No. 753,058. PATENTED FEB. 23, 1904.

F. J. FLOCKE.

MACHINE FOR BORING HOLES IN THE KEYS OF PIANO ACTIONS.

APPLICATION FILED MAY 15, 1903.

NO MODEL. 4 SHEETS—SHEET 1.

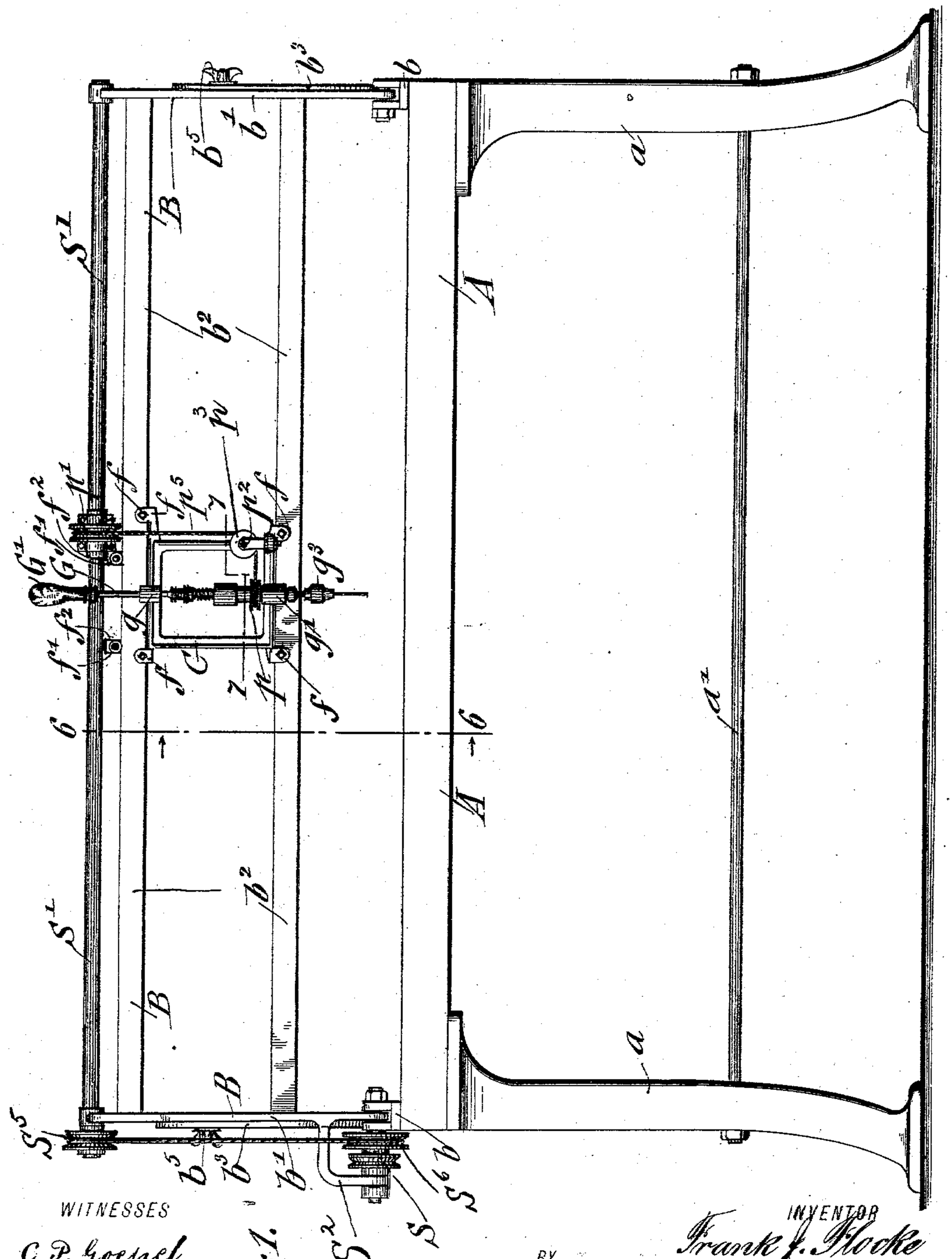

Fig. 1.

WITNESSES

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NO MODEL. 4 SHEETS—SHEET 2.

Fig. 2.

