

(No Model.)

2 Sheets—Sheet 1.

J. A. WHITNEY.

APPARATUS FOR MAKING CURVED METAL PIPE.

No. 368,314.

Patented Aug. 16, 1887.

Fig. 1

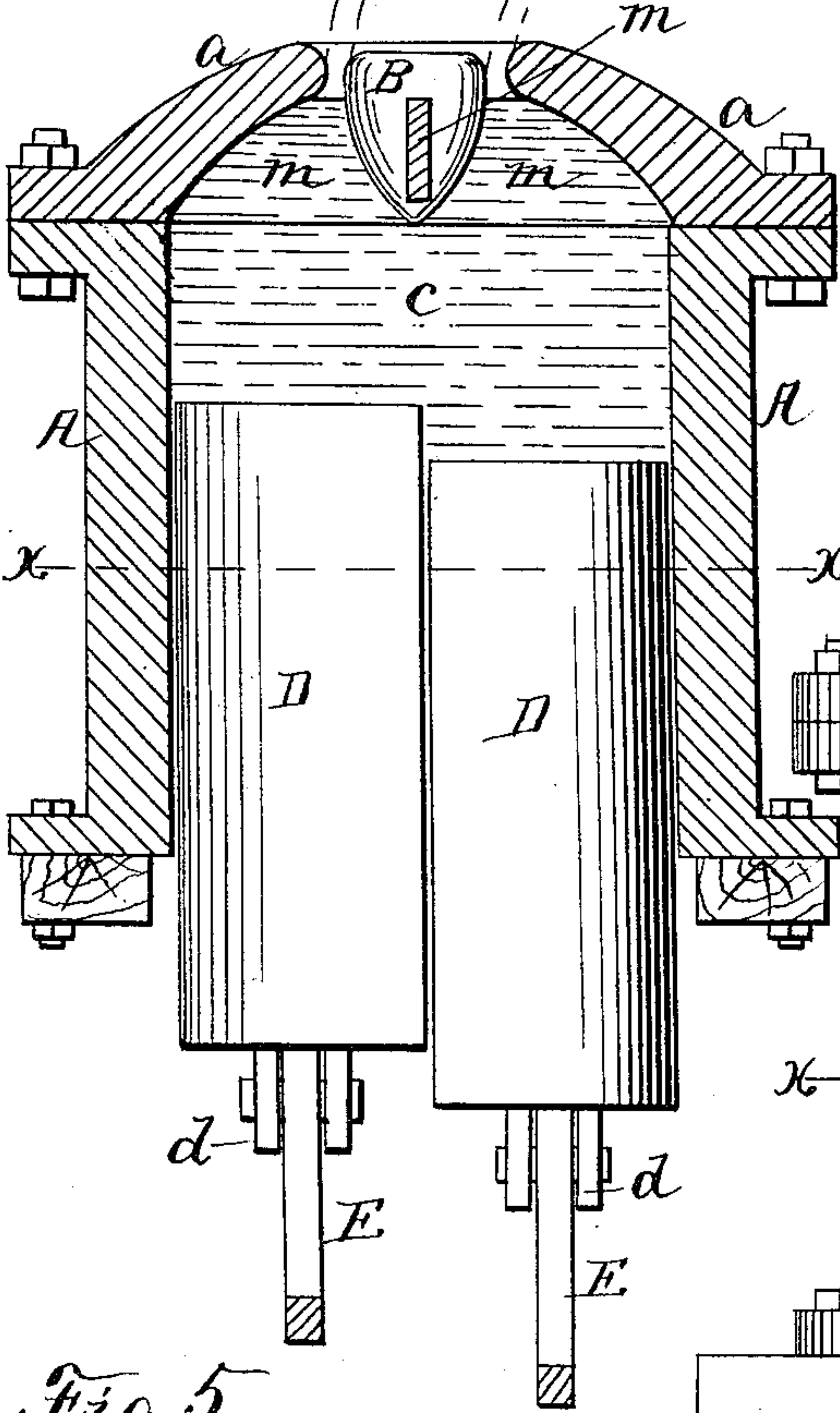


Fig. 3.

