

No. 662,127.

Patented Nov. 20, 1900.

F. L. LANE.

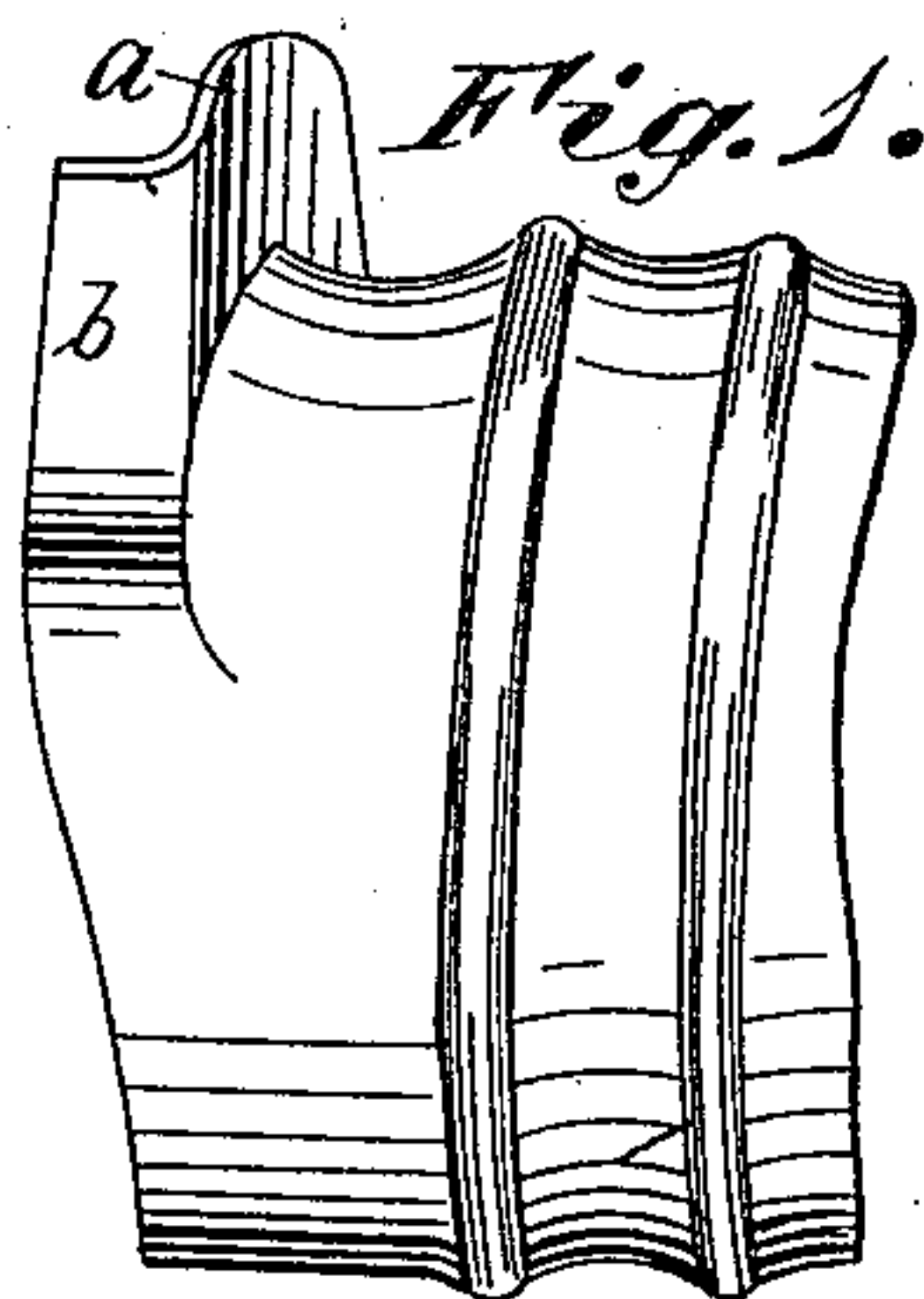
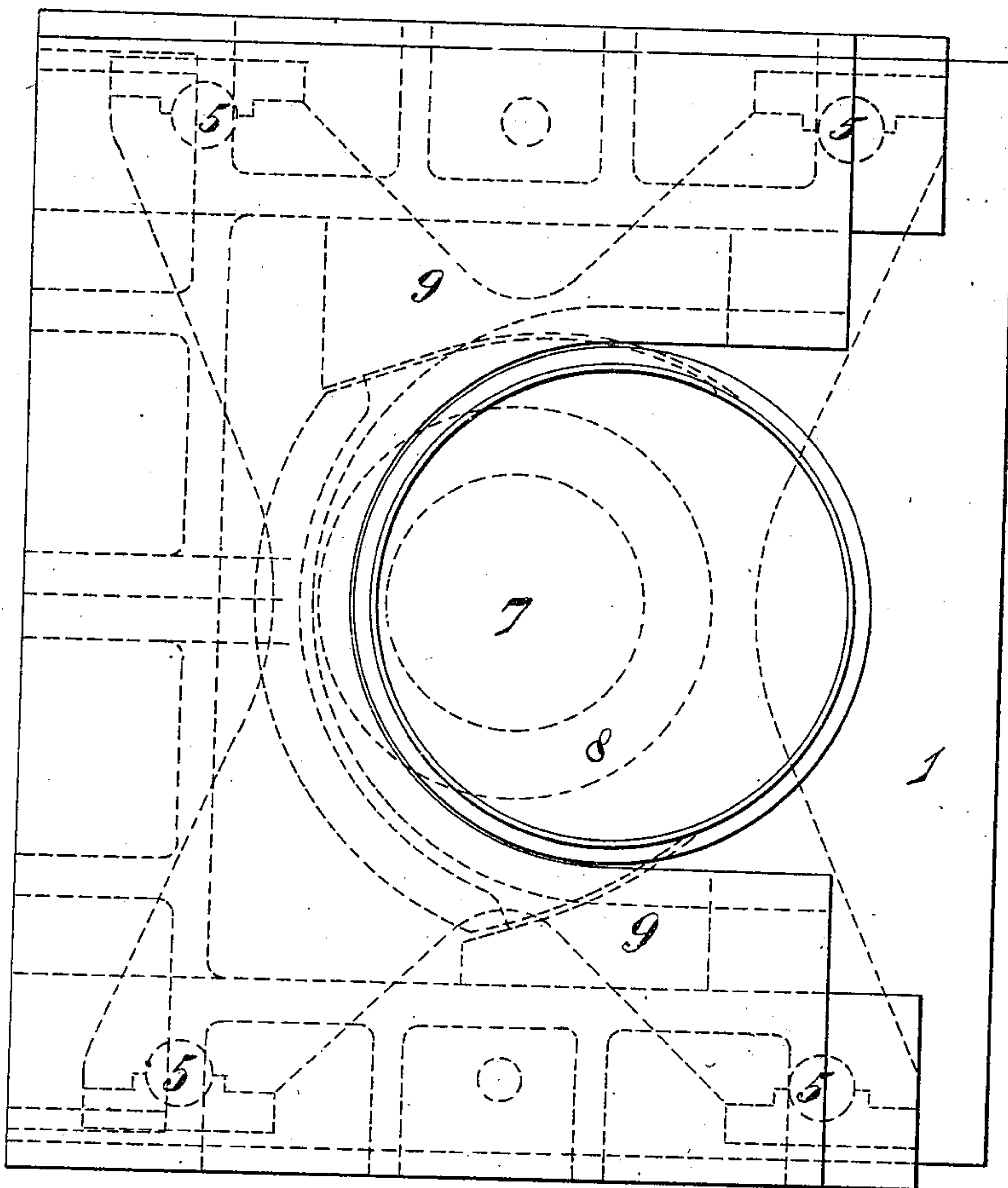
APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet 1.

