

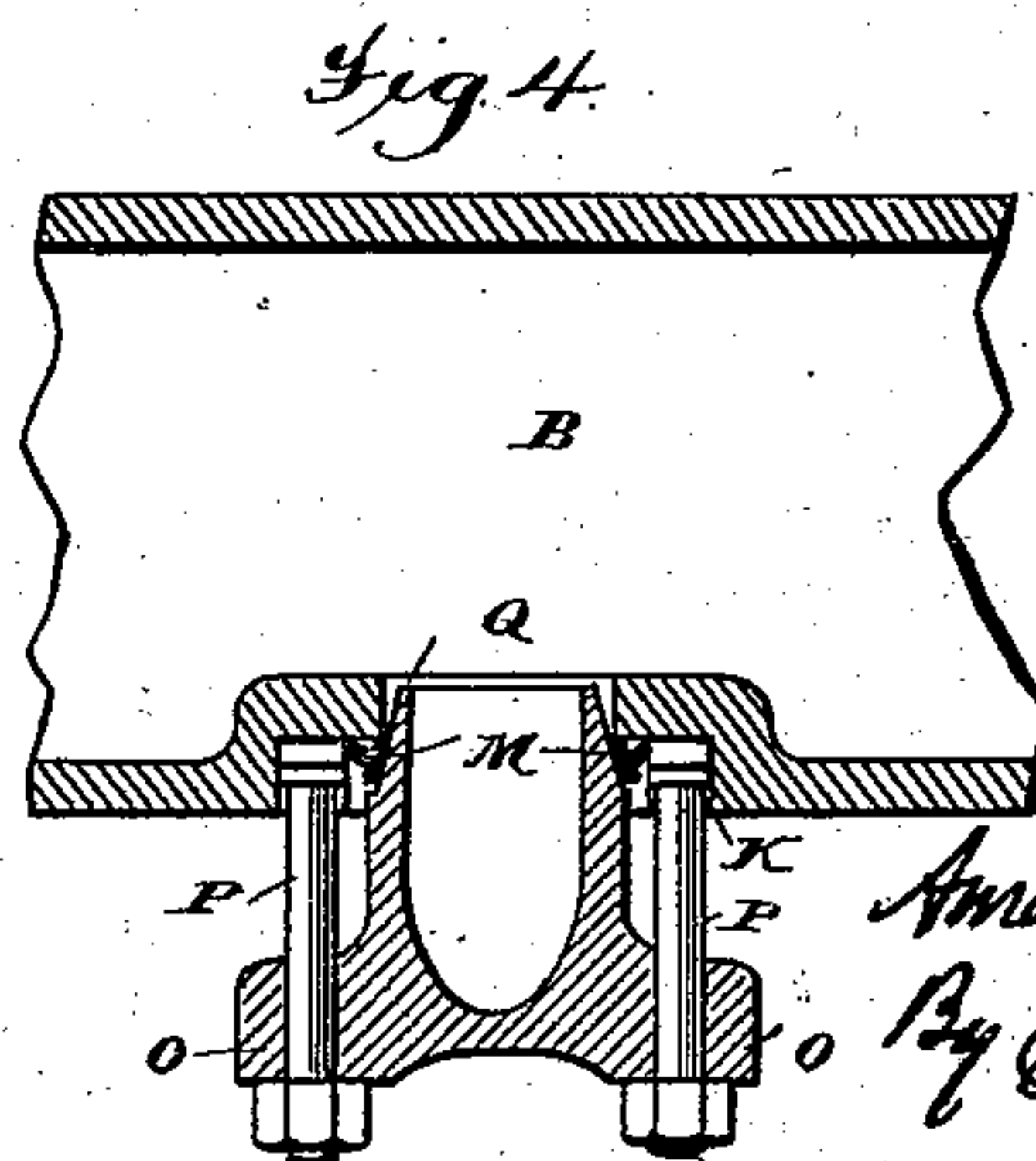
