

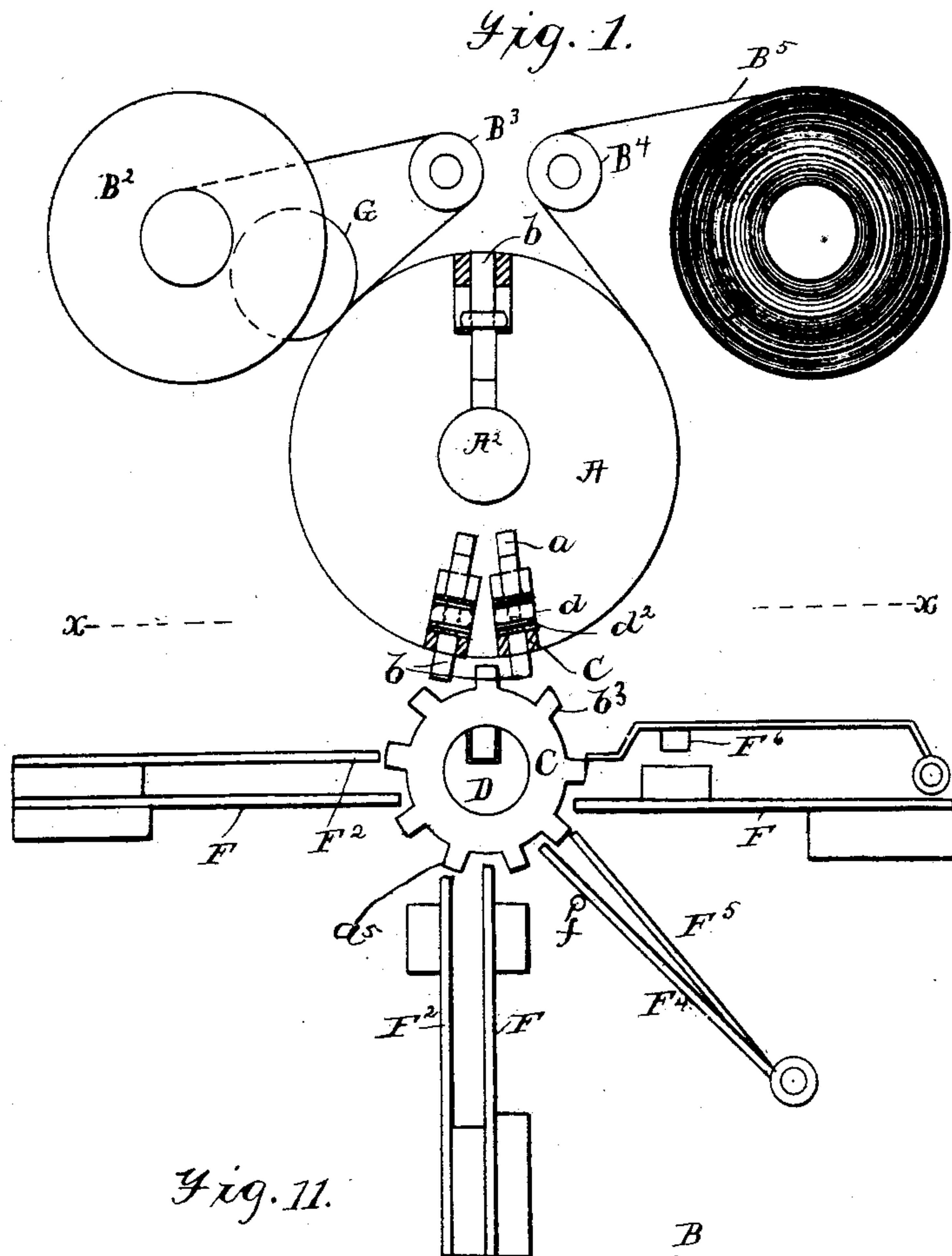
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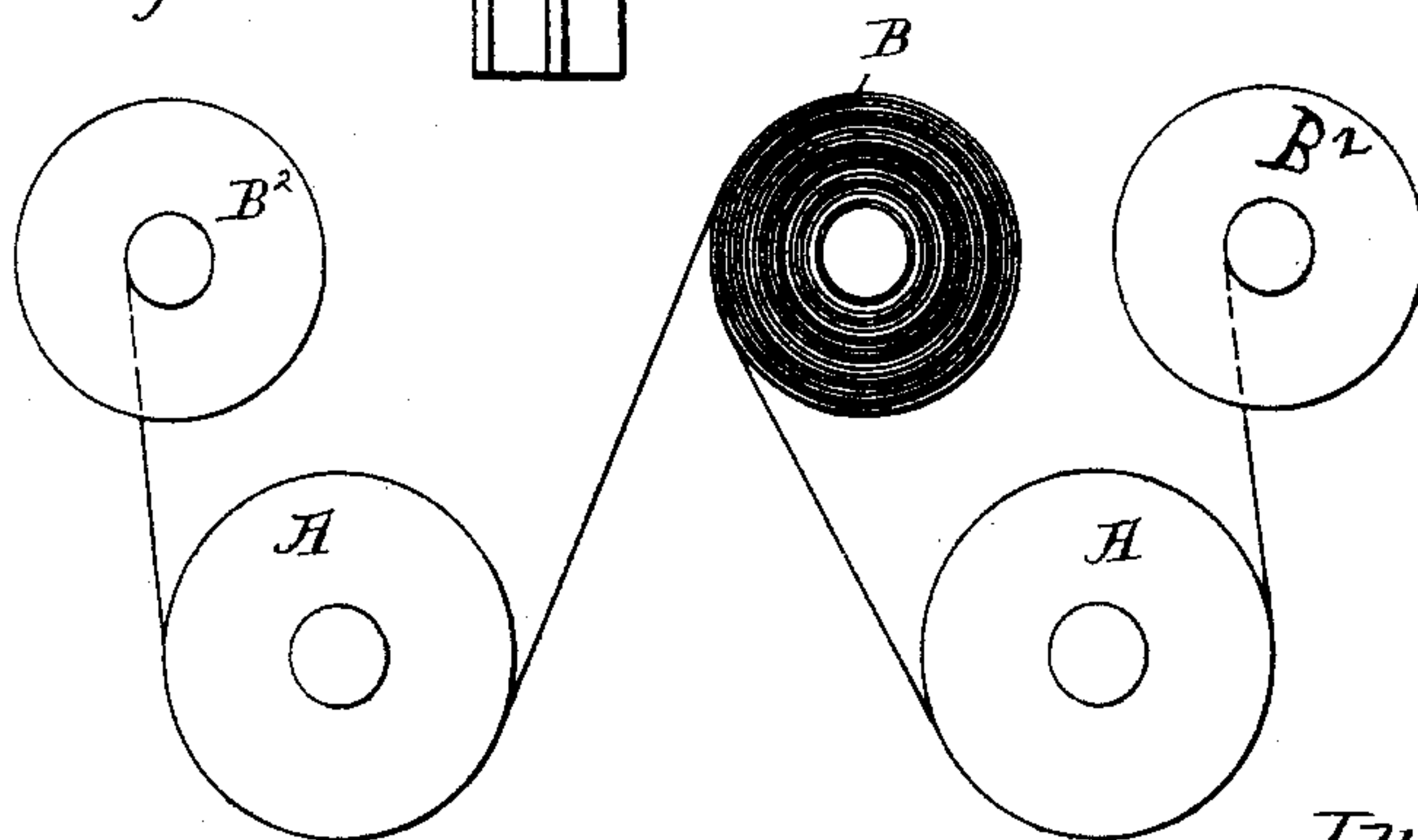
T. A. MACAULAY.  
AUTOMATIC MUSICAL INSTRUMENT.

