

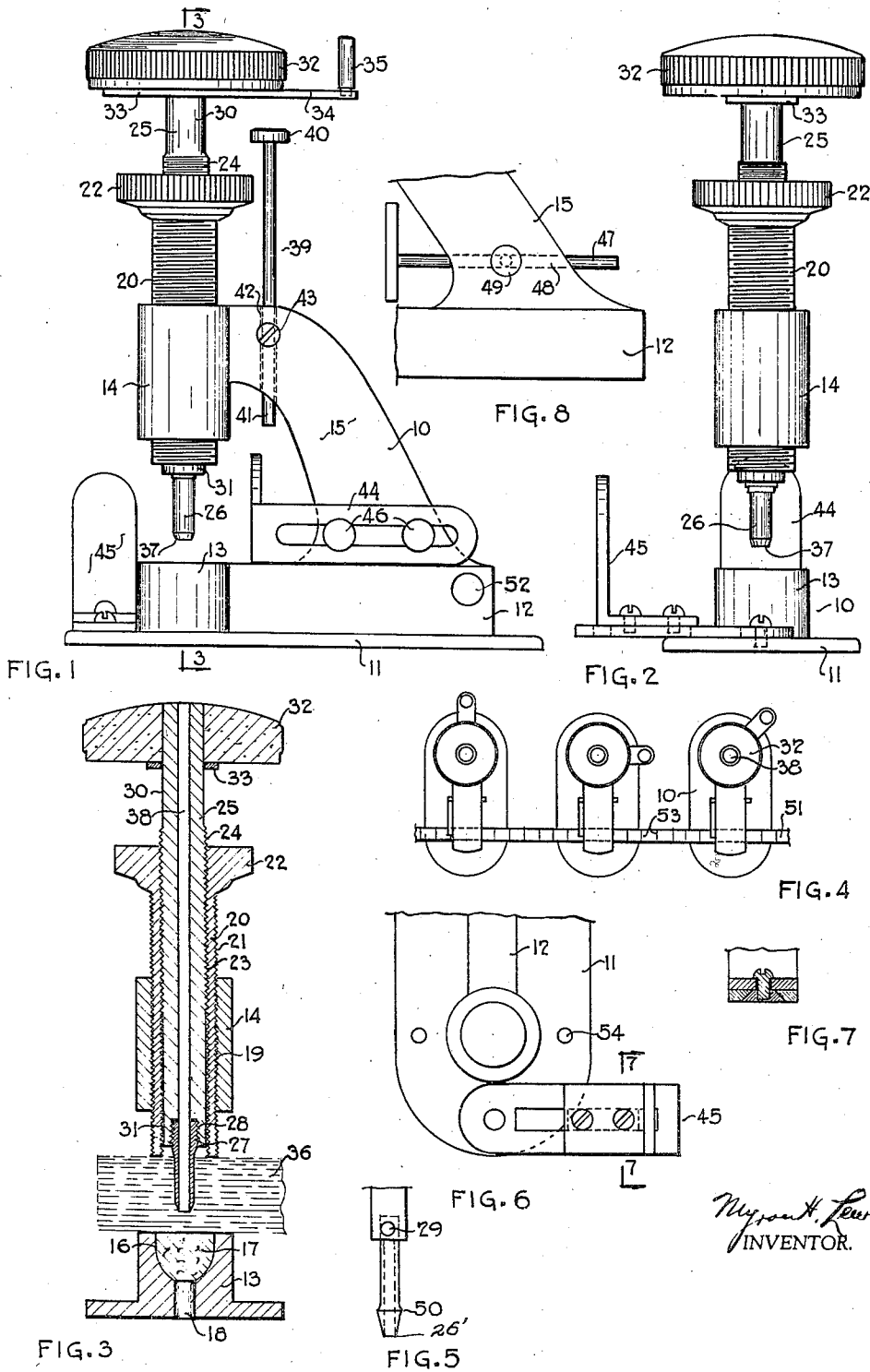
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DRILLING MACHINE AND DEVICE

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DRILLING MACHINE AND DEVICE

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3 Claims. (Cl. 164—101)

My invention relates particularly to portable hand operated drilling machines for perforating a plurality of sheets of paper, cloth, leather and material of similar texture with holes of various sizes, for the purpose of removably binding or fastening them together with removable binder pins or fasteners. My machine may also be operated by electric motor if desired.

The purpose of my invention is to provide a means to drill, bore, pierce or perforate neat, round holes quickly, easily and inexpensively through a large number of sheets or layers of material as above mentioned. It is perfectly adapted to use in the home or office for authors, writers and others who have a large number of such sheets to fasten together where they may be easily separated if desired. A large number of patent specifications, for instance, may be quickly drilled by hand in the office for binding in book form.