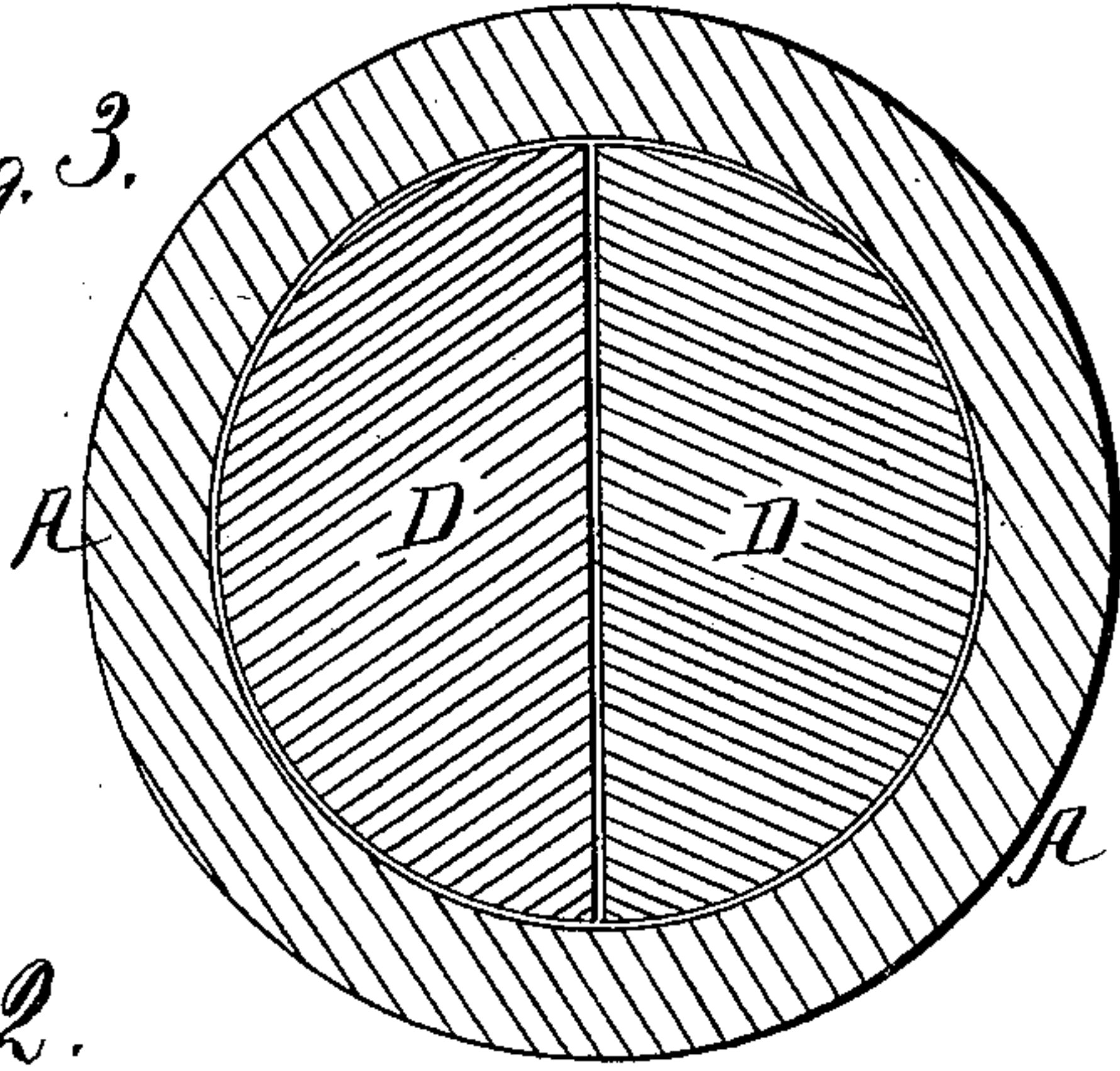


Fig. 2.

