(No Model.) 3 Sheets—Sheet 1.

C. P. JENNINGS.

EXPANSION DRILL OR BORING TOOL.

No. 457,536. Patented Aug. 11, 1891.

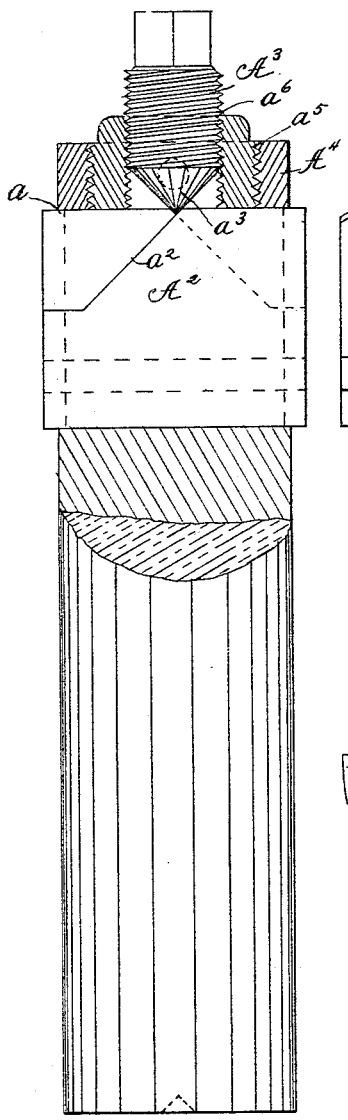


Fig. 1.

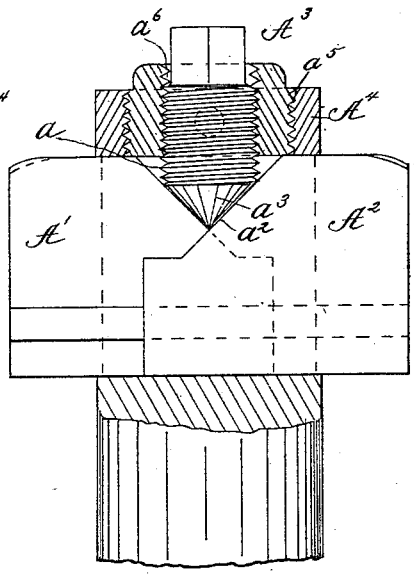


Fig. 3.

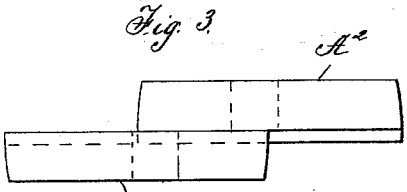


Fig. 4.

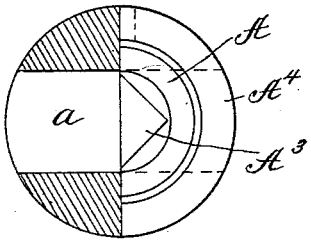


Fig. 5.

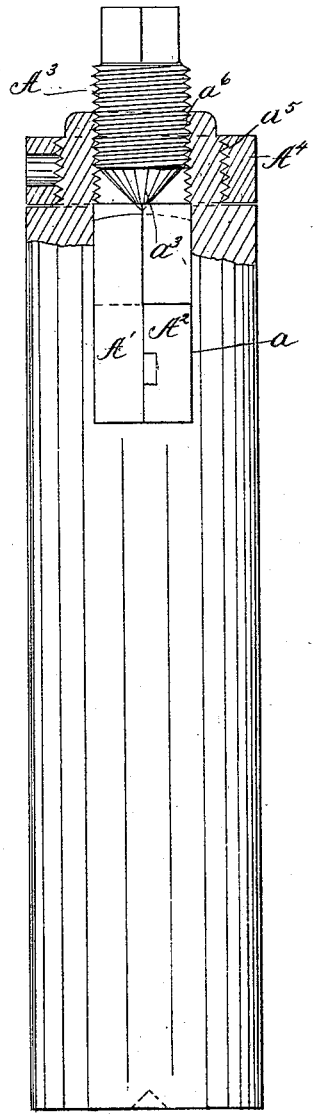


Fig. 2.