At the present time there is no appliance available to accomplish these objects with the speed, facility and economy of this invention. A thorough search of the markets has failed to reveal the existence of such a machine which the inventor herein has now developed to a practical stage.

The machines heretofore available do not answer the purpose of this invention. The hand punches in common use will punch only a few sheets at a time, making the perforation of book size manuscripts, consisting of several hundred sheets, a slow and tedious operation. The wire stapling machines in use in home or office also are limited in the number of sheets they will fasten, and once fastened, the sheets cannot be separated readily. An author, wishing to bind several hundred pages of manuscript, is forced to resort to the limited hand punches or use some awkward device like an ice pick and hammer, long nails or wood drills, all of which methods are cumbersome, slow and apt to tear the paper. Sometimes it becomes necessary to carry the bundle of sheets to a binder or printer's shop at a distance, to have the holes punched by power machines at an expense of time and cost of punching. The power punchers now in use are altogether too costly and unwieldy to use in home or office and are not portable. Eyelet machines can only take a limited number of sheets of paper at one time and will not pierce thick fabric sheets.

My invention obviates all of these difficulties in providing a simple, positive machine or device which will clamp the sheets firmly, and while remaining clamped, will drill or pierce holes

through hundreds of sheets with efficiency and dispatch and which machine can be screwed down upon a desk or table, or carried from place to place as wanted, and weighing only a few pounds. Two or more of the machines may be mounted adjustably on a rod and spaced any desired distance apart, so that two or more holes may be drilled without changing the positions of the paper. Marginal guides regulate the position of the hole with respect to the edges of the sheets and a drill stop indicates when the sheets have been completely drilled, also preventing the cutting edge from moving too far; a clamping spindle supported on a frame, working in conjunction with a drill spindle, holds the sheets firmly in position while the material is being drilled. To protect the cutting edge against injury, a relatively soft bearing core is provided. The hollow cutter is fastened to the drill spindle removably, and may be replaced when dulled. To prevent the cut-out disks from jamming in the interior hollow conduit of the cutting shaft as they pass upward, the diameter of the cutting edge is slightly smaller than the conduit of the cutting shaft. These disks travel upward and are ejected through an orifice in a knob at the top of the drill spindle, by means of which knob and said spindle is rotated.

Experience in the use of my invention, in cutting through a large number of sheets of paper and fabrics, have proved its practicability and its superiority to any such device which, as far as known, has been heretofore available for use in home or office. Its convenience and simplicity of operation obviate the difficulties of other contrivances now in use.

Special binders may be provided for use with this machine consisting of brass circular heads, with prongs at right angles to the heads. These prongs terminating in ball shaped tips avoiding injury to the finger or fingernail.

Having described the purpose and general character of my invention, I will now describe my invention in detail by reference to the accompanying drawing in which,

Fig. 1 is a side elevation of my invention, while

Fig. 2 is a front elevation of same.

Fig. 3 is a transverse sectional view on the line 3—3, Fig. 1 showing relative positions of spindles.

Fig. 4 shows an arrangement of a battery of three separate machines together forming a clamping and drilling battery of machines in one unit.

Fig. 5 is a detailed elevation showing a slight modification in regard to the hollow cutter.

Fig. 6 is a detailed plan, and in particular showing arrangement of pivotally adjustable marginal guides.

Fig. 7 is a transverse sectional view of the line 7-7 Fig. 6, while

Fig. 8 shows a modification in regard to the marginal guide for the edge of the sheets.

Referring more particularly to the drawing; 10 indicates a frame or stand preferably of metal, consisting of base 11 and integral oblong, base portion 12, one end of which terminates at its bottom in a cylindrically shaped bearing block 13 and terminates at its upper end in a hollow cylindrical frame spindle 14. The curved rectangular arm or neck portion 15 connects the said 14 with oblong base portion 12. The said bearing block 13 is provided with cut out portion 16, 20 for the purpose of receiving and holding firmly in place, a block of wood, cord or rubber 17 or any other relatively soft material which will not injure the cutting edge. Said cut out 16 may be 25 suitable shape. In the bottom of said block 13 the hole 18 is provided, extending through the base as shown in Figure 3 whereby it is possible to remove the softer block 17. By reference to Figure 1, it will be noted that cylinder 14 is directly over cylinder 13 the axes of said cylinders being substantially continuous.