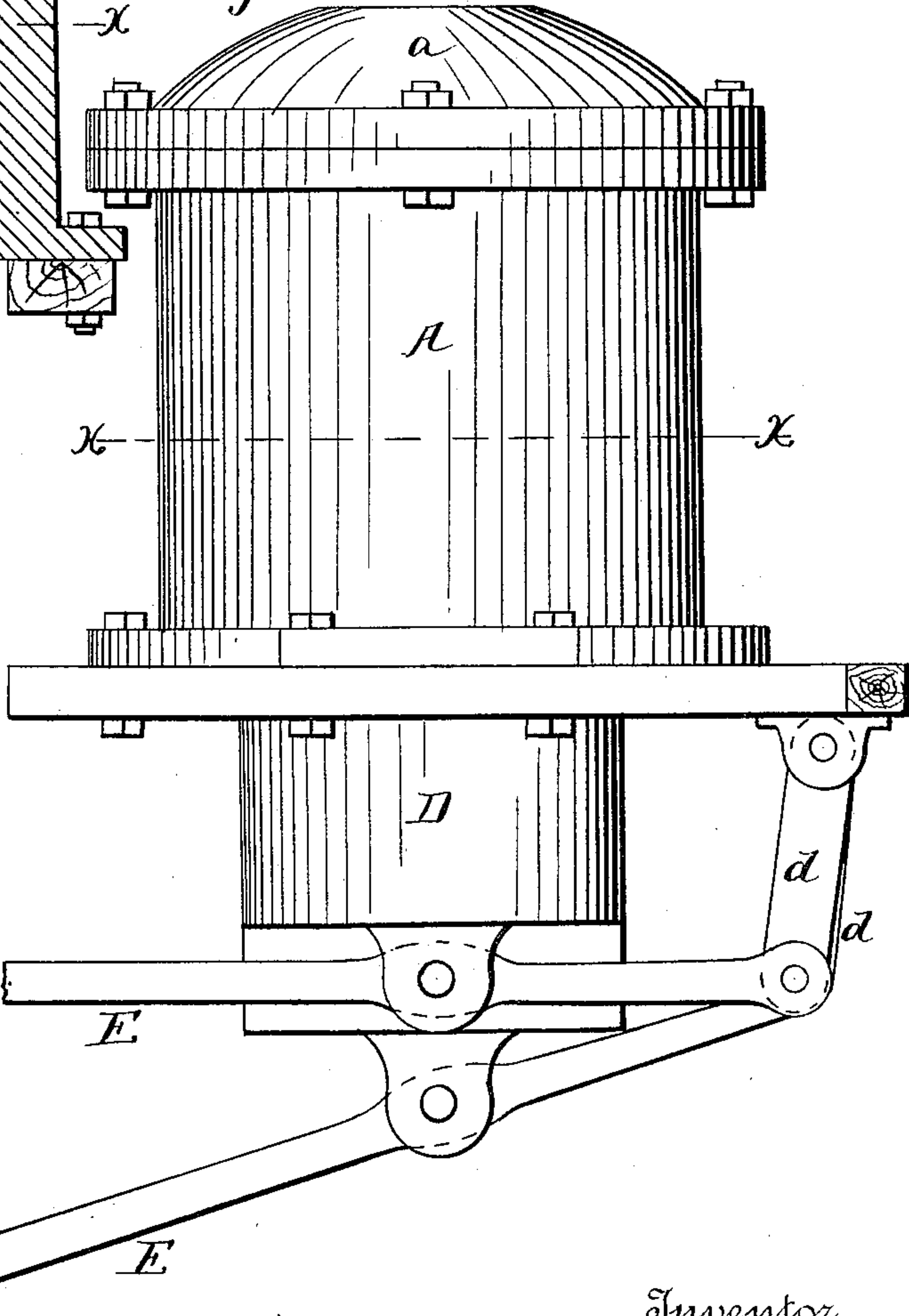
