

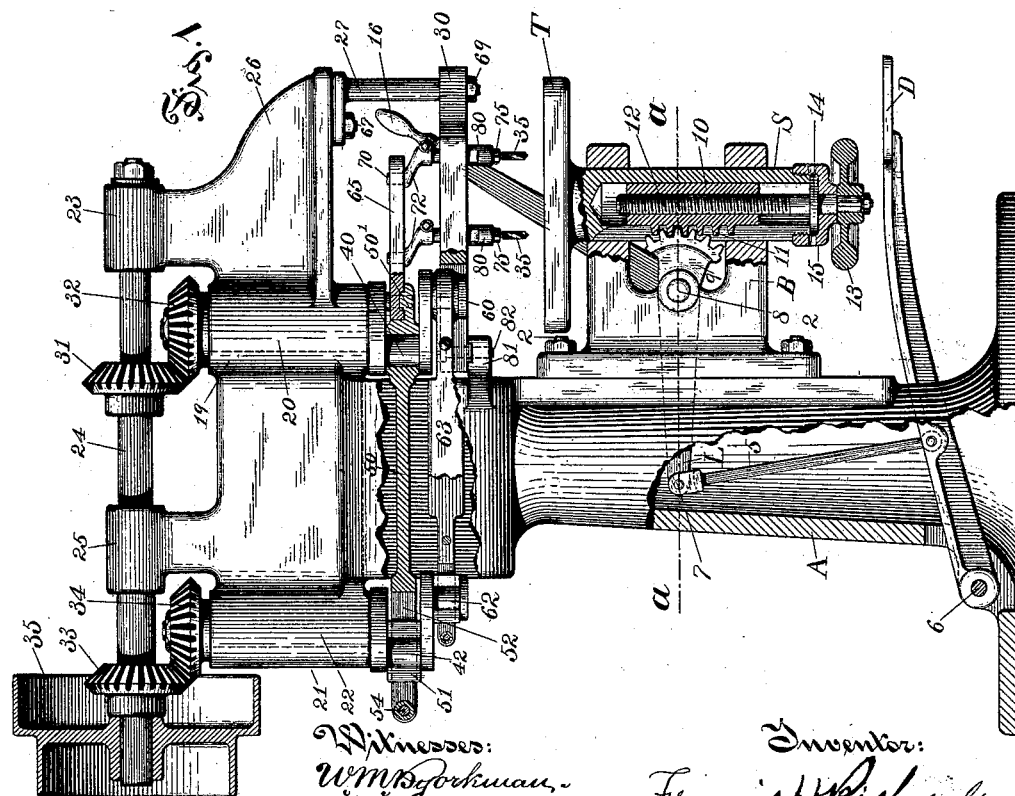
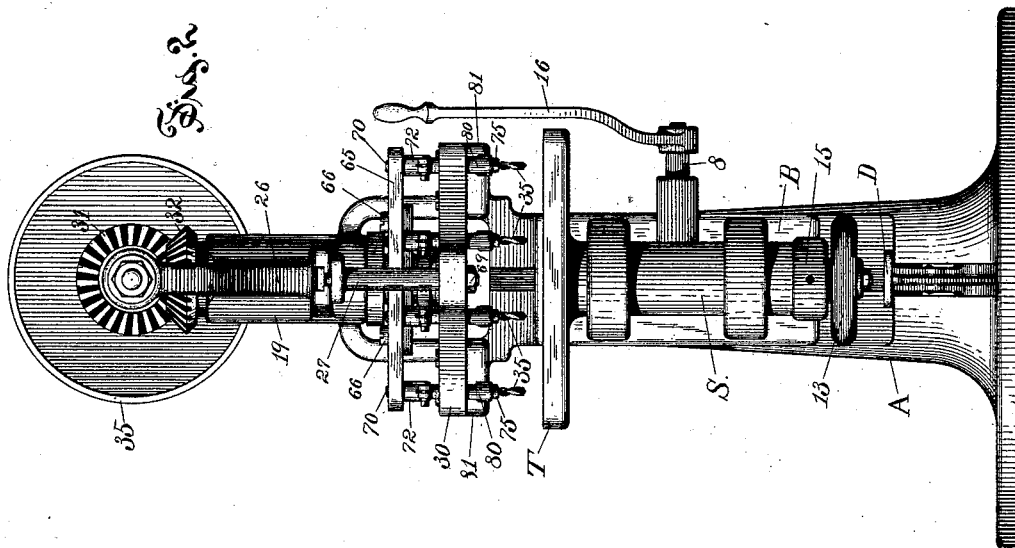
(No Model.)

