(No Model.) 2 Sheets—Sheet 1.

H. COTTRELL.

EXPANDING MANDREL.

No. 340,291. Patented Apr. 20, 1886.

Fig. 1.

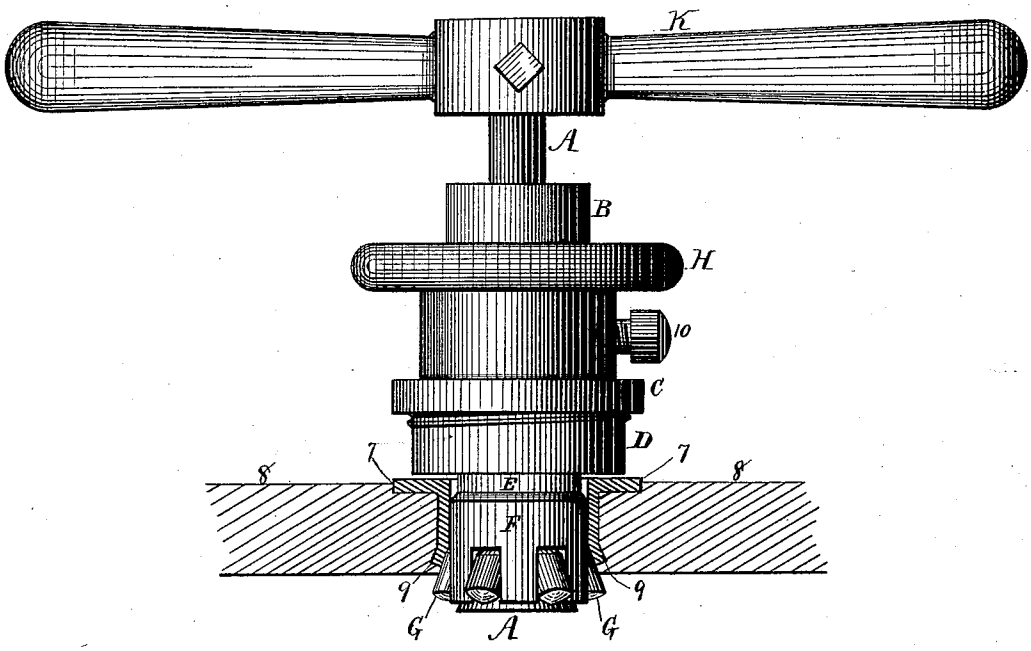


Fig. 3.

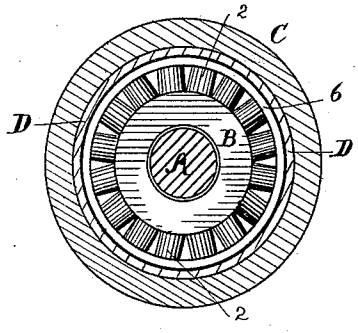
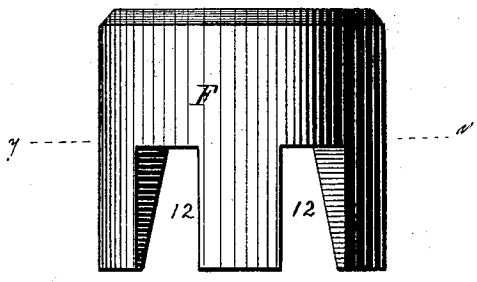


Fig. 4.



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(No Model.) 2 Sheets—Sheet 2.

H. COTTRELL.

EXPANDING MANDREL,

No. 340,291. Patented Apr. 20, 1886.

Fig. 2.