No. 401,188.

Patented Apr. 9, 1889.



*Fig. 11.*



*Attest,*  
*Cecilia Jackson.*  
*Bertini Jackson*

*Inventor:*  
*Thos. A. Macaulay*

(No Model.)

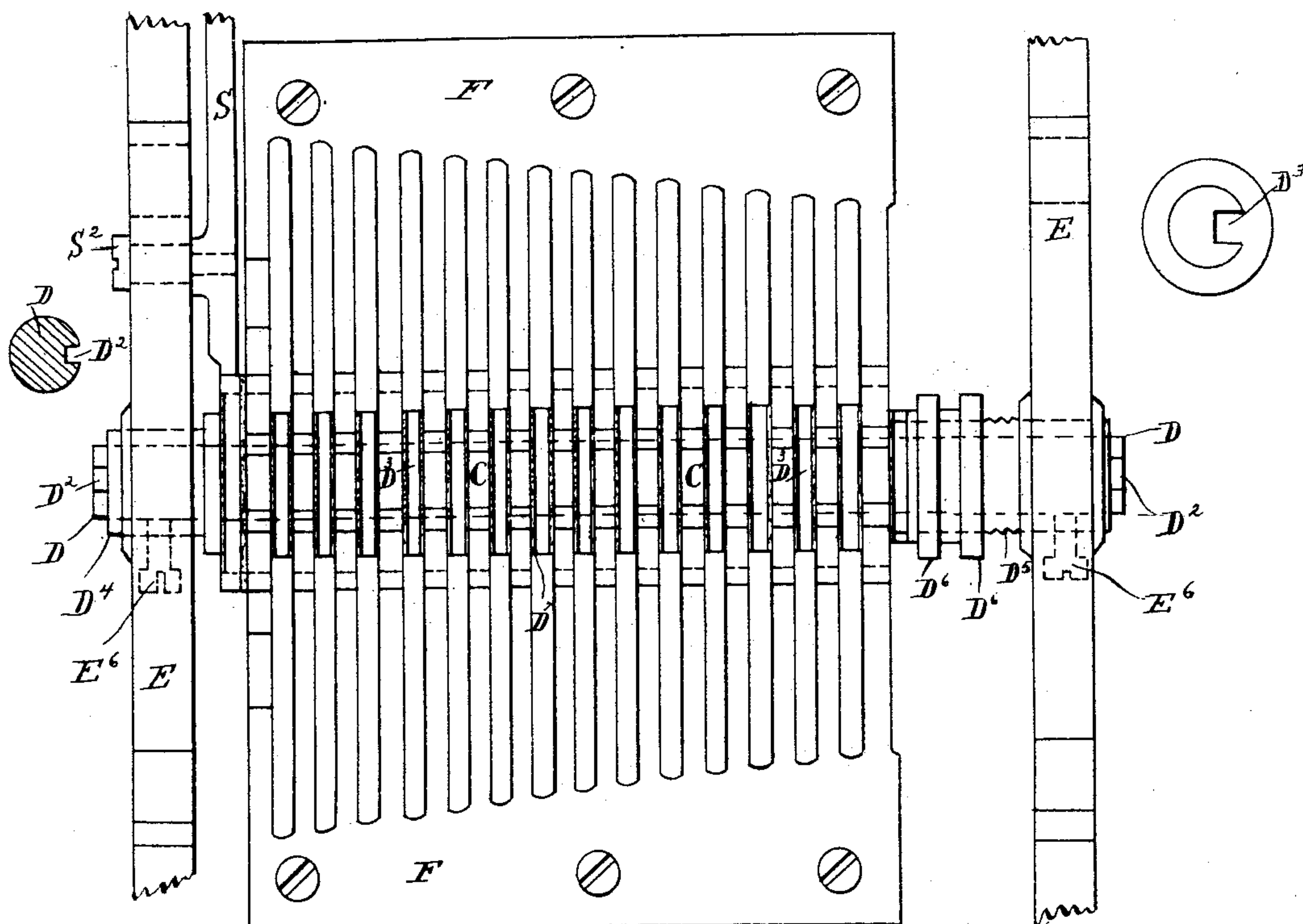
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Fig. 2.