2 Sheets—Sheet 1.

F. H. RICHARDS.
DRILLING MACHINE.

No. 422,540.

Patented Mar. 4, 1890.



Witnesses:
Wm B Gorkman,
Henry L Reckard,

Inventor:
Francis H. Richards

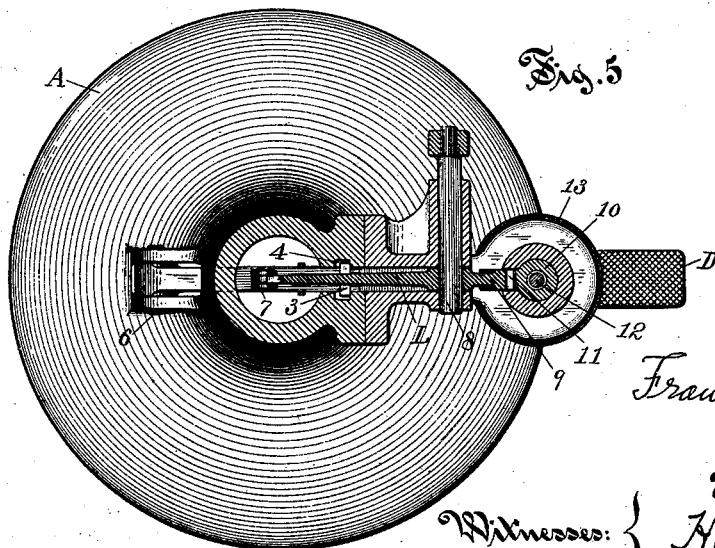
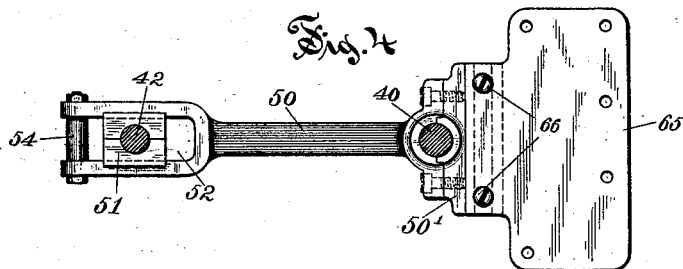
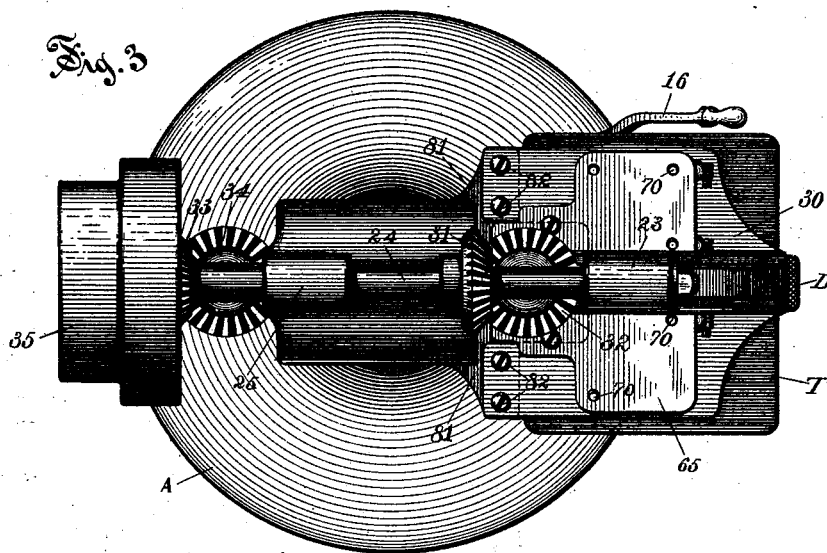
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Inventor:
Francis H. Richards.