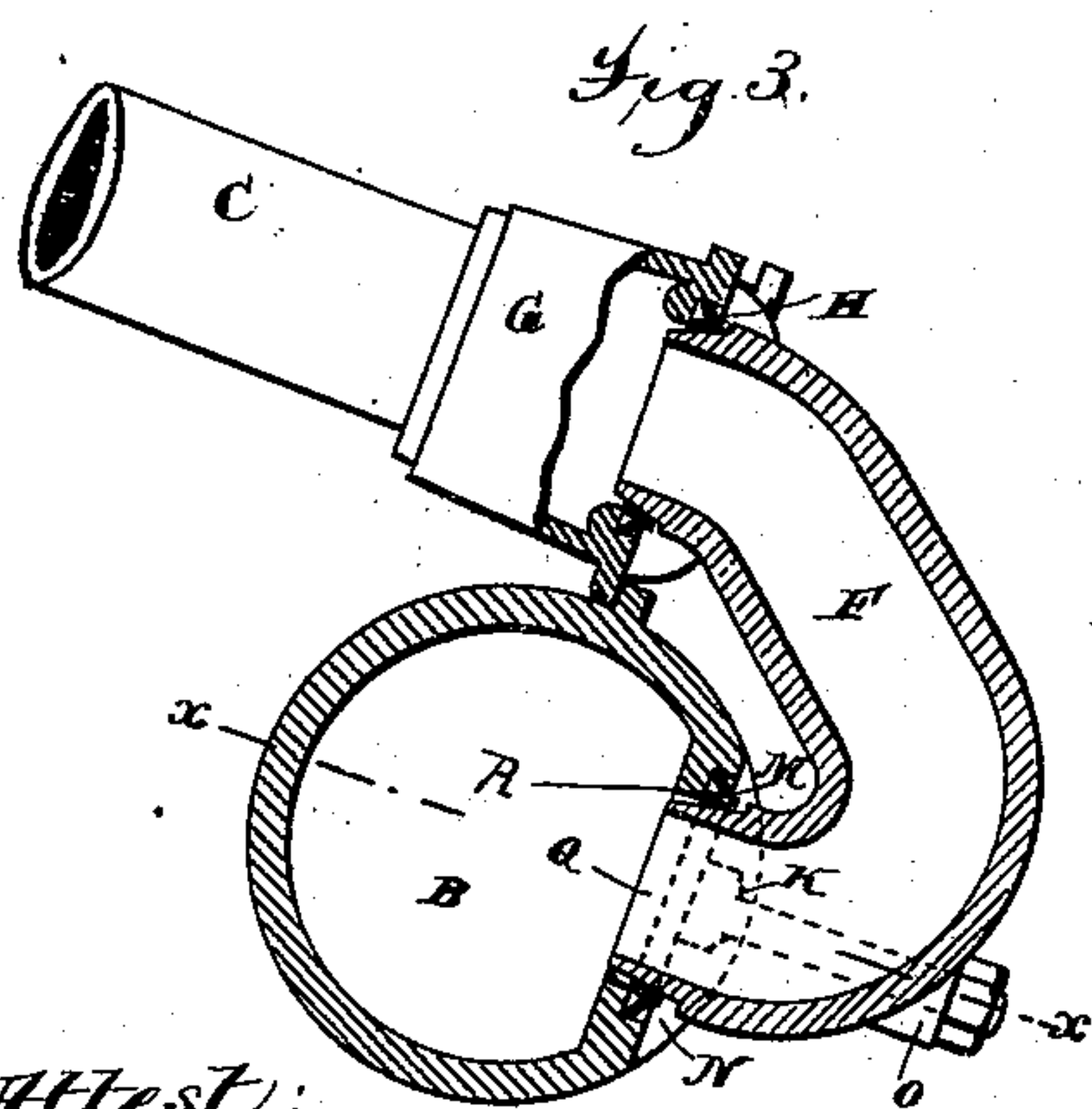
