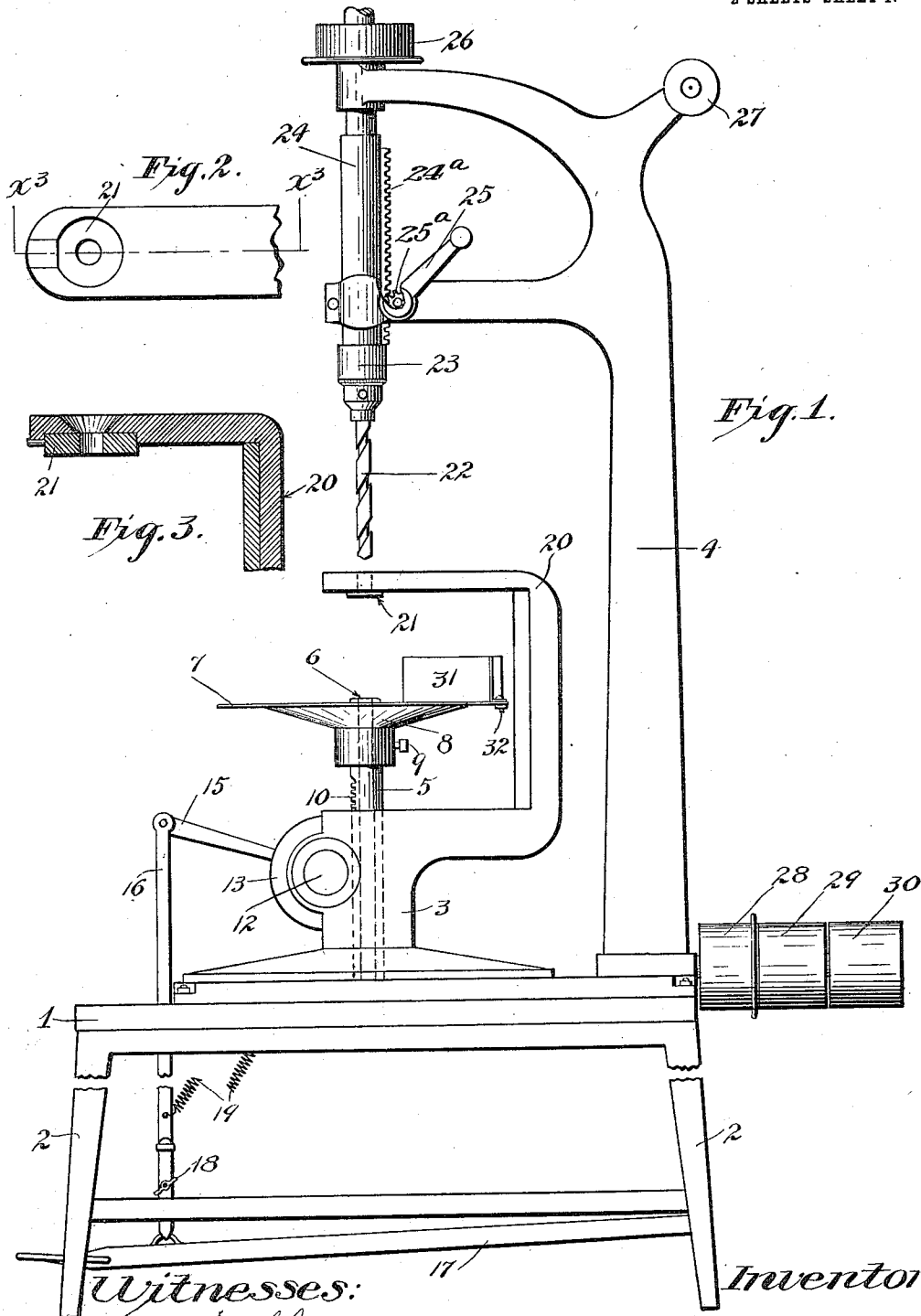


S. L. LONG.
 DRILLING MACHINE.
 APPLICATION FILED JUNE 7, 1909.

1,031,945.

Patented July 9, 1912.
 2 SHEETS—SHEET 1.