*Fig. 2.*



*Witnesses:*

*Charles Dayton*  
*William Hughes*

*Inventor:*

*Francis Laurence Lane*  
*By Julian C. Dore*  
*His Atty.*

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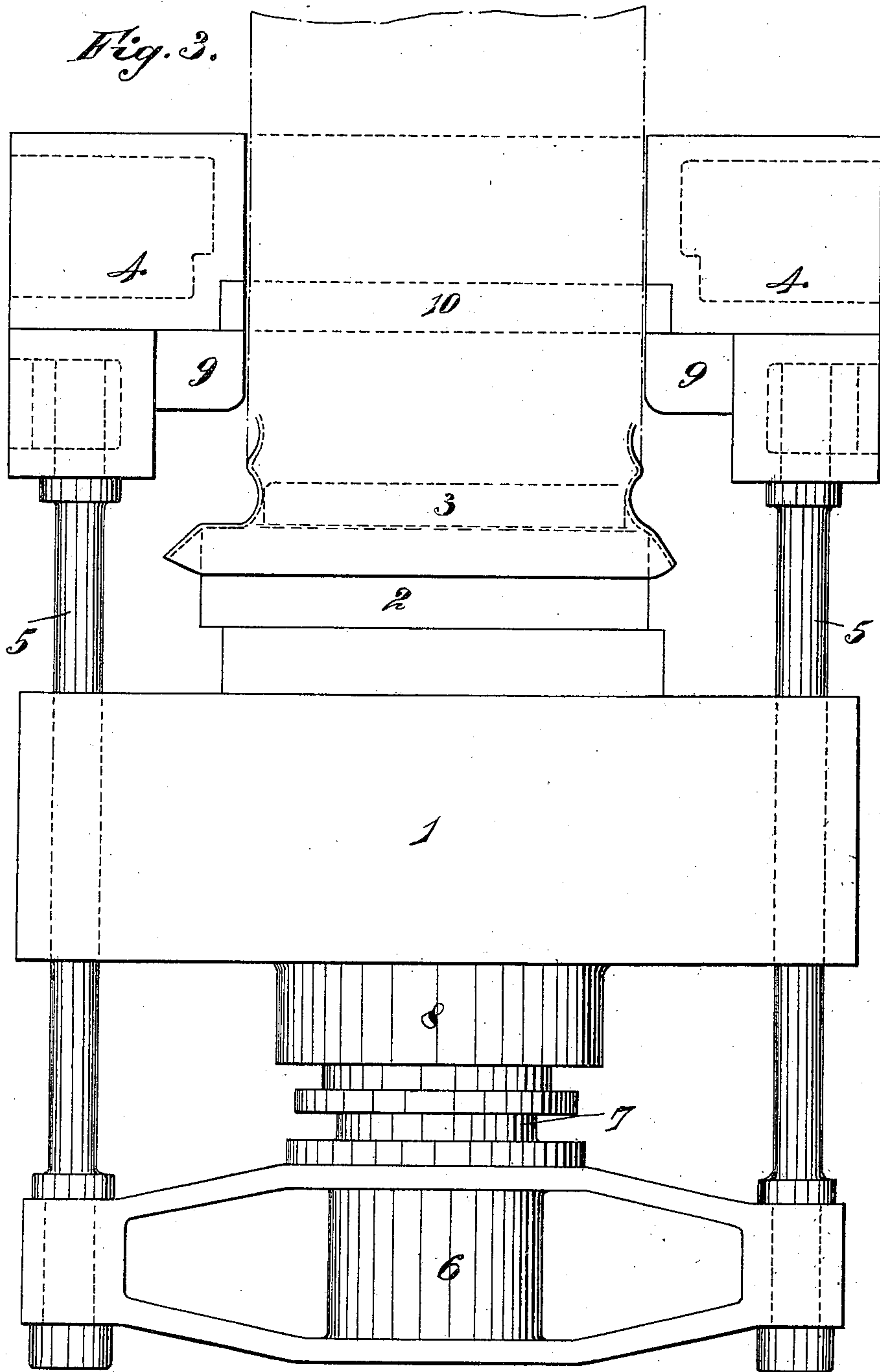
F. L. LANE.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet 2.



*Witnesses:*  
*Charles Taylor*  
*William Hughes*

*Inventor:*  
*Francis Lawrence Lane*  
*By Julian C. Powell*  
*Att'y.*

No. 662,127.

F. L. LANE.

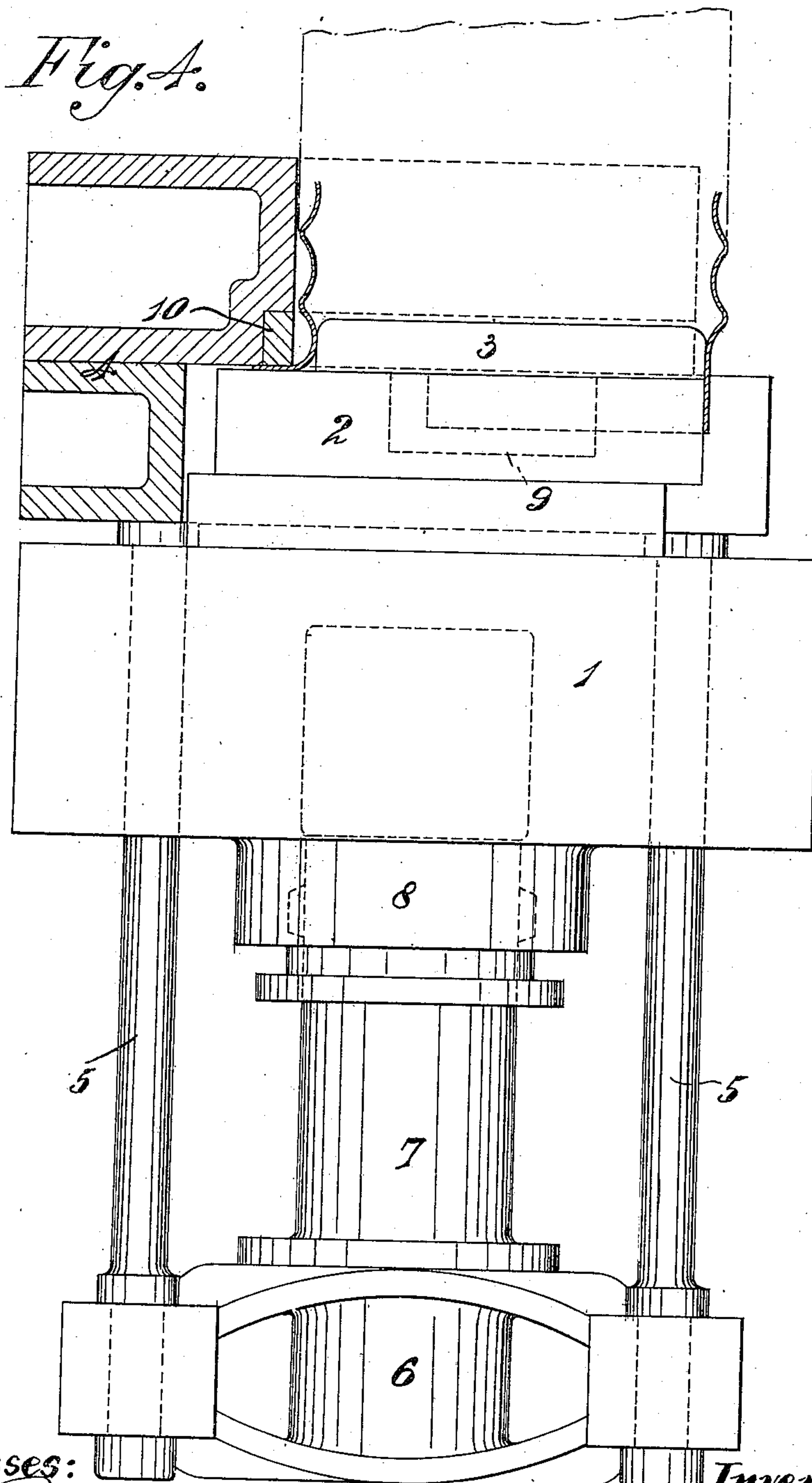
Patented Nov. 20, 1900.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

No Model.)

