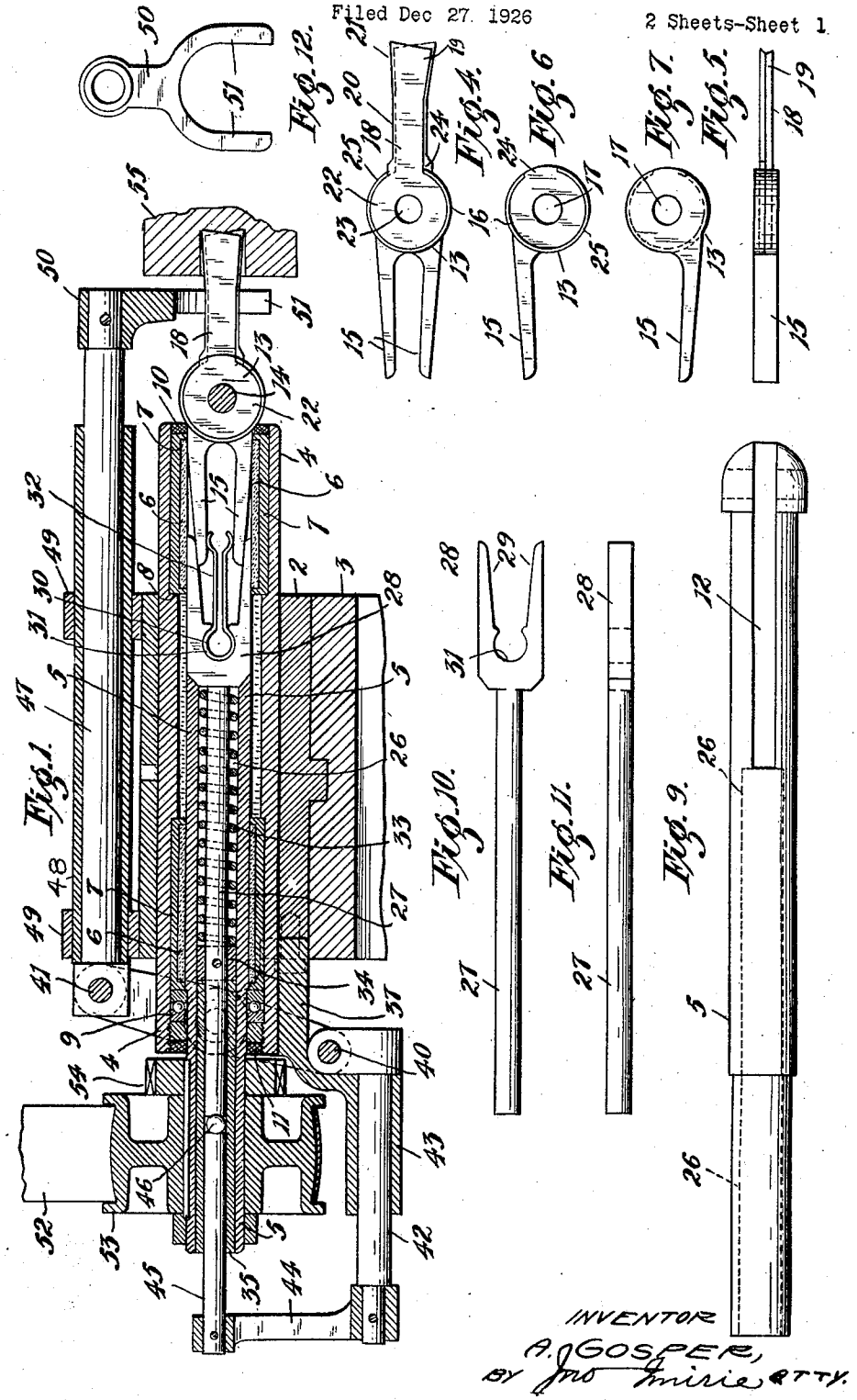
Aug. 2, 1927. 1,637,745

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EXPANSIBLE BORING MACHINE

Filed Dec 27, 1926 2 Sheets-Sheet 1



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EXPANSIBLE BORING MACHINE

Filed Dec. 27, 1926 2 Sheets-Sheet 2

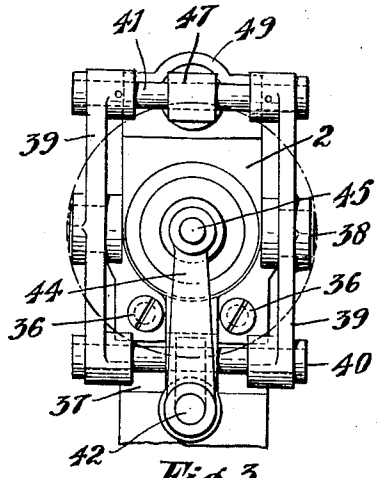


Fig. 3.