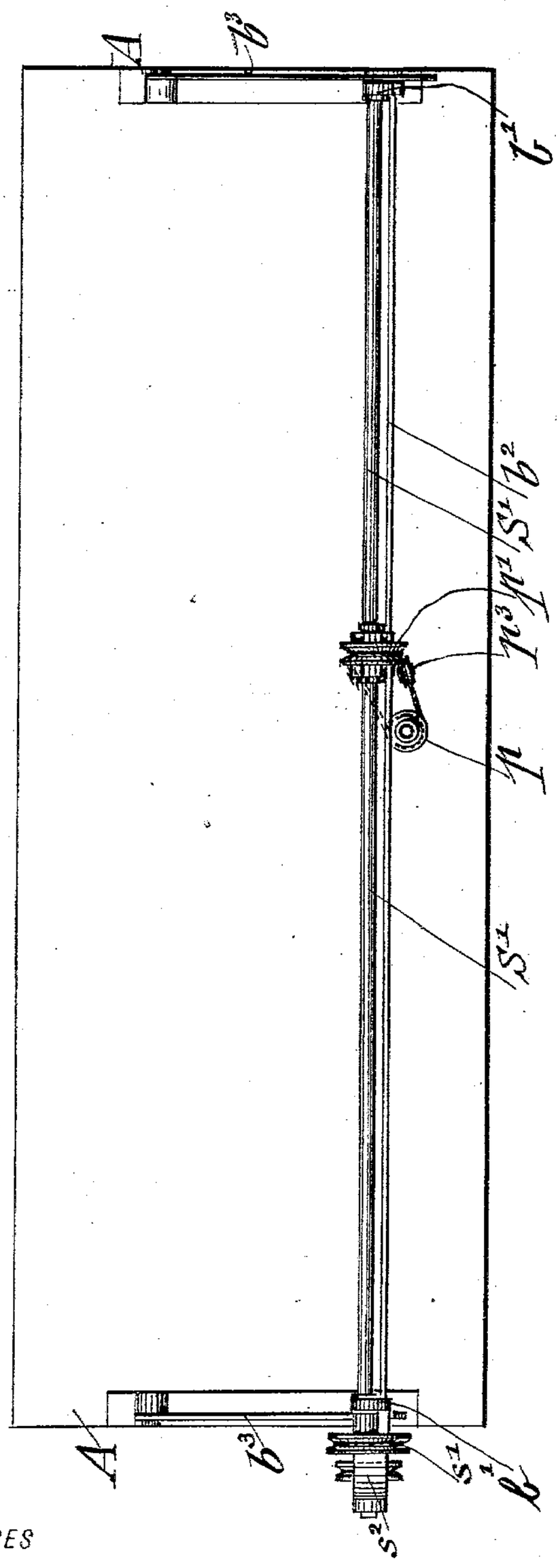


Fig. 3.

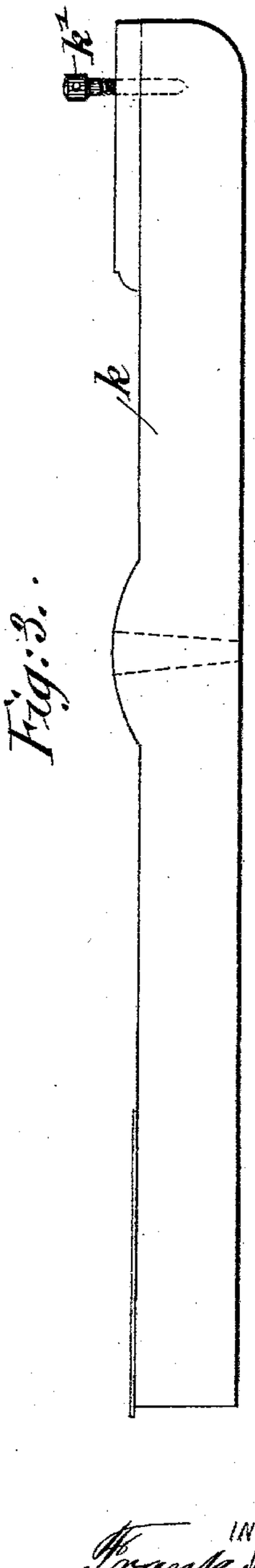
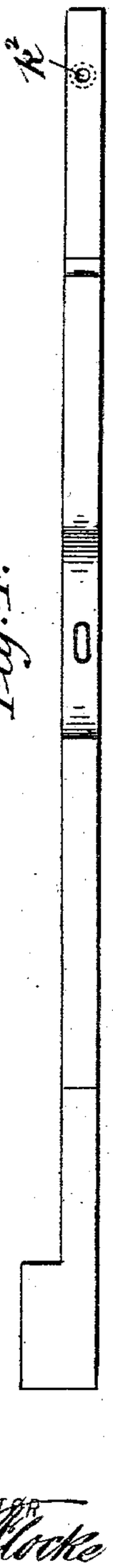


Fig. 4.



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NO MODEL. 4 SHEETS—SHEET 3.

Fig. 6.

