

F is a flange mounted loosely on the end of the shaft $A^{13}$.

G is a lifting-lever pivoted to the lower rear-end frame $A^6$.

H is a fixed shaft on which the spur-wheels B, the fixed separating-washers $D^8$, and damper-wheels $D^6$ are mounted.

J is a washer of leather riveted to the flange F.

K' K' are cups riveted to the ends of the shafts $A^{13}$ $A^{14}$ $D^3$ $D^3$.

$K^3$ is a spring on one end of the shaft $A^{13}$.

$K^4$ are lock-nuts.

$K^5$ is a pin in the cup K' for turning the tube-roller E.

The operation is as follows: The spring-motor being wound up in the usual way, the pin-cylinder is raised up out of operative position relative to the spur-wheels B by lifting the lever G, Fig. 14. The music-roller is placed in position on the cup K' by drawing the thumb-nut $D^4$ back against the spring K. The end of the sheet $D^7$, with the arrow to the left, is passed over and under the pressure-roller $A^{17}$, the roller being raised by the lever $A^{16}$. The first holes in the marginal lines of the feed-holes in the sheet commencing at the bottom are indicated by letter $a$. By placing these holes $a$ on the feed-pins $b^5$ in the cylinder A, and allowing the pressure-roller $A^{17}$ to rest upon the sheet, all the other holes in the marginal lines marked $a$ will be brought on the feed-pins in the cylinder marked $b^5$, by reason of the equal distance apart of the marginal holes $a$ and the pins $b^5$. The lever $d$ is now raised, the arm $b^{10}$ is lifted out of engagement with the pin $b^9$ in the wheel $B^3$. By lifting the lever $d$ the cylinder is turned by the motor and the sheet passes around the cylinder, being guarded by the guides $A^{18}$ until it arrives under the roller 17. The deflecting-guide $A^{19}$ will cause the sheet to pass between it and the roller 17. It is then secured to the take-up roller, which is placed in position the same as the music-sheet roller, the end of the sheet being inserted in the longitudinal slot and turned around once or twice.

The end of the music-sheet for some distance has only marginal feed-holes, the part of the sheet between the feed-holes being left blank or without music-holes until the sheet is fully placed in the instrument.

The instrument is now ready to be set in operation. The lever $d$ being raised, a hole $b'$ in the sheet $D^7$ will permit the passage of a movable pin $b^6$, which will move the spur-wheel B one tooth; the cam $B^2$, being fixed to the spur-wheel B, moves with it, moving the arm $b^7$, and will bring a blank part of the cam $B^2$ opposite the end of the arm $b^7$, against which it will rest, thus raising the arm $b^{10}$ out of engagement with the pin $b^9$ in the wheel $B^3$ and permitting the movement to go on to the end of the sheet, when another hole $b^2$, on the same line in rear end of the sheet, will permit the passage of a pin $b^6$, which will again move the spur-wheel B and cam $B^2$, and bring a notch $b^8$ opposite the end of the arm $b^7$, into which it drops, and engaging the arm $b^{10}$ with the pin $b^9$ in the wheel $B^3$ and stopping the movement. One of the pieces

of music is now played to the end and the instrument automatically stopped. The cylinder is again raised out of operative relation with the spur-wheels B by the lever G. The lever $d$ is lifted and held up, the pin $d^6$ raising $d^4$ and its connection $d^3$, disengaging the arm $b^{10}$ from the pin $b^9$. The movement again commences unwinding the remainder of the music-sheet from the music-roll to the take-up roll. The perforated music-sheet is now wholly on the take-up roll, and is taken out and placed between the flanges $A^8$ $A^9$, with the arrow to the left, when it is again passed around the cylinder, as before. The first of the marginal holes now on the end of the sheet are marked $b$, and these holes $b$ placed on the feed-pins $b^5$, being also equidistant with the feed-pins $b^5$, will cause another and different set of music-holes in the sheet to register with the movable pins in the cylinder. These holes may play the same tune, or they may represent another musical composition.

It will be noticed that the distance between the marginal holes $a$ and $b$ in the sheet is just one-half the distance between any two holes $a$ $a$ or $b$ $b$, and as the movable music-pins in the cylinder are in line with the fixed feed-pins, and as the music-holes in the sheet are also in line with the marginal feed-holes $a$ or $b$, it will result that only the piece of music represented on the sheet which will be played is the piece whose holes are in line with the marginal feed-holes then on the fixed feed-pins $b^5$ in the cylinder. By this arrangement two important results are obtained. The space between the marginal feed-holes across the sheet is utilized to duplicate the music or for a different composition, and the necessity of unwinding the perforated sheet in order to play from the beginning of a piece is avoided.