*Attest,*

Cecilia Jackson.  
Bertine Jackson

*Inventor:*

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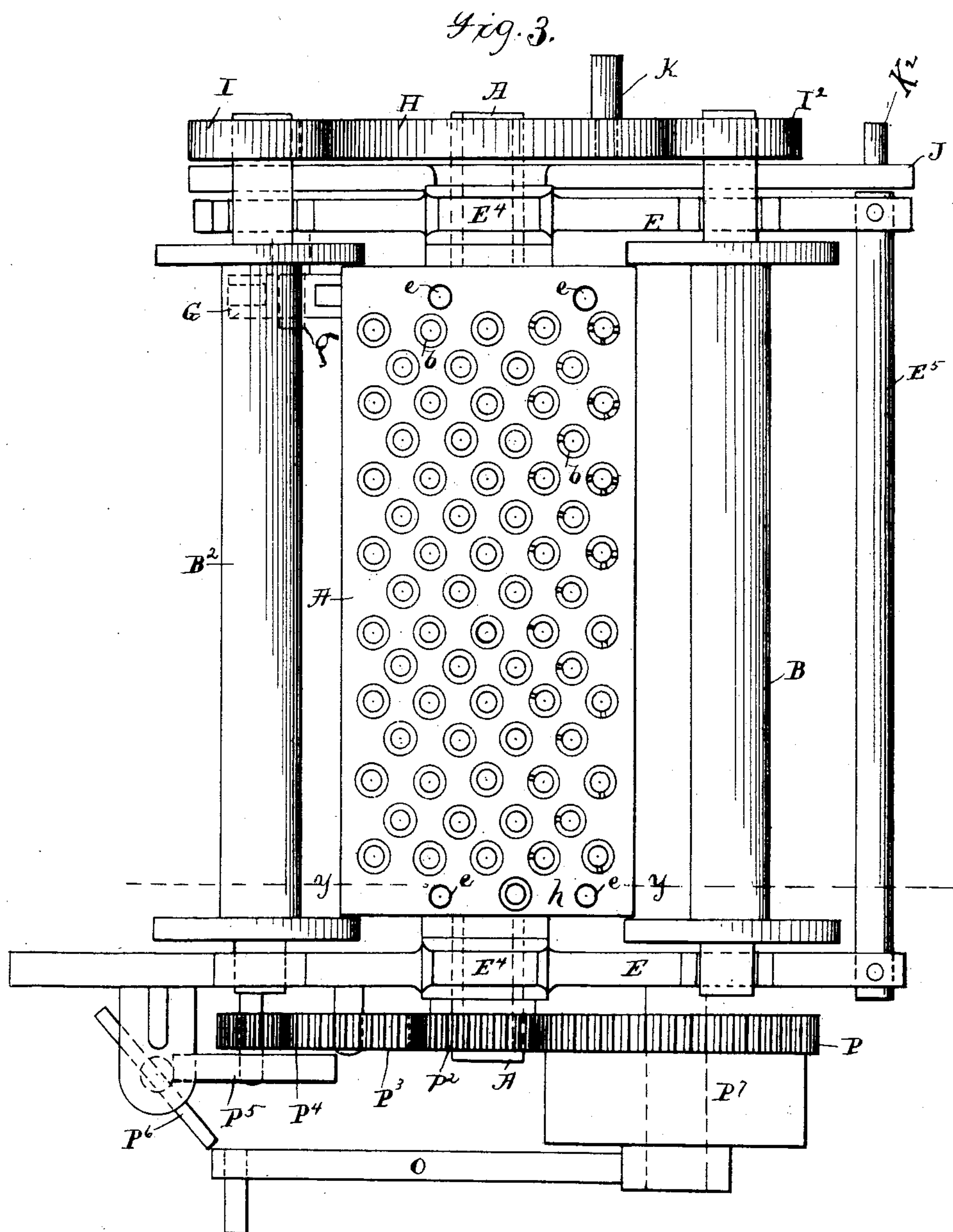
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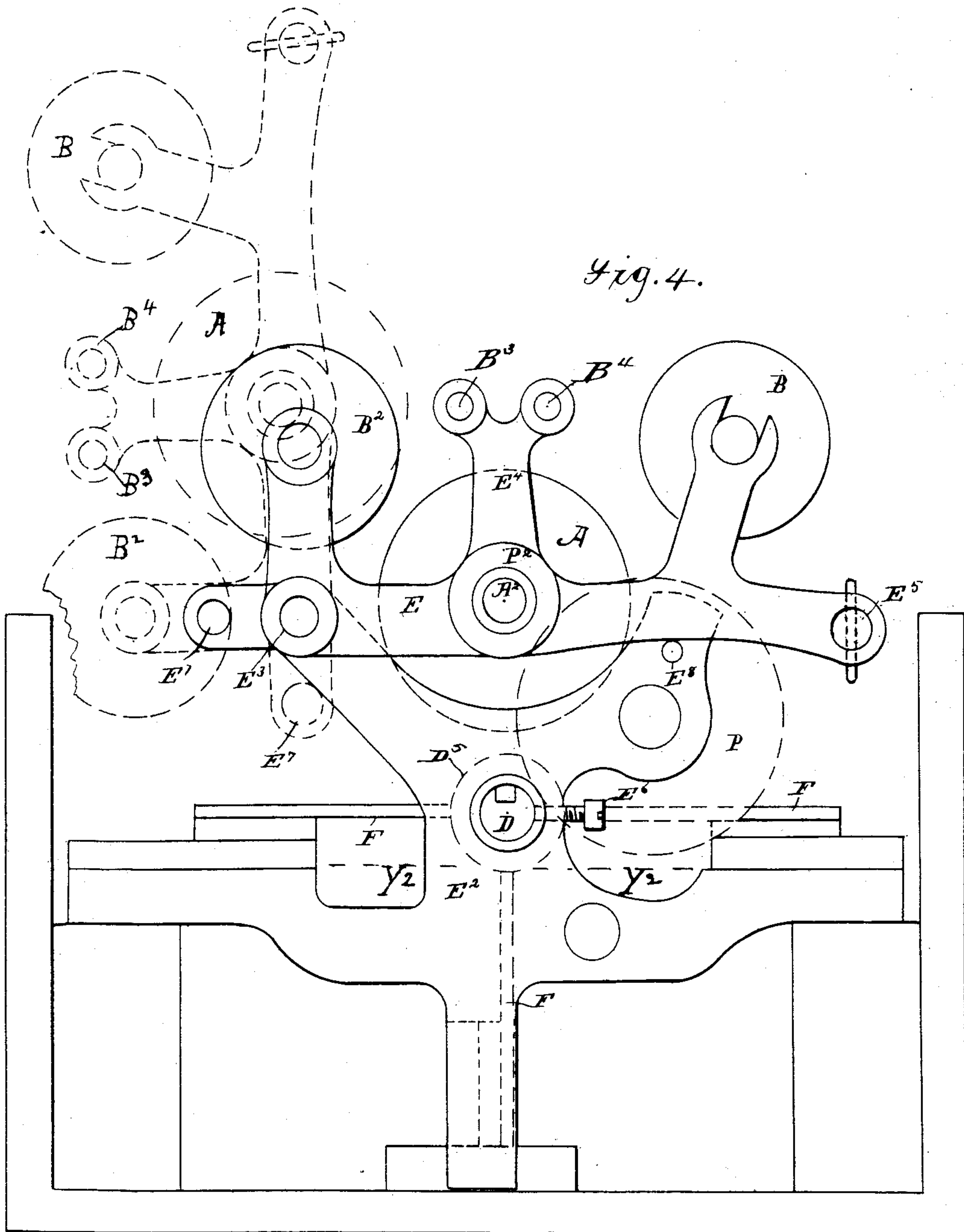
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Attest.

