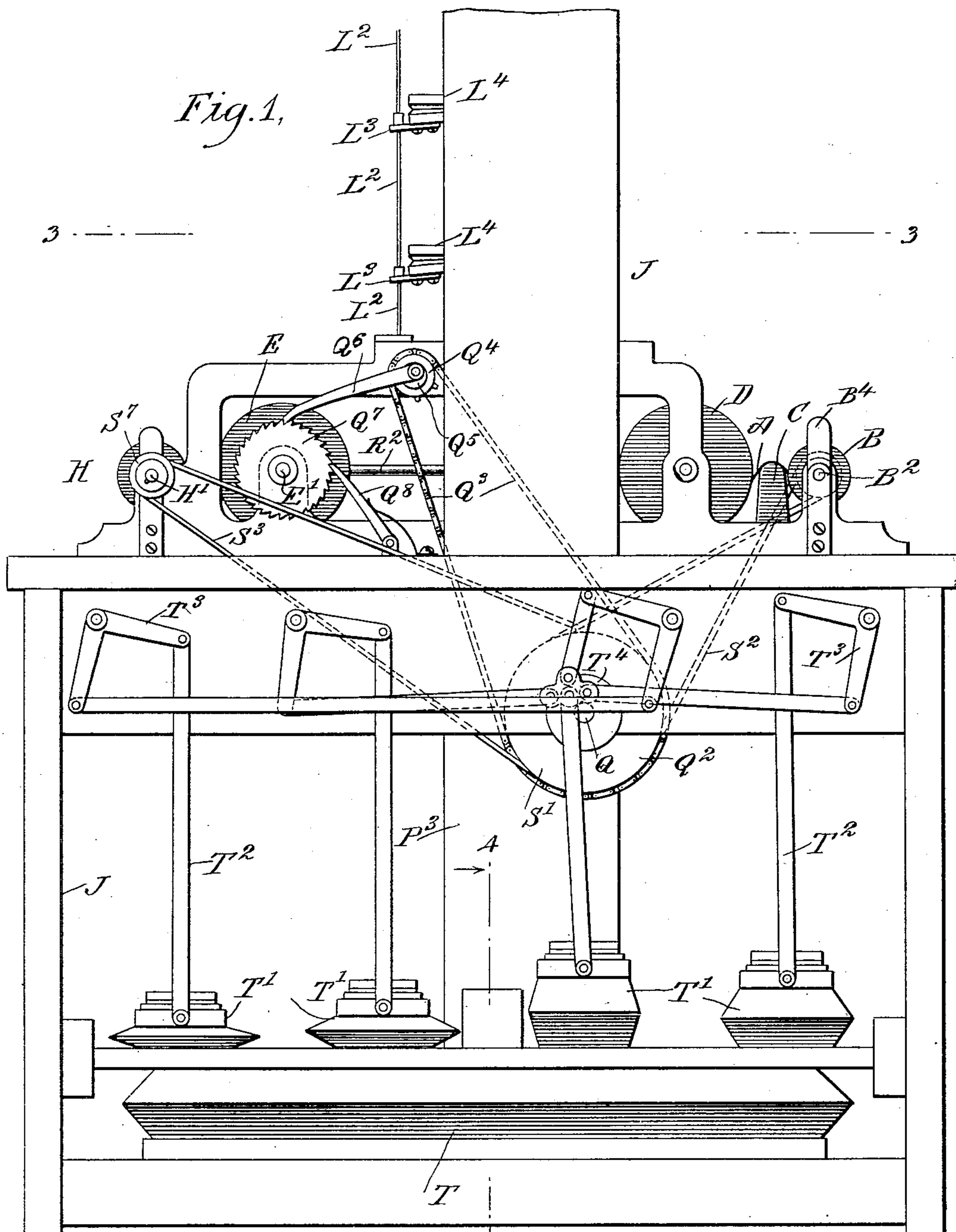


H. MEYER.
APPARATUS FOR PUNCHING MUSIC SHEETS.

APPLICATION FILED DEC. 13, 1902.

NO MODEL.

5 SHEETS—SHEET 1.



WITNESSES:

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INVENTOR

Hermann Meyer
BY *Munn & Co.*
ATTORNEYS.

No. 745,881.

PATENTED DEC. 1, 1903.