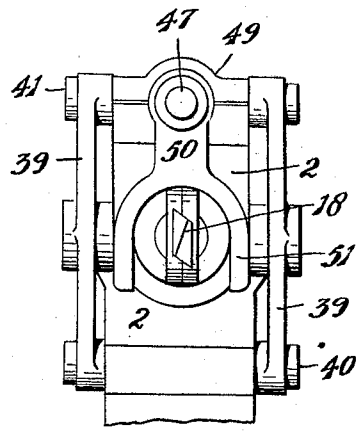


Fig. 2.

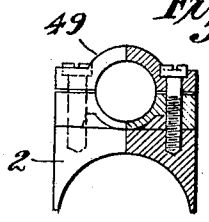


Fig. 14.

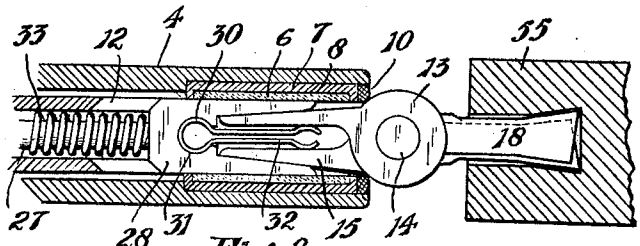


Fig. 8.

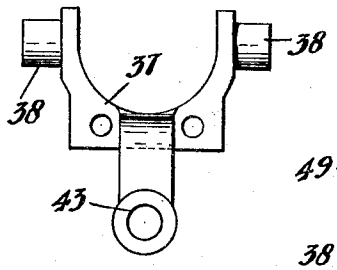


Fig. 15.

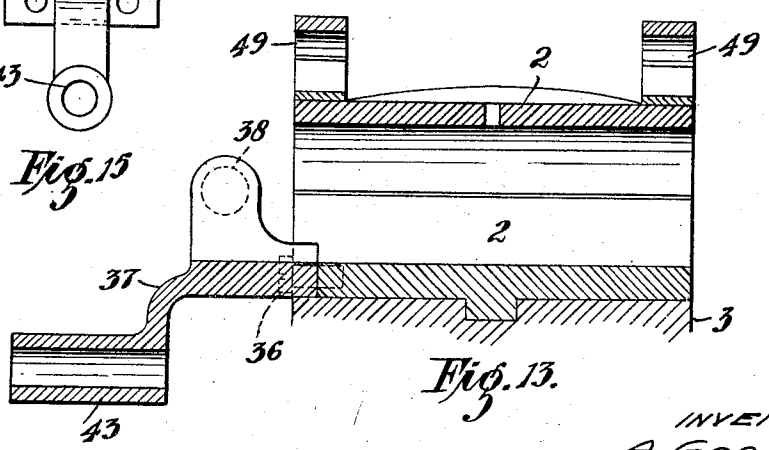


Fig. 13.

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EXPANSIBLE BORING MACHINE.

Application filed December 27, 1926, Serial No. 157,251, and in Australia May 5, 1926.

This invention relates to an improved machine for boring in work-pieces of wood or other material circular holes having straight entrance ends and expanded or enlarged portions at their inner ends. Holes of this kind are used largely in the manufacture of doors, cabinets and other articles of joinery wherein the parts are connected together by expansible dowels or similar connecting devices arranged to be concealed from view.

The principal object of the invention is to provide an expansible boring machine having cutters of improved construction, simple and improved means for detachably and interchangeably securing the cutters in position, and improved means for automatically opening or expanding the cutters during the boring operations to form the enlarged inner ends of the holes.

Reference is made to the accompanying drawings wherein:—

Figure 1 is a longitudinal sectional view of the improved expansible boring machine.

Figure 2 is a front view of the forward end of the boring machine.

Figure 3 is a view of the rear end of the machine.

Figure 4, 5, 6 and 7 are detail views illustrating the cutters and the means for detachably and interchangeably securing the cutters in position.

Figure 8 is a sectional view of the forward end of the machine showing the cutters in opened position for boring the expanded inner end of a hole.

Figure 9 is a detail view of the rotating spindle which carries the cutters.

Figures 10 and 11 are detail views of the part 27 hereinafter described.