Witnesses
Franklin Moore.
R. G. Davies.

Inventor
C. P. Jennings
By his Attorneys
Hallock & Halleck.

(No Model.) 3 Sheets—Sheet 2.

C. P. JENNINGS.

EXPANSION DRILL OR BORING TOOL.

No. 457,536. Patented Aug. 11, 1891.

Fig. 6.

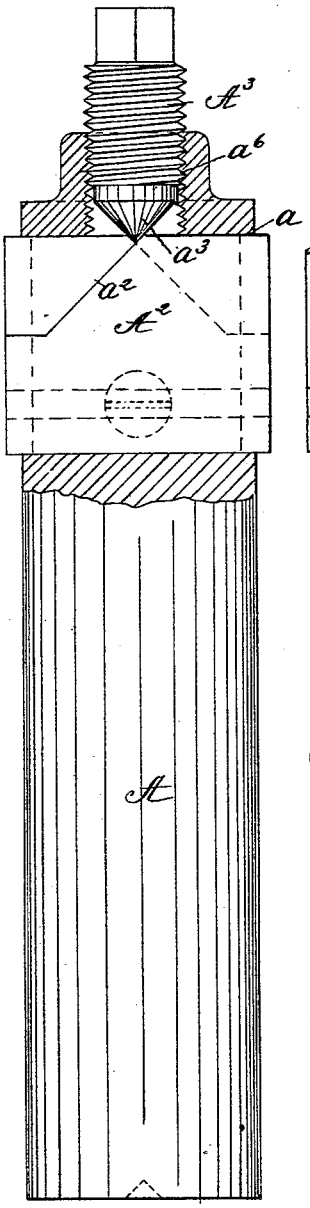


Fig. 8.

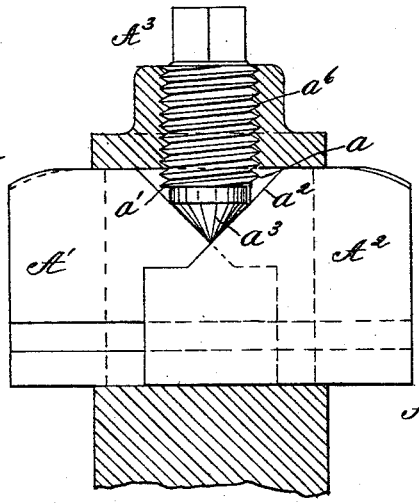
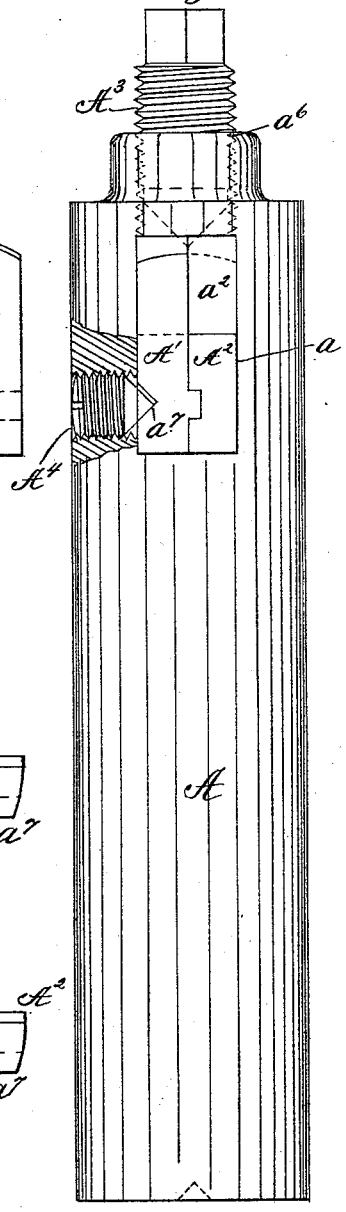


Fig. 7.



A2 Fig. 9.