H. MEYER.

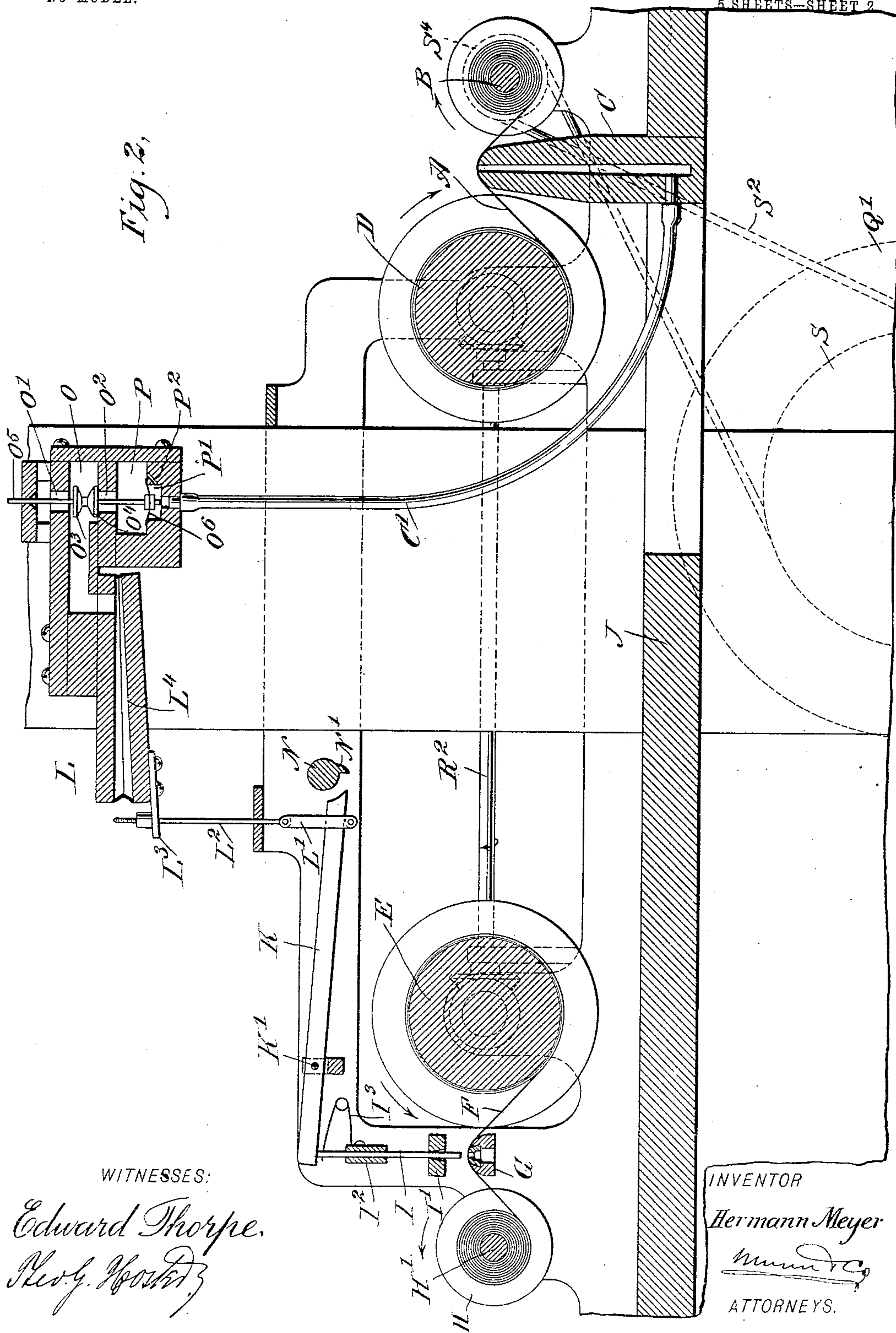
APPARATUS FOR PUNCHING MUSIC SHEETS.

APPLICATION FILED DEC. 13, 1902.

NO. MODEL.

5 SHEETS—SHEET 2

Fig. 2,



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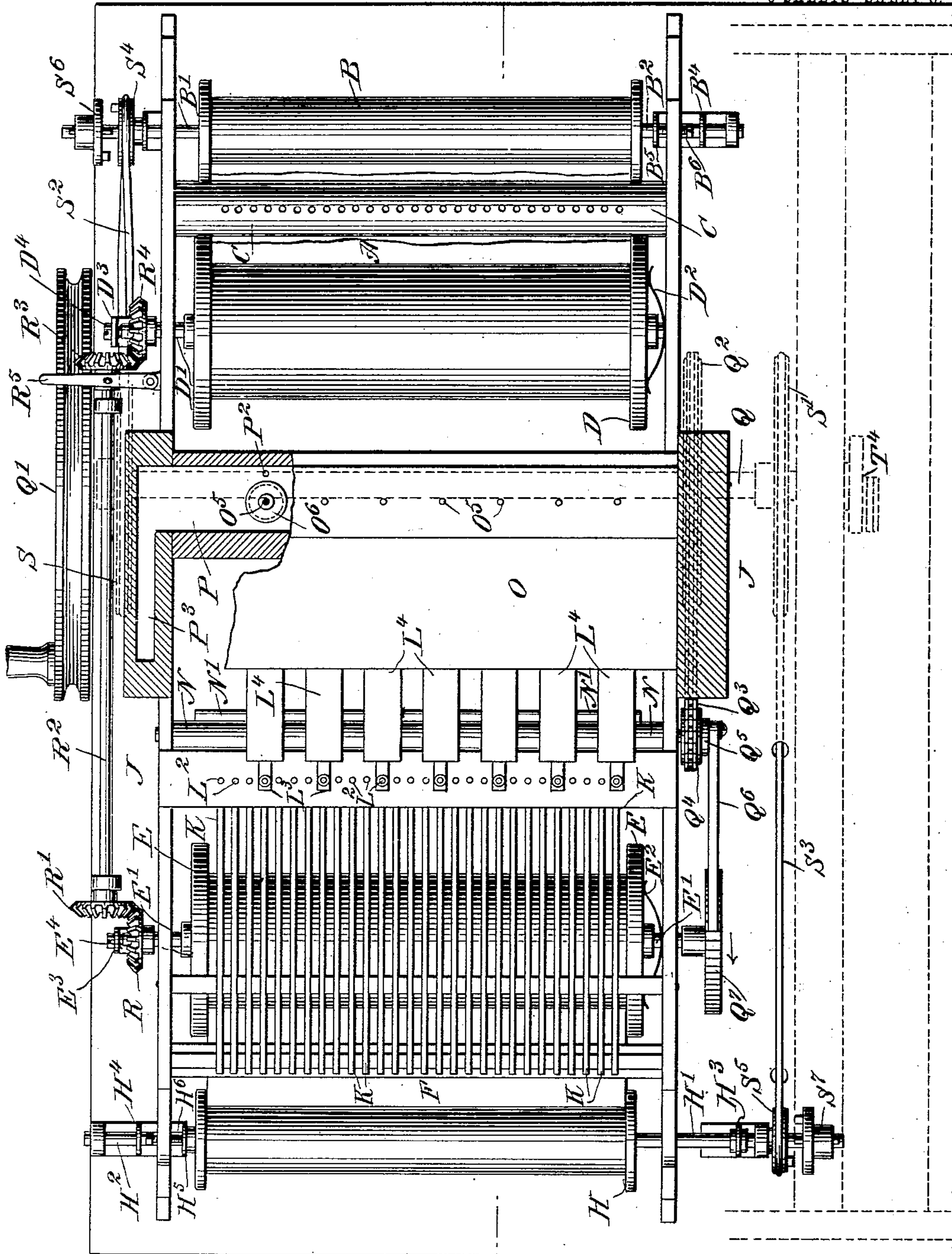
ATTORNEYS.

