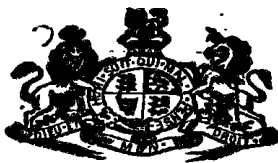


N^o 6420

A.D. 1894

Date of Application, 30th Mar., 1894—Accepted, 2nd June, 1894

COMPLETE SPECIFICATION.

Improvements in Engraving Machines.

We, WILLIAM TAYLOR, THOMAS SMITHIES TAYLOR, and HERBERT WILLIAM HOBSON, all of Slate Street, Leicester, in the County of Leicester, Scientific Instrument Makers, do hereby declare the nature of this invention and in what manner the same is to be performed to be particularly described and

5 ascertained in and by the following statement:—

This invention relates to machines in which a revolving drill guided by one arm of a pantograph engraves a copy of a design or pattern along which a tracing point carried by another arm is guided. We shall describe these improvements referring to the accompanying drawings.

10 Figure 1 is a side view, Figure 2 is an end view and Figure 3 is a plan of the upper part of an engraving machine according to this invention.

Figures 4 and 5 are respectively side and end views partly in section of the feeding gear for the drill.

15 Figures 6 and 7 are respectively side and end views and Figure 8 is a plan of a chuck for holding cylindrical or other round objects to be engraved on.

Figures 9 and 10 are respectively a front view and a section of a gauge wheel for circular work.

Figures 11 and 12 are respectively a plan and side view of a circular table for the pattern.

20 Figure 13 is an elevation showing the arrangement for copying to the same scale as the pattern.

Figure 14 is a section of arrangement for feeding the drill electrically.

Figure 15 is a section and Figure 16 a front view of a modified arrangement for electrical feed.

25 On a column A of convenient height we provide a slide bed a on which we fit a slide a^1 . On this slide we pivot at a^2 a pantograph or parallelogram of jointed bars, one of its sides being extended as an arm B carrying the tracer b . The side C opposite to B carries a slide c to which is connected the bearing of the drill G, and the side D which connects the sides B and C is fitted to slide in a guide d which

30 can turn on the pivot a^2 . By sliding the bar D to various positions in the guide d , and c to various positions proportionally on the bar C, the scale of the copy can be varied in the usual way, the centres of the tracer b , the pivot a^2 and of the drill being always in one straight line. The bars C and D are suitably graduated. The slide a is also graduated and when c is shifted along C, and D along d , the

35 slide a^1 is also moved along a so that the axis of the drill spindle G remains always in the same position when the tracer b is in the central or zero position shown in Figure 3.

A table b^1 on which the pattern or design to be copied is fixed, is mounted on a pivot b^4 on which it can be turned one quarter round, its movement being

40 limited by adjustable stop screws b^2 b^3 , so that it can be clamped by a nut on its pivot bolt b^4 , either in the position shown or in a position at right angles to it as indicated by the dotted lines in Figure 3. A slide rest E having longitudinal, transverse and vertical movements, is fixed on the column A, and on its upper face is fixed the plate or other flat object on which the copy is to be engraved.

45 When the object to be engraved is of cylindrical or other round shape the chuck F shewn in Figures 6, 7 and 8 has its base f bolted on to the table of the slide rest E. The chuck has a disc f^1 on the face of which is fixed the object to be engraved. This disc is pivotted by a pin f^3 in the centre of a disc f^2 so that

[Price 8d.]

BIRMINGHAM
FREE LIBRARIES

W. and T. S. Taylor and Hobson's Improvements in Engraving Machines.

it can be turned round. The pin f^3 has fixed on it a collar f^4 and through the centre of f^2 passes a sleeve f^5 enclosing the pin f^3 . This sleeve is fitted with a key so that it can slide in f^2 but cannot turn, its rear end is screw threaded and is engaged by a nut with a handle f^6 by pushing down which the sleeve f^5 is screwed back against the collar f^4 thereby drawing the disc f^1 back against the face of f^2 so that it is firmly clamped in position. By raising the handle f^6 the disc f^1 is released and can be turned. The disc f^2 has integral with it a double circular segment f^7 which can slide along a circular segmental guide f^8 projecting up from the base f . The disc f^2 carrying f^1 can be turned more or less on the horizontal axis of the guide f^8 and can be clamped by a nut f^9 , the face of f^1 being thus presented in a vertical or in a horizontal plane or at any intermediate inclination. On the pivot pin f^3 is clamped by a nut a notched disc f^{10} with the notches of which a spring pawl f^{11} can engage so as to hold the disc f^1 in various positions as it is turned round on its axis f^3 . It is convenient to have a number of discs f^{10} having various numbers of notches, any one of these being put on f^3 to suit the division of the circular piece, fixed in f^1 , that has to be engraved.