Figure 12 is a view of the forked control member shown in Figure 1.

Figures 13, 14 and 15 are views illustrating the tubular base member of the machine and the brackets carried thereby.

The improved expansible boring machine comprises a base member 2 of tubular construction, which is preferably formed in two interfitting sections and is mounted upon a suitable machine bed or frame 3. The base member 2 may be slidable on the bed 3 to enable the machine to be conveniently adjusted to different positions for boring holes in relatively large work-pieces which require to be supported in vises or clamping appliances.

The base member is ordinarily disposed horizontally and rigidly supports a cylindrical casing 4 wherein a rotatable spindle 5 is journaled in bearing bushes 6. These bearing bushes are accommodated in holders 7, which are fitted in shallow recesses 8 formed in the end portions of the casing 4. A thrust bearing 9 is provided at the rear end of the casing 4 to rotatably support the end of the spindle 5, and packing washers 10 and 11 of fibre or like suitable material are fitted into opposite ends of the casing to prevent escape of lubricant from the working parts of the machine.

Formed at the forward end of the spindle 5 is a diametrical slotway 12 wherein two tool holders 13 are pivoted on a detachable pin 14. These tool holders are illustrated in detail in Figures 4 to 7, and each is constructed having an integral control arm 15 to extend rearwardly within the slotway 12, and a circular socket-like member 16 which is centrally apertured at 17 to receive the pivot pin 14. The cutters 18 of the machine are detachably and interchangeably fitted into the tool holders 13 and are arranged to abut in scissors-like fashion as shown in Figure 5. Each cutter has a blade 19 formed with a straight cutting edge 20 and with an inclined or angular cutting edge 21 disposed at the outer end of the said straight cutting edge.

A circular plate 22 having a hole 23 is provided at the inner end of each cutter and is adapted for detachable fitment into the socket 16 of the tool holder, the hole 23 receiving the pivot pin 14. To prevent lateral movement of the cutters 18 when fitted in position in their tool holders, gaps 24 are formed in the walls 25 of the tool holder sockets 16 and are so arranged as to snugly receive the stem or blade portions of the cutters.

A plurality of cutters 18 of different shapes and sizes are provided for interchangeable fitment into the tool holders for boring holes of different diameters or having expanded inner ends of varying sizes. In changing the cutters, the pivot pin 14 is first withdrawn and the two tool holders 13 together with the cutters are removed from the slotway 12. The tool holders are then separated when the existing cutters are removed from the sockets 16 and the required cutters are fitted in position.

Formed axially in the spindle 5 is a hole 26 wherein a stem or rod 27 is slidably fitted.

This stem is provided at its forward end with a flat block 28 which is slidably accommodated in the slotway 12 of the spindle 5 and is formed having two inclined internal surfaces 29 engaging the ends of the control arms 15 of the tool holders. When the stem 27 is slidably moved within the axial hole 26, the inclined surfaces 29 on the flat block 28 actuate the control arms 15 causing the cutters to be moved apart in an opening movement to thus form the expanded inner ends of the holes being bored.

To automatically return the cutters to normal position after a hole has been bored, a spring 30 substantially of U-shape is fitted in a circular hole 31 in the flat block 28 and is arranged with its arms 32 bearing against the internal surfaces of the cutter control arms 15, constantly maintaining said control arms in engagement with the inclined surfaces 29 of the block 28.

Fitted around the stem 27 is a coiled spring 33 having its forward end anchored to the spindle 5. The rear end of said spring is arranged to bear against a collar 34 which is fitted onto said stem 27 and is adapted to abut against a guide bush 35 rigidly secured within the rear end of the spindle 5. The function of the coiled spring 33 is to automatically return the stem 27 and the cutters 18 to normal position after each boring operation performed by the machine.

Secured to the rear end of the machine base 2 by screws 36 is a bracket 37 designed to partly encircle the end of the cylindrical casing 4. The said bracket is formed having two oppositely disposed pins or studs 38 on which are centrally pivoted two levers 39 coupled together at their opposite ends by pins 40 and 41 respectively. The pin 40 is pivotally connected to one end of a rod 42 which is slidable in a guide boss 43 formed on the base bracket 37. This rod 42 carries an arm 44 connected to a spindle 45 slidably mounted in the guide bush 35 fitted in the rear end of the machine spindle 5. A thrust ball 46 is provided between the end of the spindle 45 and the rear end of the stem 27 so that movement of the former is freely transmitted to said stem to actuate the cutters 18 of the machine without interfering with the rotary movement of the spindle 5 and said stem 27.