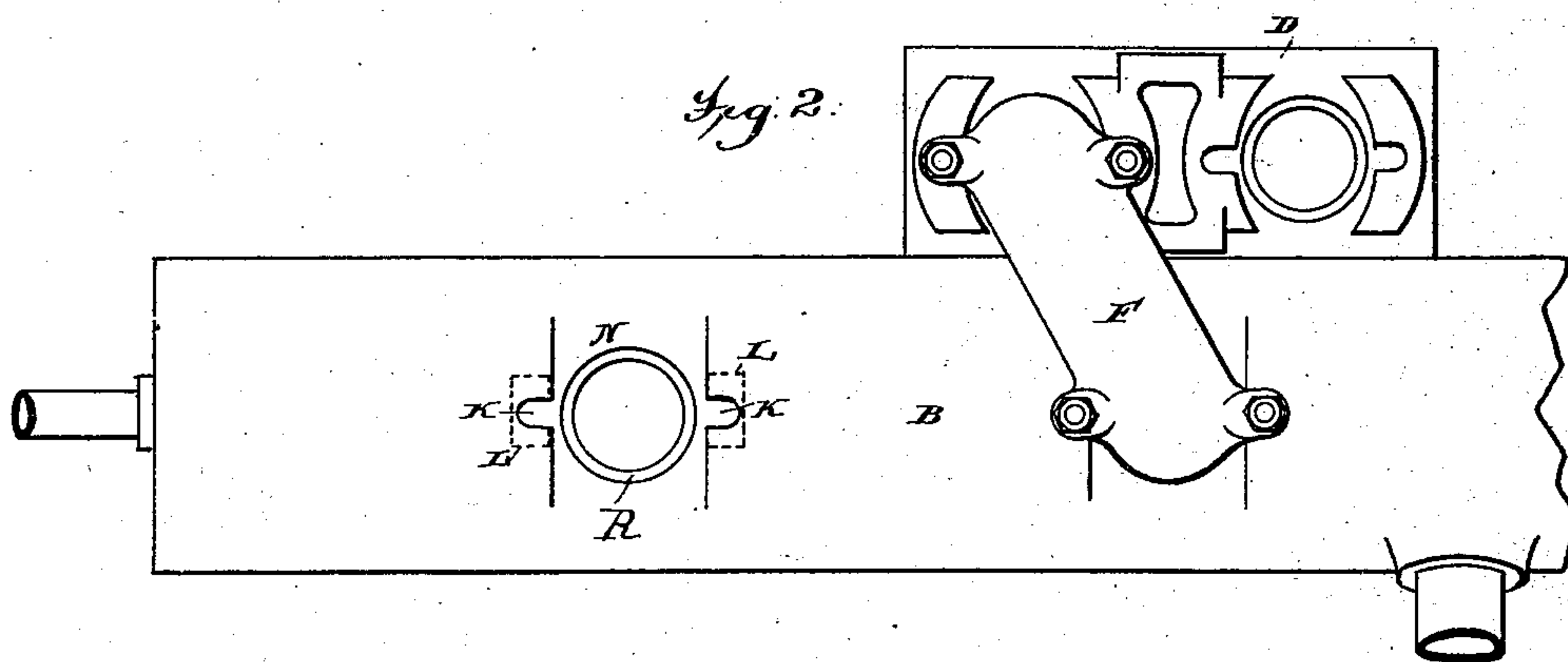