Witnesses:
 A. H. Opsahl
 H. W. Kilgore

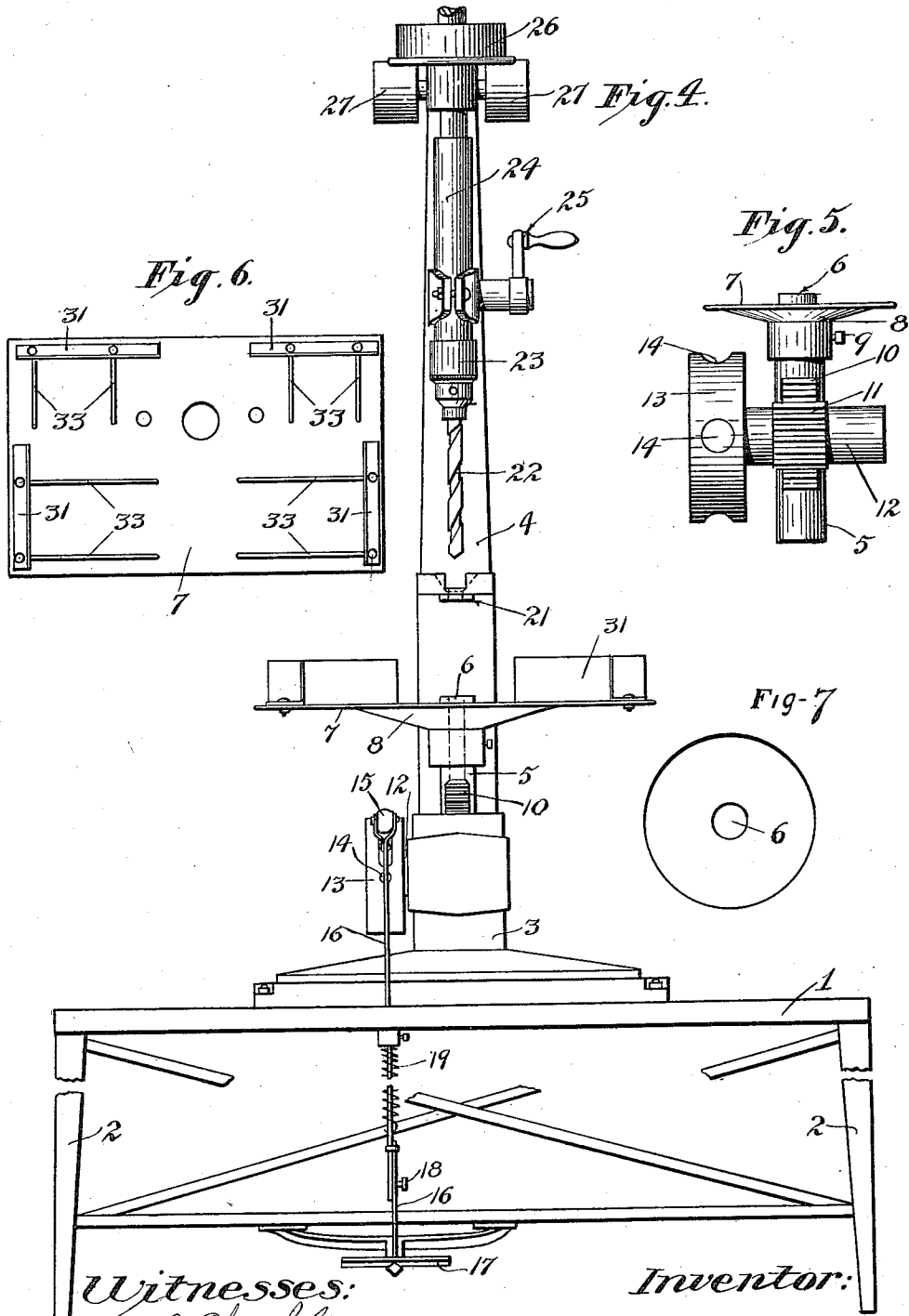
Inventor:
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Inventor:

Sidney L. Long

UNITED STATES PATENT OFFICE.

SIDNEY L. LONG, OF MINNEAPOLIS, MINNESOTA, ASSIGNOR OF ONE-HALF TO GEORGE E. YOUNG AND FRED B. ATWOOD, BOTH OF MINNEAPOLIS, MINNESOTA.

DRILLING-MACHINE.

1,031,945.

Specification of Letters Patent.

Patented July 9, 1912.

Application filed June 7, 1909. Serial No. 500,792.

To all whom it may concern:

Be it known that I, SIDNEY L. LONG, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Drilling-Machines, of which the following is a specification.

My present invention has for its object to provide an improved boring machine adapted for general use, but especially designed and particularly adapted for use in boring holes through stacks of paper sheets or leaves, through stacks of cloth, leather or like substances which can be bored only when firmly clamped and held together. A boring machine of this type is extremely well adapted for use in boring holes in the leaves of loose leaf ledgers and the like, wherein it is desirable to bore very smooth holes to a considerable depth, through a very large number of such leaves held tightly together, and for boring holes in books that are to be hung up.

The improved boring machine is illustrated by the accompanying drawings wherein like characters indicate like parts throughout the several views.

Referring to the drawings; Figure 1 is a view in side elevation, showing the improved boring machine, some parts being broken away. Fig. 2 is a detail view in plan, showing the combined drill guide and upper die, some parts being broken away. Fig. 3 is a section taken on the line $x^3 x^3$ of Fig. 2. Fig. 4 is a front elevation of the boring machine, some parts being broken away. Fig. 5 is a front elevation in detail of work clamping and supporting plunger, a portion of the work table and means for vertically moving said plunger; and Fig. 6 is a plan view of the work table and adjustable gage strips applied thereon. Fig. 7 is a plan view of work table 7.