The pin 41 at the opposite end of the levers 39 is pivotally connected to a rod 47, which is slidable in a guide sleeve 48 mounted in apertured members 49 secured to the upper section of the machine base member 2. The forward end of the rod 47 is fitted with a forked control member 50, which has two arms 51 arranged one on each side of the cutters 18 as is shown clearly in Figure 2.

The machine is adapted to be driven at high speed by a belt 52 which passes around a pulley wheel 53 keyed onto the rear end of the machine spindle 5. If desired, a gear wheel 54 may be fitted on the machine spindle adjacent to the pulley wheel 53 and by gearing the same to an adjacent machine or machines a gang of machines can be simultaneously driven by a single power belt.

In the operation of the machine, the workpiece or workpieces 55 to be bored are first forced inwardly against the rotating cutters 18. These cutters when first contacting with the workpieces are in closed position as shown in Figure 1, and they thus bore the straight entrance end of the hole. When a predetermined depth of hole has been bored, the workpiece contacts with the forked control member 50 and moves it inwardly thus actuating the levers 39 through the sliding rod 47 and the pin 41. The levers 39, in turn, slidably move the rod 42 and cause the spindle 45 to be slidably moved within its guide bush 35, thus actuating the stem 27 through the thrust ball 46 and causing the cutters 18 to be opened in the manner previously described. The opening movement of the cutters takes place gradually as the work-piece slowly actuates the forked control member and as a result the enlarged inner portion of the hole is bored uniformly.

When the work-piece is removed from the machine, the coiled spring 33 automatically returns the stem 27, the forked control member 50 and other slidable parts of the machine to initial position, while the U-spring 30 causes the cutters 18 to be moved to closed position.

What I do claim is:—

1. An improved boring machine for boring holes having enlarged inner ends comprising, a casing, a spindle rotatable in said casing, a pair of tool holders pivotally carried by said spindle, control arms on said tool holders extending inwardly into the casing, cutters carried by said tool holders, a stem slidable within the spindle and adapted to engage said control arms, and a control member mounted adjacent to the cutters and adapted to be actuated by the workpieces being bored to slidably move the stem member and thus automatically open the cutters to form the enlarged inner ends of the holes being bored.

2. An improved boring machine for boring holes having enlarged inner ends comprising, a casing, a spindle mounted in bearings in said casing, means for rotating said spindle, a pair of tool holders pivotally carried at one end of said spindle, control arms on said tool holders extending inwardly into the casing, cutters interchangeably carried by said tool holders, a stem slidable within the spindle and adapted to engage said control arms to open the cutters to form the

enlarged inner ends of the holes being bored, a forked control member arranged around the cutters and adapted to be engaged by the work-piece being bored, and connections between said forked control member and the slidable stem whereby the control arms of the tool holders are actuated to open the cutters when the forked control member is moved inwardly by the work-piece.

3. An improved boring machine as claimed in claim 2, and wherein the spindle is formed with a slotway to receive a block fitted on the end of the slidable stem, and internal inclined faces are provided on said block to engage the control arms of the tool holders.

4. An improved boring machine as claimed in claim 2, and wherein the tool holders are mounted on a pivot pin at the end of the rotatable spindle and are formed with sockets which detachably receive circular plates formed at the inner ends of the cutters.

5. An improved boring machine as claimed in claim 2, and wherein a coiled spring surrounds the slidable stem to automatically return said stem and the forked control member to initial position when the work-piece is removed from the machine, and wherein a spring is fitted between the control arms of the tool holders to close the cutters after boring operations.

6. An improved boring machine for boring holes having enlarged inner ends comprising, a base member, a casing carried by said base member, a spindle mounted in bearings in said casing, means for rotating said spindle, a slotway formed in said spindle, a pair of tool holders pivotally carried at one end of the spindle, cutters interchangeably fitted into said tool holders, control arms on the tool holders extending into the slotway of the spindle, an axial hole in the spindle, a stem slidable in said axial hole, a flat block carried by said stem and slidable in the slotway of the spindle, internal inclined surfaces on said block engaging the control arms of the tool holders to automatically open the cutters when said stem is actuated, a spring carried by said flat block and engaging said control arms to close the cutters after boring operations, brackets secured to the machine base member, levers carried by said brackets, a forked control member fitting around the cutters and adapted to be actuated by the workpiece being bored, connections between the forked member and said levers, and further connections between said levers and the slidable stem whereby said stem is slidably moved within the spindle to open the cutters when the forked control member is actuated.

In testimony whereof I affix my signature.

AMOS GOSPER.