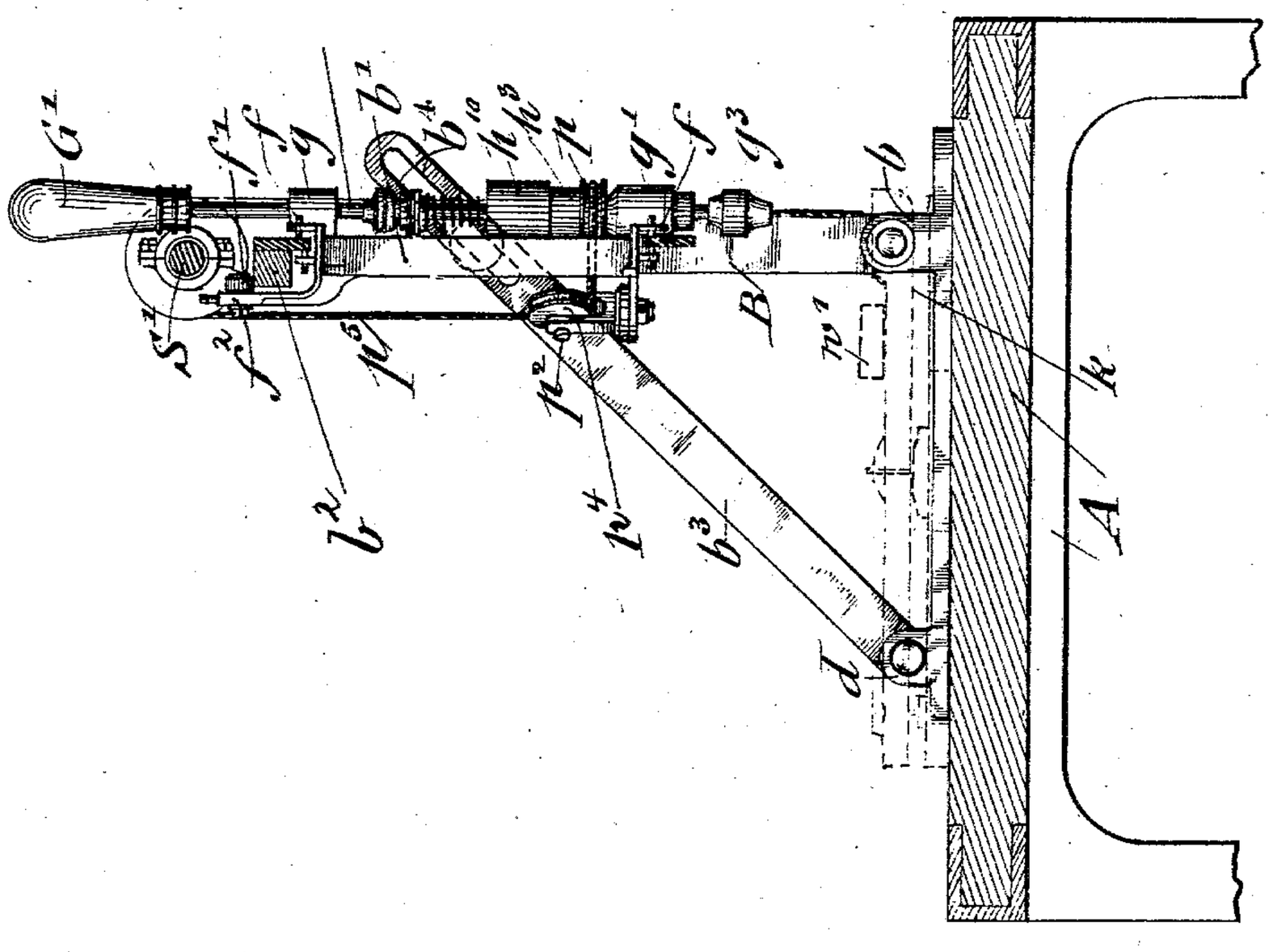


Fig. 5.