H. MEYER.
APPARATUS FOR PUNCHING MUSIC SHEETS.

APPLICATION FILED DEC. 13, 1902.

NO MODEL.

5 SHEETS—SHEET 3.



WITNESSES:

INVENTOR

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Fig. 3.

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5 SHEETS—SHEET 4.

Fig. 4,

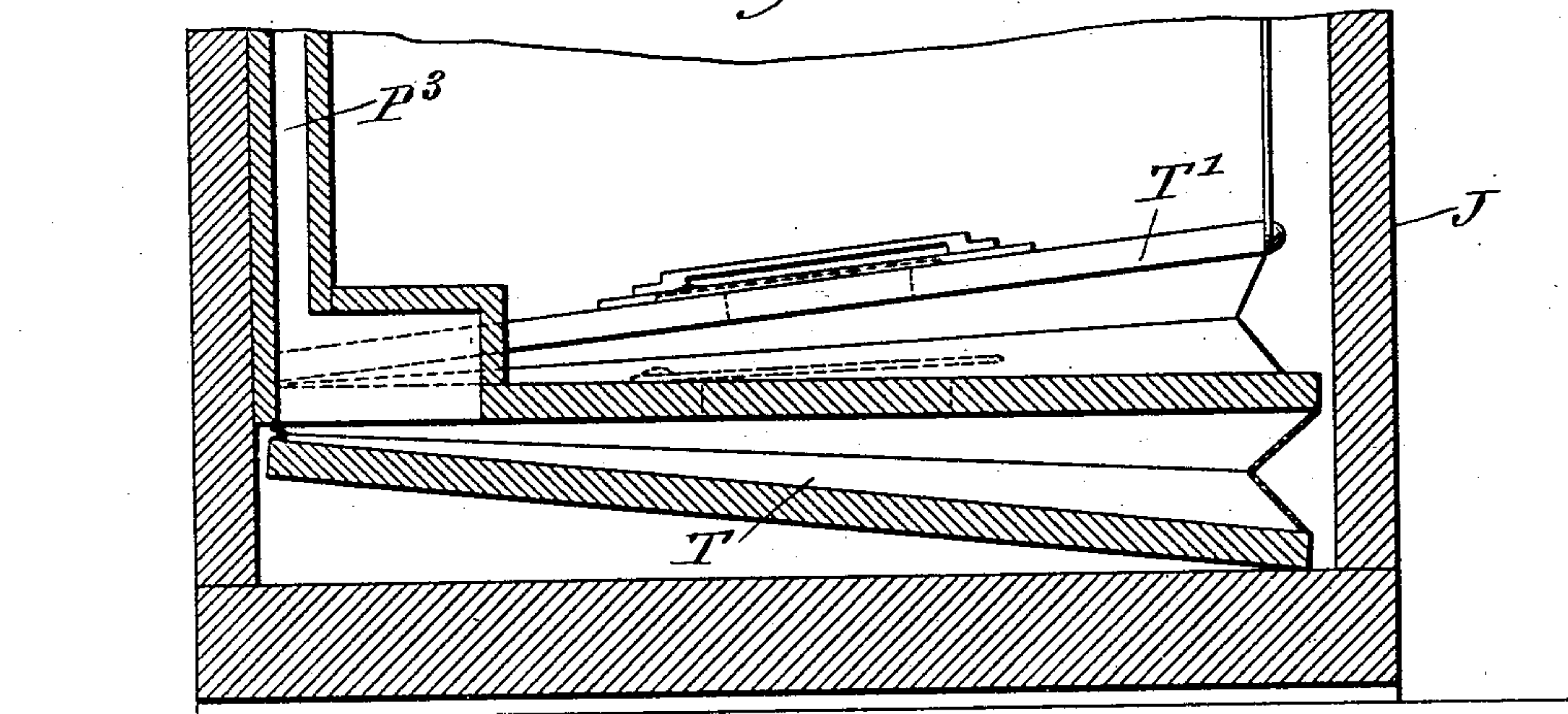


Fig. 5,

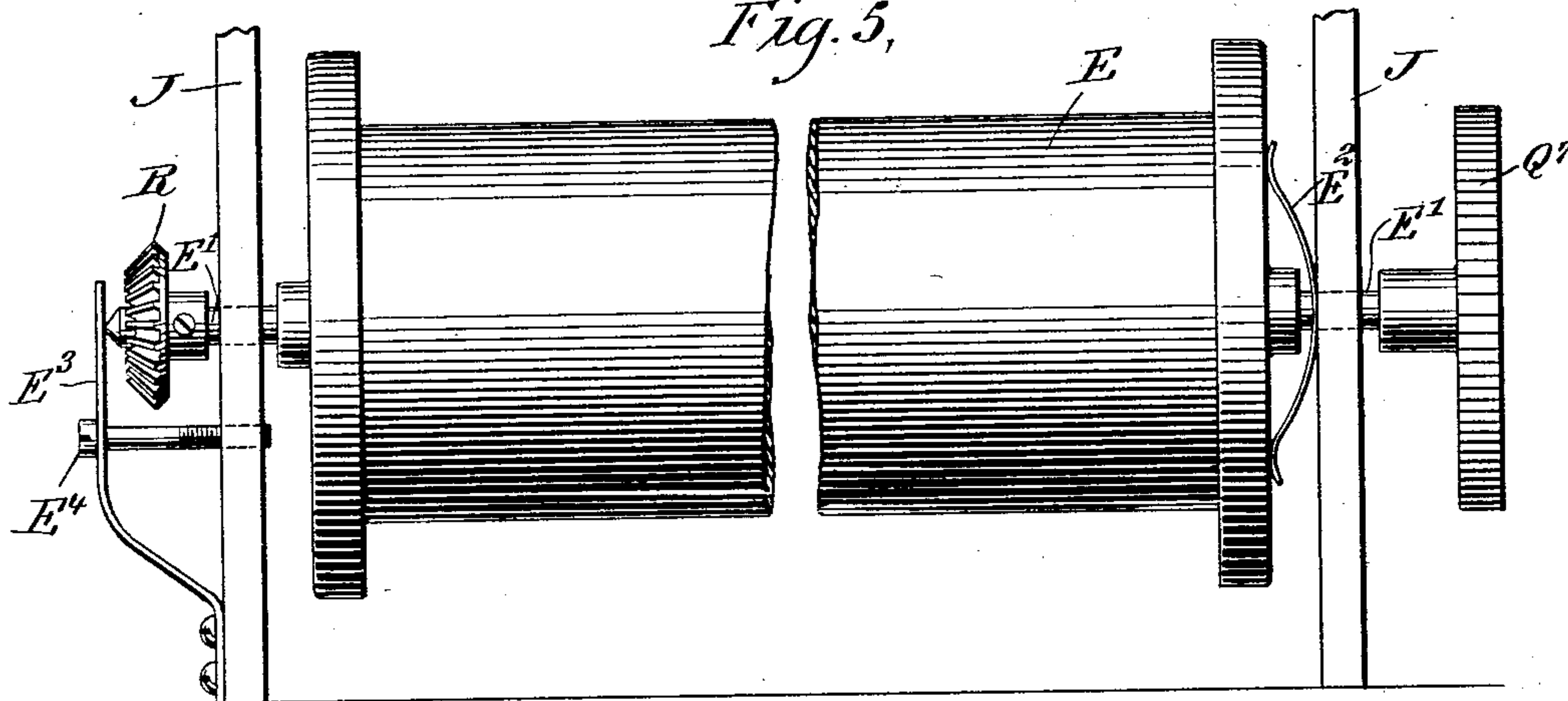
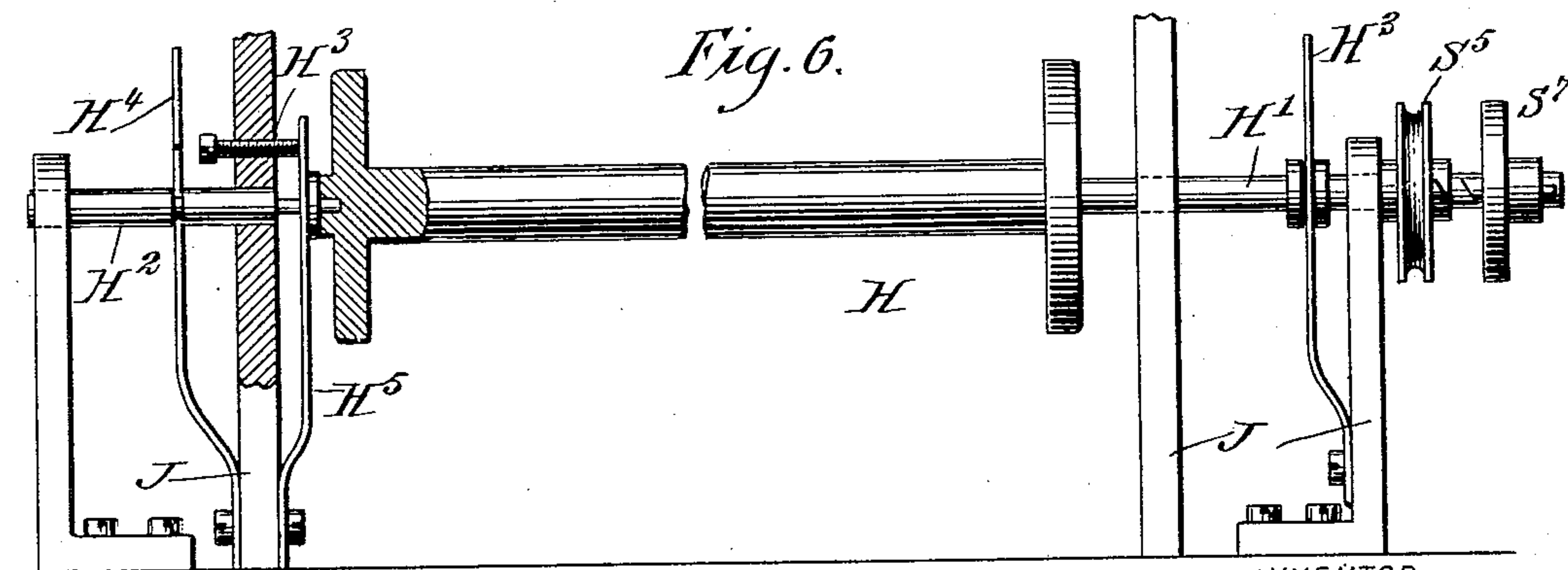