When work has to be done for which no disc f^{10} is adapted it is convenient to employ, instead of the divided disc f^{10} , a gauge wheel W such as is shown in front view in Figure 9 and in section in Figure 10; the rim of this wheel is slit at w and has fitted within it an elastic spring ring w^1 . A strip of paper or other flexible material can be put round the circumference of the wheel the ends of the strip being both passed through the slit w and the ring w^1 can be then turned round until its end reaches a stop at w^2 , thus clamping the ends of the strip. This strip having been marked (with lines to be read against the edge of the pawl) for certain engraving work can be taken off the wheel W and put aside to be used again when similar work has to be executed.

Having, as stated above, made provision for always bringing the axis of the drill spindle into the same vertical line when the tracer is in its zero position notwithstanding the alteration of parts to vary the scale of the copy, we prefer to make the chuck base f so that when it is fixed on the slide rest E with its right hand edge close against the vertical face of the slide rest, the axis of the disc f^1 is vertically below the axis of the drill spindle.

When the pattern to be copied consists of letters or other designs which are to be successively brought to the zero point for the tracer b , we remove the rectangular table b^1 and fix in its place a circular table b^5 , shown in plan in Figure 11 and in elevation in Figure 12. It is fixed by the bolt b^4 so that a point z upon its face coincides in position with the centre of the bolt b^4 and therefore with the position of the tracer b as shewn in Figure 3 corresponding to what may be termed the zero position of the drill. The circular plate b^5 is divided at its edge by notches engaged by a spring pawl b^7 so that it can be turned round a pin b^6 to bring successive letters or other designs round to z .

When the engraving has to be made to the same scale as the pattern, we remove the slide a^1 and the pantograph, leaving the drill bearing still carried on the arms h h^1 . On the top of h we fix by a screw l a U shaped bracket L which carries a tracer l^1 adjustable in height. We also bolt on a the head of the column, a stand l^2 on which we mount the plate b^1 carrying the pattern. On now moving the tracer l^1 over the pattern, which is stationary, the drill moves with it copying to the same scale as the pattern.

The drill spindle G has on it a pulley g round which the driving band is led from a pair of guide pullies g^1 mounted in a fork g^2 which is steadied by a link g^3 connecting it to the column A and by a stay rod g^4 connecting it to the bearing of the drill spindle, along which rod the fork g^2 can be slid to tighten the band. The bearing of the drill spindle is formed in a boss H projecting from a deep bracket h which is jointed to a deep link h^1 pivotted to an arm h^2 projecting up from the top of the column A . Thus, while the jointing of h to h^1 and of h^1 to h^2 allows freedom of motion to the drill spindle in the horizontal plane, the boss H is

W. and T. S. Taylor and Hobson's Improvements in Engraving Machines.

steadied against any vertical movement or oscillation. The feed of the drill is effected in the following manner. The bearing of the drill spindle G is formed in a sleeve K which can slide vertically in the boss H. In a collar k at the top of the sleeve is adjustably fixed a nut k^1 for a screw threaded sleeve k^2 from which
5 projects a horizontal pin k^3 between two vertical pins, one of which k^3 projects down from the nut k^1 and the other from the collar k . A milled hand wheel k^4 has the lower part of its spindle projecting down through the sleeve k^2 , which is clamped on it with certain friction by a nut and elastic washer k^5 , and has the upper part k^6 screw threaded to work in the boss of a bracket projecting from h . The pitch of
10 the screw thread on k^2 is greater than the pitch of k^6 . The edge of the nut k^1 is graduated so that it can be turned more or less round from the position shown and clamped in the collar k by a screw k^7 . By thus turning the nut k^1 the pin k^3 is moved away from k^3 allowing the sleeve k^2 to turn to an extent determined by the setting of the nut k^1 . If k^1 be in the position shewn so that the pin k^3 is
15 engaged between the two vertical pins, then the sleeve k^2 cannot turn and consequently, on turning by hand the wheel k^4 , the screw k^6 alone operates, moving the sleeve K and drill spindle G up or down according as k^4 is turned in the one direction or the other. In this case, as the sleeve k^2 is kept stationary, the spindle of the wheel k^4 merely turns within it subject to the frictional resistance due to
20 the nut and washer k^5 . But, when the pin k^3 is moved a certain distance away from k^3 leaving the sleeve k^2 free to turn so far round, then on turning the wheel k^4 the sleeve K and drill spindle G are raised and lowered to an extent determined by the difference in pitch of the two screw threads k^2 and k^6 and the part of a revolution through which the sleeve k^2 is turned as determined by the position of
25 the pin k^3 . In this way the depth to which the drill enters the work is determined by the setting of the nut k^1 more or less round. If, for instance, the nut k^1 be set so that the pin k^3 is turned away from k^3 to the extent of a quarter of a revolution, and if the hand wheel k^4 be turned until k^3 meets k^3 , the drill then just touching the work, then on turning back the hand wheel k^4 while the screw k^6
30 tends to raise the drill, the screw sleeve k^2 tends to a greater extent to lower it, and the drill is thus fed gradually downwards until the pin k^3 is stopped after having turned the quarter of a revolution backwards, and then the screw k^6 alone acts, raising the drill. The screw k^6 may be used alone for feeding, the sleeve k^2 being in that case prevented from turning by its pin k^3 being engaged between the
35 two vertical pins. When the feeding is effected in this manner, we provide an adjustable stop k^8 to prevent the sleeve K and drill G from being screwed down beyond the distance to which the stop is adjusted.