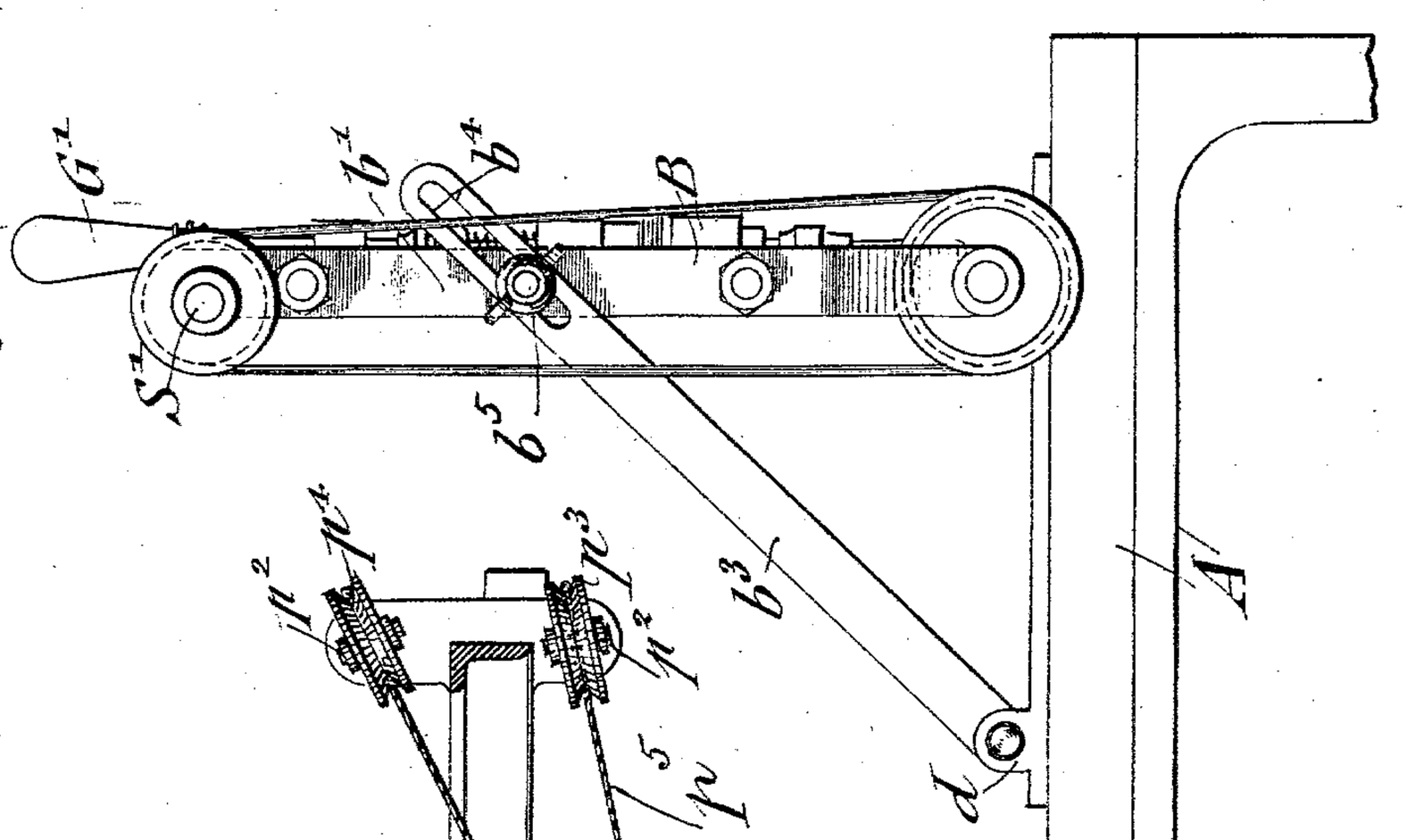
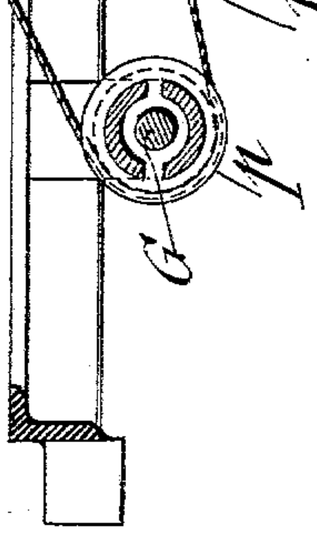


Fig. 7.



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NO MODEL. 4 SHEETS—SHEET 4.