The hollow, cylindrical interior face of frame spindle 14 is provided with a thread 19, fitted to engage another and smaller hollow clamping 35 spindle 20, the outside of which is correspondingly threaded 21, by means of which, said clamping spindle 20 revolves downward through spindle 14 until edge of spindle 20 clamps into place the material to be drilled 36. Said spindle 20 terminates at its upper end in a knurled head 22 convenient for the necessary rotation of spindle 20 downward for clamping, and rotating upward when the material is to be released.

The inside face of the said clamp spindle 20 is also threaded with thread 23 corresponding to the exterior thread 24 of a third or hollow drill spindle 25, to the lower end of which a cutter 26 is fastened; either, by means of providing both cutter and drill spindle with hollow threads 27 and 28, outwardly and inwardly respectively as shown in Figure 3, or by means of a bolt or flat screw as indicated at 29 in Figure 5. The cutting edge 37 of cutter 26 is slightly less in diameter than the conduit in the cutting shaft 26 to insure that 55 the circular cut out disks will be slightly smaller in diameter than the bore or conduit in said shaft, to insure free travel of said disks upward through said shaft.

The said smaller hollow spindle 25 has its outward thread 24 partly removed at the top 30 and the bottom 31 for the purpose of time saving during the revolution downward and upward.

A knob 32 is formed with an orifice therein adapted to fit the upper part 30 of the spindle 25, as the knob is mounted upon said upper part 30. A plate 33, as shown in Figure 3, is secured to the upper part 30 of the spindle 25, and fastened to the knob 32. Said plate 33 may, as shown 70 at 34 in Figure 1, be elongated and have a small handle 35 attached thereto in order to provide an additional leverage for manipulation.

A plurality of paper sheets 36, or other materials to be perforated are shown by the dotted 75 lines of Figure 3, resting on bearing block. Clamping

spindle 20 is now rotated and moves downward until said papers are firmly clamped in place by the bottom edge of said clamp 20, whereupon the actual perforating process may be started.

By rotating the inner drill spindle 25 into which the cutter 26 is secured, either by means of knob 32 or handle 35, the cutting edge 37 descends and easily perforates through the plurality of sheets 36 leaving a perfectly smooth, round hole or perforation ready for binding: The cut-out round disk-shaped paper or fabric pieces, being of slightly smaller diameter than the conduit of the drill spindle, will be forced upward through said conduit, gradually working their way upward and are expelled through the central orifice in top of spindle 25, said orifice and conduit through the entire length of the drill spindle being circular, perfectly round and smooth and continuous in alignment. If so desired, these disks may be 20 removed by merely turning the machine upside down, the disk falling out of their own gravity.

In order to avoid unnecessary cutting and to know when the bottom sheet or layer has been perforated, an adjustable stop 39 is provided. 25 Said stop consists of a flat head 40 on a stem 41 slidable in the hole 42, bored in the arm 15 of the frame 10. A screw 43 may be round or any other shape and is for the purpose of setting the stop in any desired position, so that, when the cutting edge 37 has entirely perforated the plurality of sheets 36 the lower surface of knob 32 or plate 33 is in contact with upper surface of stop head 40.

Two marginal guides 44 and 45 are conveniently arranged as are shown in Figures 1 and 6. One is at an angle of 90 degrees to the other. These guides regulate the position of the holes to be perforated with respect to the edges of sheets 36. While guide 44 is fastened to arm 15 40 by two screws, 46, as shown in Figure 1, the arrangement as shown in Figure 8 may prove preferable. Here the guide stem 47 slides in the hole 48 and is held in place by a screw 49. Marginal guide 45 however is pivotally mounted as in Figure 45 6: this is for the purpose of using the same guide both for the left and right hand corners of the sheets without interference of the guide. Figure 7 indicates means for adjusting of position of said guide plate 45.

A modification of the drill cutter 26, is shown at 26' in Figure 5, where the lower end of the same is formed with a circular extended portion 50, the diameter of which is slightly smaller than that of the shaft 25 but larger than the diameter of cutting edge 37; thereby to a great extent reducing friction between the surface of drill and the surfaces being drilled.

If desired, several of my machines may be combined into one unit by means of rod 51 sliding through holes 52 provided in base 12 of frame 10 as illustrated in Figure 4; said rod may for convenience be graduated as indicated by 53. This permits several holes to be drilled in the sheets 36 at any desirable distances apart without removing the sheets until the operation is complete. One drilling spindle may, if desired, be used for a battery of two or more machines.

Holes 54 are provided in the base 11 of the frame 10, designed to fasten the machine to a desk or table.