12 Sheets—Sheet 3



Witnesses:

Clarence Rayton  
William English

Inventor:

Francis Lawrence Lane  
By Julian C. Howell  
His Atty.

No. 662,127.

F. L. LANE.

Patented Nov. 20, 1900.

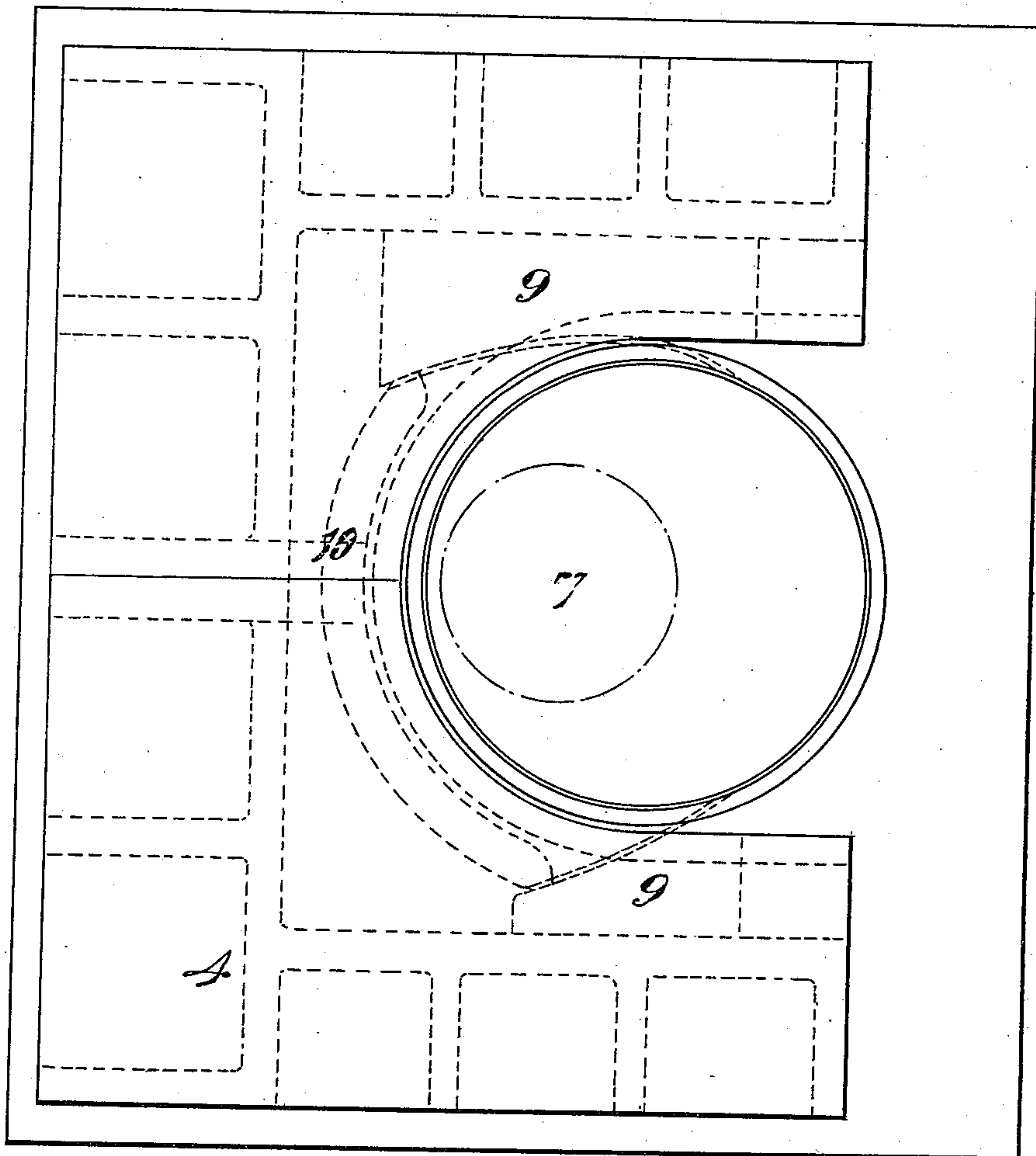
APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

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(No Model.)

12 Sheets—Sheet 4.

*Fig. 5.*



*Witnesses:*

*Clarence Fayston.*  
*William Hughes.*

*Inventor:*

*Francis Lawrence Lane*  
*By Julian C. Smith.*  
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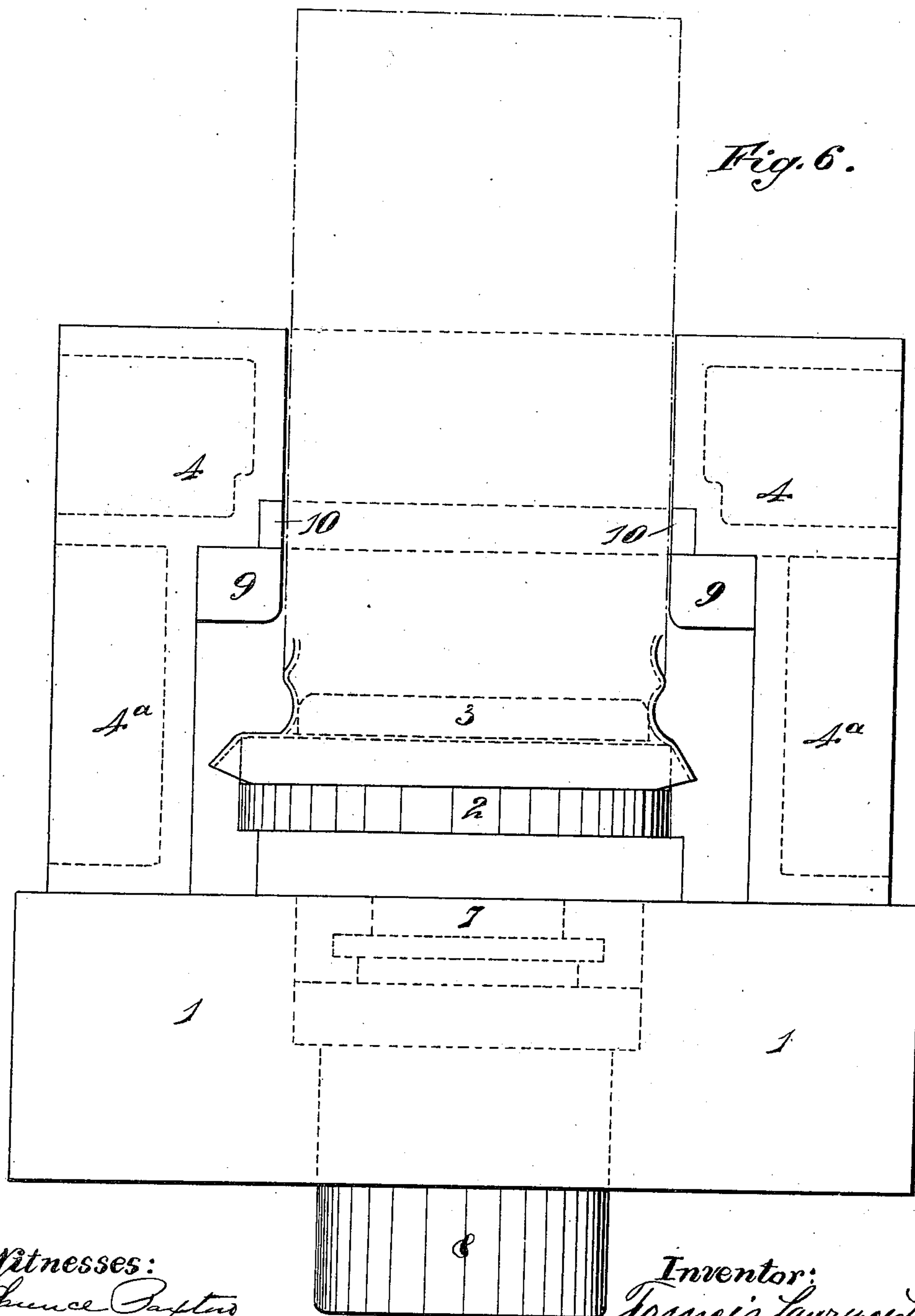
F. L. LANE.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet 5.