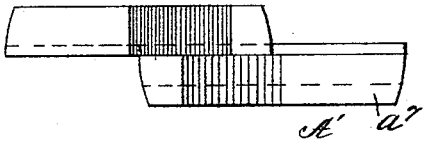
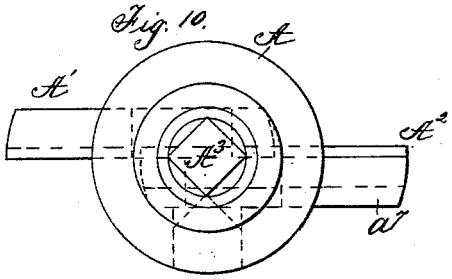


Fig. 10.



Witnesses
Franklin Moore
R. S. Ames.

Inventor
C. P. Jennings
By his Attorneys
Hallock & Halleck

(No Model.) 3 Sheets—Sheet 3.

C. P. JENNINGS.

EXPANSION DRILL OR BORING TOOL.

No. 457,536. Patented Aug. 11, 1891.

Fig. 11.

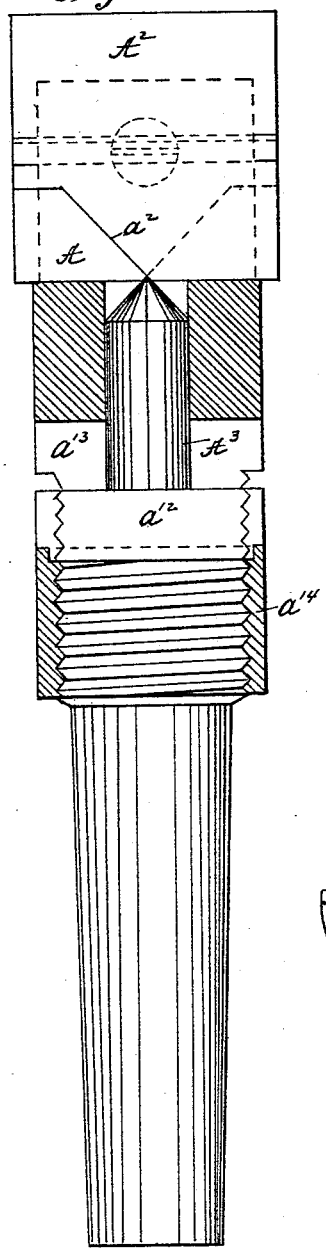


Fig. 13.

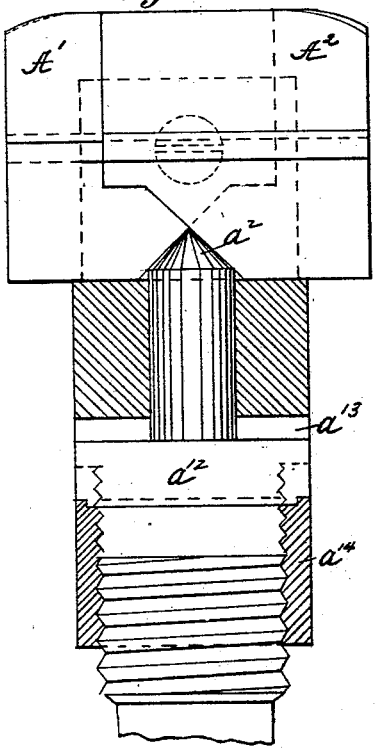


Fig. 12.