The consecutive order of operations of my machine is as follows:

The cutter 26 is rotated by knob 32 until the 75

cutting edge 37 and the lower edge of clamp 20 are about even in position. The clamp 20 is then rotated by means of its head 22 until its lower edge is sufficiently clear, so that any desired plurality of sheets or layers 36 may be inserted and placed on the bearing block 13 as shown in the Figure 3. The clamp head 22 is then rotated clockwise, and the clamp spindle 20 descends through frame spindle 14, until the sheets 36 are gripped firmly in position by lower edge of said clamp spindle. Then the drill knob 32 is rotated clockwise, forcing the cutting drill 26 down and through the sheets 36 until the underside of said knob 32 comes into contact with the top of the stop head 40 which indicates that the cutting edge 37 has completely penetrated the sheets 36 and has moved a slight distance into the softer protecting material 17.

As the cutting edge 37 penetrates the material 36, the disks of cut out material, being slightly smaller in diameter than the circular conduit of the drill, will travel freely upward and may be emptied later by turning the machine upside down, or said disks will be automatically expelled through the central orifice of the knob 32.

When the drilling operation has been completed, the head 22 of clamp spindle 14 is rotated in the opposite direction, traveling upward and releasing said clamp from the sheets 36. The knob 32 is then rotated in anticlockwise direction and the cutter 26 rises upward through sheets 36 until the cutting edge 37 of drill has passed entirely out of and is free from said sheets 36, leaving a perfectly smooth round hole through the plurality of sheets. The disks remaining in the conduit of the drill until emptied as above described.

The sheets 36 are then removed from machine and are ready for new perforations. The ball tipped fasteners, referred to in the preamble above, can now be inserted through said plurality of sheets binding said sheet removably together; said fasteners consisting of flat or rounded heads; two shanks at right angles to said heads, attached to said heads, one shank being slightly longer than the other and fitted closely together: the end of each said shank terminating in a ball-like tip, which keeps said shanks slightly apart so that they may be separated without injury to the hand or finger.

Although the above description seems lengthy, the actual operation of my machine is extremely simple, rapid and reliable. Holes through telephone books over 500 pages have been quickly bored for the purpose of hanging same on hooks. Although the above illustrates and describes the preferred forms of my invention, modification may be made in details without affecting its main features.

It will be obvious that the drill in the hereinbefore described device may be operated by a gear arrangement as well as by an electric motor, or

by the combination of both, for the sake of obtaining the necessary power.

What I claim and desire to protect by Letters Patent are:—

1. In a drilling machine of the class described, adjustable means whereby to indicate when the cutting edge of the drill has entirely penetrated the material to be drilled, said means consisting of a stem, an arm forming part of the machine and being made with a bore therein adapted to receive therein said stem, means to hold said stem in adjusted position, said stem terminating at its upper end in an enlarged flat head-portion adapted to prevent further downward movement of the drill after perforation of the sheet.

2. A hollow core drilling machine, comprising a frame terminating at one end in a bearing block, the latter being formed with a recess to receive therein relatively protective material softer than a cutting edge, said frame having at the upper end an enlarged hollow, internally threaded frame spindle, the axes of said frame spindle and bearing block being substantially in line, and an arm integrally connecting said bearing block and frame spindle, a drill stop adjustably secured to said frame, means for adjustably attaching the position of said stop, said frame having a hole at its lower rear end for receiving a slidable rod therein, a hollow clamping spindle externally threaded to correspond with and engage said frame spindle and travel through the latter, said clamping spindle terminating at its upper end in a large hollow rotative knob and having its body threaded internally, a hollow drill spindle having a partly threaded outer surface and adapted to be mounted in said clamping spindle, said drill spindle terminating at its lower end in a removable and replaceable cutting drill, an enlarged rotative knob formed with a central orifice therein and adapted to be mounted upon the upper end of the drill spindle, an elongated plate securing said knob to the drill spindle, and a manipulating handle mounted upon said plate.

3. In a drilling machine, a base formed with a recess therein adapted to receive a somewhat soft material, a neck portion integral with said base, said neck portion terminating in a frame spindle, a clamping spindle mounted in the latter, and a hollow drill spindle operably mounted in said clamping spindle, said neck portion being formed with a vertical bore therein, a drill stop adjustably mounted in said bore, the upper end of said drill stop terminating in a knob, an operable knob upon the hollow drill spindle adapted to cooperate with the knob upon the drill stop, a detachable, hollow cutter mounted upon said drill spindle, said cutter having a cutting edge slightly smaller in diameter than the hollow conduit of the cutter and drill spindle, and means permitting adjustment of the material to be drilled, substantially as shown and described.

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