Witnesses:  
Chance Daptus.  
William English

Inventor:  
Francis Lawrence  
By Julian C. Drwell  
His Atty.

**No. 662,127.**

**Patented Nov. 20, 1900.**

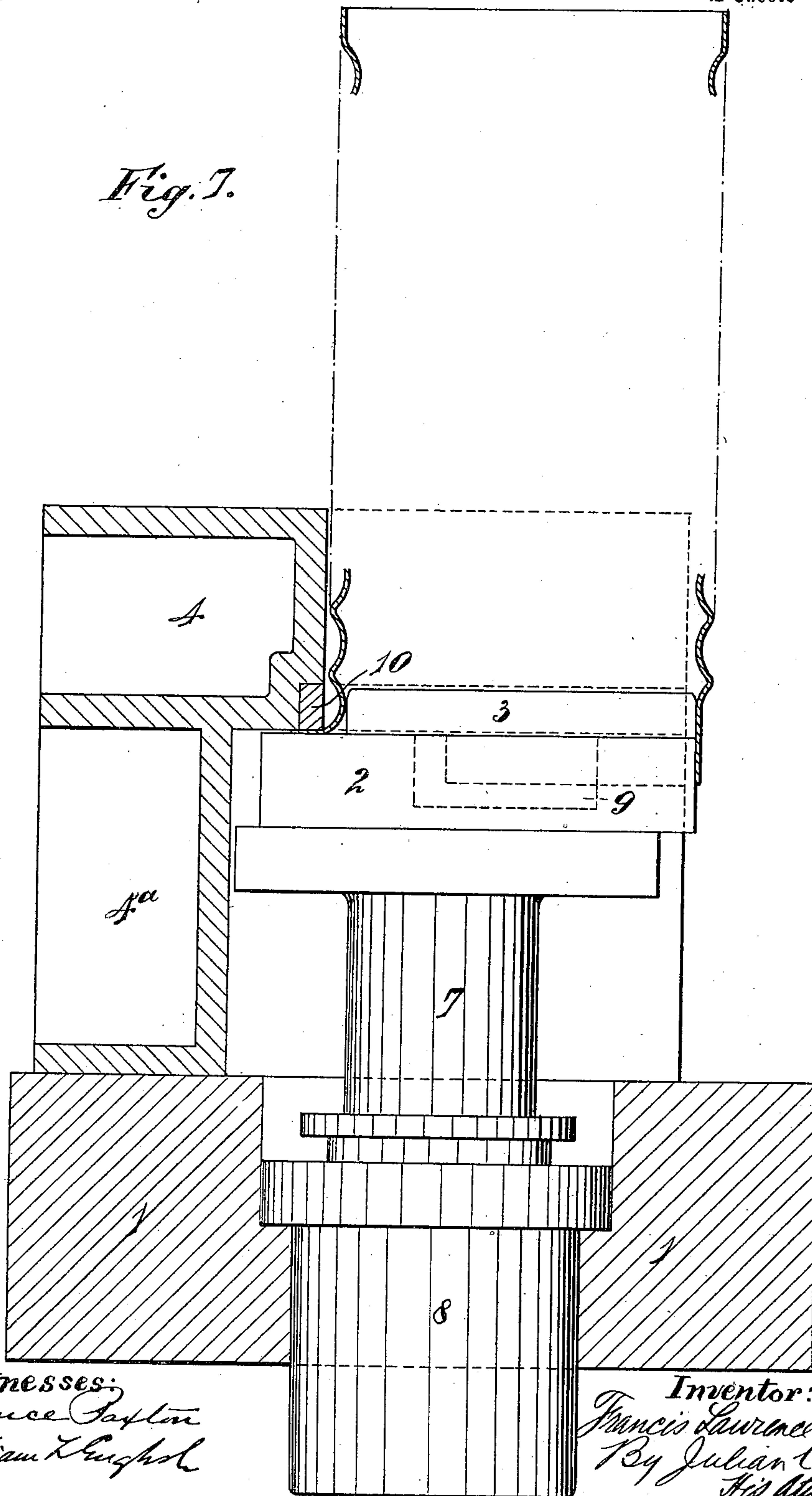
F. L. LANE.

# APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

**12 Sheets—Sheet 6.**



Witnesses:  
 Clarence Payton  
 William English

*Inventor:*  
Francis Lawrence Lane  
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His Atty.

No. 662,127.

Patented Nov. 20, 1900.