Fig. 6.



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UNITED STATES PATENT OFFICE.

HERMANN MEYER, OF NEW YORK, N. Y.

APPARATUS FOR PUNCHING MUSIC-SHEETS.

SPECIFICATION forming part of Letters Patent No. 745,881, dated December 1, 1903.

Application filed December 13, 1902. Serial No. 135,057. (No model.)

To all whom it may concern:

Be it known that I, HERMANN MEYER, a citizen of the United States, and a resident of the city of New York, borough of the Bronx, in the county and State of New York, have invented a new and Improved Apparatus for Punching Music-Sheets, of which the following is a full, clear, and exact description.

The invention relates to machines for perforating music-sheets for self-playing musical instruments; and its object is to provide a new and improved apparatus for punching the sheets in a simple and exceedingly accurate manner according to the perforations in the pattern-sheet.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement. Fig. 2 is an enlarged sectional side elevation of the same on the line 2 2 of Fig. 3. Fig. 3 is a sectional plan view of the same on the line 3 3 of Fig. 1. Fig. 4 is a transverse section of the exhausting-bellows, the section being on the line 4 4 of Fig. 1. Fig. 5 is an enlarged end elevation of the improvement, showing the mounting of one of the winding-up drums. Fig. 6 is a similar view of the improvement, showing one of the removable spools. Fig. 7 is an enlarged sectional side elevation of the punching devices and the means for setting the punches and for actuating the same, and Fig. 8 is a face view of one of the perforated sheets.

A pattern-sheet A is perforated according to the piece of music which it represents, and the said sheet unwinds from a spool B and then passes over a tracker-board C to wind upon a drum D, which rotates in unison with a similar drum E, on which winds a sheet or sheets F as the latter are punched while passing over a die or punching block G, the said sheet or sheets unwinding from a spool H similar to the spool B. Punches I operate in conjunction with the die-block G to punch holes in the sheet F as the latter passes over

the die-block G, and the said holes are punched in accordance with the holes in the pattern-sheet A registering at the time with the openings in the tracker-board C, so that the punched sheets F are exact reproductions of the pattern-sheet A, it being understood that either a single sheet F may be punched at a time or a plurality of superimposed sheets passing over the die-block G, as before mentioned.

Each of the punches I is mounted to slide in bearings I' and I², attached to the main frame J of the machine, and the punches are held normally in an uppermost position by springs I³, and the said punches are first moved downward into a setting position previous to punching the holes by levers K, fulcrumed at K' on the main frame J and engaging with their forward ends the upper ends of the punches I, as plainly indicated in Figs. 2 and 7. The inner ends of the setting-levers K are connected with a pneumatic means L for moving the levers and punches into setting position, and the said pneumatic means are controlled from the sheet A as the latter passes over the tracker-board C, and when the levers have moved into the setting position they are then acted on by transverse shoulders or projections N' on a shaft N, extending transversely and journaled in suitable bearings in the main frame J. Thus the setting-levers K, moved into position by the pneumatic means L, are acted on by the projections N' as the shaft N rotates, so that a swinging motion is given to the said setting-levers to press the corresponding punches I downward to punch holes in the sheet or sheets F over the die-block G.