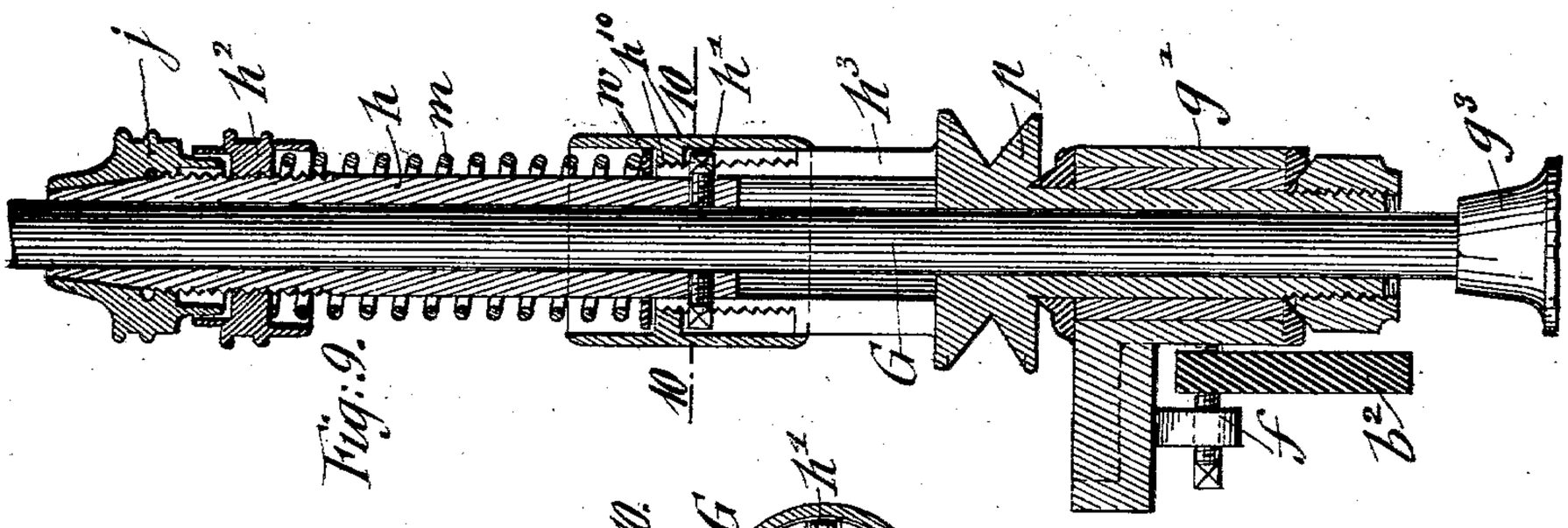

Fig: 9.

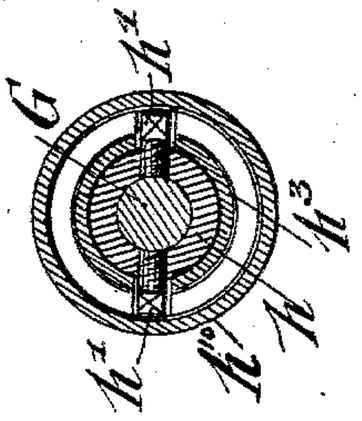

Fig: 10.