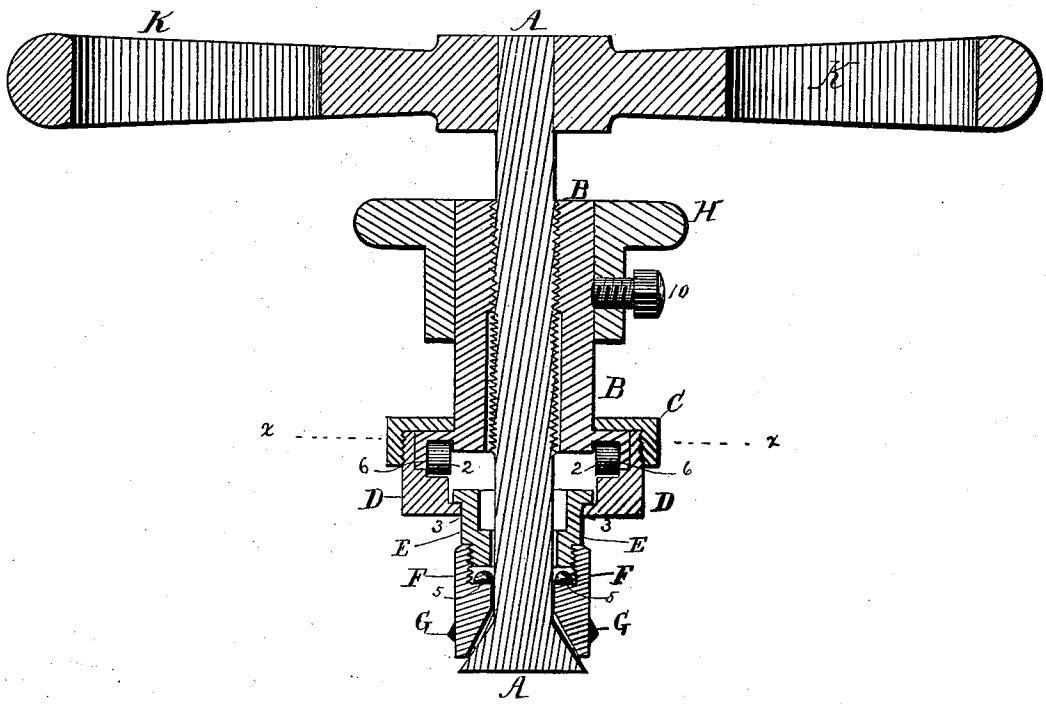


Fig. 5.

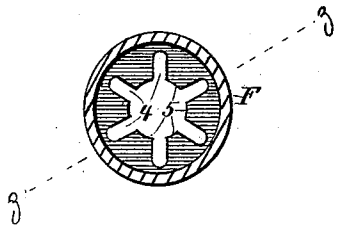


Fig. 6.

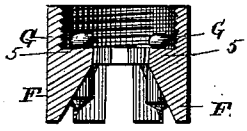


Fig. 7.



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UNITED STATES PATENT OFFICE.

HERBERT COTTRELL, OF NEWARK, NEW JERSEY.

EXPANDING-MANDREL.

SPECIFICATION forming part of Letters Patent No. 340,291, dated April 20, 1886.

Application filed August 26, 1885. Serial No. 175,391. (No model.)

To all whom it may concern:

Be it known that I, HERBERT COTTRELL, a citizen of the United States, residing at Newark, county of Essex, and State of New Jersey, have invented a new and useful Improvement in Expanding-Mandrels, of which the following is a specification.

The object of my invention is to provide an efficient device for the expansion of the inner and lower end of a metallic bushing without liability of rupturing the metal composing the same, and whereby said bushing is held through such expansion firmly in position in a barrel, or wherever it may be inserted. I secure this object by providing a series of hanging rollers, supported at one end by a suitable annular plate, having slots therein for holding the neck of said rollers at or near the base of the mandrel, a central core having a cone-shaped lower end, actuated by mechanism hereinafter described, whereby the upward movement of the central core, through contact of its cone-shaped end with the free end of the rollers, changes the angle of inclination of said rollers at will, and thus secures any degree of expansion that may be required to firmly retain the bushing in its place.

Figure 1 represents a perspective elevation of my improved mandrel and its application to the bushing of a barrel. Fig. 2 represents a sectional view of the mandrel, drawn on a vertical central line. Fig. 3 represents a cross-section drawn on line *x x* of Figs. 1 and 2. Fig. 4 represents the base-piece of the mandrel wherein the expanding-rollers are hung, showing two of the vertical openings through which the rollers incline outwardly at their free ends when the pressure of the cone-shaped end of the central core is applied. Fig. 5 represents a cross-section of the mandrel drawn on line Y Y of Figs. 2 and 4, showing the annular supporting-plate and the slots therein in which the roller-heads have their bearing. Fig. 6 represents a vertical section of the base-piece drawn on line Z Z of Figs. 4 and 5, showing the flanged edge of the supporting-plate and two of the rollers held in position thereby. Fig. 7 represents a perspective view of one of the expanding-rollers, showing the neck which enters the slots in the annular supporting-plate and the roller-head which holds it in position.

Like letters and figures indicate like parts.

A is the central core, having a cone-shaped base. K is a hand-lever secured to and rotating said core.

B is the main stock, through which core A has a longitudinal movement by means of a screw on said core and engaging threads on main stock B. The main stock has an annular projection or flange, 6, said flange having an annular groove on its lower face, forming a track for the anti-friction rollers 2. (Shown in Figs. 2 and 3.) A similar groove is formed in the upper portion of piece D, so that when the annular cap C, resting on the flange of the main stock B, is screwed upon piece D the loose rollers 2 are confined to the track. (Shown in Figs. 3 and 2.)

As cap C has a free rotary movement around the base of the main stock B, it will be seen that said stock has an independent movement between cap C and piece D. The piece D rests upon the bushing 7. (Shown in Fig. 1.) The rollers 2 tend to lessen the friction and afford a compensating movement of the main stock when the upward and outward pressure of the cone-shaped end of the central core, A, is applied to the expanding-rollers G.

The lower section, F, of the mandrel, in which the rollers G are hung on supporting-plate 5, is screwed at its upper end to the intermediate piece, E, which telescopes into piece D, and has a longitudinal movement through the central opening of said piece. An annular flange, 3, is formed on piece D, and a similar one on the intermediate piece, E. These flanges act as stops, limiting the longitudinal movement of E through the opening in D.