F. L. LANE.

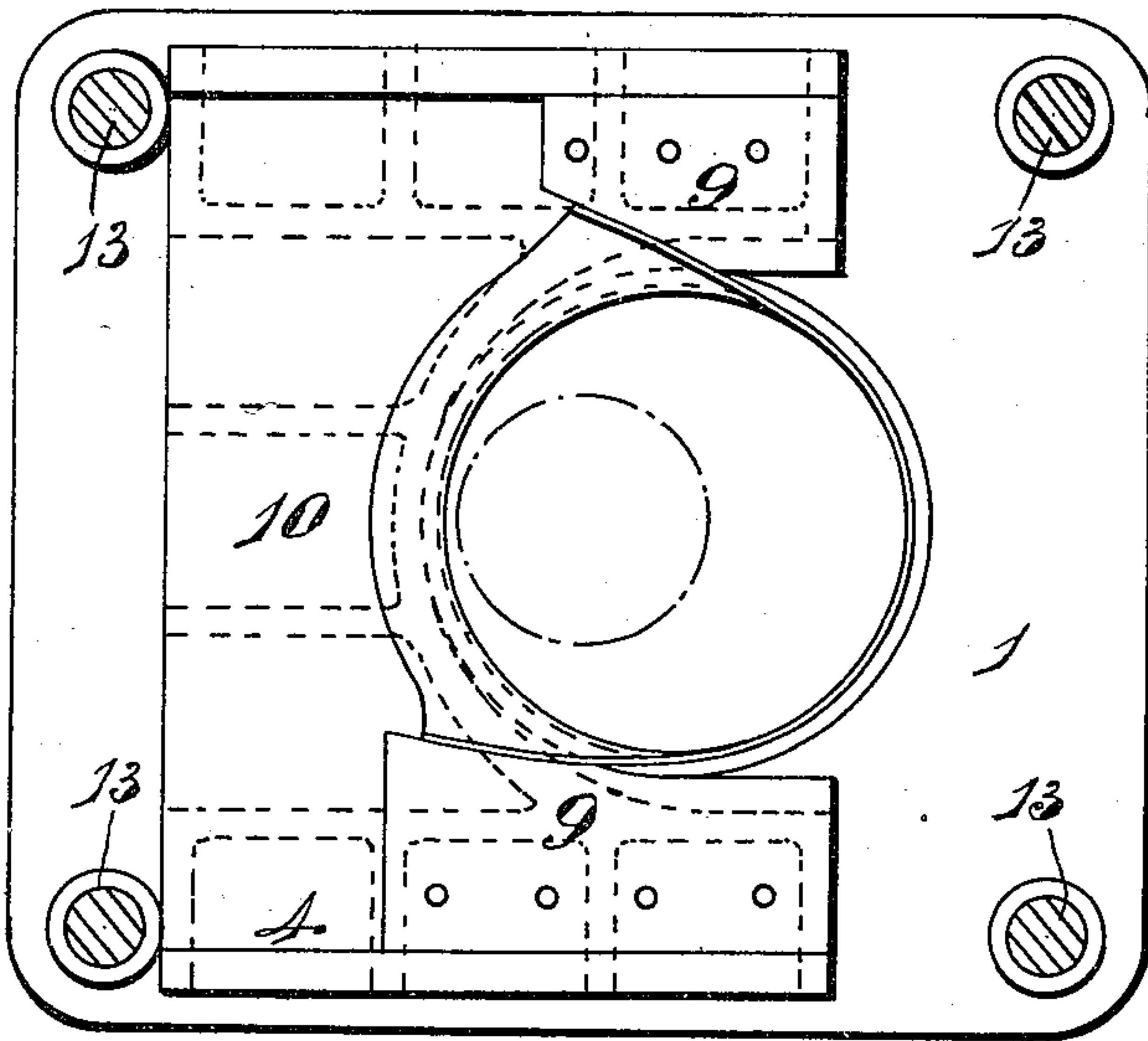
APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet 7.

*Fig. 8.*



*Witnesses:*  
*Clarence Paxton*  
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*Inventor:*  
*Francis Lawrence Lane*  
*By Julian C. Bowser*  
*His Atty.*

No. 662,127.

Patented Nov. 20, 1900.

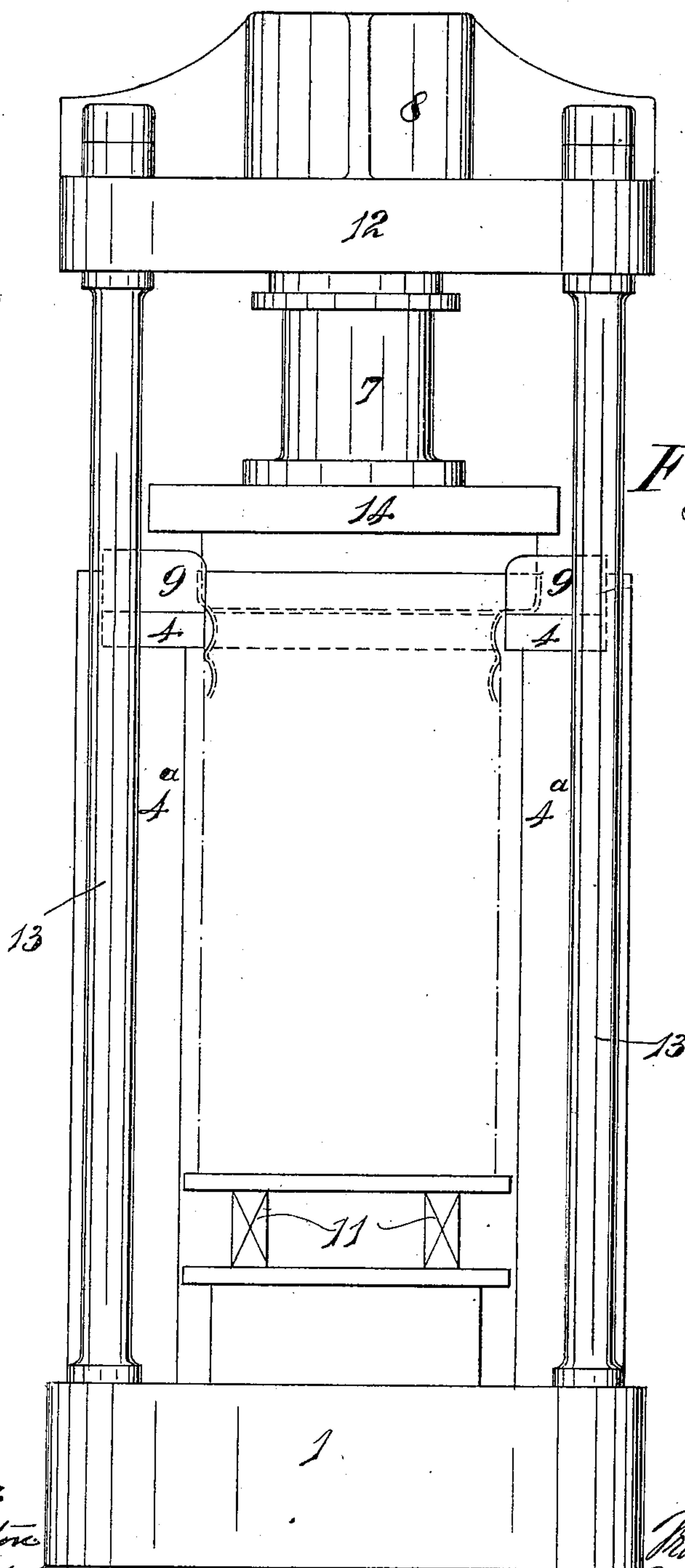
F. L. LANE.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet 8.



Witnesses:  
Clarence Taylor  
William Hughes

Inventor:  
Francis Lawrence Lane  
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Julian C. Dorrell  
His Atty.