The pneumatic means L for setting the punches as described are constructed as follows: The inner end of each lever K is engaged by a loop L', held on the lower end of a rod L², connected with a bracket L³ on the movable part of a pneumatic L⁴ in communication with a chamber O, connected by a port O' with the outer air and by a port O² with an exhausting-chamber P, as plainly shown in Figs. 2 and 7. The ports O' and O² are controlled by valves O³ O⁴, respectively, secured on a valve-stem O⁵ and connected with a diaphragm O⁶, arranged in the exhausting-chamber P over a chamber P', having a

feed-groove P^2 , opening into the exhausting-chamber P . The chamber P' is connected by a flexible tube C' with a corresponding opening in the tracker-board C , so that when an aperture in the sheet A registers with the corresponding tracker-board opening then air passes through this opening and tube C' into the chamber P' to press against the under side of the diaphragm O^6 , so as to move the same upward to cause the valve O^4 to move off its seat over the port O^2 and connect the exhausting-chamber P with the chamber O , while the valve O^3 closes the port O' , and thus disconnects the chamber O from the outer air. Now as soon as the chambers O and P are connected with each other then the corresponding pneumatic L^4 collapses, owing to the suction action, and consequently the rod L^2 is drawn up by the closing pneumatic, so that the corresponding lever K is swung upward at its rear end and downward at its front end to move the punch I into punching position, and at the same time the rear end of the lever K moves into the path of the projection N' , so that the latter imparts a powerful swinging motion to the lever K to cause the punch I to punch an aperture in the sheet or sheets F over the die-block G . As soon as the sheet A closes the tracker-board opening, and thereby cuts off atmospheric air from the tube C' and chamber P' , then the diaphragm O^6 is immediately forced downward, so that the valve O^4 moves into a closed position, while the valve O^3 moves into an open position to again connect the chamber O with the atmosphere, so that the pneumatic L^4 becomes inflated and the rod L^2 moves downward to allow the lever K to return to its former position, and with it the punch I , owing to the action of its spring I^3 . By reference to Fig. 1 it will be seen that the pneumatics L are arranged in tiers to readily accommodate the same.

The pattern-sheet A and the sheets F to be punched travel intermittently in unison, and the distance between successive transverse rows of apertures in the sheet A is such that during the time the sheets A and F are at a standstill apertures in the sheet A register with the corresponding openings in the tracker-board C for the purpose above described—that is, for actuating the corresponding punches I to punch the sheets F while stationary over the die-block G . When the punches have returned to their outermost position, then the sheets A and F can receive a traveling motion, and the above-described operation is repeated. Now in order to impart this intermittent traveling motion to the sheets A and F the following device is provided: A main shaft Q , extending transversely, is journaled in suitable bearings on the main frame J , and on one end of the said shaft is secured a pulley Q' , connected by belt with other machinery for imparting a continuous rotary motion to the said shaft. On the shaft Q is secured a sprocket-wheel

Q^2 , connected by a sprocket-chain Q^3 with a sprocket-wheel Q^4 , secured on one outer end of the shaft N , so that the rotary motion of the shaft Q is transmitted to the shaft N to actuate the punches, as previously explained. On one outer end of the shaft N is arranged a crank-disk Q^5 , carrying on its wrist-pin a pawl Q^6 , engaging a ratchet-wheel Q^7 , secured on one end of the shaft E' of the drum E , so that an intermittent rotary motion is given to the drum E from the continuous rotation of the shaft N by the pawl-and-ratchet mechanism just described. A spring-pressed dog Q^8 engages the ratchet-wheel Q^7 to prevent accidental movement of the same. (See Fig. 1.) The other end of the shaft E' of the drum E carries a bevel gear-wheel R in mesh with a bevel gear-wheel R' , secured on one end of a shaft R^2 , extending longitudinally and journaled in suitable bearings on the main frame J . Mounted to slide on the shaft R^2 and to rotate therewith is a bevel gear-wheel R^3 in mesh with a bevel gear-wheel R^4 , secured to the shaft D' of the pattern-sheet drum D , so that the intermittent rotary motion of the drum E is transmitted by the gearing described to the drum D to cause the drums to rotate intermittently in unison with each other and in the direction of the arrows indicated in Fig. 2. A shifting-lever R^5 is connected with the bevel gear-wheel R^3 to permit the operator to move the bevel gear-wheel R^3 out of mesh with the bevel gear-wheel R^4 whenever it is desired to do so for stopping the movement of the sheets F while adjusting the pattern-sheet A . When the machine is in operation and the drums D and E rotate intermittently, they impart a traveling motion to the sheets A and F , as described, so that the sheets unwind from the spools B and H , and when the last row of holes has been punched in the sheets F then it is desirable to rewind the pattern-sheet A on the spool B and to rewind the punched sheets F on the spool H , so that the pattern-sheet is again in position for the next bunch of sheets F to be punched, while the spool H , with the punched sheets thereon, can be conveniently removed and replaced by another spool for the blank sheets. For the purpose mentioned the spool H is removably journaled on aligned shafts H' and H^2 , (see Fig. 6,) journaled in suitable bearings in the main frame A and provided with spring shifting-levers H^3 H^4 for moving the shafts H' H^2 outwardly to disengage the inner ends of the shafts from the spool H .