The feed may also be effected electrically as we shall describe referring to Fig. 14 which is a vertical section. To the sleeve K which slides in the boss H we attach
40 a frame M which carries within it an electro magnet m attached to its upper limb. Through this electro magnet passes a spindle m^1 which terminates above in a screw that is worked in a screw threaded hole in the bracket of h by turning an iron hand wheel m^2 . On the lower limb of the frame M centrally under the spindle m^1 is a screw stop m^3 which can be delicately adjusted up or down by a
45 graduated head m^4 .

The rest on which the work to be engraved is fixed or the work itself, which is of metal, is insulated from the machine and connected by a conductor to one terminal of a battery or other source of electricity, the other terminal is connected to the one end of the coil wire of the magnet m , the other end of the coil being
50 connected to the frame M.

Having adjusted the stop m^3 a certain distance down from the end of the spindle m^1 which distance is to determine the depth of the engraving, the wheel m^2 is turned by hand screwing down the spindle and lowering the wheel from the magnet until the spindle m^1 meets the stop m^3 . Continuing to turn the wheel m^2
55 the whole frame M and with it the drill spindle and also the magnet are lowered, the wheel m^2 continuing to maintain the same distance from the magnet as that determined in the first instance by the setting of the stop m^3 . But, as soon as the

W. and T. S. Taylor and Hobson's Improvements in Engraving Machines.

drill touches the work, an electrical current is transmitted through the magnet coils, and the magnet is attracted down to the iron wheel m^2 feeding the drill into the work until the magnet reaches the wheel.

A modified arrangement of electrical feed is shewn in vertical section Fig. 15 and front view Fig. 16. In this case the soft iron collar k of the sleeve K is made with it a disc n^1 which has a notch at the edge and is enclosed within a milled ring n^2 forming a hand wheel.