F. L. LANE.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet 9.

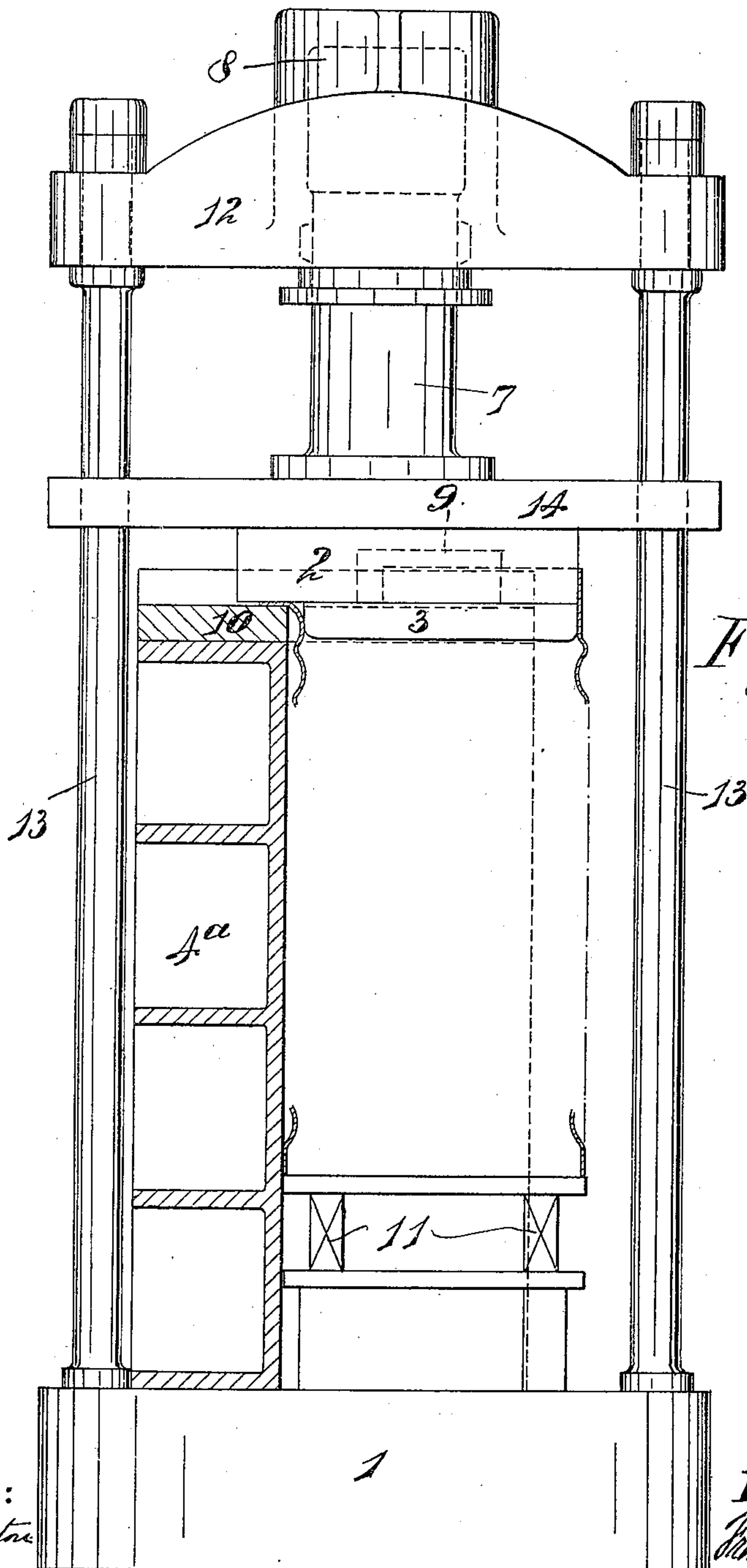


Fig. 10.

Witnesses:

Clarence J. Payne

William H. English

Inventor:

Francis Lawrence Lane

By  
Julian C. Dowd  
His Atty.

No. 662,127.

Patented Nov. 20, 1900.

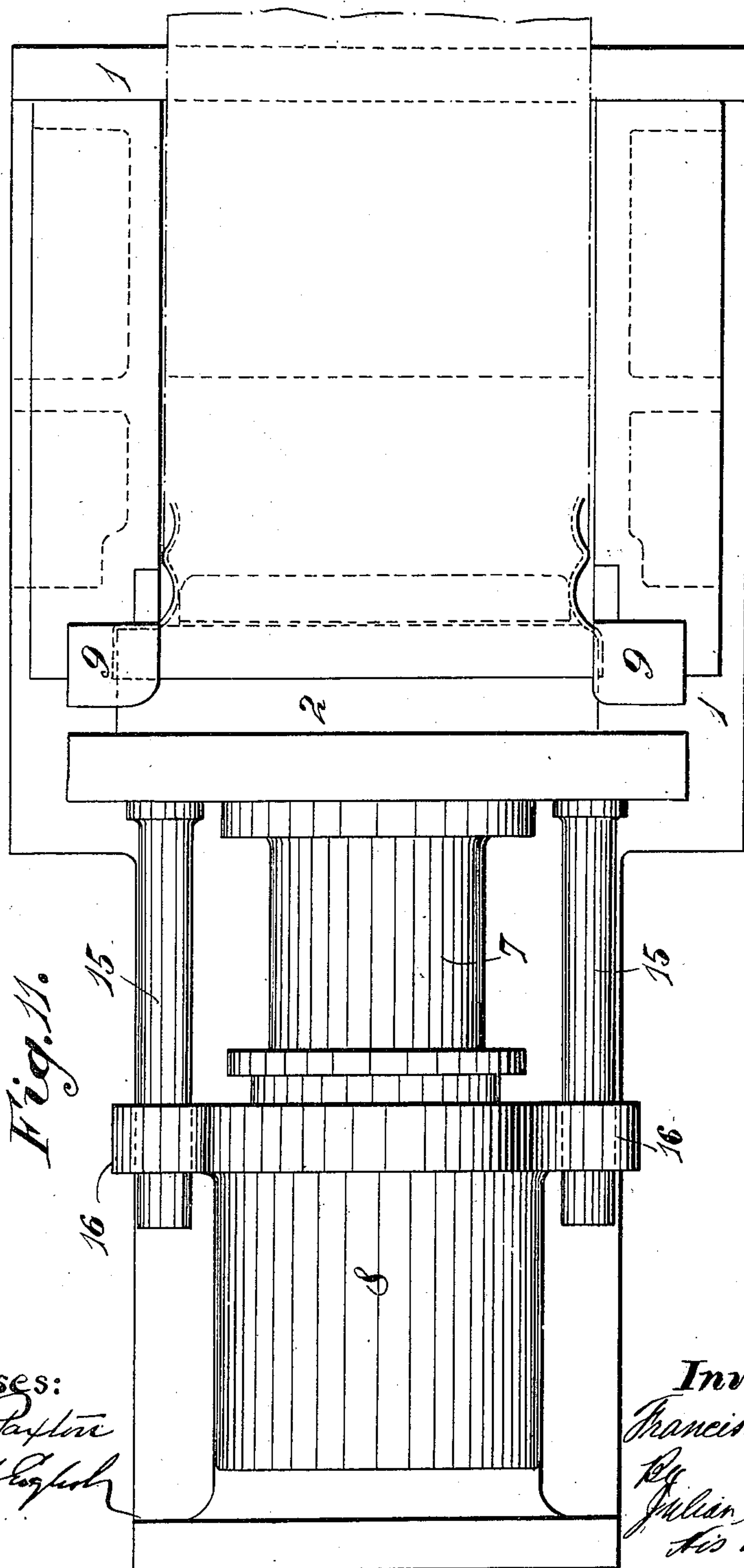
F. L. LANE.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets--Sheet 10.



Witnesses:  
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William H. Hough

Inventor:  
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his Atty.

No. 662,127.

Patented Nov. 20, 1900.