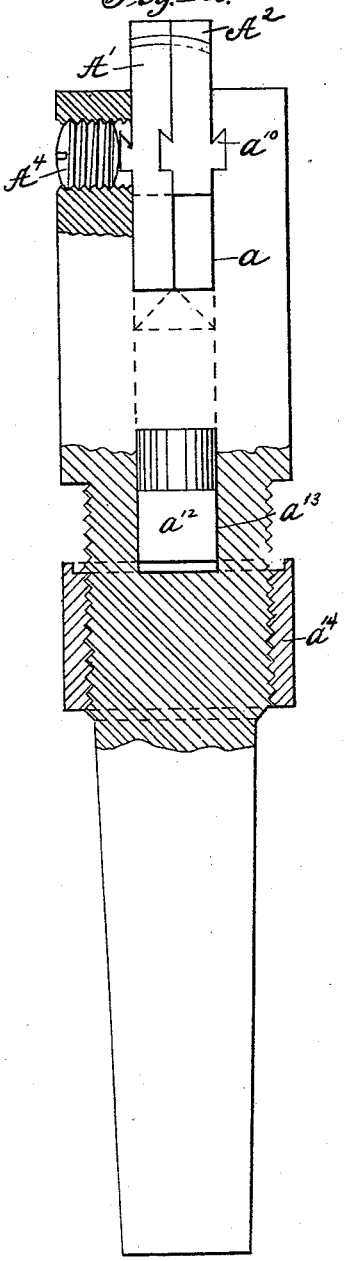


Fig. 14.

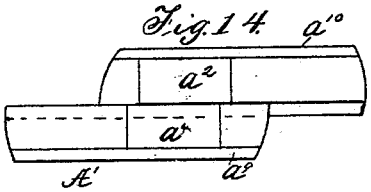
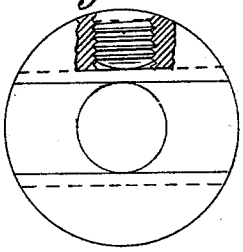


Fig. 15.



Witnesses

Franklin Moore

L. R. Miller

Inventor

C. P. Jennings

By his Attorneys

Hallock & Halleck.

UNITED STATES PATENT OFFICE.

CHARLES P. JENNINGS, OF BRADFORD, PENNSYLVANIA.

EXPANSION-DRILL OR BORING-TOOL.

SPECIFICATION forming part of Letters Patent No. 457,536, dated August 11, 1891.

Application filed April 7, 1891. Serial No. 388,054. (No model.)

To all whom it may concern:

Be it known that I, CHARLES P. JENNINGS, a citizen of the United States, residing at Bradford, in the county of McKean and State of Pennsylvania, have invented certain new and useful Improvements in Expansion-Drills or Boring-Tools; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of cutting-tools which are moved laterally from the center when it is desired to increase the diameter of an opening already made.

The object of my invention is to so arrange the tool that when it is desired to move the cutters they will each move the same distance, so that the cutting-edges will be upon the same circle, the center of which is the longitudinal center of the mandrel carrying said cutters. To accomplish this object I provide the cutters with inclined faces running in opposite directions and operated upon by a conical screw-threaded pin, the slant of which is the same as the slant of the inclined faces of the cutter, so that no matter in what position the pin may be the slant-line of the cone and the cutters will be the same.

The invention consists of constructions and combinations, all as will hereinafter be described in the specification, and pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 represents a mandrel, partly in elevation and partly in section; Fig. 2, a side elevation, partly in section; Fig. 3, an elevation, partly in section, showing the cutters expanded; Fig. 4, a bottom plan of the cutters when in the position shown in Fig. 3; Fig. 5, a view, partly in elevation and partly in section, the part in elevation showing the top of the mandrel and the part in section showing the opening for the cutters; Fig. 6, a mandrel having a modified construction of that shown in Fig. 1; Fig. 7, an elevation of the same, showing parts broken away; Fig. 8, a section showing the cutters expanded; Fig. 9, a bottom plan of the cutters; Fig. 10, a top plan of the device shown in Figs. 6, 7, and 8; Fig. 11, a modification, shown in section, of the device shown in Figs. 6, 7, and 8; Fig. 12, a side elevation, partly in section, of the device shown in Fig. 11; Fig. 13, a section showing the cutters expanded; Fig. 14, a bottom plan of the cutters, and Fig. 15 a bottom plan of the device.