Cecilia Jackson.  
Berline Jackson

Inventor

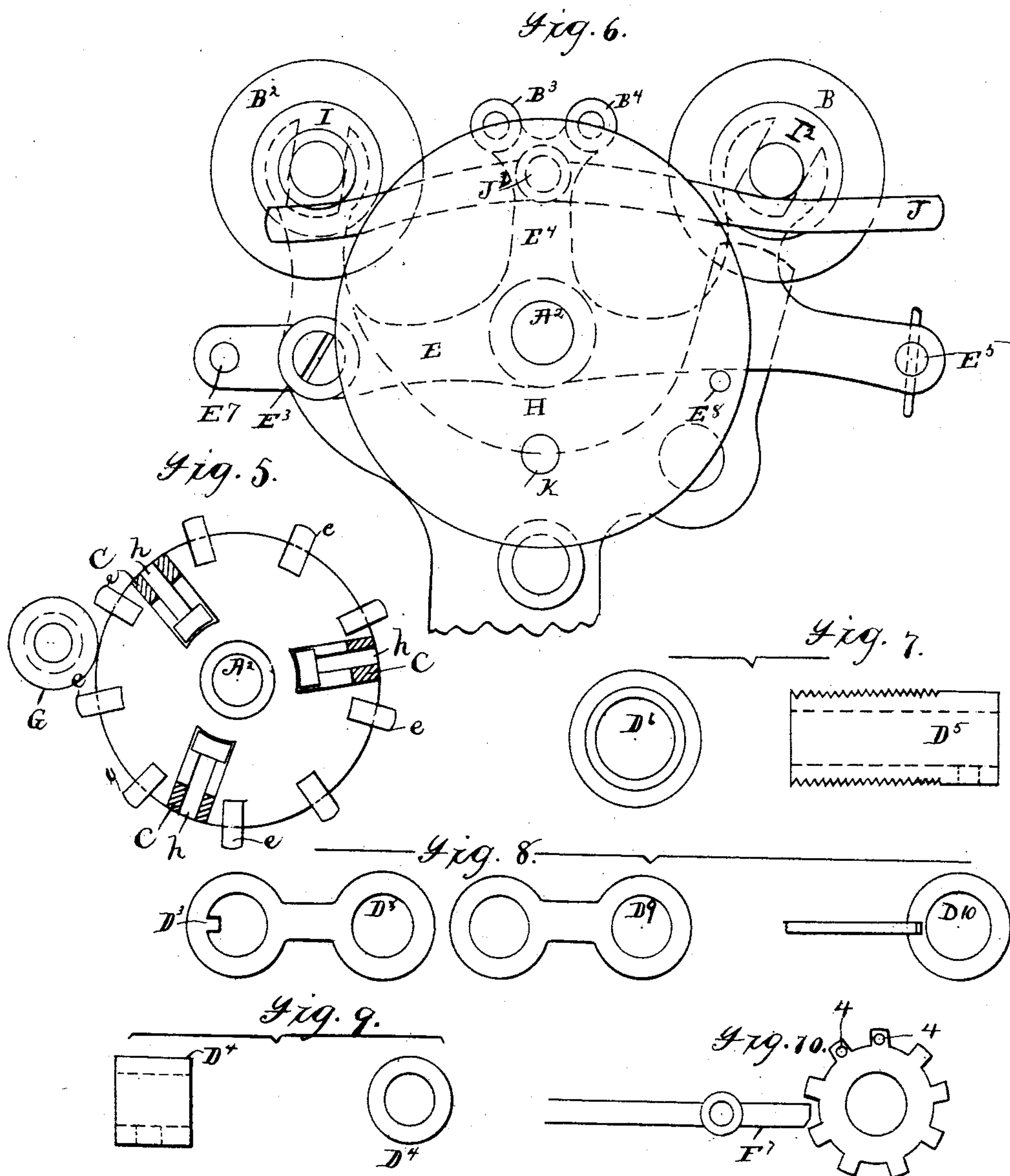
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Bertrini Jackson

Inventor  
Tho. A. Macauley

(No Model.)