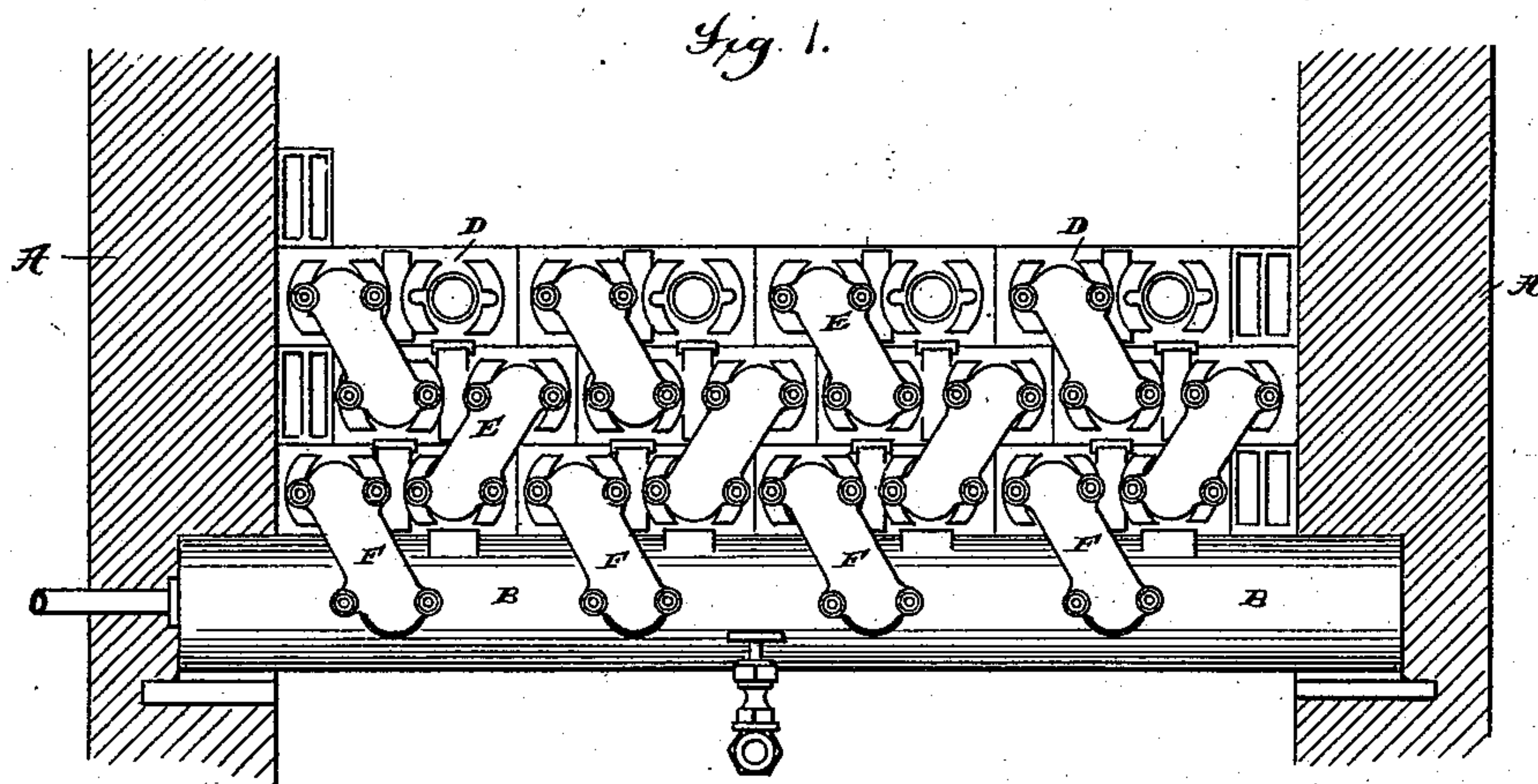
(No Model.)