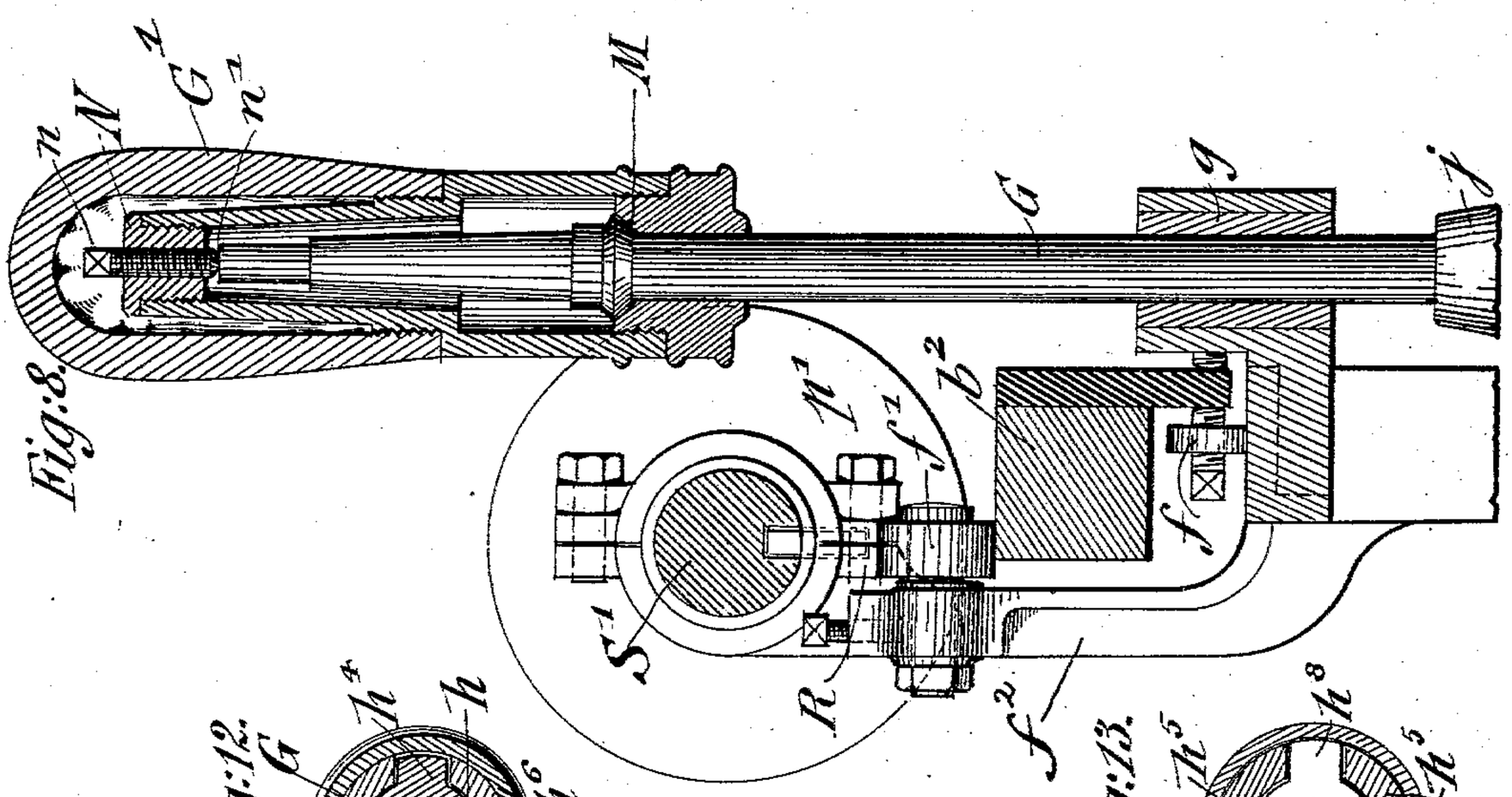

Fig: 8.

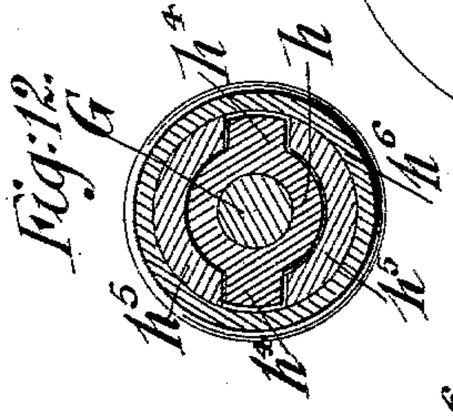

Fig: 12.

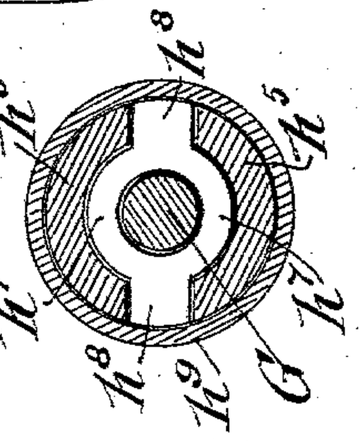

Fig: 13.

Fig: 11.

WITNESSES

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No. 753,058. Patented February 23, 1904.

UNITED STATES PATENT OFFICE.

FRANK J. FLOCKE, OF NEW YORK, N. Y.

MACHINE FOR BORING HOLES IN THE KEYS OF PIANO-ACTIONS.

SPECIFICATION forming part of Letters Patent No. 753,058, dated February 23, 1904.

Application filed May 15, 1903. Serial No. 157,303. (No model.)

To all whom it may concern:

Be it known that I, FRANK J. FLOCKE, a citizen of the Empire of Germany, residing in New York, borough of the Bronx, and State of New York, have invented certain new and useful Improvements in Machines for Boring Holes in the Keys of Piano-Actions, of which the following is a specification.

This invention relates to an improved machine for boring holes in the keys of piano-actions.

Heretofore the holes in the rear ends of the keys of piano-actions into which the action-operating screw was inserted were bored by hand, which operation was, however, connected with inaccuracies, especially when the holes had to be bored at a slight slant. My improved machine is intended to overcome this objection by boring the holes of all the keys at any desired slant and at the exact point where they are required after the same are assembled on the key-bottom in a quick and effective manner; and for this purpose the invention consists of a machine for boring holes in the keys of piano-actions which comprises a table for supporting the keyboard, a guide-frame pivoted to said table and adapted to be set at a suitable inclination thereto, a traversing frame supported on said guide-frame, a drill-spindle supported in bearings of said traversing frame, means for transmitting continuous rotary motion to the drill-spindle from the driving-shaft, a handle at the upper end of the drill-spindle for raising or lowering the boring-tool, and means connected with the drill-spindle by which the depth of the hole is controlled. The invention consists, further, of certain details of construction and combinations of parts, which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front elevation of my improved machine for boring holes in the keys of piano-actions. Fig. 2 is a plan view of the same. Figs. 3 and 4 are respectively a detail side and top view of a key, showing the hole bored in the same for the action-operating set-screw. Fig. 5 is a side elevation of the machine. Fig. 6 is a vertical transverse section on line 6 6, Fig. 1. Fig. 7 is a horizontal section on line 7 7, Fig. 1, showing the cord-and-pulley transmission for the drill-spindle. Fig. 8 is a vertical transverse section drawn on a larger scale through the handle at the upper end of the drill-spindle and the support for the same on the upright and traversing frames. Fig. 9 is a vertical central section through the drill-spindle. Fig. 10 is a horizontal section on line 10 10, Fig. 9. Fig. 11 is a vertical transverse section of a modified construction of the drill-spindle; and Figs. 12 and 13 are horizontal sections respectively on lines 12 12 and 13 13 of Fig. 11.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the supporting-table of my improved machine for boring holes in the keys of piano-actions. The table A is supported on upright side standards a, which are connected by longitudinal brace-bolts a'. At the ends of the table A are arranged lugs b, to which are pivoted the lower ends of an upright guide-frame B, which is of oblong shape and composed of end standards b' and longitudinal connecting-bars b^2. The upright pivoted guide-frame B is adjusted either at right angles to the supporting-table A or at any suitable angle of inclination or slant to the same by means of braces b^3, which are pivoted to lugs d back of the lugs b and which are provided with slots b^4, through which clamping-screws b^5 pass, by means of which the guide-frame may be clamped in any desired position within the limits of the slots, as shown in Figs. 5 and 6. The sides of the guide-frame B are provided at their upper ends with suitable bearings for a longitudinal shaft S′, which carries a pulley S^5 at one end, to which rotary motion is imparted by a pulley S^6 on the driving-shaft S, which is supported in suitable bearings located in brackets S^2 and which receives motion from an overhead counter-shaft and belt-and-pulley transmission in the usual manner.