A represents a mandrel of any desired form or size and provided with an opening a for the cutters. The cutters A' A^2 are of any desired kind, and are provided with inclined faces a' and a^2, respectively, and which slant in reverse directions, as shown in the drawings. The cutters are expanded by means of a set-screw A^3, having a conical head a^3, the slant of which is the same as the slant of the inclined faces a' and a^2 of the cutters, and the apex of the cone normally points to the apex of the wedge-like inclines of the cutters, as shown in Figs. 1, 6, and 11. The set or adjusting screw A^3, when moved against the cutters, forces the latter apart to any desired extent, and when so adjusted the cutters are held in place by a retaining device A^4, which may be arranged at any desired point to lock or hold the parts rigidly in place.

In Figs. 1 to 5, inclusive, is shown the simplest form of my device. The slot a for the cutters is formed transversely to the length at a point below the top or upper end of the mandrel, which is screw-threaded at a^5 for a ring A^4, that retains the cutters in place when screwed down against the latter, as shown in Figs. 1 and 2. The cutters are tongued and grooved together to prevent vertical play, and also to guide each other when moved by the adjusting-pin A^3. This pin is screw-threaded and enters the mandrel from the top through a screw-threaded opening a^6.

In Figs. 6, 7, 8, 9, and 10 is shown my preferred form of device. The adjusting-pin A^3 is arranged in the same manner as the pin shown in Figs. 1, 2, and 3. The retaining device A^4 in this form, however, is a set-screw which acts directly upon the cutters, which are tongued and grooved together. One of the cutters A' is provided with a groove a^7, V-shaped in cross-section, and preferably extending from end to end of the cutter, as shown in Fig. 9. The apex of the conical head of pin or set-screw A^4 is slightly below the apex of the V-shaped groove a^1, so that when the set-screw A^4 is screwed against the

cutter it will crowd the latter against the bottom of the groove *a* to more rigidly hold the cutters in place. If desired, the under side of the cutters may be provided with teeth which will bite into the groove when the retaining device A^4 is screwed against the cutter.

In Figs. 11, 12, 13, 14, and 15 is shown a modification of the devices shown in the other figures of the drawings. The end of the mandrel is slotted so that the cutters project above it. The cutters instead of being tongued and grooved together have side projections a^9, which enter grooves a^{10} in the walls of slot *a*. These projections are preferably of dovetail form to afford a greater surface to stand the pressure of the adjusting device, which in this instance is a plain pin entered into an opening in the body of the mandrel and resting upon a bar a^{12} in a transverse slot a^{13} of the mandrel. The body of the mandrel is screw-threaded to receive a screw-threaded ring a^{14}, upon the upper part of which the bar a^{12} rests or is secured in any desired way. When the ring is screwed up, it moves the bar upwardly, and it in turn moves the pin against the cutters, which, when expanded, are held in place by set-screw A^4.

What I claim as new is—

1. The combination of a mandrel having a slot, cutters arranged in said slot and having the oppositely-inclined faces, an adjusting device having a conical head the slant of which is the same as the slant of the inclined faces of the cutters, and a retaining device, substantially as described.

2. The combination of a mandrel having a slot, cutters arranged in said slot and having the oppositely-inclined faces, an adjusting device or pin screwed into the top of the mandrel and having a conical head the slant of which corresponds to the slant of the inclined faces of the cutters, and a retaining device, substantially as described.

3. The combination of a mandrel having a slot, cutters arranged in said slot and having inclined faces, an adjusting-pin for said cutters and having a conical head the slant of which corresponds to the slant of the inclined faces of the cutter, and the set-screw for holding the cutters in place, substantially as described.

4. The combination of a mandrel having a slot for the cutters and an expanding device for the cutters, said cutters having a V-shaped groove, the apex of which is above the apex of the set-screw which is inserted through the mandrel, substantially as described.

5. The combination of a mandrel having a slot for the cutters, said cutters having a V-shaped groove and teeth, an expanding device for the cutters, and a set-screw the conical head of which forces the cutters together and presses them against the bottom of the slot.

6. The combination of a mandrel having a slot, cutters arranged in said slot and having the oppositely-inclined faces and dovetailed grooves and ties, an adjusting device having a conical head the slant of which is the same as the slant of the inclined faces of the cutters, and a retaining device, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

CHARLES P. JENNINGS.

Witnesses:
H. H. NORTH,
C. C. NORTH.