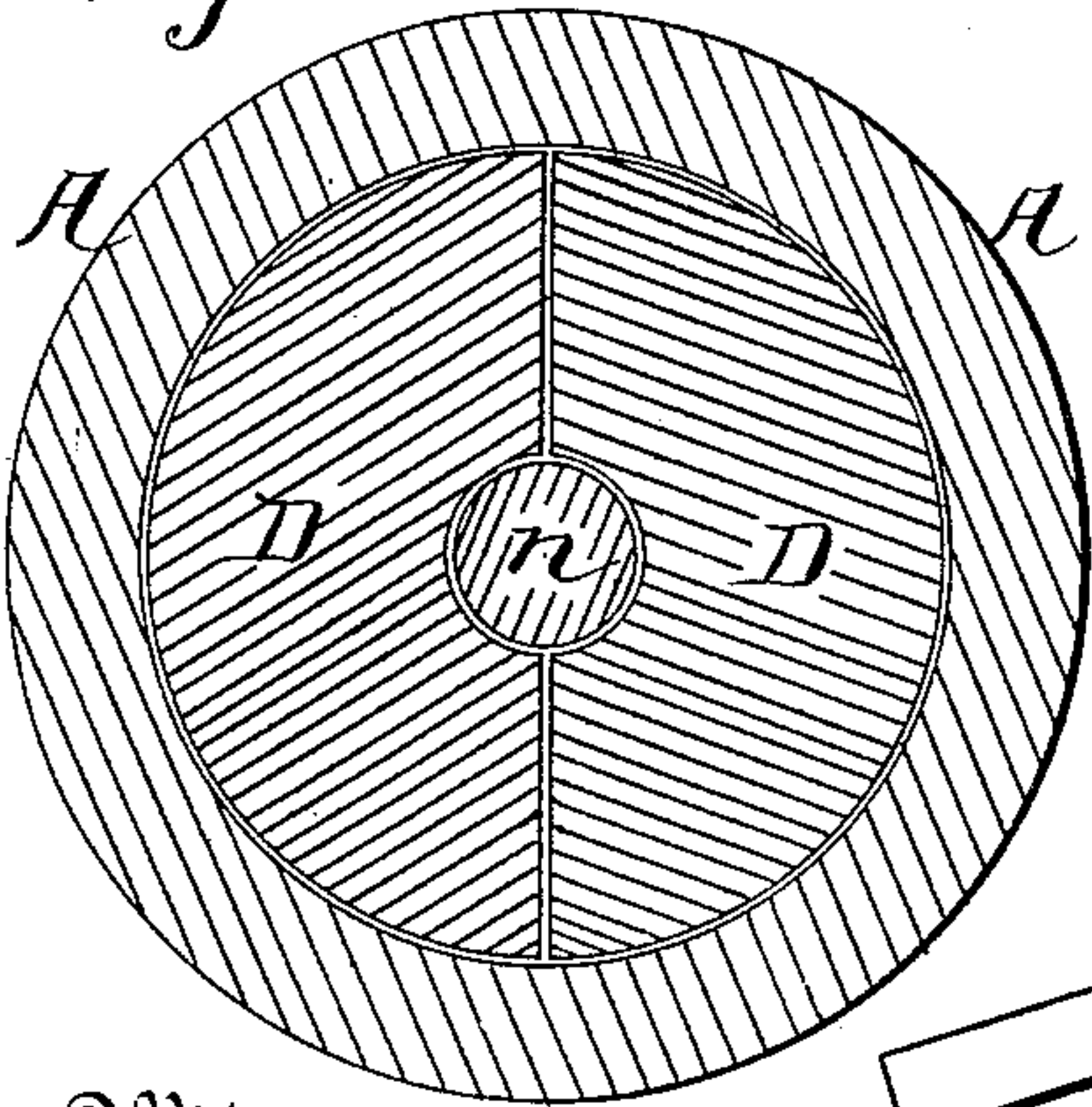