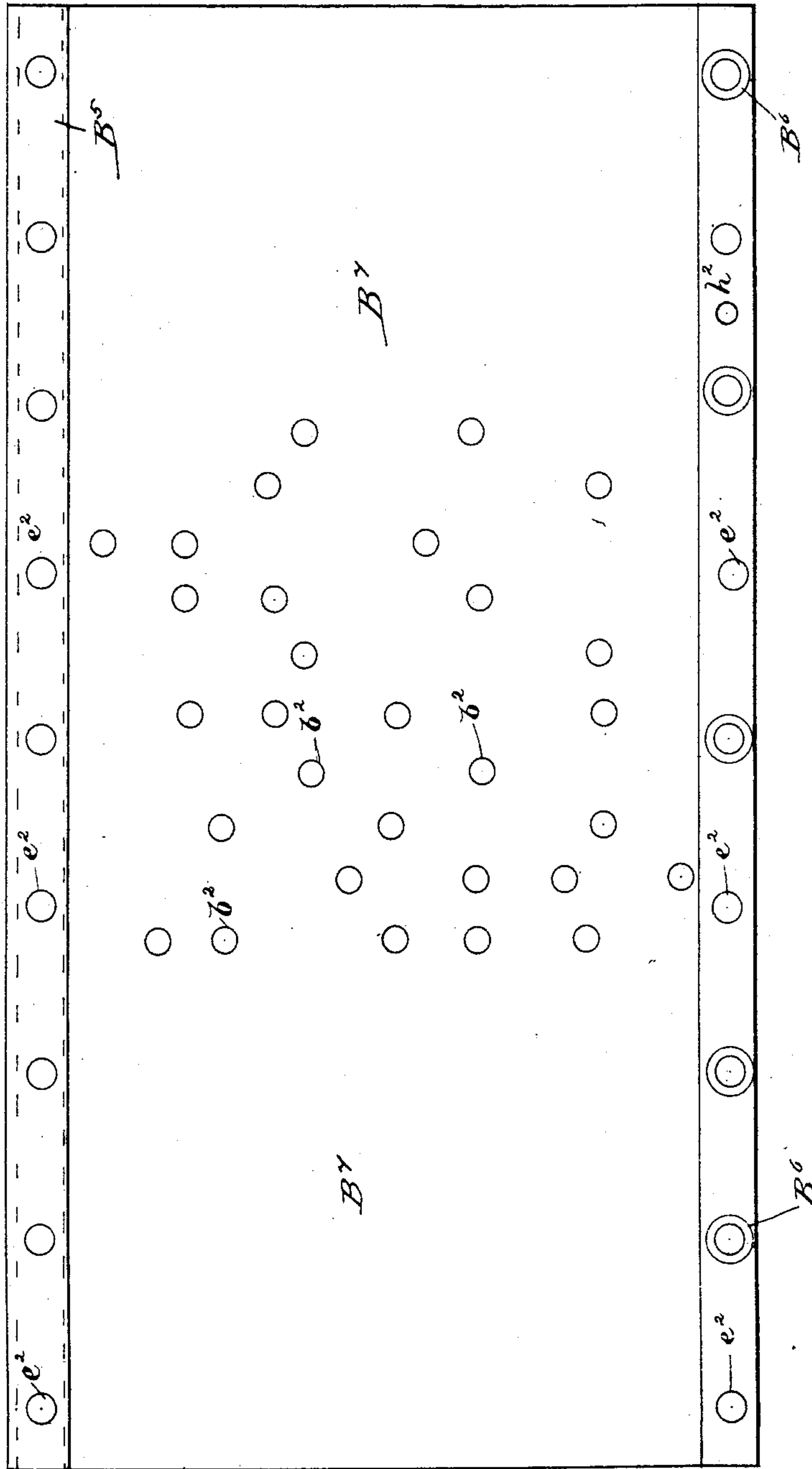
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Fig. 12.



Attest

Cecilia Jackson.  
Bertin Jackson.

Inventor

Thos. A. Macaulay



# UNITED STATES PATENT OFFICE.

THOMAS A. MACAULAY, OF NEW YORK, N. Y.

## AUTOMATIC MUSICAL INSTRUMENT.

SPECIFICATION forming part of Letters Patent No. 401,188, dated April 9, 1889.

Application filed December 20, 1887. Serial No. 258,450. (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.

In the drawings, Figure 1 is a central view. Fig. 2 is a view below the line  $x x$  in Fig. 1. Fig. 3 is a top view. Fig. 4 is an end view. Fig. 5 is partly a sectional view of the pin-cylinder through the line  $y y$  in Fig. 3. Fig. 6 is an opposite end view of the upper part of Fig. 4 through line  $y^2 y^2$ . Figs. 7 to 11, inclusive, are detail views hereinafter referred to. Fig. 12 is the perforated music-sheet.

A is the pin-cylinder, having on its periphery sliding pins  $b$ . Its axle  $A^2$  has a central bore for the escape of dust and is journaled in suitable bearings in a hinged frame, E. The sliding pins  $b$  are incased in adjustable detachable bushes  $c$ , have a collar,  $d$ , about midway of their length and a bearing in the bush  $c$  at one end, and at the other end in the hole  $a$ , which connects with the hollow axle  $A^2$ , on each side of the collar  $d$ , is a cloth washer,  $d^2$ , for deadening sound.

B is a roller on which the perforated sheet, Fig. 12, is wound.

$B^2$  is a take-up roller. Both rollers are suitably journaled in arms of the hinged frame E, three of which are slotted for admission of the rollers and to permit their journal rising and falling in the slots.

$B^3$  is a re-enforcing or strengthening strip in the perforated sheet.

$B^6$  are washers or rings on perforated sheet.

$B^3 B^4$  are guide-rollers journaled in a bracket-arm,  $E^4$ , in the hinged frame E.

$B^5$  is a blank space at the ends of the perforated sheet.

C is a spur or picker wheel mounted on a grooved shaft, D, having spurs, pickers, or projections  $a^5 a^5$  on its periphery, which may be of any preferable shape or form to act on the tongues  $F F^2$  and to give movement to a lever,  $F^7$ . (See Fig. 10.)