Witnesses: { Wm. Dyorkman,
Henry L. Reshard.

UNITED STATES PATENT OFFICE.

FRANCIS H. RICHARDS, OF HARTFORD, CONNECTICUT, ASSIGNOR TO ECKLEY B. COXE, OF DRIFTON, PENNSYLVANIA.

DRILLING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 422,540, dated March 4, 1890.

Application filed December 6, 1888. Serial No. 292,844. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS H. RICHARDS, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

This invention relates to that class of multiple drilling-machines in which the drills are operated by means of a gyratory driving-plate; and the object of my present improvements is to furnish a machine of that class especially adapted to drive small drills at a comparatively high speed, and to be used for "jig-work," as required in the manufacture of sewing-machines, fire-arms, and other articles generally manufactured by the interchangeable method.

In the drawings accompanying and forming a part of this specification, Figure 1 is a side elevation, partially in section, of a machine embodying my improvements. Fig. 2 is a front elevation of the same. Fig. 3 is a plan or top view of the machine. Fig. 4 is a horizontal section through the cranks and above the driving-bar. Fig. 5 is a horizontal section in line *a a*, Fig. 1.

Similar characters designate like parts in all the figures.

The frame-work of my improved drilling-machine consists of some suitable column A, which carries the drilling mechanism and has devices for supporting the table T on which to place the pieces to be drilled. These devices consist, as shown in the drawings, of a vertical slide S, carried in a movable frame B, which is fixed upon the front of column A by bolts 2, whose heads 3 lie within the T-slot 4 in said column. The column A is or may be formed hollow to contain the treadle-rod 5, operated by the treadle D, pivoted in the column at 6. At its upper end rod 5 connects at 7 to the rear end of the lever L, which is pivoted at 8 to the sliding head B, and has at its forward end a segment 9, that engages with the rack-teeth 11 on the sliding nut 10, lying within the main slide S. The nut 10 is moved in the slide S by means of the adjusting-screw 12, operated by the hand-wheel 13 on the lower end thereof. A collar 14 on

the screw 12 fits within the cap 15, which is screwed to the slide to furnish a bearing therefor. This furnishes the required means for adjusting the table T to the required height underneath the drills. In practice a hand-lever 16 is sometimes affixed to the pivot-shaft 8 and may be used in conjunction with or as a substitute for the said treadle.

In the upper part of the frame-work bearings 19 and 21, Fig. 1, are provided for the crank-shafts 20 and 22, and other bearings 23 and 25 for a driving-shaft 24; also, a projecting beam 26 reaches out to carry a support 27 for the jig-plate or drill-carrying plate 30. The shaft 24 couples and drives the crank-shafts 20 and 22 through the similar pairs of gears 31 32 and 33 34, respectively, and has a pulley 35, whereby power is applied to drive the machine. The cranks 40 42 on the shafts 20 22, respectively, are of substantially the same radii and are driven in the same direction. These cranks are set one rearward, in the machine, of the other, and together carry the driving-bar 50. In order to secure smoothness of operation without excessively fine fitting, the crank 40 is journaled directly in said bar and the crank 42 indirectly, this latter crank being provided with a box 51, which slides in the slot 52, formed in said bar to accommodate any inequality existing in the radius or rotary movement of the cranks. Such variations it is obvious may arise from defective workmanship in the cranks themselves or in the gears described, or from torsion of any of the shafts connected by said gears. The forward crank 40 I call the "driving-crank" and the rearward crank 42 the "guide-crank." The bifurcated rear end of the bar 50 I usually connect by a tie-bolt 54 to prevent the springing of the same.