As each composition commences at the ends, there will always be a piece ready to play from either end of the sheet without rewinding.

Should it become necessary to rewind, a rewinding mechanism is provided in the gear $A^{10}$ and the pinion $A^{14}$. By moving the gear $A^{10}$ out of mesh with the pinion $A^{11}$ and into mesh with the pinion $A^{12}$ rewinding may be done.

Should it be deemed desirable to stop the instrument before the end of the sheet is reached, the lever $d$ is moved downward, bringing the spur $d^8$ and the stop-pin $d^2$ in the wheel $B^9$ in engagement, thereby stopping the instrument, the slot $d^5$ in the cross-piece $d^4$ $d^8$ permitting this movement of the lever $d$.

As music is written to be played quickly or slowly, in an automatic instrument intended to play all kinds of music it is important to automatically regulate the speed of the instrument so as to play the musical composition in about the same time in which it is written, without requiring any skill to regulate the time on the part of the user of the instrument. To this end I have provided devices shown in Fig. 4, in which a cam-wheel C causes a lever $C^2$ $C^5$, to which a very light spring $C^3$ is fixed, to move against a wheel $B^3$ with varying degrees of force, thereby retarding the speed of the instrument to the requisite degree.

In the music-sheet, Fig. 12, a special set of holes $c'$ $c^2$ $c^3$ $c^4$ is provided that permits the passage of movable pins $b^6$, which come in contact with a spur-wheel B, to which the cam-wheel C is fixed, causing the spur-wheel to move one or more teeth, and moving the cam-wheel against the lever $C^2$ $C^5$ and the spring $C^3$ against the wheel $B^3$ with such force as the varying degrees of eccentricity 2 3 4 shown on the cam C, 1 being the normal or greatest speed and 4 the slowest, by reason of its greater eccentricity pressing the spring $C^3$ with greater force against the wheel $B^3$. The line of holes $c'$ $c^2$ $c^3$ $c^4$ are placed, one, $c'$, at the front end of the sheet. This hole $c'$, permitting the passage of a pin which actuates the cam C, leaves the regulating-spring $C^3$ out of contact with the wheel $B^3$, permitting the highest requisite speed. When the sheet reaches its end in the course of playing, the three other holes $c^2$ $c^3$ $c^4$ permit the passage of three pins acting successively on the spur-wheel B, and will bring the cam-wheel C to the position of normal or 1 again. If the piece to be played is to be played slower—that is, when the music is written in slow time—then two holes $c^1$ and $c^2$ are placed at the front end of the sheet, causing the cam C to move the spring $C^3$ against the wheel $B^3$, regulating the speed to the point 2 the desired speed. Then there will be only two holes on the same line at the rear end of the sheet, which will permit the passage of two pins actuating the spur-wheel and bringing the spring-regulator $C^3$ to 1 again, or the normal speed. If it is desired to move at the slowest speed, there will be three holes at the front end of the sheet, as shown, when the marginal holes $b$ are on the feed-pins $b^5$ and only one at the rear end, which will permit the passage of a pin to bring the speed to highest or normal. If it is desired to provide more than three changes of speed, the cam can be divided into as many degrees of eccentricity as desired.

It will be noticed that there are two lines of space in the music-sheet which have a like number of holes. The line on which $b'$ and $b^2$ are located and the line on which $c'$ $c^2$ $c^3$ $c^4$ are located and when the sheet is reversed the number and position of these holes are the same, except that $c'$ to $c^4$ are changed to meet the speed requirements. These two lines of holes are only operative when they are on the left side of the cylinder, there being no movable pins in the right side of the cylinder, where these holes would come. Consequently these holes $b'$ $b^2$ and $c'$ to $c^4$ are inoperative at the right side of the cylinder. The line on which are the holes $b'$ to $b^4$ in the

paper sheet do not come on the same line with the feed-holes in both cases; but the movable pins in the cylinder are located to register with them.

In automatic musical instruments heretofore constructed the speed-regulating devices consisted of adjustable fans or flaps which are moved in or out from the center of rotation manually, so as to suit the speed of the instrument to any given time of the music; but in such instruments the power is generally from a coiled spring, which when wound up fully gives out more power than when nearly run down. Therefore it is necessary to manually change the position of the fans frequently in order to secure the speed required for quick or slow music.