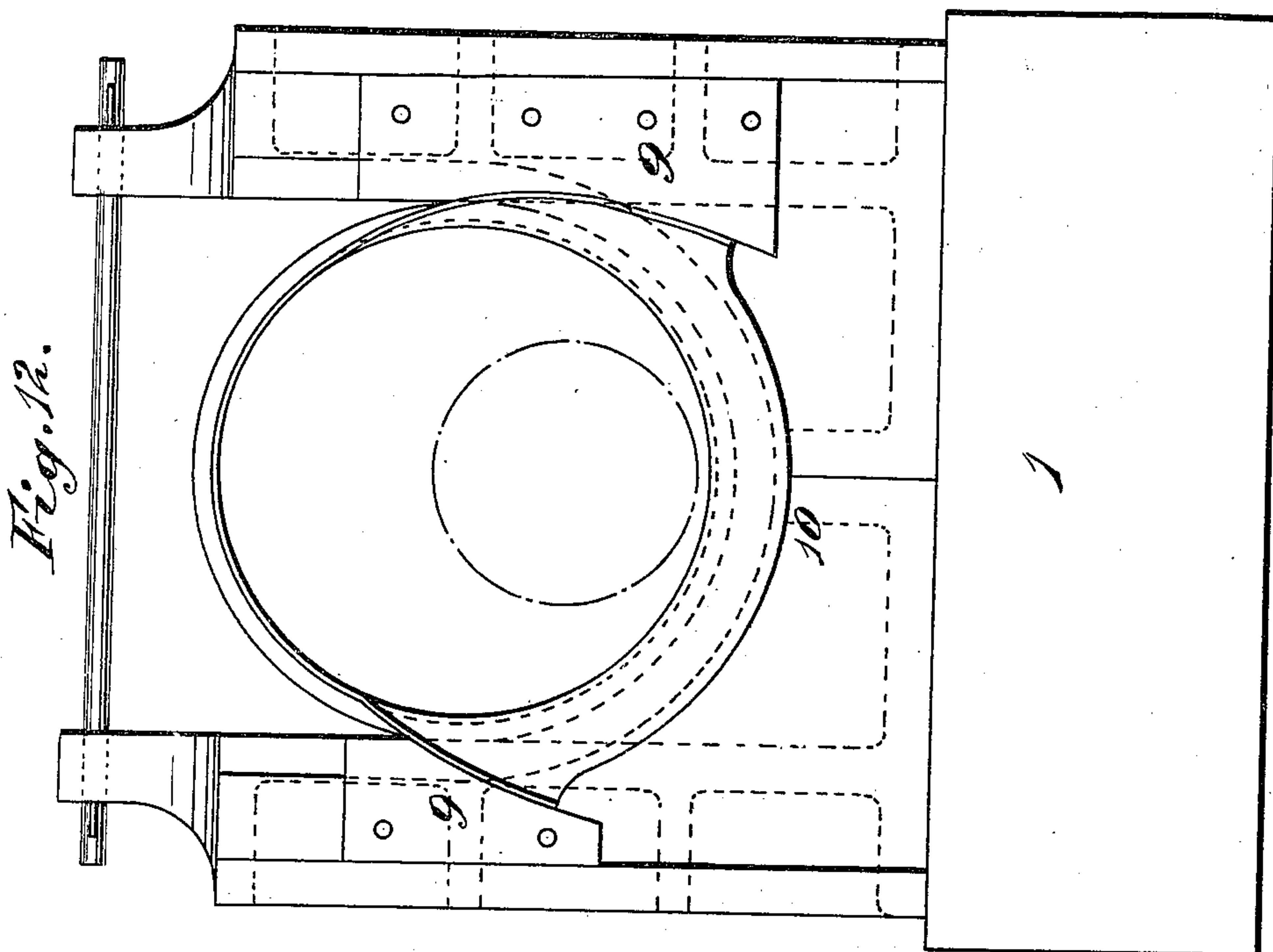
F. L. LANE.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet II.



*Witnesses:*

*Clarence Taylor*  
*William T. English*

*Inventor:*

*Francis Lawrence Lane*  
*By Julian C. Dowell*  
*His Atty.*

No. 662,127.

Patented Nov. 20, 1900.

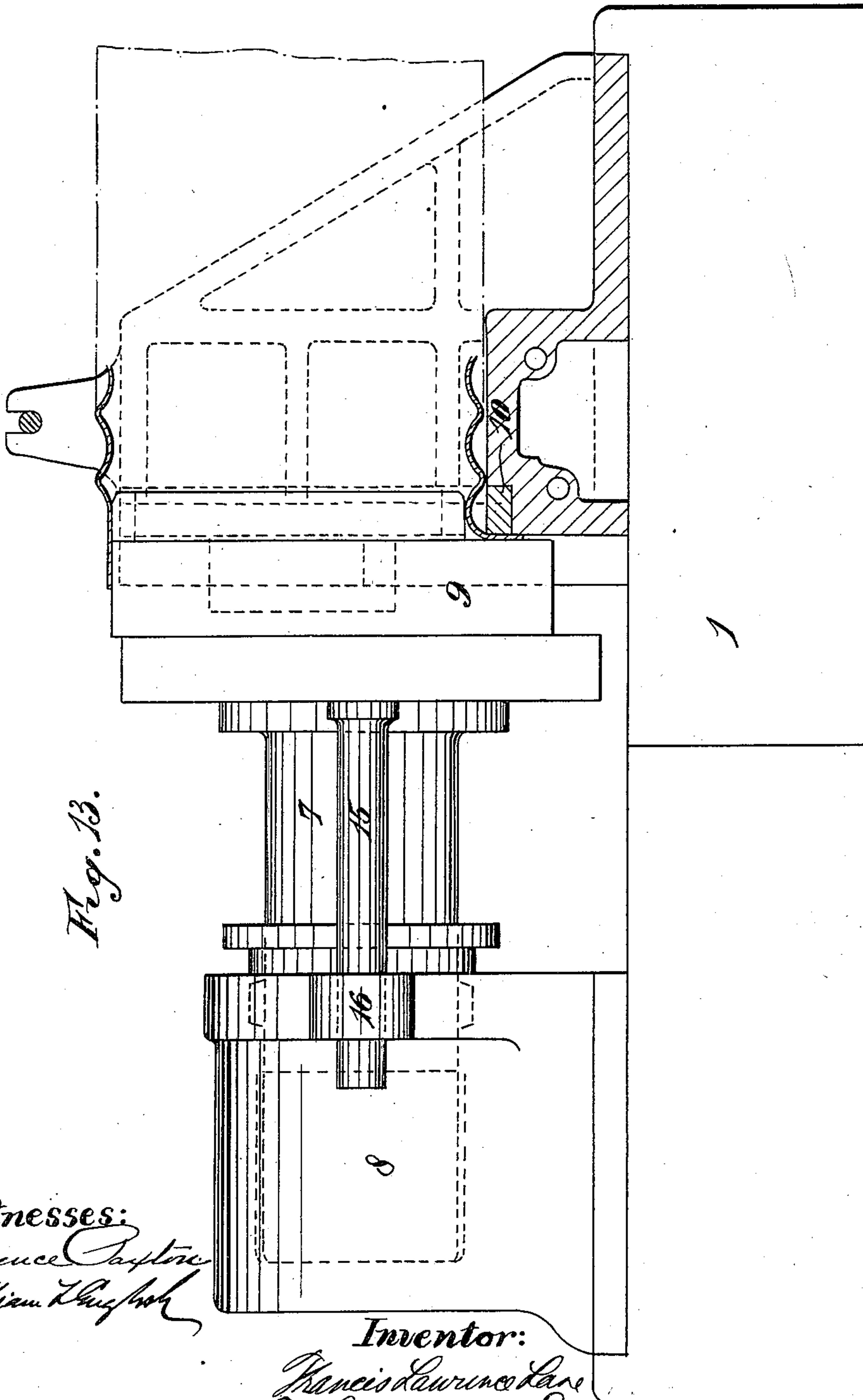
F. L. LANE.

APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

(Application filed Aug. 11, 1899.)

(No Model.)

12 Sheets—Sheet 12.



Witnesses:  
Clarence Dapton  
William Dapton

Inventor:  
Francis Lawrence Lane  
By Julian C. Dowell  
His Atty.



# UNITED STATES PATENT OFFICE.

FRANCIS LAWRENCE LANE, OF LEEDS, ENGLAND, ASSIGNOR TO THE LEEDS FORGE COMPANY, LIMITED, OF SAME PLACE.

## APPARATUS FOR MANUFACTURING FLANGED FLUES FOR BOILERS.

SPECIFICATION forming part of Letters Patent No. 662,127, dated November 20, 1900.

Application filed August 11, 1899. Serial No. 726,908. (No model.)

*To all whom it may concern:*

Be it known that I, FRANCIS LAWRENCE LANE, a subject of the Queen of Great Britain and Ireland, residing at Leeds, in the county of York, England, have invented Improvements in Machinery or Apparatus for Use in the Manufacture of Flanged Flues for Boilers, of which the following is a specification.