Fig. 5.



Witnesses

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(No Model.)

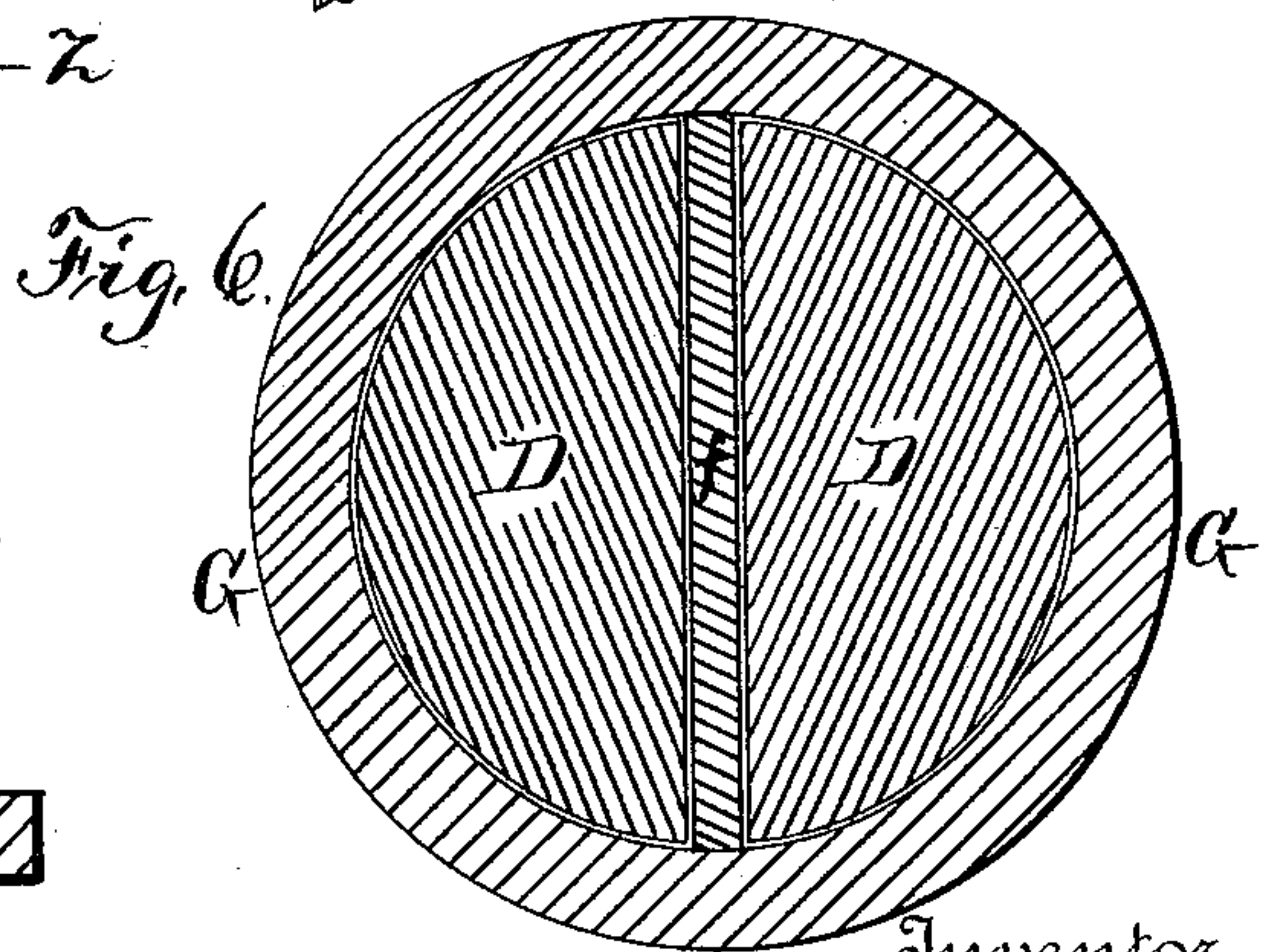