The numeral 1 indicates a bed plate shown as supported by legs 2. A relatively low plunger guide 3 and a relatively high bearing pedestal 4 are rigidly secured at their lower portions to the bed plate 1. A tubular plunger 5 is mounted to move vertically through the plunger guide 3, and its extreme upper end (see Fig. 5) is provided with a clamping die or bushing 6. A flat metal work-table 7 is rigidly secured to a flanged hub 8, that is telescoped on the upper end of

the plunger 5 and is secured thereto, with freedom for vertical adjustments, by a set screw 9. The bushing or clamping die 6, by adjustments of the hub 8, is adapted to be projected more or less above the table 7, 60 and it may be here stated that the thicker the stack of paper to be bored, the greater should be the projection of the said die above the said table.

The table supporting plunger 5 is provided with rack teeth 10 that are in mesh with the pinion 11 on a short horizontal shaft 12, which shaft is mounted in suitable bearings on the plunger guide 3 and is provided with a head 13 having radial circumferentially spaced perforations 14, in one or the other of which the inner end of an arm 15 is seated. The free end of the arm 15 is connected at one end to the leg structure 22. Preferably, the rod 16 is made of two sections that are overlapped and adjustably connected, as shown, by short nutted bolts 18 and a coiled spring 19 anchored to the bed plate 1 and connected to the rod 16 and yieldingly holding the arm 15 and the foot lever 17 in their uppermost positions. The plunger guide 3 is provided with a heavy, approximately U-shaped arm 20, that extends radially outward from the upper portion thereof, thence upward and thence radially inward to a point above the die or bushing 6. A die or bushing 21 is set into the upper inner-end extremity of the arm 20 and is held in axial alinement with the lower die or bushing 6. 90

The holes of the dies 6 and 21 are of the same diameter and adapted to closely fit a drill 22. This drill 22, as shown, is an ordinary twist drill and is detachably held in a chuck 23 of a spindle 24 that is mounted for rotary and vertical endwise movements in arms formed on the upper end of the pedestal 4. The spindle 24 is adapted to be raised and lowered by a lever 25 and is adapted to be driven by a belt, not shown, but which will run over a pulley 26 on the spindle 24 and over guide wheels 27 and 28 on the pedestal 4. 100

The numeral 29 indicates a pulley fixed to the pulley 28, and the numeral 30 indicates a loose pulley mounted on the same shaft as said pulleys 28 and 29. The said parts 24 to 30, inclusive, are of standard drill press construction, and hence, are herein but briefly described. 110

It is, of course, understood that by movements of the lever 25, the drill 22 may be moved downward through the upper die 21, through the paper or material clamped between the dies 6 and 21, through the lower die 6 and onto the tubular plunger 5.

For properly holding the leaves on the work table 7, a multiplicity of gage strips 31, as shown of angle arm form, are adjustably secured to the said table, as shown, by short nutted bolts 32 that work in slots 33 and the said table.

As is evident, the stack of sheets or material to be bored, when properly placed upon the working table 7, on top of the lower die 6, may be tightly compressed and clamped together, and between the dies 6 and 21, by the operator stepping upon the foot lever or treadle 17. While the material is thus tightly packed and held, a smooth hole may be bored therethrough by the drill, which is forced downward, as already indicated, by manipulation of the lever 25. The upper die 21 serves as a guide for the drill, and directs the same on a straight line through the work and onto the alined lower die 6. To produce the compression of the material required to enable a true hole to be bored through the same, the greatest pressure on the leaves must be immediately adjacent to the hole bored, and, as is evident, this is produced by the projection of the lower die 6 above the table 7, and by the projection of the upper die 21 below the upper portion of the arm 20. Secured to the lever 25, is a pinion 25^a which meshes with the rack teeth 24^a on the sleeve 24. In fact, the dies act as clamping abutments as well as guides for the drills. The upper die constitutes the fixed or relatively stationary abutment and drill guide, and bears a fixed relation with respect to the normal position of the drill, that is, the drill is normally raised but very slightly out of the same, and might, in fact, be normally positioned with its lower end in the said upper die. This permits the drill to be forced in its full length through the work

whenever required, under the predetermined vertical movements which may be given to the drill by the lever 25. The work is raised against the said upper die by vertical movements of the work table, and for work of predetermined thickness, the table should be adjusted to a normal position in which there would be but slight clearance between the work and the upper die. This will make the necessary but slight upward movement for the work table, in order to clamp the work.

The work table may be set in different normal positions for the purpose above stated, by thus disconnecting the arm 15 from the shaft head 13, then rotating said shaft till the table is brought approximately to the proper adjustments, then again inserting the said arm 15 into the properly positioned perforation 14 of the said head.

By the improved boring machine above described, holes of any desired size or depth can be bored through paper, leather, cloth, or any other soft substance, with perfectly smooth sides and without tearing the material.

What I claim is:

In a boring machine, the combination with a relatively fixed die support and a die therein projecting below the same and serving as a drill guide, of a working table mounted for vertical movements below said upper die and provided with a lower die projecting above the same in axial alinement with said upper die, and a rotary drill spindle axially alined with the said upper and lower dies, mounted for vertical movements, and provided with a drill adapted to be moved downward through said upper die, through the work clamped between said upper and lower dies and into said lower die, substantially as described.

Signed at Minneapolis, Minnesota, May 15, A. D. 1909.

SIDNEY L. LONG.

Witnesses:

GEO. E. YOUNG,
OLGA H. OLSEN.