D is a shaft fixed in bushes  $D^4 D^5$  in the end frame,  $E^2$ . It has a groove along its entire length. On this shaft are placed the spur or picker wheels C. Between the spur-wheels are placed washers  $D^3$ , each having an in-

ward projection fitting into the groove  $D^2$  in the shaft D, which prevents the washers from turning with the spur-wheels, and also prevents the movement of one spur-wheel from affecting the spur-wheel next to it. Between each spur-wheel and washer is placed a washer of felt, cloth, or other suitable material to prevent the contact of the metals of the spur-wheel and washer with each other and permit a smoother movement of the spur-wheels to bring the spur-wheels in proper position.

The bushes  $D^4 D^5$  are adjustable to the comb-teeth and held in position by set-screws  $E^6$ .

$D^5$  is threaded and provided with lock-nuts  $D^6$ , one of which adjusts the necessary friction on the spur-wheels C, so that they may retain the position in which the sliding pins leave them. The spur-wheels, as shown, have nine pickers or spurs, and, as will be seen, there are three lines of comb-teeth or sounding devices,  $F F^2$ , in the same plane. Each comb-tooth F is in such near relation to a tooth of a spur-wheel that the comb-teeth may be set in vibration simultaneously by a single movement of the spur-wheel actuated by one of the sliding pins  $b$ .

If all of the comb-teeth to one spur-wheel be tuned in unison, a very full sound may be produced. It will be seen that the comb-teeth are double combs—that is, there are two teeth in the same plane; but only one is shown as coming in contact with a spur-wheel, the other tooth being set in vibration by “sympathy,” as in a tuning-fork, so that an additional source of sound is added by this provision.

In Fig. 10 is shown the spur-wheel C, operating a lever,  $F^7$ , as in a piano, to strike strings or other sounding device.

E is the roller-frame, hinged to arms of the end frame,  $E^2$ , by studs  $E^3$  at one side and connected together by a rod,  $E^5$ , at the opposite side.

$E^4$  is a bracket or extension of E, supporting the guide-rollers  $B^3$  and  $B^4$ .

$E^6$  is a set-screw.

$E^7$  is a stop-pin in the extension E to stop the hinged frame E.  $E^8$  is a stop-pin to gage the position of the pin-cylinder and the spur-wheels and the motor-gears.



Referring to Fig. 1,  $F^6$  is a form of damper operated by a tooth of the spur-wheel. It is lifted off the comb-tooth about the time the comb-tooth is set in vibration by the spur-wheel, and is held by the spur-wheel until the next movement of the spur-wheel, when it drops by gravity or spring force on the comb-tooth and arrests its vibration, and is in position to be lifted off again to permit the tooth to vibrate. Another form of damper is shown in Fig. 4. The spur-wheel acts on a spring-lever,  $F^4$ , to which is attached a light spring,  $F^5$ , which comes in contact with the comb-tooth, arresting its vibration, and falls back against a fixed pin,  $f$ , in position to be again operated in like manner.

In Fig. 4 is shown one end of the frame  $E^2$  and the hinged roller-frame  $E$ . In dotted lines the hinged frame  $E$  is shown lifted upon the hinge  $E^3$  and stopped by the pin  $E^7$  coming in contact with an arm of  $E^2$ . With the pin-cylinder in this position the perforated sheet may easily be passed around the pin-cylinder and to the take-up roller  $B^2$  and again be brought into its proper position to play.

$G$  is a roller, of rubber or other suitable material, adapted to keep the strain of the take-up roller from pulling the sheet on the fixed pins  $e$ , and serves also, if extended across the entire length of the cylinder, to push back into proper position any pins which fall for any cause to fall back by gravity. It is pivoted on stud  $g$ , which is fixed to the bracket  $E$ . One of these rollers may be at each end of the pin-cylinder, or one may be stretched across the entire length of the pin-cylinder.

$H$  is a driving-wheel fixed to the axle  $A^2$  of the pin-cylinder.

$I$  is a take-up pulley fixed to the axle of the take-up roller  $B^2$ , and is in frictional contact with the wheel  $H$ .

$J$  is a shipping-lever pivoted to the arm  $E^4$  by stud  $J^2$ .

$K$  is a crank-pin for turning the wheel  $H$ .

$P$  to  $P^5$ , Fig. 3, is a train of motor-gears, such as is used in music-boxes.

$P^6$  is a fan-wheel for regulating speed.

$P^7$  is spring-power.

$O$  is a lever for winding the spring  $P^7$ .

$S$  is a stop-lever.

$S^2$  is a pivot for  $S$ .

In Fig. 5 is shown a sectional view through the line  $Y Y$ , Fig. 3, of the fixed registering-pins  $e e e$ , equally distant from each other, corresponding in this respect with holes  $e^2 e^2 e^2$  in the perforated sheet, Fig. 12. In Fig. 5 are also shown the stop-pins  $h h h$ , which register with the holes  $h^2$  in the perforated sheet, and are intended to act on a spur-wheel on the shaft  $D^2$ , which in turn actuates a lever,  $S$ , the other end of which comes in contact with a fan-wheel,  $P^6$ , to stop the operation of the instrument. Instead of acting on a spur-wheel the stop-pins may operate a lever directly to stop a fan-wheel.

In Fig. 8 are shown modified forms of the washer  $D^3$ . In one case,  $D^{10}$ , a notch is cut in the periphery of the washer, in which a pawl or bar is inserted to keep it from turning. In this form a groove in the shaft is not necessary. In another form one end is formed, as in  $D^3$ . The other end has an eye,  $D^8$ , to be inserted in a bar or shaft, so as to afford some support to the shaft  $D$ . This form requires a partial groove or dent in the shaft  $D$ ; but only in one of them is it necessary to have an inward projection. The rest may be as  $D^9$ .

In Fig. 11 are shown two pin-cylinders,  $A A$ , controlled by two sheets on a common roll,  $B$ , and two take-up rollers. By this arrangement a more complex piece of music may be played, as the perforations may be arranged to play different parts of the same piece at the same time.

In Fig. 1 one of the spurs of the spur-wheels  $C$  is shown with a tooth,  $b^3$ , slightly inclined to permit the damper to fall off the moment it leaves the tooth, and also a free escape of the comb-tooth.