When the central core, A, is rotated by hand-lever K and the upward movement of the cone-shaped base takes place, the base-section F of the mandrel and its connecting-piece E is slightly drawn upward as the expanding-rollers are pressed outwardly, assuming the position on the bushing as shown in Fig. 1. It will be seen that by this movement the cone-shaped base of the core A exerts a powerful pressure on the free ends of rollers G, and by frictional contact therewith imparts a rolling-pressure to the lower end of the bushing, (shown at 9 in Fig. 1,) expanding it and forcing it into the wood 8, without liability of rupturing the metal composing said bushing.

H is a hand-piece held rigidly on the main stock B by means of set-screw 10. During the process of expanding the bushing addi-

tional pressure is required upon the expanding-rollers. This pressure is secured by holding hand-piece H, and with it the main stock B, so that the rotation of the central core will have its full effect in drawing the base-piece F and the rollers therein upward, thus increasing the pressure against the lower edge of the bushing.

The pendent or expanding rollers G are formed as shown in Fig. 7, the neck fitting loosely in slots 4 of supporting-plate 5, while the head of the roller, conforming on either side of the slots to the flanged edge of the supporting-plate, (shown in Fig. 6,) prevents the roller from slipping from the slot after the intermediate piece, E, is screwed into position. (See Fig. 2.) These pendent rollers have a free movement from their lower ends outwardly through vertical slots or openings 12 in the base-piece F (shown in Figs. 1 and 4) whenever the pressure of the cone-shaped end of the central core is applied. When relieved from this pressure, they fall back into the openings 12, until their faces are flush with the outer surface of the base-piece F, thus permitting the removal of the mandrel from the bushing when the expansion of its lower edge is finished.

The mode of operating my improved mandrel is as follows: The bushing 7 having been inserted in the hole through the stave 8, the lower end of the mandrel is inserted until the bearing-piece D rests upon the rim of the metallic bushing 7. The hand-piece H is held by the operator until the rotation of the central core has brought the expanding-rollers G into contact with the lower edge of the bushing. The continued rotation of the core imparts, through the frictional contact of its cone-shaped end, a rotary movement to the base-piece F and the pendent rollers therein. The tendency of the main stock to revolve with the central core is increased by the presence of the anti-friction rollers at its base. This tendency prevents an undue or excessive pressure upward, while the outward rolling-pressure at the lower end of the bushing continues. As hitherto stated, an increased upward pressure can be had at any time by simply holding the main stock by piece H while the central core revolves therein. The result attained is best shown in Fig. 1.

What I claim as new, and for which I ask Letters Patent of the United States, is—

1. In an expanding-mandrel, the combination, with a main stock, of a bearing-piece loosely mounted thereon, a base-piece supporting pendent rollers in radial openings in said base-piece, said base-piece being loosely connected with and having an independent longitudinal and rotary movement on said bearing-piece, a central core having a cone-shaped base, and means for imparting to said core a longitudinal and rotary movement, substantially as set forth and described.

2. The combination, with a central core, A, outwardly inclined at its base and having a longitudinal movement through the main stock B by means of thread-and-screw engagement therewith, of bearing-piece D, having an independent rotary movement at the base of said main stock, intermediate piece, E, having telescopic connection with bearing-piece D, base-piece F, firmly screwed to piece E and provided with vertical openings, and pressure-rollers G, pendent in said openings and supported at one end by suitable bearings therein, whereby, through the upward movement of the cone-shaped core, the free ends of said rollers are inclined outwardly, substantially as and for the purpose set forth and described.

3. The combination, with main stock B, provided with an annular flange around its base, of central core, A, having a longitudinal movement in said stock by means of thread-and-screw engagement therewith, bearing-piece D, cap C, screwed upon and securing said bearing-piece in position, intermediate piece, E, base-piece F, having vertical openings 12 therein, and pendent rollers G, having a free swinging movement in and out of said openings, whereby, through the upward movement of the cone-shaped base of the central core, the free ends of the rollers are pressed outwardly, substantially as set forth and described.

4. The combination, with a central core having cone-shaped end and means for rotating it, of pendent pressure-rollers operated by said core, as shown and described, main stock B, through which core A has a longitudinal movement by means of thread-and-screw connection therewith, and having a flange around its base and an annular groove in the lower face of said flange, bearing-piece D, having corresponding groove in its upper end, anti-friction rollers 2, loosely resting in said groove, cap C, screwed upon said bearing-piece and holding the rollers in place, as shown and described, whereby, through the rotation of the main stock, when the core is turned, excessive upward pressure on the pendent pressure-rollers is prevented, substantially as set forth.

5. The combination of central core, A, having a screw thereon, main stock B, provided with a threaded opening for the engagement of said core, and a flanged base with annular groove in its lower face, hand-piece H, secured to said main stock by set-screw 10, bearing-piece D, with roller-track in its upper end, cap C, anti-friction rollers 2, intermediate piece, E, telescoped into bearing-piece D, as shown and described, base-piece F, provided with vertical openings, and pressure-rollers G, loosely journaled at one end in annular supporting-plate 5 and provided with a flanged edge to retain the head of said rollers in position, substantially as set forth.

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Witnesses:
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W. H. NICHOLS.