A. WORTHINGTON.

BOILER.

No. 377,001.

Patented Jan. 24, 1888.



Attest:  
Geo. H. Bott.  
Douglas Wymanforth.

Inventor  
Amasa Worthington  
By E. W. Webb  
Atty.



# UNITED STATES PATENT OFFICE.

AMASA WORTHINGTON, OF BROOKLYN, NEW YORK, ASSIGNOR TO THE  
ABENDROTH & ROOT MANUFACTURING COMPANY, OF NEW YORK.

## BOILER.

SPECIFICATION forming part of Letters Patent No. 377,001, dated January 24, 1888.

Application filed October 12, 1886. Serial No. 216,061. (No model.)

*To all whom it may concern:*

Be it known that I, AMASA WORTHINGTON, a citizen of the United States, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Boilers, of which the following is a full, clear, and exact description.

My invention relates to an improvement in water-tube boilers, and particularly in the connection between the water-tubes and the mud-drum; and the object of my invention is to provide a means for connecting the lowermost series of water-tubes with the rear of the mud-drum below its center, which shall at the same time present no obstruction to the ready upward flow of water.

The character of boiler to which the invention more particularly relates is fully described in an application for Letters Patent filed by me of even date herewith, Serial No. 216,060, and consists of a series of water-tubes supported in an inclined position, the tubes being connected together in vertical horizontal series by means of headers and bends. In boilers of this class it is found preferable to provide the mud-drum at the rear or lower end of the water-tubes, whence the water flows upward through the series of tubes to the steam-drum. It is found important to preserve the size and shape of the mud-drum and maintain it below the center of gravity of the boiler-tubes; but this is not ordinarily possible with the character of connection in common use, necessitating, as it does, a reduction in the area of the drum and its local displacement, or a change in its cylindrical contour, as well as other changes rendering the drum more complicated and less efficient. To obviate this difficulty I provide a bend or connection between the lowermost series of tubes and mud-drum, having a long and a short arm and a bore of uniform diameter, and communicating with the mud-drum below its center; and my invention further consists in the details, as hereinafter set forth.

In the drawings, Figure 1 represents a rear elevation of the mud-drum and lower part of a steam-boiler made in accordance with my invention; Fig. 2, an enlarged view showing a detail; Fig. 3, a cross section through the

drum and one of the bends or connections; and Fig. 4, a section of the same on the line *x x*, Fig. 3.

A is the furnace-wall, B the mud-drum, C the boiler-tubes, D the headers, and E the bends for connecting the water-tubes together, all constructed as described in my said other application.

F is the bend or connection between the lowermost series of water-tubes and the mud-drum, of which in a boiler of the size illustrated four will be provided, it being noted that each bend provides a connection for a pair of tubes with the drum, and through the headers and bends with one entire vertical section of tubes. The upper end of the bend F is chamfered, as shown, and enters the aperture in the rear of the header G, being secured in place by bolts, and impinging against a washer, H, substantially in the manner illustrated and described in my said other application.

The bend F comprises a bent tube having a long and a short arm, the bore of which extends with slight divergence from a straight line for a large part of its extent, and then changes its direction sharply, maintaining, however, a uniform diameter throughout. By this construction I am able to provide a connection between the lower ends of the water-tubes and the rear and lower part of the mud-drum without interposing any obstacle to the free flow of the water.

The connection between the bend and mud-drum is effected as follows: A part of the cylindrical surface of the mud-drum is flattened and an aperture of sufficient size formed in the wall of the drum at the flattened part, and a square groove, R, is provided in the wall of the drum contiguous to said aperture, for the reception of a soft-metal washer of the kind described in my said other application, Serial No. 216,060, said washer, however, forming no part of the invention claimed in this application.

The wall of the cylindrical part of the mud-drum contiguous to the aperture is recessed at L to receive the head of a T-bolt, the shank passing through the recess K, also formed in the wall of the drum. The lower outlet of the bend F is chamfered, and the bend is provided



on its exterior with perforated ears O. To connect the bend and mud-drum, the head and part of the shank of T-bolts P are inserted in the recesses L and K and the chamfered end 5 of the bend inserted into the aperture, the recessed ears O receiving the bolts P. Nuts are then applied to the bolts and screwed home, when the connection is complete.

What I claim as new, and desire to secure 10 by Letters Patent, is—

1. The bend F, having a long and a short arm and a bore of uniform diameter throughout, affording a connection between the mud-drum and water-tubes of a water-tube boiler, sub- 15 stantially as and for the purpose set forth.

2. In combination, the mud-drum B, having apertures Q and recesses K below its center, water-tube header G, bend F, having a long and a short arm and a bore of uniform diameter throughout, chamfered at its opposite 20 ends and provided with perforated ears O, and T-bolts P and nuts, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand this 7th day of October, A. D. 1886.

AMASA WORTHINGTON.

Witnesses:

THORNE S. WALLING,  
DOUGLAS DYRENFORTH.