In order to rewind the sheets on the spools B and H , the following device is provided: On the main shaft Q are secured pulleys S and S' , connected by belts S^2 S^3 with pulleys S^4 S^5 , mounted to rotate loosely on the shafts B' and H' of the spools B and H , respectively, and the said pulleys S^4 and S^5 are in the shape of clutch-pulleys, adapted to be engaged by clutches S^6 S^7 , mounted to slide on and to turn with the shafts B' and H' . The

clutches S^6 and S^7 are normally out of engagement with the clutch-pulleys S^4 and S^5 , so that the latter rotate loosely when the machine is in operation for punching the sheets F, as described; but when it is desired to re-wind the sheets then the clutches S^6 S^7 are moved in engagement with the pulleys S^4 S^5 , so that the shafts B' and H' , and consequently the spools B and H, are rotated in the inverse direction of the arrows shown in Fig. 2 to wind up the pattern-sheet A on the spool B and the punched sheets F on the spool H. During this operation the pawl Q^6 is drawn out of engagement with the ratchet-wheel Q^7 to allow rotation of the drums E and D in the reverse direction of the arrows shown in Fig. 2.

In order to hold the drums D and E in proper alignment with their spools B and H, the drums are pressed on at one end by springs E^2 D^2 and their shafts are pressed on at the other end by springs E^3 D^3 , adjustable by screw-rods E^4 D^4 , screwing in the main frame J, as plainly indicated in Figs. 3 and 5, it being understood that the springs E^3 D^3 press against the outer pointed ends of the shafts E' D' of the said drums E and D. The spools B and H are similarly adjusted by the use of springs B^5 H^5 and adjusting-screws B^6 and H^6 , as indicated in Figs. 3 and 6.

In order to exhaust the air from the chambers P in the several tiers, the said chambers are connected with a vertical channel P^3 , (see Figs. 1, 3, and 4,) opening at its lower end into a main bellows T, carrying a plurality of exhaust-bellows T' , actuated by suitable links T^2 and levers T^3 from a crank-arm T^4 , secured on the main shaft Q, so that while the machine is in operation the air is conveniently exhausted from the several chambers P to insure proper action of the pneumatics L, as previously explained.

The operation is as follows: When the several parts are in the position shown in Fig. 2 and the main shaft Q is rotated and an intermittent traveling motion is given to the sheets A and F, then whenever a transverse row of apertures in the sheet A registers with corresponding apertures in the tracker-board C, the corresponding pneumatics L are caused to collapse to move the levers K and the punches I into a setting position for the actuating-shoulders N' of the shaft N to impart a swinging motion to the said levers to cause the punches I to punch apertures in the sheets F corresponding to the apertures then in register with the openings in the tracker-board C. It is understood that during this operation the sheets A and F are at a standstill; but as soon as the punches I have returned to their uppermost inactive position then the sheets are again caused to travel as described to bring the next row of transverse apertures in the pattern-sheet A in register with the corresponding tracker-board openings, and the above-described operation is then repeated. Thus the sheets F are automatically punched to form sheets which are facsimiles of the

pattern-sheet A, and when the sheets F are completely punched, as described, then the sheet A is rewound on the spool B and the punched sheets F are rewound on the spool H, after which the spool H is removed from the shafts H' and H^2 and a new spool having blank sheets thereon is replaced on the said shafts. The outer ends of the blank sheets F are now drawn over the die-block G to the drum E and fastened thereon and then the above-described operation is repeated—that is, the pattern-sheet A is drawn over the tracker-board C by the rotation of the drum D, while the sheets F are drawn over the die-block G by the revolving of the drum E, as previously explained.

It is expressly understood that the pneumatics L simply move the punches into setting position—that is, for the shaft N to act on the levers K, which are set—but the pneumatics do not cause the punches I to punch the paper, and consequently little power is required for the pneumatics to perform their functions—that is, to move the levers K and punches I into setting position.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. An apparatus for punching sheets, provided with punching devices comprising punches and levers for moving the same, means for positively actuating the said levers, but normally out of engagement therewith, means for setting the levers in position for engagement by the said actuating means, and means for moving the sheets to be punched intermittently and controlled by the said actuating means, as set forth.

2. An apparatus for punching music-sheets, provided with pneumatic means controlled by a pattern-sheet, punching devices for punching the sheets, and comprising punches and levers for moving the same, the levers being moved by the said pneumatic means to set the punches in punching position, actuating means for actuating the levers when the levers and punches are moved into punching position by the said pneumatic means, and mechanism controlled by the said actuating means for moving the sheets to be punched intermittently, as set forth.

3. An apparatus for punching music-sheets, provided with punches for punching the sheets, levers engaging the punches, setting devices for moving the levers to set the punches into position for punching the sheets, and means normally out of engagement with the levers and arranged to engage said levers to actuate the punches when the latter are moved into punching position by the said setting devices, as set forth.

4. An apparatus for punching sheets, provided with a tracker-board, a punching-die, means for simultaneously moving a pattern-sheet over the tracker-board and the sheet to be punched over the punching-die, punches for the punching-die, levers engaging the

punches, pneumatic setting devices controlled by the pattern-sheet on the tracker-board and arranged to move the levers to set the punches in punching position, and an actuating device for moving the levers to actuate the punches set by the setting device, as set forth.

5. An apparatus for punching sheets, comprising drums geared together and rotating intermittently in unison with each other, one of the drums winding up a pattern-sheet and the other the sheets to be punched, a tracker-board over which passes the pattern-sheet, a pneumatic controlled from the tracker-board, punches for punching the sheets, levers for imparting movement to the punches, the said levers receiving an initial movement from the said pneumatics, and a revolving shaft having a shoulder for engaging the levers actuated by the said pneumatics to impart a final swinging motion to the levers, as set forth.

