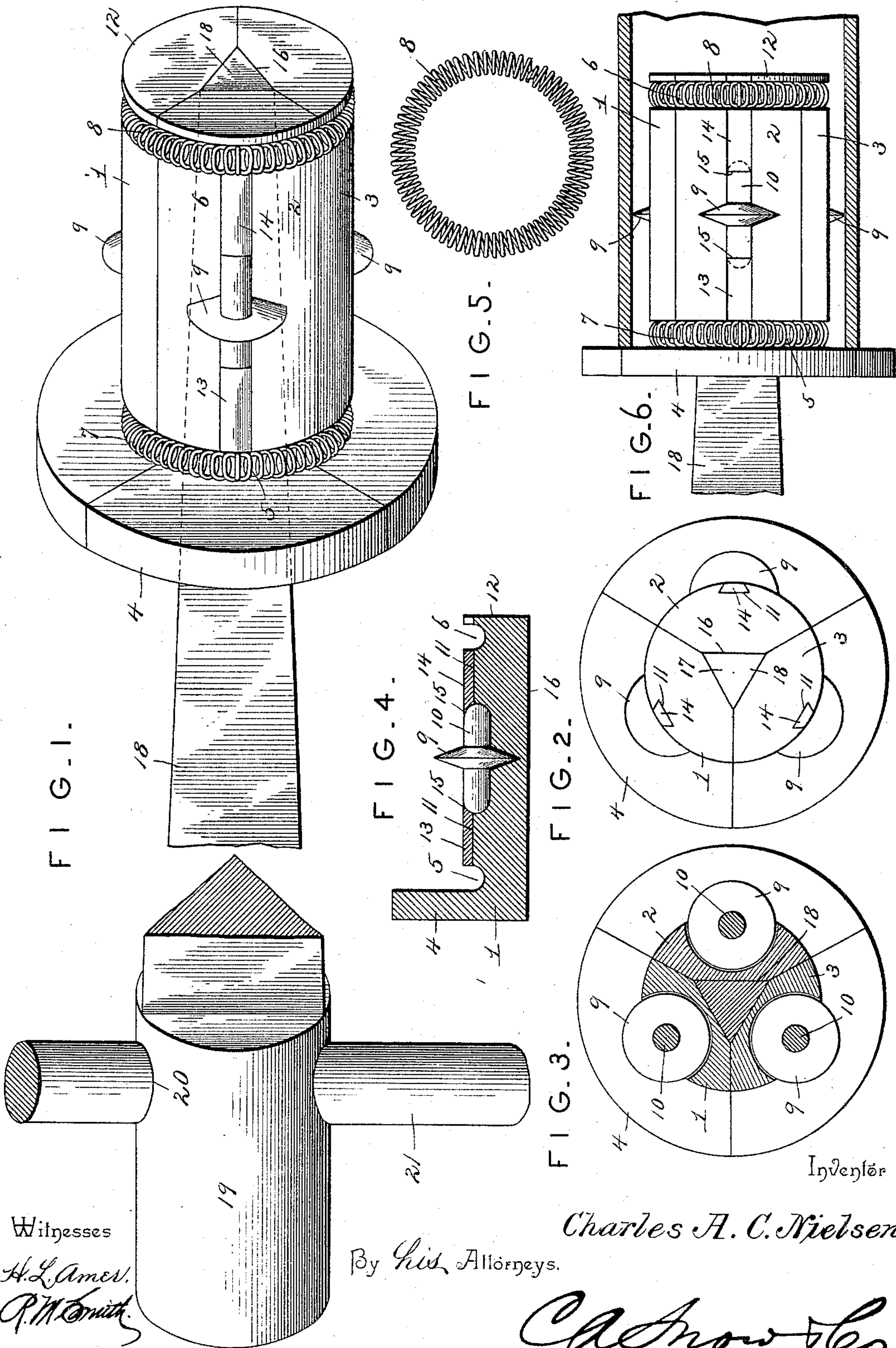


(No Model.)

C. A. C. NIELSEN.
FLUE CUTTER.

No. 540,401.

Patented June 4, 1895.



Witnesses
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UNITED STATES PATENT OFFICE.

CHARLES A. C. NIELSEN, OF TYLER, MINNESOTA.

FLUE-CUTTER.

SPECIFICATION forming part of Letters Patent No. 540,401, dated June 4, 1895.

Application filed March 14, 1895. Serial No. 541,787. (No model.)

To all whom it may concern:

Be it known that I, CHARLES A. C. NIELSEN, a citizen of the United States, residing at Tyler, in the county of Lincoln and State of Minnesota, have invented a new and useful Flue-Cutter, of which the following is a specification.

This invention relates to an improvement in tube or flue cutters especially designed for cutting off boiler tubes inside of the tube sheet.

The object of the invention is to provide an improved cutting tool which shall be simple and inexpensive in construction, durable in practice, and effective in operation.

The present invention consists in certain features and details of construction and arrangement of parts, as hereinafter fully described, illustrated in the drawings, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a perspective view of a sectional cutting-tool constructed in accordance with my invention, showing, also, the expanding-mandrel and operating rod or pin. Fig. 2 is an end elevation of the advance end of the tool, showing the form of the sliding key for retaining the cutter-disks in position. Fig. 3 is a transverse vertical section through the cutting-tool in close proximity to the beveled cutting-disks. Fig. 4 is a sectional view of one of the segmental cutter-sections detached. Fig. 5 is a detached view of the surrounding spiral spring for holding the several tool-sections in place. Fig. 6 is a longitudinal section through a tube or flue, showing the manner in which my improved cutting-tool operates thereon.