For the purpose of strengthening the perforated sheet at the points of greatest wear it is folded over and re-enforced with a strip of cloth,  $B^5$ , or other material, or there may be used washers  $B^6$  around the holes  $e^2 e^2 e^2$ . A blank space is left at each end of the perforated sheet between the lines of feed-holes to prevent the pins from operating the spur-wheels at the beginning and ending of a piece.

Referring to Fig. 6 it will be seen that the take-up pulley  $I$  is in frictional contact with the driving-wheel  $H$ , and as the wheel rotates the perforated sheet passing around the pin-cylinder is taken up on the roller  $B^2$  during the operation of playing. To rewind, the hinged frame  $E$  is lifted by the connecting-rod  $E^5$  until the pin  $E^7$  comes in contact with the arm of the frame  $E^2$ . The pulley  $I$  is lifted off the wheel  $H$  by pressing the lever  $J$ . This will raise the pulley  $I$  off the driving-wheel  $H$  and bring the pulley  $I^2$  in frictional contact with the driving-wheel  $H$ , and the sheet may be rewound on the roller  $B$ .

To insert a new sheet, the hinged frame is lifted, as above described, and the perforated sheet  $B^5$  is passed from the full roller  $B$  over the guide-roller  $B^4$ , around the pin-cylinder  $A$ , under the roller  $G$ , over the guide-roller  $B^3$ , and fastened to the take-up roller  $B^2$ . The hinged frame  $E$  is now brought back to its former position in relation to the spur-wheels and the motor-wheel, the arm being in contact with the pin  $E^8$ . The motor being now wound up by the lever  $O$ , the cylinder  $A$  is set in motion. As a pin,  $b$ , comes opposite a hole,  $b^2$ , in the perforated sheet it falls through by its gravity and comes in contact with the spur-wheel  $C$ , which it moves, and by it the comb-teeth are set in motion in the order predetermined by the holes  $b^2$  in the perforated sheet. Then it will discourse most eloquent music.



In Fig. 3 the bushes *b* are shown as split along their entire length, so as to afford a friction, and nicked to take them out, as they may be threaded and screwed in or unthreaded and driven. For the latter purpose it would be desirable to make a shoulder on one end of the bush and drive it to the shoulder in the cylinder.

In Fig. 3 is also shown the alternating position of the lines of pins and bushes. Placing the pins in this relation instead of in line with each other the surface of the cylinder is better utilized and a greater number of comb-teeth may be set in vibration.

Having described my invention, I claim—

1. In a musical instrument, a picking device and means to operate the same, said picking device provided with multiple projections moving in substantially the same planes and adapted to be brought in simultaneous or nearly simultaneous engagement with two or more sounding devices and set them in vibration.

2. In a musical instrument, a device, as *C*, and means to operate the same, said device provided with means, as *a<sup>5</sup> a<sup>5</sup>*, moving in substantially the same plane, adapted to be brought into simultaneous or nearly simultaneous engagement with two or more sounding devices to set them in vibration.

3. In a musical instrument, a spur-wheel, as *C*, and means to operate the same, having devices, as *a<sup>5</sup> a<sup>5</sup>*, moving in substantially the same plane, adapted to be brought in simultaneous or nearly simultaneous engagement with two or more sound-producing devices and set them in vibration.

4. In an automatic musical instrument, in combination, movable pins in a cylinder controlled by a perforated sheet, a device, as *C*, operated by said pins, having means, as *a<sup>5</sup> a<sup>5</sup>*, adapted to be brought in simultaneous or nearly simultaneous engagement with two or more sounding devices, for the purpose specified.

5. In a musical instrument, the combination of a spur-wheel, as *C*, and means to operate the same, and two or more sounding devices arranged in different radial lines in relation to the axis of the spur-wheel, the different projections of the said spur-wheel being adapted to actuate the said sounding devices simultaneously, or nearly so, for the purpose specified.

6. In an automatic musical instrument, a movable perforated sheet, operating devices controlled by said sheet, and a picker having multiple projections operated by said sheet-controlled devices, and two or more sounding devices operated by said multiple projections, for the purpose specified.

7. In an automatic musical instrument having a flexible sheet, a sheet-roller, and take-up roller provided with pulleys, adjustable bearings for said rollers, a wheel for operating said roller-pulleys, and a device adapted to disengage either of said pulleys from said wheel, for the purpose specified.

8. In an automatic musical instrument having a perforated flexible sheet, sheet-roller, and a take-up roller having pulleys, slotted bearing-brackets containing said rollers, a driving-wheel for operating said roller-pulleys, and a lever arranged to disengage either of said rollers from said driving-wheel, for the purpose specified.

9. In an automatic musical instrument, the combination of the driving-wheel *H*, the pulleys *I I<sup>2</sup>*, the slotted brackets, and the levers *J*, for the purpose specified.

10. In an automatic musical instrument controlled by a perforated sheet, a pin-cylinder supported in movable bearings and adapted to be raised out of operative position, for the purpose specified.

11. In an automatic musical instrument, a pin-cylinder, a hinged frame supporting said cylinder, and a stopping device, as *E<sup>7</sup>*, for limiting the position of said frame, for the purpose specified.

12. In an automatic musical instrument controlled by a perforated sheet, a pin-cylinder and sheet-rollers supported in a hinged frame adapted to raise said cylinder and rollers out of operative position, for the purpose specified.

13. In an automatic musical instrument, a pin-cylinder, a spur-wheel shaft, a hinged frame in which said cylinder is supported, and a device to fix the operative positions of said cylinder and said spur-wheel shaft, for the purpose specified.

14. In an automatic musical instrument, in combination, a pin-cylinder and spur-wheel shaft, one being movable from the other, and devices by which the relative positions of said spur-wheel shaft and pin-cylinder are fixed when brought into operative position.

15. In an automatic musical instrument, a pin-cylinder, a motor-wheel, a hinged frame in which said cylinder is supported, and a device to fix the operative position of said cylinder and motor-wheel, for the purpose specified.