This invention has reference to machinery or apparatus for use in flanging boiler-flues of the kind having a tube-plate flange whose direction is at right angles to the axis of the flue and reverse flanges at the two opposite edges of the tube-plate flange, these reverse flanges merging into the wall of the circular or approximately circular portion of the flue.

The improved machinery or apparatus is intended to be used after the tube-plate flange has been produced in order to form the reverse flanges (while the metal is in a sufficiently-heated condition) by and between a bed, table, or "former" and suitable flanging tools or dies, means being provided for holding the tube-plate flange while the reverse flanges are being formed.

Referring to the accompanying drawings, Figure 1 illustrates the back end of a corrugated flue having a tube-plate flange *a* formed with reverse flanges *b*. Fig. 2 is a plan of an apparatus according to this invention for producing the reverse flanges. Fig. 3 is an elevation thereof, and Fig. 4 is a sectional elevation at right angles to Fig. 3. Fig. 5 is a plan, Fig. 6 an elevation, and Fig. 7 a sectional elevation at right angles to Fig. 5, of a modified construction of apparatus. Fig. 8 is a sectional plan, Fig. 9 an elevation, and Fig. 10 a sectional elevation at right angles to Fig. 9, of another modified construction of apparatus. Fig. 11 is a plan, Fig. 12 an end elevation and Fig. 13 a side elevation, partly in section, of a further modified construction of apparatus.

In the several views there is shown in the flanging position a corrugated wing-flue with the return-flanges already formed.

Referring to the arrangement illustrated in Figs. 2 to 4, inclusive, 1 is the bed of the apparatus, on which is fixed a former 2, which is preferably provided with central block or retainer 3, adapted to fit within the cylindrical

portion of the flue on which the reverse flanges are to be produced. The retainer 3 holds the flue in position upon the former 2. 4 is a cross-head or frame connected by rods 5, sliding in guides formed through the bed 1 to a lower cross-head or frame 6, that is attached to the plunger 7 of a hydraulic ram 8 or equivalent, whereby the cross-head 4 can be moved toward and from the bed 1, the direction of motion being parallel with the axis of the flue. The cross-head 4 is formed or provided on its under side with a pair of downwardly-extending flanging-dies 9 and with a tube-plate-flange presser or holder 10, which are so arranged that the dies 9 will during their descent come in contact with lateral portions of the tube-plate flange of the flue, which project beyond the sides of the former 2 and over which the dies bend the said lateral portions, so as to form the reverse flanges. The flange presser or holder during the completion of the descent of the cross-head 4 presses upon and grips between itself and the top surface of the former 2 the tube-plate flange, and thus prevents buckling of the plate or flattens out any buckling caused by forming the reverse flange.

In the modification illustrated in Figs. 5 to 7, inclusive, the cross-head or frame 4 is stationary, being carried by a support 4<sup>a</sup>, with which it is formed and which is bolted to the bed 1. The former 2 and the block or retainer 3 are mounted upon the plunger 7 of a ram 8. The flue to be operated upon is placed upon the former 2 and is during the reverse-flanging operation moved upwardly toward the flanging-dies 9 and the flange presser or holder 10, which, as in the previously-described arrangement, are secured to the under side of the cross-head or frame 4. Fig. 6 shows the plunger 7 lowered, and Fig. 7 shows it having made its upward stroke, the tube-plate flange being gripped between the former 2 and the flange presser or holder 10.

In the construction illustrated in Figs. 8 to 10, inclusive, the arrangement is such that the reverse flanges are formed by and between a stationary flange presser or holder 10 and flanging-dies 9, arranged to form a female die, and a former 2, arranged to serve as a male die and being connected to and actuated



by the plunger 7 of a hydraulic ram 8, so as to force the tube-plate flange of the flue into the female die, and thereby to produce the reverse flanges. The flue to be treated is arranged with its back end uppermost and with the tube-plate flange resting on the dies 9, suitable means, such as blocks 11, being provided for holding or supporting the flue in this position until it is gripped between the former and the dies. The plain end of the flue may rest, after the reverse flanges have been formed, on the bed 1. The ram 8 is carried by a cross-head or frame 12, supported on rods or standards 13, secured to the bed 1. The former 2 is preferably secured to the plunger 7 through a cross-head 14, which is guided by the rods 13. The flue is or may be retained in position by a central block or retainer 3, secured to and moving with the former 2.

In some cases apparatus according to this invention is constructed and arranged to produce the reverse flanges while the flue is in a horizontal attitude, or approximately so. Such an arrangement is illustrated in Figs. 11 to 13, inclusive. In this arrangement also the stationary flange presser or holder 10 and flanging-dies 9 form a kind of female die of approximately horseshoe shape in end view. The die thus formed is secured to the bed 1 of the apparatus opposite to a hydraulic ram 8, also secured to the bed 1 and whose plunger 7 carries a former 2, which serves as a male die. The flue is held with its tube-plate flange resting against the dies 9, as shown, so that the former 2 will by pressure against the tube-plate flange move the flue lengthwise and cause a part of the tube-plate flange to enter the female die, between which and the male die or former the reverse flanges will be simultaneously formed.

15 15 are guide-rods attached to the head of the plunger 7, to which the former 2 is secured, said rods 15 working through lugs 16, formed upon the cylinder of the ram 8.

In the several constructions above indicated the details may be more or less varied to suit circumstances.

What I claim is—

1. In an apparatus for producing reverse flanges on a flue already formed with a tube-plate flange, a flange-presser and a reverse-flanging die rigidly connected together and combined with a former having a central block or retainer adapted to enter the end of the flue, and means for imparting relative movement to said parts, as set forth.

2. In an apparatus for producing reverse flanges on a flue already formed with a tube-

plate flange, a flange-presser and reverse-flanging dies rigidly connected together and combined with a stationary former carrying a central block or retainer adapted to enter the end of the flue and means for moving said flange-presser and dies toward and from said former, as set forth.

3. In an apparatus for producing reverse flanges on a flue already formed with a tube-plate flange, the combination of a fixed bed, a former secured thereon and carrying a central block or retainer adapted to enter the end of the flue, a cross-head movably supported above said former and having rigidly attached thereto a flange-presser and reverse-flanging dies and means for moving said cross-head and attached parts toward and from said bed and former, as set forth.

4. In an apparatus for producing reverse flanges on a flue already formed with a tube-plate flange, the combination of a fixed bed, a former secured thereon and carrying a central block or retainer adapted to enter the end of the flue, a cross-head movably supported above said former and having rigidly attached thereto a flange-presser and reverse-flanging dies and a hydraulic ram, the movable portion of which is connected to said cross-head, as set forth.

5. In an apparatus for producing reverse flanges on a flue already formed with a tube-plate flange, the combination of a fixed bed, a former secured thereon and carrying a central block or retainer adapted to enter the end of the flue, a cross-head movably supported above said former and having rigidly attached thereto a flange-presser and reverse-flanging dies and an inverted hydraulic ram connected to the under side of said bed and having its plunger provided with a cross-head or frame that is connected to the first-mentioned cross-head or frame, as set forth.

6. For producing reverse flanges on a flue already formed with a tube-plate flange, an apparatus comprising a bed 1, a former 2 secured thereon, a central retainer 3 adapted to enter the end of the flue, a cross-head or frame 4 connected by rods 5 with a lower cross-head 6 secured to the plunger 7 of a hydraulic ram 8 attached to the bed, and flanging-dies 9 and a flange-presser 10 secured to the under side of the cross-head or frame 4, as set forth.

Signed at Leeds, in the county of York, England, this 3d day of July, 1899.

FRANCIS LAWRENCE LANE.

Witnesses:

GEO. COOPER,  
CHAS. GILLIARD.