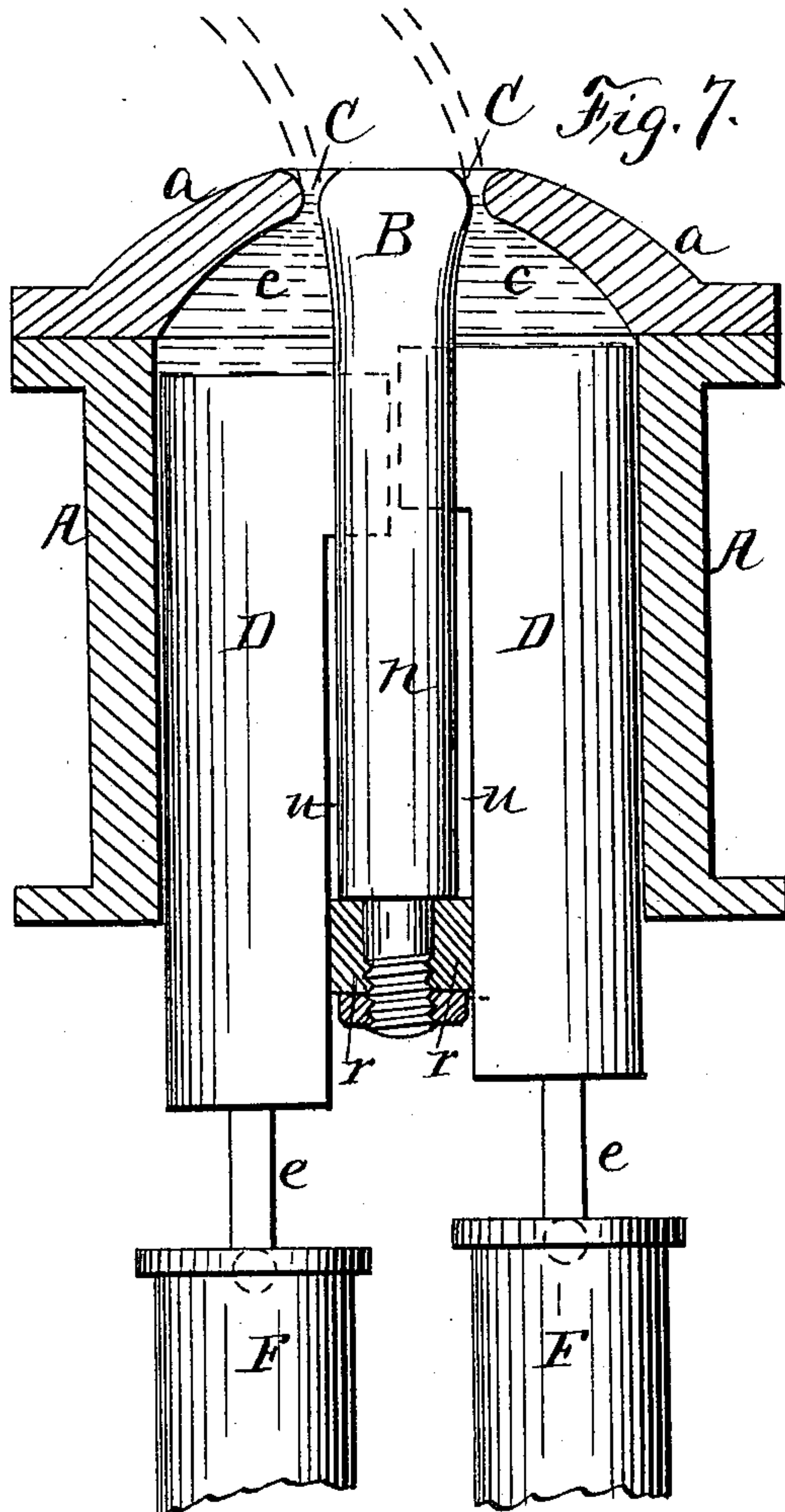
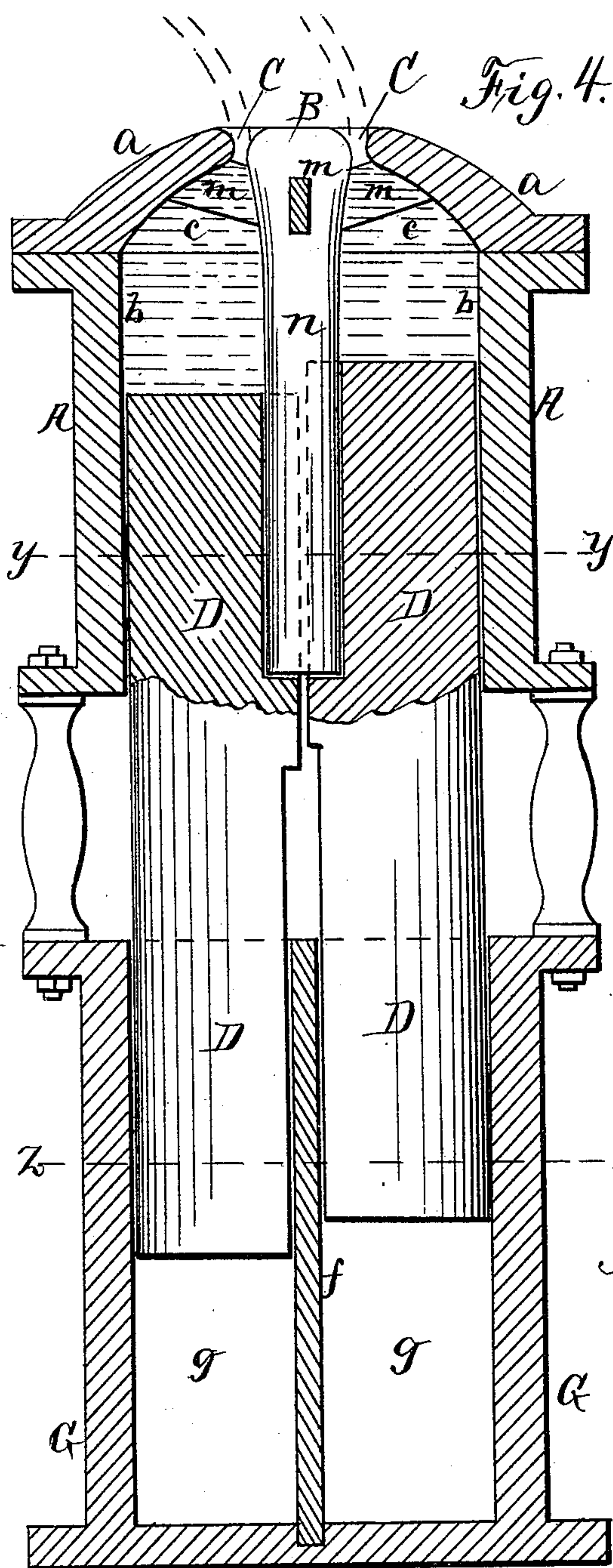
2 Sheets—Sheet 2.