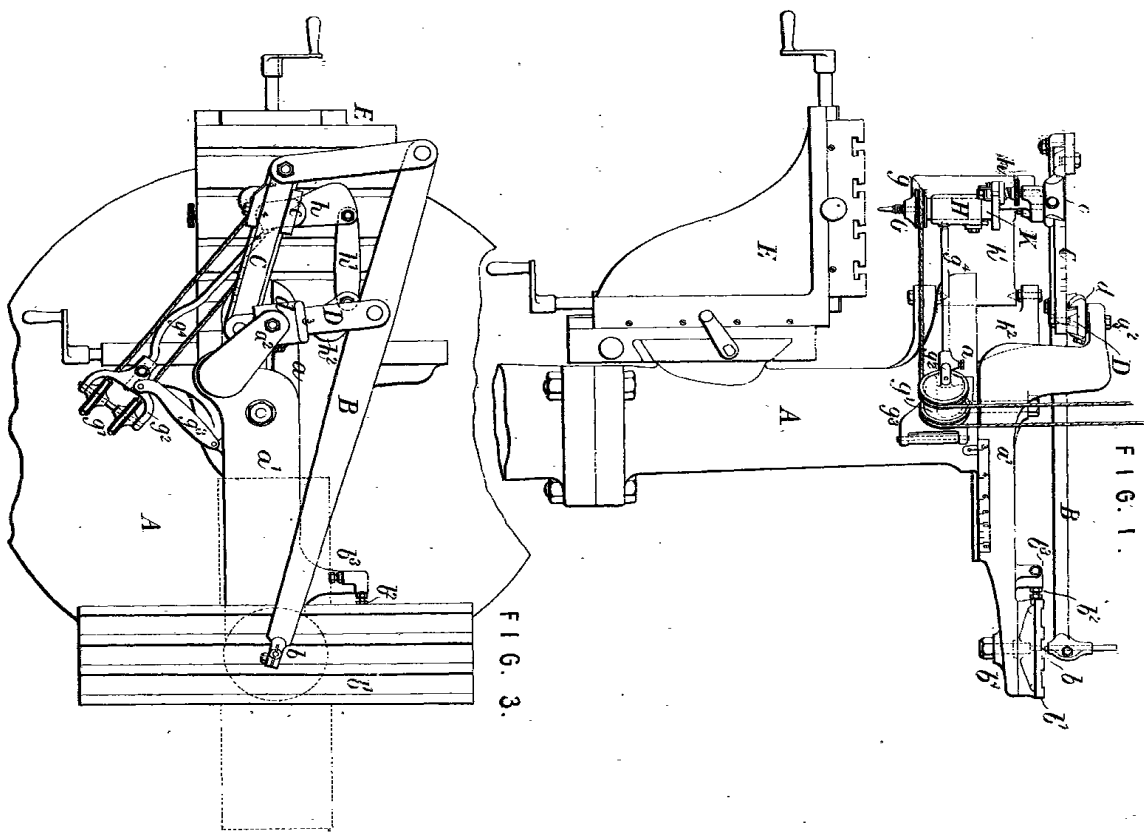
Under this is another milled hand wheel n^3 having within it a disc n^4 jointed at its edge to n^3 by a spring hinge which usually holds n^4 up so that a stud upon its opposite edge is engaged in the notch of n^1 . On the hand wheel n^3 there is a stop n^5 projecting upwards and on the ring n^2 there is a stop n^6 projecting downwards; the chamfered inner edge of the ring n^2 has a zero mark, and the upper face of the disc n^1 is graduated, and the ring n^2 can be turned round any desired number of the divisions according to the desired depth of the engraving, separating more or less the stop n^6 from n^5 , in which position the ring n^2 is clamped to the disc n^1 by a setting screw n^7 . The metal to be engraved being insulated, and it and the coil of m being connected to a source of electricity, as in the arrangement Fig. 14, the operator turning the ring n^2 lowers the sleeve K and all carried on it until the drill touches the work, closing the circuit of the magnet m which thereupon attracts its armature, the hinged disc n^4 , the stud of which is thus withdrawn from the notch of n^1 . The operator continues to screw down until the stop n^6 meets n^5 , and now, as the hand wheel n^3 is firmly held by the magnetic attraction on n^4 the drill cannot be fed farther down. Thus the depth of the engraving is determined by the number of divisions through which n^2 is turned.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1. An engraving machine constructed and operating substantially as described with reference to Figs. 1 to 10 inclusive.
2. Mounting the pantograph and the pattern table on a slide, adjustable to maintain the axis of the drill always in the same position when the tracer is at zero of the table.
3. Supporting the guide pulleys of the band by a steadying link and stay rod.
4. The chuck for circular work constructed and operating substantially as described with reference to Figs. 6, 7 and 8.
5. The gauge wheel for flexible band, substantially as described with reference to Figs. 9 and 10.
6. The circular pattern table, arranged and operating substantially as described with reference to Figs. 11 and 12.
7. The appliance for copying to same scale as pattern, substantially as described with reference to Fig. 13.
8. The feed apparatus substantially as described with reference to Figs. 4 and 5.
9. The herein described method of determining the depth of the engraving by providing for the feed screw of the drill an adjustable stop actuated by an electro magnet having its coil in a circuit which is closed by the contact of the drill with the work.
10. The electrical feed arrangement described with reference to Fig. 14.
11. The modified electrical feed arrangement described with reference to Figs. 15 and 16.

Dated this 30th day of March 1894.

ABEL & IMRAY,
Agents for the Applicants.



[This drawing is a reproduction of the Original on a reduced scale]