In my improved speed-regulator I combine with the fans or flaps a pair of balls or weights fixed to flexible flat springs centrally of their length, which when the speed is increased move out from the center of motion, similarly to jointed bars, by centrifugal force, being opposed by the force of the springs, and the fans' blades, being fixed to the balls, are also carried out from the center with the balls, thus presenting a greater leverage to the action of the air and thereby automatically conserving the energy of the spring-power by preventing acceleration of speed, while the springs cause the return of the fans as acceleration of speed is checked, retarding the speed.

Should there be too great a speed or a too sudden increase of speed, the centrifugal force of the balls flying from the center of motion will move the wheel $B^5$ upward, coming in contact with the spring $b^{12}$, which will be an additional check on the speed; but if still too great to be checked by the spring $b^{12}$ and the increased leverage of the fans, then the pin $b^{13}$ in the wheel $B^5$ will come in contact with the bracket $b^{11}$ and stop the instrument.

In automatic musical instruments of the kind to which my improvements relate a "damper" to arrest the vibration of the sounding devices before they come in contact with the picker is a necessity. My improved damper consists of a disk of thin sheet metal, having wings or projections $h$ pressed out of its periphery at $g$, forming the damper-springs $h^2$. (Shown in Fig. 8.) The disk is slightly greater in diameter than the spur-wheel, the springs $h^2$ are placed behind and between the spurs on the spur-wheels. The disk and spur-wheel are fixed together so that the rotating movement of the spur-wheel is imparted to the damper-wheel. The action of this damper in performing its function is seen by reference to Fig. 5. *mm* are vibrating reeds. The damper and spur-wheel rotate on shaft II in the direction of the arrow, Fig. 7. So soon as a spur-wheel sets the reed in vibration, having an intermittent motion, it ceases to move, the reed continuing its vibrations until the spur-wheel commences its motion again, carrying with it the damper-wheel $D^6$, the bent wing $h^2$, which forms a spring, coming in contact with the vibrating reed and pressing it sidewise, arrests its motion before the spur-wheel touches the reed to again set it in motion.

Since the cylinder A has a fixed diameter, and the take-up has a constantly-increasing diameter due to the winding of the sheet upon it, the sheet would tend to break if a compensating device was not provided to modify the varying surface speed of the take-up roller, and make it the same as the speed of the cylinder A. The wheel $A^{10}$ mounted on the cylinder-shaft rotates the pinion $A^{11}$ uniformly. To cause the speed of the periphery of the take-up roller to correspond with the speed of the cylinder the flange F is mounted loosely on the spindle $A^{13}$. Its surface has a leather washer J and it is kept pressed against the flange $A^9$, by the spring $K^3$ with sufficient force to be rotated by frictional contact with the flange $A^9$; the nuts $K^4$ serving to adjust the pressure to the requisite degree. When the speed of the periphery of the take-up roller becomes greater than the speed of the cylinder the flange F will slip enough to bring the speed of the roller to equal that of the cylinder. The roller is shown in Fig. 11. In its center is a longitudinal slot. The end of the sheet is made stiff by additional thickness of material and placed in the slot in the usual manner. The roller is given a rotation or two and the paper sheet is secured. There are short slots in the ends of the tube-roller, which fit onto a pin $K^5$ in the cup K'. The roller is hollow, as shown, and is placed in the instrument by pulling the thumb-nut $K^2$ backward against the spring K and placing the ends of the roller on the cup K'. The springs K are intended to give only sufficient force to bring the flanges to the ends of the rollers without exerting any pressure against them, the thumb-nuts $K^2$ coming in contact with the bearings, as shown in Fig. 10.

I have shown a specific way of carrying out my invention; but I do not limit myself thereto, as various modifications and changes may be made within the scope of my invention, such as using the time-changing mechanism in the middle of a tune as well as at the beginning of one, or the time-changing mechanism may be applied to automatic instruments other than instruments having a perforated sheet.

It is also evident that the fan-blades may be made adjustable—inward and outward—and that they may be made of such thickness to be of sufficient weight as to utilize the centrifugal force, thus performing both functions of weights and fan-blades.

Having described my invention, I claim—

1. In an automatic musical instrument in combination, the distending rotary fans the springs and the longitudinally-movable spiral for the purpose set forth.

2. In an automatic musical instrument in combination a spindle, a spiral longitudinally movable on the spindle, a spiral operating-wheel pressing the spiral against the force of the spring, for the purpose specified.

3. In an automatic musical instrument in combination distending devices, a spring resisting the action of the distending devices, and devices as $b^{12}$, for increasing the resistance as the spiral moves longitudinally, for the purpose specified.