Below the cranks 40 42 the shafts 20 22 have other cranks 60 62, oppositely disposed to said cranks 40 42, respectively, and on which is carried a counterbalancing bar or weight 63, for steadying the machine against the disturbing momentum of the bar 50. The counter-balance is or may be connected to its said cranks by the same mode of construction as above described for the driving-bar 50.

The front part 50' of the driving-bar 50 is

fitted to carry the driving-plate 65, which is attached to said bar by screws 66, or by other well-known means. This plate has holes in which turn the crank-pins 70 of the cranks 5 72 of the drill-spindles 75, which spindles are carried in the sockets 80, that are fixed in said jig-plate 30. The particular construction of the said spindles and sockets, as shown in the drawings, is more fully described in my application, Serial No. 292,843; but modifications of these parts may be resorted to without departing from my present invention. The jig-plate is secured to the frame-work by suitable means--as, for instance, the 15 shelf or ledge 81 and screws 82.

In preparing to use the machine for the drilling of any particular piece, of course it is first necessary to provide a jig-plate having holes corresponding in distances apart and arrangement to the holes to be drilled and to provide a corresponding driver-plate. The 20 vertical support 27, Fig. 1, I attach to the under side of the beam 26 by a bolt 67, whose head fits in a T-slot in the under side of said beam, whereby the support may be adjusted longitudinally of the beam to accommodate different sizes of jig-plates. The lower end of said support or brace may be screwed directly to the said plate 30 by a nut 69, as 30 herein shown.

It is frequently necessary in this class of multiple drilling-machines to use drills of various sizes in the same machine at the same time and to set the drills at various distances 35 apart, as required by the positions of the holes in the articles to be drilled. In this machine all such arrangements and constructional adjustments are very readily made, it only being necessary to provide a drill-carrying plate and a driving-plate of the required 40 dimensions to carry the desired sizes and arrangement of drills.

Having thus described my invention, I claim--

45 1. In a drilling-machine, the combination, with a frame-work, of a main crank, a guide-

crank, a driving-bar journaled on the main crank and guided by the guide-crank, and a counter-balance carried on cranks oppositely disposed to said driving-bar cranks, substantially as described. 50

2. In a drilling-machine, the combination, with a frame-work, of the jig-plate fixed thereto and carrying drills provided with cranks, a pair of cranks located one rearward 55 of the other and similarly actuated, a driving-bar carried by said cranks, and the driving-plate affixed to the forward end of said driving-bar and engaging said drill-cranks, all substantially as described. 60

3. In a drilling-machine, the combination, with a frame-work, substantially as described, having the projecting beam 26, of the similarly-actuated crank-shafts journaled in said frame-work and carrying the driving-plate, 65 the jig-plate carrying the drills, having cranks engaging said driving-plate, and the adjustable support connecting the forward part of said jig-plate to said beam, all substantially as described. 70

4. In a drilling-machine, the combination, with the shafts 20 and 22, having cranks 40 and 42, of the driving-bar 50, journaled on one crank, and provided with the bearing 51, movable therein and journaled on the other 75 crank, substantially as described.

5. In a drilling-machine, the combination, with the vertical column provided with a treadle and treadle-rod, of the bracket adjustable on said column and carrying the 80 table-supporting slide, the sliding nut adjustable within said slide by means substantially as described, and the lever pivoted in said bracket, connected to be actuated from said treadle-rod and having a segment engaging 85 the rack on said nut, all substantially as shown and described.

FRANCIS H. RICHARDS.

Witnesses:

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