BIRMINGHAM
FREE LIBRARY

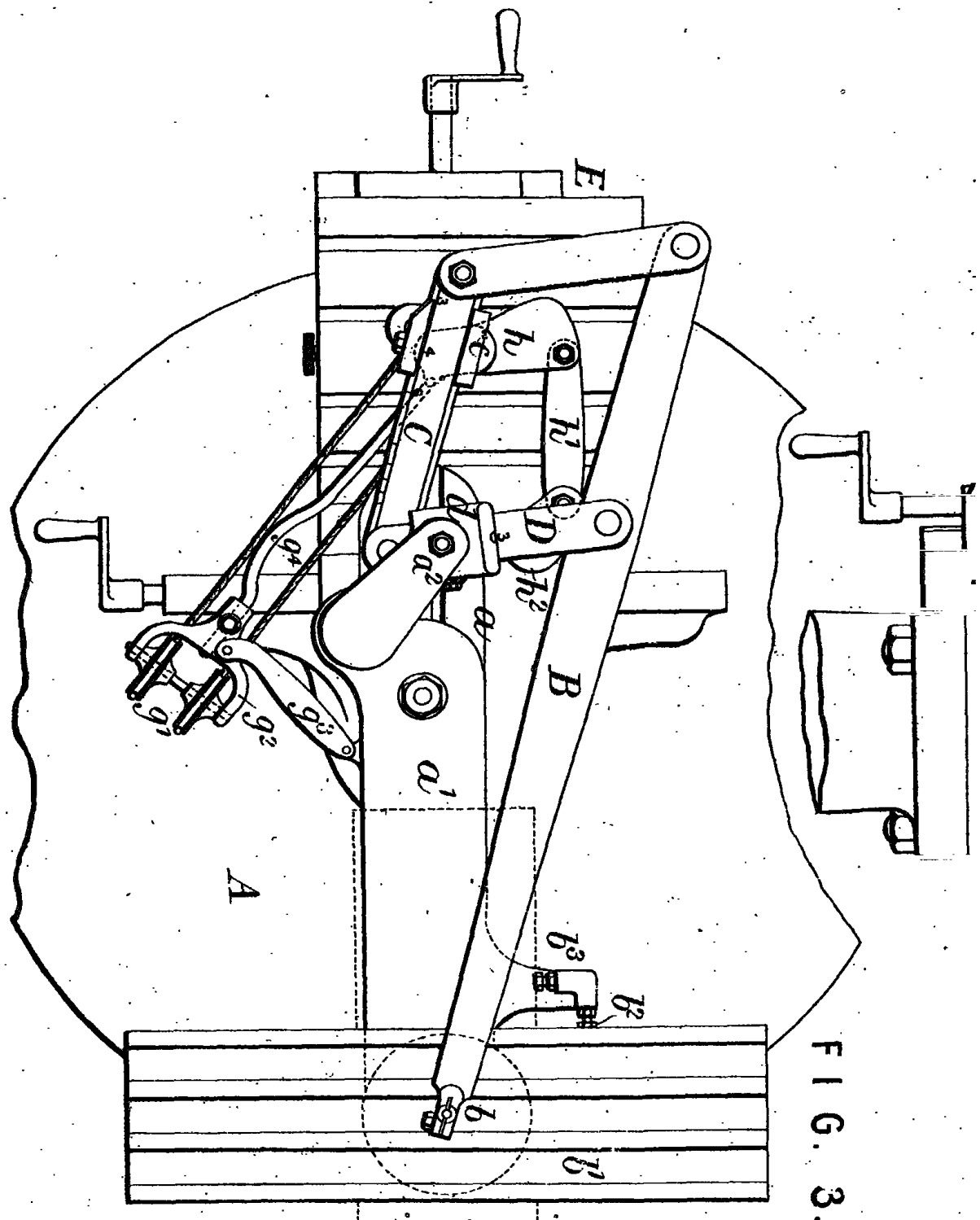


FIG. 3.

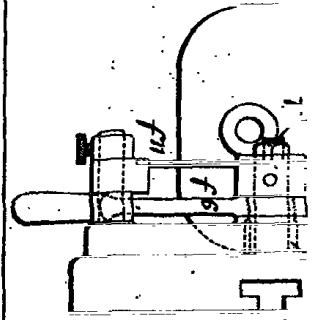
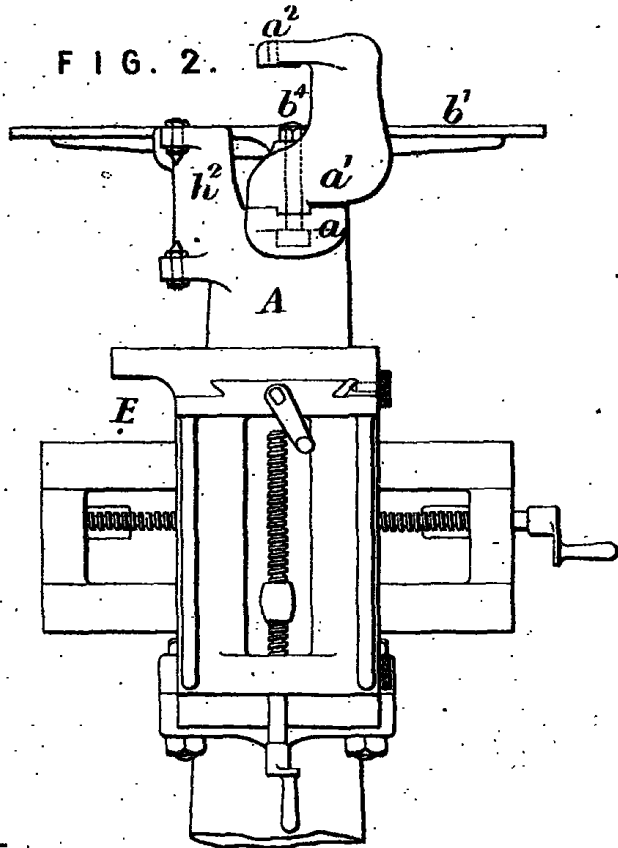


FIG. 5.