Similar numerals of reference indicate corresponding parts in all the figures of the drawings.

Referring to the drawings, the improved flue-cutting tool is made preferably in three equal sections, 1, 2 and 3, each of which is the exact counterpart of the other. Each of said sections is provided at the rear end with a flange 4 and a groove 5, and each section is also provided at its forward or advance end with a groove 6, the purpose of which will be hereinafter explained. When the sections 1, 2 and 3 are assembled they form a substantially cylindrical tool provided at the rear end

with an annular flange or disk of greater diameter than the main body of the cutting tool, and also of greater diameter than the internal diameter of the flue or boiler tube to be operated upon. When the different sections are assembled the grooves 5 and 6 are practically continuous, extending entirely around the cutting tool at either end thereof, and within said groove are placed spiral springs 7 and 8 which extend entirely around the tool and are suitably connected or coupled together at either end. The tension of the springs 7 and 8 is exerted to hold the several sections of the cutting tool snugly in place, and by locating a spring at either end of the cutting tool the sections thereof will be more effectively held in position than where only one spring is employed at one end of the cutting-tool.

The cutters 9 are made substantially in the form of beveled disks, as shown, and are provided upon either side with laterally projecting trunnions 10 adapted to lie in corresponding recesses or depressions in the outer faces of the sections 1, 2 and 3.

In order to secure the beveled cutting disks to their respective sections the outer face of each section is provided with a dovetailed groove or channel 11, extending the entire length of each section and terminating in the grooves 5 and 6, and also extending through the forward flange 12 which holds one of the retaining springs in place. Keys 13 and 14, with inclined tapering edges corresponding to the shape and size of the dovetailed groove 11, are inserted within said grooves and caused to occupy the positions indicated, namely, the key 13 being next to the groove 5 and the other key 14 adjacent to the groove 6 in the advance end of the cutting tool. The keys 13 and 14 slide longitudinally within the groove 11, and are provided at their inner adjacent ends with inclined or tapering edges, as indicated at 15, by means of which said keys are adapted to overlap the trunnions 10 of the beveled cutting disks 9 at either end, and thereby to firmly and securely retain said cutting disks in position and prevent the escape thereof when the cutting tool, as a whole, is withdrawn from the tube or flue in connection with which it has been used.

The several sections, 1, 2 and 3, are formed

each with a flat inner face, as indicated at 16, and when the several sections are assembled a triangular perforation or opening 17 is formed extending entirely through the cutting tool, and also beveled or made larger at one end than at the other. After the cutting tool has been inserted into the end of the tube or flue to be cut out, a tapering mandrel 18, which is triangular in cross section to correspond with the shape of the opening 17 extending through the tubular cutter, is inserted into said opening between the several sections of the cutting tool, and is driven therein for the purpose of expanding or throwing out, radially, the sections 1, 2 and 3 and the beveled cutting disks carried thereby. The tapering mandrel 18 is provided with a hub extension 19, having formed therein a perforation 20 for the reception of an operating handle, rod or pin 21, by means of which the mandrel 19 may be revolved, thereby also revolving the cutting tool and causing it to operate upon the inner face of the tube or flue. The mandrel is driven still farther through the cutting tool after which it is again turned by means of the handle 21, and this operation is repeated until the beveled cutting disks have cut entirely through the tube or flue, when the latter may be removed from the boiler. By withdrawing the tapering mandrel 18 the several sections of the cutting tool will be drawn inward by the action of the springs 7 and 8, allowing said cutting tool to be removed in a manner that will be readily understood. The beveled cutting disks may be removed by sliding the keys 13 and 14 away from the trunnions 10 thereof for the purpose of sharpening said disks when it becomes necessary.

Having described my invention, what I claim is—

1. In a tube or flue cutter, a cylindrical

body composed of three equal and corresponding sections, the spring retaining grooves at either end thereof, the retaining springs located therein and surrounding the cutting tool, the flange for regulating the position of the cutting tool with relation to the tube or flue operated upon, in combination with a series of beveled cutting disks mounted in recesses in the outer faces of the several sections and provided with laterally projecting trunnions, the dovetailed grooves extending longitudinally of the cutting tool, the sliding keys movable lengthwise in said grooves and overlying the trunnions of the cutting disks at their inner adjacent ends, and a tapering expanding mandrel operating in connection with the several sections of the cutting tool, all arranged and adapted to operate in the manner specified.

2. A tube or flue cutter comprising several corresponding sections, each one of which is provided with a recess or depression for the reception of and in combination with a beveled cutting disk, laterally projecting trunnions on either side thereof, a dovetailed groove extending longitudinally the entire length of said section, and the sliding and longitudinally adjustable keys confined within said groove and beveled or cut at their inner adjacent ends to adapt them to overlap the ends of the trunnions on the cutting disk for the purpose of holding the cutting disk in place and preventing the escape thereof, substantially as described.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in the presence of two witnesses.

CHARLES A. C. NIELSEN.

Witnesses:

ANDERS C. NIELSEN,
ANDREAS P. SORENSSEN.