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# UNITED STATES PATENT OFFICE.

JAMES A. WHITNEY, OF BROOKLYN, NEW YORK.

## APPARATUS FOR MAKING CURVED METAL PIPE.

SPECIFICATION forming part of Letters Patent No. 368,314, dated August 16, 1887.

Application filed May 13, 1887. Serial No. 238,155. (No model.)

*To all whom it may concern:*

Be it known that I, JAMES A. WHITNEY, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in the Manufacture of Curved Pipes, Plumbers' Traps, &c., of which the following is a specification.

The invention is designed for the manufacture of curved pipes, water-traps, &c., of any suitable plastic material.

It comprises certain novel means whereby such articles may be produced with facility and cheapness.

Figure 1 is a vertical sectional view; Fig. 2, a side view, as seen from a standpoint different from that of Fig. 1; and Fig. 3 is a horizontal sectional view, on the line  $xx$ , of an apparatus embracing or illustrating certain features of my invention. Fig. 4 is a vertical sectional view illustrating a further feature of my said invention. Figs. 5 and 6 are horizontal sectional views taken on the lines  $yy$  and  $zz$ , respectively, of Fig. 4. Fig. 7 is a side and partial sectional view further illustrating my said invention.

A is a barrel or cylinder, in the top or cap  $a$  of which is an opening in which is placed a core, B. The space C, between the walls  $b$  of this opening and the said core, forms an annular die through which the plastic material, (indicated at the broken lines  $c$ ), is forced from the cylinder A in the production of the curved pipe or traps.

Placed within the cylinder A, and capable of longitudinal movement therein, are two (or more, if desired) pistons, D D, each of which has its side nearest the center of the cylinder flat, or substantially so, while its outer side or surface is curved to correspond to the curvature of the adjacent inner surface of the cylinder. These pistons D D are provided with suitable mechanical means for independently moving them longitudinally with reference to the cylinder. By thus providing a plurality of pistons within a single cylinder and combining with said pistons mechanism for operating them independently of each other I am enabled to produce a compact and comparatively inexpensive machine for the purposes herein mentioned, and one capable of easy and con-

venient operation. By having the pistons flat on their inner sides and on their outer sides curved to conform to the inner surface of the cylinder I am enabled to make the apparatus very compact, and also obtain other advantageous results.

For the production of curved pipes, traps, &c., of soft or very plastic material, the pistons may be independently actuated by levers E, connected to their outer extremities and suitably fulcrumed—as, for example, upon pivoted links  $d$ , as shown in Fig. 2—or, when desired, the piston may be provided with stems  $e$ , each of which connects with the ram or plunger of a suitable hydraulic press, the cylinder F of which is indicated in Fig. 7.