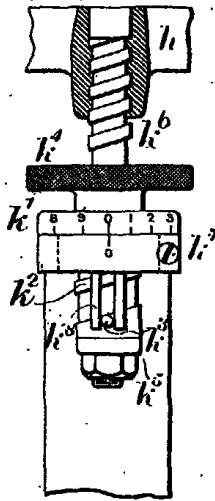
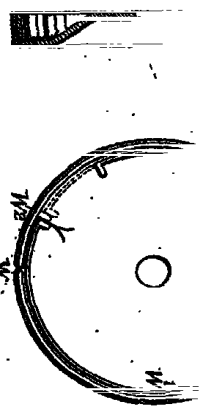
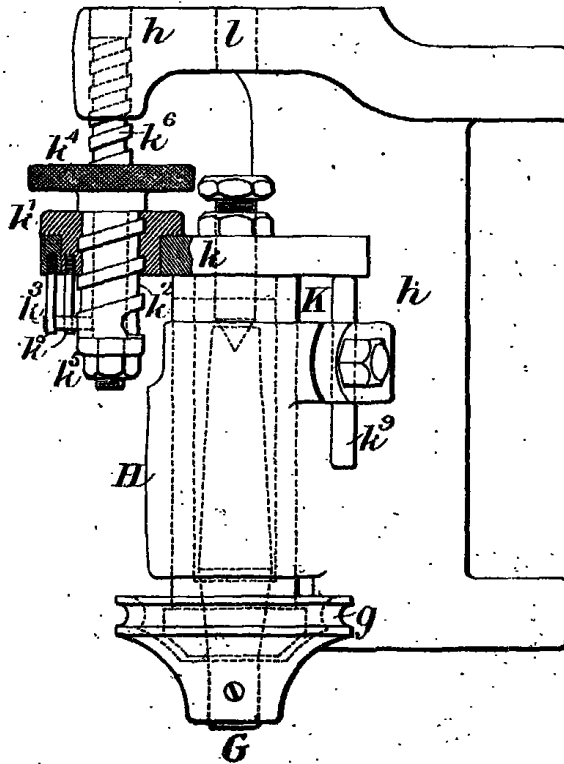


FIG. 4.



[This Drawing is a reproduction of the Original on a reduced scale.]

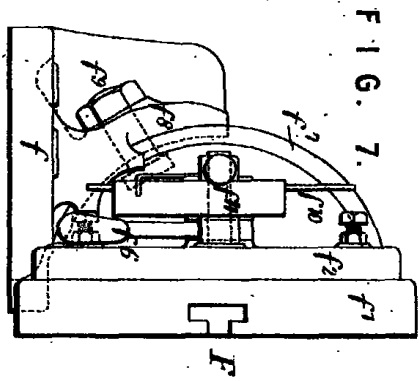


FIG. 7.

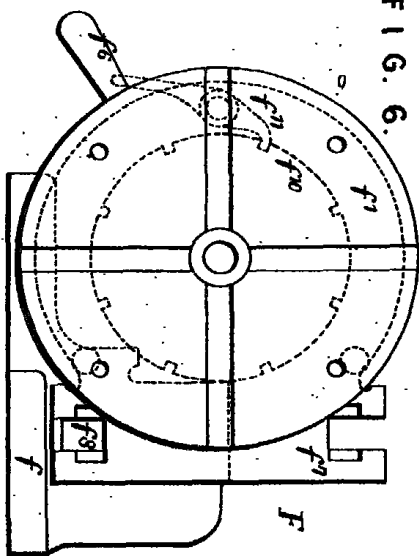


FIG. 6.

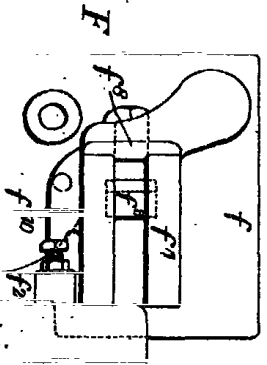


FIG. 8.

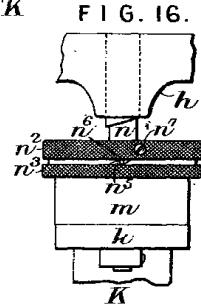
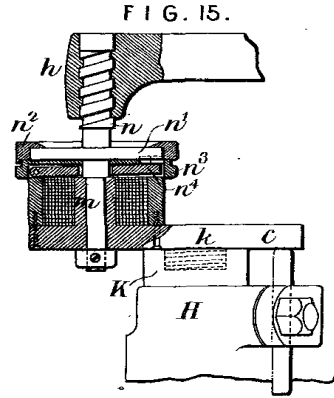
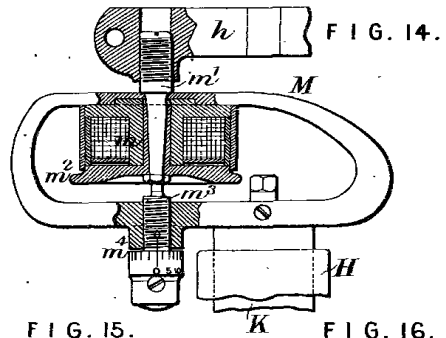
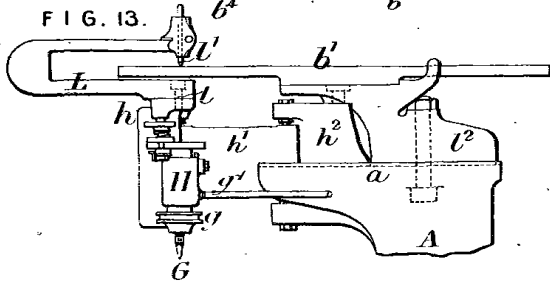
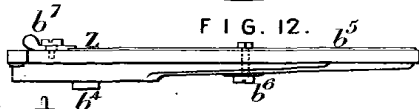
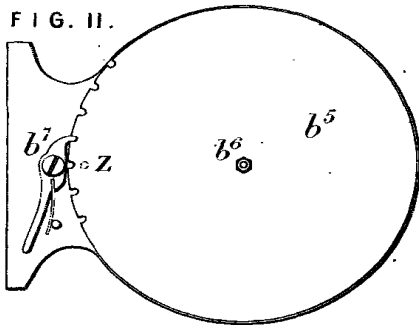