4. In an automatic musical instrument, a cylinder having pins controlled by a perforated sheet, the spur-wheel B and cam C, the lever $C^2$, $C^5$, spring $C^3$ and the wheel $B^3$, for the purpose specified.

5. In an automatic musical instrument, a perforated sheet, a cylinder having devices controlled by said sheet adapted to operate a cam, said cam adapted to operate a lever having suitable means as $C^3$, to regulate the speed of the instrument.

6. In an automatic musical instrument, a perforated sheet controlling devices adapted to operate a cam having varying degrees of eccentricity said cam operating suitable devices for varying the speed of the instrument.

7. In an automatic musical instrument, a perforated sheet controlling suitable devices to operate a cam having notches 1, 2, 3, 4, adapted to retain a device as $C^2$ and a spring $C^3$, and a wheel $B^3$, for the purpose specified.

8. In an automatic musical instrument, the perforated sheet, the cylinder, the spur-wheel and cam, the lever, the spring and wheel, for the purpose specified.

9. In an automatic musical instrument, a cylinder having pins, a spur-wheel, a cam, a lever, a spring and a rotating device as $B^3$, for the purpose specified.

10. In an automatic musical instrument, a cylinder and devices controlled by a perforated sheet adapted to operate a spur-wheel B, and cam C, a rock-shaft operated by said cam and suitable devices adapted to engage with a wheel as $B^3$ for the purpose specified.

11. In an automatic musical instrument, a rotating cylinder, a perforated sheet and devices controlled by said sheet adapted to operate a cam said cam adapted to operate a device having suitable means as $C^3$, to regulate the speed of the instrument, substantially as described.

12. In an automatic musical instrument, a cylinder and devices controlled by a perforated sheet, operating a spur-wheel adapted to operate a lever, said lever adapted to engage with a rotary shaft to stop it.

13. In an automatic musical instrument, a cylinder and devices controlled by a perforated sheet, operating a spur-wheel adapted to operate a device having means to engage with a wheel to stop it, for the purpose specified.

14. In an automatic musical instrument, a perforated sheet controlling a device adapted to operate an arm fixed to a rock-shaft said rock-shaft having a suitable device adapted to engage with a wheel to stop it.

15. In an automatic musical instrument, in combination, a cylinder having movable pins controlled by a perforated sheet, a spur-wheel operated by said movable pins provided with means adapted to operate a lever said lever adapted to engage with a rotating device to stop it.

16. In an automatic musical instrument in combination, a rotating cylinder and devices controlled by a perforated sheet operating a spur-wheel having means adapted to operate a lever said lever adapted to engage with a wheel to stop it.

17. In an automatic musical instrument, a rotating cylinder and devices controlled by a perforated sheet operating a spur-wheel having means adapted to operate a device, said device adapted to engage with a wheel to stop it, for the purpose specified.

18. In an automatic musical instrument, a perforated sheet controlling devices adapted to operate sounding devices and a rotating device adapted to engage with said sounding device to stop its sounding.

19. In an automatic musical instrument, a sounding device and means to operate it, a rotating disk and suitable devices to operate it, said disk having springs adapted to engage with said sounding device to stop it, as specified.

20. In an automatic musical instrument, a sounding device and means to operate it, a rotating disk and suitable devices to operate it, said disk having devices adapted to engage with said sounding device to stop it, as specified.

21. In an automatic musical instrument, a perforated sheet controlling movable pins in a cylinder, a spur-wheel operated by said pins, a disk operated by said spur-wheel having springs adapted to engage with sounding devices to stop them.

22. In an automatic musical instrument a device having projections adapted to operate spur-wheels, said spur-wheels having dampers adapted to engage with sounding devices.

23. A damper for automatic musical instruments consisting of a disk of suitable material having springs formed from its outer part, for the purpose specified.

24. In an automatic musical instrument, a device having projections adapted to operate spur-wheels, said spur-wheels having spring-dampers adapted to engage with sounding devices to stop the sound.

25. In an automatic musical instrument, a device having projections adapted to operate spur-wheels, said spur-wheels having devices adapted to engage with sounding devices to stop them, for the purpose specified.

26. In an automatic musical instrument, a

cylinder having fixed pins, a perforated sheet having holes adapted to engage said pins, a lever having a pressure-roller pressing said roller against the cylinder, said lever being adapted to raise said roller from the cylinder, as specified.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

THOS. A. MACAULAY.

Witnesses:
W. E. BAKER,
WM. W. PALMER.