When the apparatus is to be used for making the articles of lead or other soft metal, the pistons are extended into a single hydraulic cylinder, G, which is internally divided by a longitudinal partition,  $f$ , into two parts or hydraulic chambers,  $g$ . These parts or chambers  $g$  are distinct from each other, and each is provided with the usual appliances used in a hydraulic press to actuate the plunger or ram thereof, so that by this means the two pistons may be independently actuated by hydraulic power. When the pistons are moved inward at equal speed, the material  $c$  will be forced from the die C in the form of a straight tube. When one of the pistons moves faster than the other, the material in front of it is forced out from the corresponding side of the die C in greater quantity and more rapidly than at the other side of the die, thereby causing the issuing material to curve in the direction of the side at which the smaller quantity passes out. The pipe or trap is thus curved in one direction or the other, as may be desired, by giving the requisite relatively greater velocity to the one or the other of the pistons.

The core B may be short and be tapered at its inner end, as shown in Fig. 1, in which case it is held in place and position by radial wings  $m$ .

When desired, the core may have its outer end sustained by the wings  $m$ , but with a cylindrical stem,  $n$ , extended inward through a bore formed by coincident grooves in the flat inner faces of the pistons, as shown in Figs. 4 and 5; or, as shown in Fig. 7, the stem  $n$  may



extend through the length of the cylinder, with its rear extremity secured to a cross-pin, *r*, at the rear end of the cylinder. In this case the inner sides of the pistons must be flattened  
5 for a portion of their length, as shown at *u*.

The flat inner sides of the hydraulic plungers, bearing upon the opposite sides of the fixed partition in the hydraulic cylinder shown in Figs. 4 and 6, prevent the pistons from turn-  
10 ing around within the cylinder, having a die, as aforesaid, which turning, if permitted, would tend to give an undesirable twist to the material while issuing from the die.

It is the parallel positions of the pistons placed longitudinally with the axis of the die which constitutes the principal feature of my invention, so as to provide a compact and direct-acting machine, which will not require any substantial bend in the general directions of the  
20 opposite parts of the stream of lead toward the die, as contradistinguished from a machine having pistons arranged in the same axial line and at right angles to the longitudinal axis of the disk.

25 What I claim as my invention is—

1. In a machine for making curved tubes, pipes, &c., the combination of two parallel or substantially parallel pistons, with a receiver for holding the plastic metal or material, a die  
30 secured to said receiver, and means for simultaneously and independently actuating said parallel pistons with reference to the die, substantially as and for the purpose herein set forth.

35 2. In a machine for making curved tubes, pipes, &c., the combination of two parallel or substantially parallel pistons, a receiver for holding the plastic metal or material, a die secured to said receiver, and hydraulic mech-  
40 anism for simultaneously and independently actuating said pistons, substantially as and for the purpose herein set forth.

3. In a machine for making curved tubes, pipes, &c., the combination, with a cylinder having a suitable die, parallel pistons having  
45 flat inner surfaces, and means for independently actuating said pistons, of means for preventing the turning of the said pistons around a longitudinal axis of movement, substantially as and for the purpose herein set forth. 50

4. The combination, with a cylinder provided with an annular die, of pistons having flat inner faces and outer surfaces curved to conform to the internal surface of the cyl-  
55 nder, and means for independently actuating said pistons, substantially as and for the purpose herein set forth.

5. The combination, with a cylinder having an annular die, of pistons having flat inner faces and outer surfaces curved to conform to  
60 the internal surface of the cylinder, and a plurality of hydraulic presses arranged to independently actuate the said pistons, substantially as and for the purpose herein set forth.

6. The combination, with a cylinder pro-  
65 vided with an annular die, of pistons having flat inner faces and outer surfaces curved to conform to the internal shape of the cylinder, and a hydraulic cylinder having a partition which divides it into a plurality of hydraulic  
70 chambers arranged to independently operate the said pistons, substantially as and for the purpose herein set forth.

7. The combination, in a machine for the purpose stated, of a receiver for holding the  
75 plastic material and forming the die, and co-acting pistons arranged and operating side by side in longitudinal relation to the axis of the die within said receiver, for the purpose stated.

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Witnesses:

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