6. An apparatus for punching sheets, comprising drums geared together and rotating intermittently in unison with each other, one of the drums winding up a pattern-sheet and the other the sheets to be punched, a tracker-board over which passes the pattern-sheet, a pneumatic controlled from the tracker-board, punches for punching the sheets, levers for imparting movement to the punches, receiving an initial movement from the said pneumatics, a revolving shaft having a shoulder for engaging the levers actuated by the said pneumatics, a driving device for imparting a continuous rotary motion to the said shaft, and a pawl-and-ratchet mechanism, actuated from the said shaft, for imparting an intermittent rotary motion to the drums, as set forth.

7. An apparatus for punching sheets, provided with drums, spools, and means for rotating the spools, to rewind the sheets on the spools and unwind the sheets from the drums, the said means comprising a main shaft, pulleys secured on said shaft, clutch-pulleys mounted to rotate loosely on the shafts of the spools, and driven from the pulleys on the main shaft and clutches mounted to slide on and to turn with the shafts of the spools and adapted to engage the said clutch-pulleys, as set forth.

8. An apparatus for punching sheets, provided with spring-pressed punches, levers engaging the punches, pneumatics for imparting an initial movement to the levers and punches, and means for imparting a final swinging motion to the levers actuated by the said pneumatics, as set forth.

9. An apparatus for punching sheets, provided with spring-pressed punches, levers engaging the punches, pneumatics for imparting an initial movement to the levers and punches, and means for imparting a final swinging motion to the levers actuated by the said pneumatics, the said means comprising a revolving shaft and a projection thereon for engaging the levers, as set forth.

10. An apparatus for punching sheets, provided with a drum, a spool, a support intermediate the drum and spool, springs pressing against the drum and spool in one direction, springs pressing the drum and spool in the opposite direction, and adjusting-screws screwing in the supporting-frame for adjusting the last-mentioned springs, as set forth.

11. An apparatus for punching sheets according to a pattern-sheet, provided with a drum, a spool, a support intermediate the drum and spool, and means for adjusting the drum and spool, to bring the same in alignment with each other, the said means comprising springs pressing against the drum and spool in one direction, and adjustable springs pressing the drum and spool in the opposite direction, as set forth.

12. An apparatus for punching sheets, provided with a drum for the sheets to wind up on, a spool for the sheets to unwind from, a punch-die intermediate the drum and spool for the sheets to pass over in a stretched condition, punches operating in conjunction with the punch-die, to punch the sheets, levers for moving the punches, means for imparting an initial movement to the levers to set the punches in punching position, and means for imparting a final swinging movement to the levers, as set forth.

13. An apparatus for punching sheets provided with spring-pressed punches, levers engaging with one end the upper ends of the punches, pneumatics, rods connected with the pneumatics and provided with loops engaging the other ends of said levers, to impart an initial movement to the levers and punches, and means for imparting a final swinging motion to the said levers, as set forth.

14. An apparatus for punching sheets, provided with punches mounted to slide vertically, springs for normally holding the punches in an uppermost position, levers engaging with their outer ends the upper ends of the punches, pneumatics for imparting an initial movement to the levers and punches, rods connected with the said pneumatics and having loops at their lower ends engaging the inner ends of said levers, a revolving shaft and a projection on said shaft for engaging the inner ends of said levers to impart a final swinging motion thereto, as set forth.

15. An apparatus for punching sheets, comprising drums arranged to turn in unison, one of said drums winding up a pattern-sheet and the other the sheets to be punched, punching devices for punching the sheets, means for positively actuating the said punching devices, but normally out of engagement therewith, means for setting the punching devices in position for engagement by the said actuating means, and means controlled by the said actuating means for imparting an intermittent rotary motion to the drums, as set forth.

16. An apparatus for punching sheets, com-

prising drums geared together, one of the drums winding up a pattern-sheet and the other the sheets to be punched, a tracker-board over which passes the pattern-sheet, pneumatics controlled from the tracker-board, punches for punching the sheets, levers for imparting movement to the punches, and receiving an initial movement from the said pneumatics, a shaft provided with means for engaging the said levers to impart a final movement to the punches, means for driving the shaft and mechanism actuated from the shaft for imparting an intermittent rotary motion to the drums, as set forth.

17. An apparatus for punching sheets, comprising drums, rotating in unison with each other, one of the drums winding up a pattern-sheet and the other the sheets to be punched, a tracker-board over which passes the pattern-sheet, a die-block over which the sheets to be punched are moved, pneumatics controlled from the tracker-board, vertically-movable punches operating in conjunction with the die-block for punching the sheets, springs for normally holding the punches in

an uppermost position, levers engaging the upper ends of said punches to move the same against the tension of the springs, connections between the pneumatics and the said levers for imparting an initial movement to the levers from the pneumatics, a shaft provided with means for imparting a final swinging motion to the levers, means for revolving the said shaft and means actuated from the said shaft for imparting an intermittent rotary motion to the drums, as set forth.

18. An apparatus for punching sheets provided with punches, levers for moving the punches, means for imparting an initial movement to the levers and punches, and means for imparting a final swinging motion to the levers, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HERMANN MEYER.

Witnesses:

HERMAN J. GROENEVELD,
AMEDEO RINO.