On the longitudinal guide-bars b^2 of the upright guide-frame B is supported a traversing frame C, which is guided on said longitudinal bars b^2 by means of adjustable screw-studs f, located in brackets at the corners of the trav-

ersing frame C and moved by means of adjustable antifriction-rollers f' on the upper guide-bar b^2, which are applied to the upwardly-extending hanger ends f^2 of the traversing frame C. The frame C can be easily moved by a slight pressure in one or the other direction over the guide-bars b^2 while being held all the time in proper and accurate position thereto by the screw-studs. The traversing guide-frame C is provided with central neck and step bearings g g' for a vertical drill-spindle G, which carries at its lower end a chuck g^3 for the boring-tool, as shown in Figs. 1 and 6. The drill-spindle G is provided at its upper end with a handle G', which is provided at the lower end with a journal-bearing M for the rotary drill-spindle G and at the upper end with a retaining-nut N, provided with a screw n, that seats with its lower conical end n' on the upper end of the drill-spindle G, as shown clearly in Fig. 8. By this arrangement the drill-spindle G can turn freely in the handle G' and be pressed in downward direction by the hand during the boring action of the tool. The depth of the boring action of the tool is controlled by a tubular sleeve h, which is attached to the drill-spindle G by a set-screw h' and which is provided with a screw-collar h^2, that is screwed on the upper exteriorly-threaded end of the tubular sleeve h and which is provided with a jam-nut j, that fits on the upper end of the tubular sleeve h and retained rigidly in position thereon. To the upper end of the pulley p is attached a diametrically recessed cylindrical collar h^3, that is threaded at its upper end, so as to permit the adjusting of a screw-threaded supporting-collar h^{10}. The exterior threaded portion of the sleeve h^3 forms, with the collar h^{10}, in connection with a suitable washer w, a support for a helical spring m, that is interposed between the collar h^2 and washer w, as shown clearly in Fig. 9. The tension of the spring m returns the drill-spindle G into normal raised position as soon as the pressure of the hand is released from the handle G'. By the downward pressure of the hand on the handle G' the spring m is contracted and the drill-spindle G lowered until the sleeve h abuts against the driving-pulley p on the drill-spindle G and limits thereby the depth of the hole to be bored. By adjusting the collar h^{10} higher or lower on the exterior threaded portion h^3 the depth of the hole to be bored is accurately limited. The construction so far described is shown clearly in Figs. 9 and 10.

In Figs. 11, 12, and 13 a modified construction is shown, which is independent of the tension of the spring. In this case the tubular sleeve h is provided at its lower end with diametrical lugs h^4, that are guided in recesses of the cylindrical collar h^5, to which is screwed a collar h^6, that supports the lower end of the helical spring m. A second collar h^7, having diametrical lugs h^8, is screwed into the lower end of a surrounding sleeve h^9 and adjusted higher or lower in the same, so as to define thereby the depth of the bore hole by the abutting of the lower end of the tubular sleeve h against the collar h^7. Any other construction for limiting the downward motion of the drill-spindle for boring the required depth of hole may be employed, as I do not desire to confine myself to the special construction shown.

Rotary motion is transmitted to the pulley p on the drill-spindle G from a pulley p' on the intermediate shaft S', to which the pulley p' is splined, and permitted to slide on the shaft S' in connection with the traversing frame C, as shown in Fig. 1. For this purpose the upper end of one of the bracket-hangers of the traversing frame C is connected with the frame of the pulley in a suitable manner, as shown at R in Fig. 8, so that the pulley p' moves with the traversing frame C over the guide-bars b^2. At the lower part of the traversing frame C, vertically below the pulley p', are arranged on horizontal brackets p^2 two additional guide-pulleys p^3 p^4, over which an endless cord or belt p^5 is guided, which passes from the pulley p' of the intermediate shaft S' over the two guide-pulleys p^3 p^4 and over the pulley p of the drill-spindle G, as shown clearly in Fig. 7, so as to transmit thereby continuous rotary motion from the drill-spindle G.