FIG. 10.



FIG. 9.

BIRMINGHAM
FREE LIBRARIES



[This Drawing is a full-size reproduction of the Original.]

FIG. II.

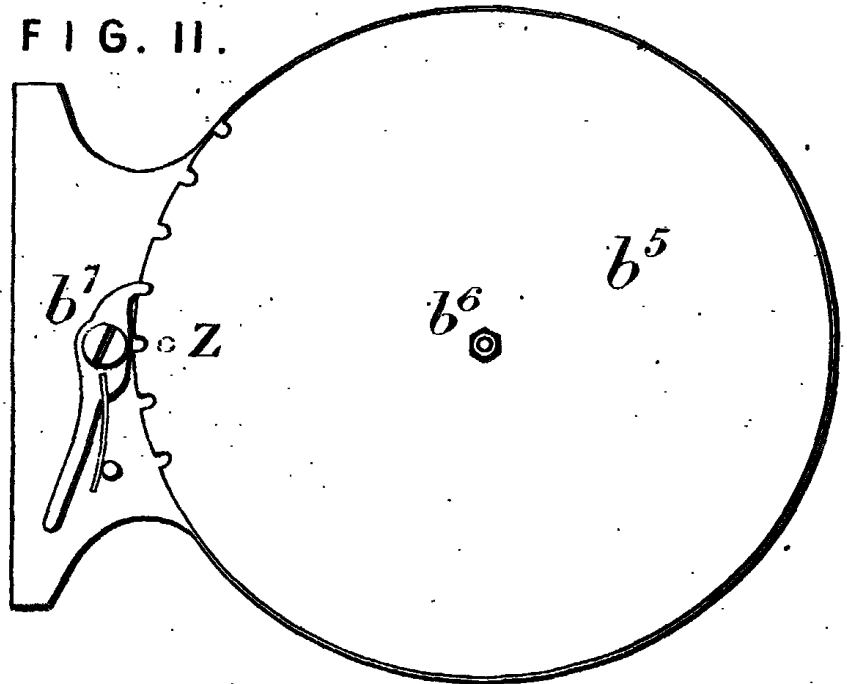


FIG. 12.