16. In an automatic musical instrument, a movable pin-cylinder having pin-holes and an axle having a hole connecting with said pin-holes, for the purpose specified.

17. In an automatic musical instrument, a sliding pin-cylinder having an axle provided with a hole through its entire length, for the purpose specified.

18. In an automatic musical instrument, a sheet-roller having two perforated sheets, two pin-cylinders controlled by said sheets of perforations, and two take-up rollers for taking up said sheets, for the purpose specified.

19. In an automatic musical instrument, two perforated sheets containing parts of the same piece of music, pins in two cylinders controlled by said sheets, and devices operated by said pins adapted to operate sounding devices, for the purpose specified.

20. In a musical instrument, the combination of the shaft *D*, the spur-wheels *C*, the



washers D<sup>3</sup>, the screw D<sup>5</sup>, and the nuts D<sup>6</sup>, for the purpose specified.

21. In a musical instrument, the combination of the shaft D, the spur-wheels C, the washers D<sup>3</sup>, and means to secure said spur-wheels and washers on said shaft, for the purpose specified.

22. In an automatic musical instrument, in combination, the shaft D, the washers D<sup>3</sup>, and a picking device, and means to secure said picking device and washers on said shaft, for the purpose specified.

23. In a musical instrument, a shaft, as D, having a series of spur-wheels, as C, a comb-plate, as F, and adjusting-bushes, as D<sup>4</sup> D<sup>5</sup>, to adjust the positions of said spur-wheels to said comb-plate, for the purpose specified.

24. In a musical instrument, in combination, a shaft having a groove, a series of spur-wheels adapted to rotate on said shaft, and a series of washers having projections adapted to enter the grooves in said shaft.

25. In a musical instrument, in combination, a shaft having a series of rotating spur-wheels, a series of fixed washers alternating with said spur-wheels, and a series of cloth or other similar washers interposed between said spur-wheels and said washers, for the purpose specified.

26. In a musical instrument, in combination, a shaft having a series of spur-wheels and an alternating series of non-rotary separating devices, for the purpose specified.

27. In a musical instrument, a pin-cylinder, a shaft having spur-wheels, as C, and adjustable devices whereby said spur-wheels are adjusted to said pin-cylinder, for the purpose specified.

28. In a musical instrument, a shaft having spur-wheels, a comb-plate operated by said spur-wheels, and devices by which said spur-wheels are adjusted to said comb-plate, for the purpose specified.

29. In an automatic musical instrument, a pin-cylinder having an adjustable bush, said bush being split longitudinally, for the purpose specified.

30. In an automatic musical instrument, a sliding pin having a head or collar, a stop-ping device for said pin, and a sound-deadening washer, for the purpose specified.

31. In a musical instrument, in combination, the comb-tooth F<sup>2</sup>, with the comb-tooth F, the spur-wheel C, and means to operate the same, for the purpose specified.

32. In a musical instrument, in combination, the comb-tooth F<sup>2</sup>, arranged to escape action of the picking device C, and the comb F, arranged to be set in vibration by the said picking device, for the purpose specified.

33. In a musical instrument, a comb-tooth, as F<sup>2</sup>, arranged to escape the action of its picking device, and the comb-tooth F, arranged to be set in vibration by said picking device, for the purpose specified.

34. In an automatic musical instrument, the combination of a pin-cylinder, a perforated sheet, a spur-wheel, as C, a lever, as F<sup>4</sup>, and a spring, as F<sup>5</sup>, and a stop-pin, as *f*, for the purpose specified.

35. In a musical instrument controlled by a perforated sheet, the combination of the spur-wheel C, the lever F<sup>4</sup>, the spring F<sup>5</sup>, and the stop-pin *f*, for the purpose specified.

36. In an automatic musical instrument, a spur-wheel and means to operate it, controlled by a perforated sheet, and a damper operated by a projection on said spur-wheel, said damper held from contact with the sounding device by said projection, for the purpose specified.

37. In an automatic musical instrument, a cylinder having pins, a spur-wheel, as C, operated by said pins, and a damper operated by said spur-wheel, for the purpose specified.

38. In an automatic musical instrument, a comb-tooth-picking device operated by a rotating device having pins, and a damper operated by said picking device, for the purpose specified.

39. In an automatic musical instrument, a spur-wheel and means to operate it, a damper consisting of a lever operated by a projection on said spur-wheel, and a sounding device controlled by said damper, for the purpose specified.

40. In an automatic musical instrument, a flexible sheet having perforations, a cylinder having pins engaging said perforations, an elastic roller pressing said sheet against said cylinder, and a take-up roller, for the purpose specified.

41. In an automatic musical instrument, a flexible sheet having perforations, a cylinder provided with pins engaging said perforations, a roller pressing said sheet against said cylinder, and a take-up roller, said pressure-roller located between said cylinder and said take-up roller, for the purpose specified.

42. In an automatic musical instrument, in combination, a roller having a perforated sheet, a guide-roller, as B<sup>3</sup>, one or more, a cylinder having pins engaging in said perforations, and a take-up roller for taking up said sheet, for the purpose specified.

43. In an automatic musical instrument, a flexible sheet having perforations, a cylinder provided with pins engaging said perforations, a roller pressing said sheet against said cylinder, and a take-up roller, for the purpose specified.

44. In a musical instrument, a series of spur-wheels, a shaft and frictional devices, and means to adjust the same, said frictional devices applied to the faces of said spur-wheels, for the purpose specified.

45. A perforated sheet for automatic musical instruments, having lines of holes along its edges, and a blank space at one or both ends of said sheet for some distance between said lines of holes, for the purpose specified.



46. A music-sheet roller having two perforated sheets containing different parts of the same piece of music adapted for simultaneous use in automatic musical instruments, for  
5 the purpose specified.

47. A duplex perforated sheet adapted for simultaneous use in automatic musical instru-

ments having different parts of the same piece of music on each sheet, for the purpose specified.

THOS. A. MACAULAY.

Witnesses:

CECILIA JACKSON,  
BERTINI JACKSON.