An individual key k is shown in Fig. 4 provided with a hole k^2, and in Fig. 3 the key is shown provided with an action-operating screw k', inserted in the hole. The keys k are assembled on the key-bottom and placed on the table A with their rear ends to be bored vertically below the upright guide-frame B, as shown in dotted lines in Fig. 6. A heavy iron bar or weight w' is then placed in longitudinal position over the entire set of keys, so as to hold them firmly in position on the table A. The guide-frame B is then adjusted into vertical position or at an angle to the table, as required by the holes to be bored. The transverse frame C is then moved over to the left-hand side and the boring-tool then placed in position over the point at the rear end of the first key where the hole is to be bored. By pressure on the handle G' of the drill-spindle G the boring-tool is then lowered and the hole bored. The traversing frame C is then moved by the left hand forward toward the right, so as to place the boring-tool in position over the next key, when the next hole is bored in the same manner, and so on until the traversing frame C arrives at the right-hand end of the guide-frame B.

By my improved machine the holes for the actuating-screws of the keys of the piano-actions are bored quickly and accurately and all in the same relative position, so that a reliable and accurate connection is obtained. The boring of the holes of the keys of the entire

keyboard is accomplished very quickly, so that not only a better boring of the holes is obtained, but also a considerable saving in time and labor in accomplishing this part of the work.

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

1. In a machine for boring holes in the keys of piano-actions, the combination, with a supporting-table for the piano-keyboard, of an upright guide-frame pivoted to said table, means for adjusting said upright guide-frame in proper position relatively to the table, a traversing frame guided on said guide-frame, a drill-spindle supported on said traversing frame, and means for transmitting continuous rotary motion to said drill-spindle while the same is lowered for boring the hole, substantially as set forth.

2. In a machine for boring holes in the keys of piano-actions, the combination, with a supporting-table for the piano-keyboard, of an upright guide-frame pivoted to said table, means for adjusting said upright guide-frame in proper position relatively to the table, a traversing frame guided on said guide-frame, a drill-spindle supported on said traversing frame, means for transmitting continuous rotary motion to said drill-spindle while the same is lowered for boring the hole, and means arranged on the drill-spindle for controlling the depth of the hole to be bored, substantially as set forth.

3. In a machine for boring holes in the keys of piano-actions, the combination, with a supporting-table for the piano-keyboard, of an upright guide-frame pivoted to said table, means for adjusting said upright guide-frame in proper position relatively to the table, a traversing frame guided on said guide-frame, a drill-spindle supported on said traversing frame, a driving-shaft at one end of the machine, an intermediate shaft supported in bearings at the upper end of said guide-frame, means for transmitting motion from the driving-shaft to the intermediate shaft, and means for transmitting motion from the intermediate shaft to the drill-spindle, substantially as set forth.

4. In a machine for boring holes in the keys of piano-actions, the combination, with an upright supporting guide-frame formed of vertical end standards and horizontal guide-bars, of a traversing frame, hangers on said traversing frame for suspending the same from the horizontal guide-bars, antifriction-rollers on said hangers, corner set-screws on said traversing frame, step and neck bearings on said traversing frame, a drill-spindle supported in said step and neck bearings, a handle at the upper end of the drill-spindle, means arranged on said drill-spindle for limiting the extent of boring motion of the tool, means for returning the drill-spindle into normal raised position, and means for imparting rotary motion to the drill-spindle, substantially as set forth.

5. In a machine for boring holes in the keys of piano-actions, the combination, with an upright supporting-frame provided with longitudinal guide-bars, of a driving-shaft supported at the upper end of said supporting-frame, a pulley splined to said driving-shaft, a traversing frame guided on said guide-bars, means for connecting said traversing frame with the splined pulley, bearings on said traversing frame, a drill-spindle supported in said bearings, a handle at the upper end of the drill-spindle, means for limiting the vertical motion of the drill-spindle for controlling the depth of the bore-hole, a spring for returning the drill-spindle into normal position, and means for transmitting rotary motion from the pulley on the intermediate shaft to the drill-spindle, substantially as set forth.

6. In a machine for boring holes in the keys of piano-actions, the combination, with an upright supporting-frame provided with longitudinal guide-bars, of a traversing frame supported and movable on said guide-bars, a drill-spindle supported by said traversing frame, a sleeve keyed to said drill-spindle, means for limiting the motion of said sleeve when the spindle is pressed, for limiting the depth of hole to be bored, means for returning the spindle to its normal position, and means for rotating the spindle, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

FRANK J. FLOCKE.

Witnesses:

PAUL GOEPEL,

C. P. GOEPEL.