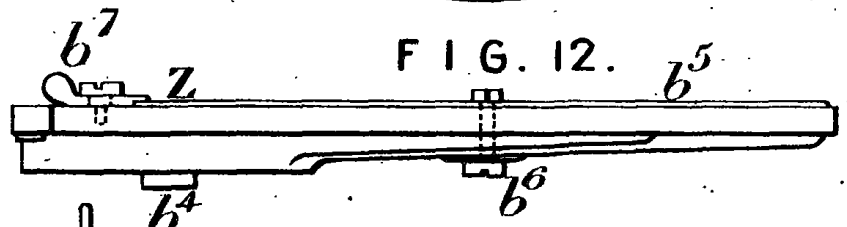
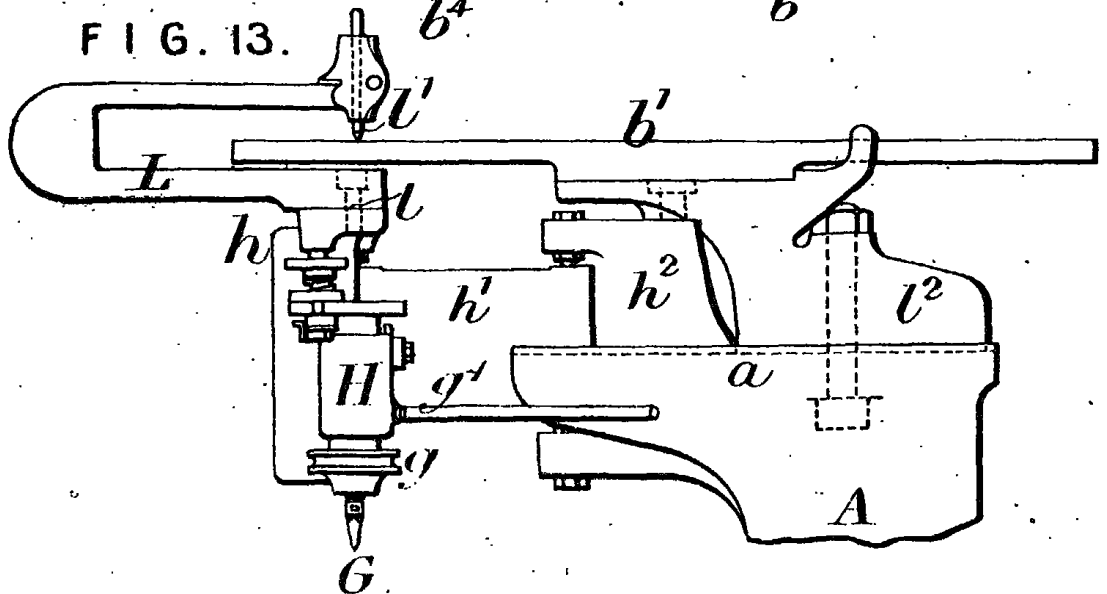
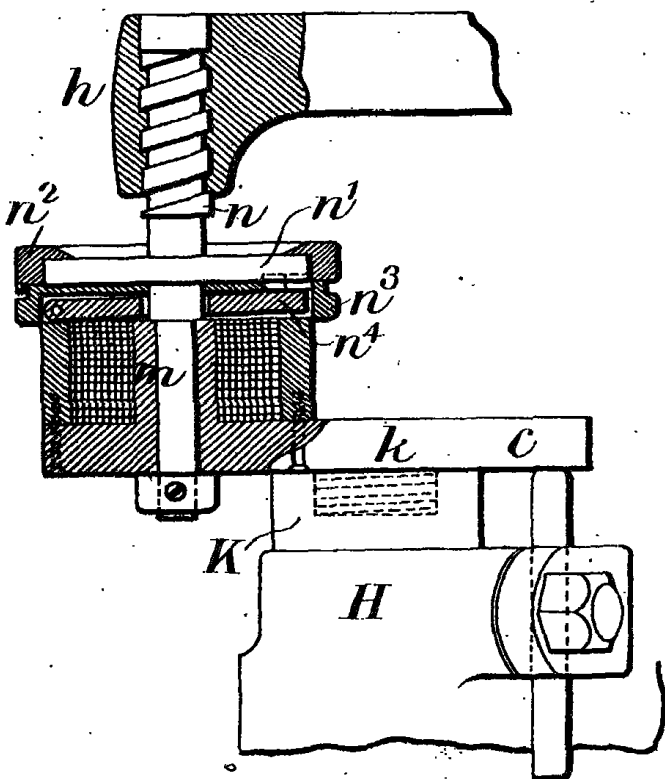
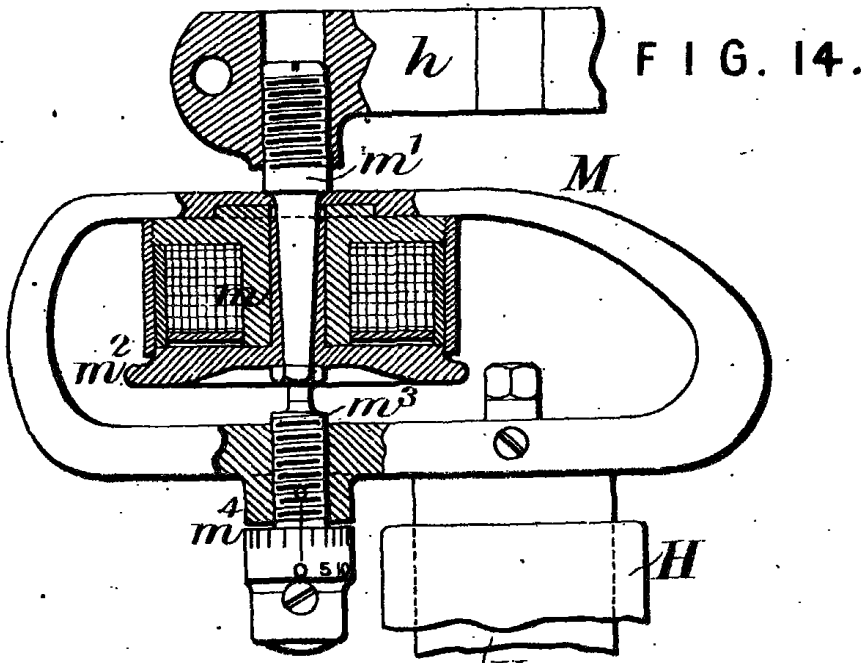


FIG. 13.





[This Drawing is a full-size reproduction of the Original.]

BIRMINGHAM
FREE LIBRARIES