

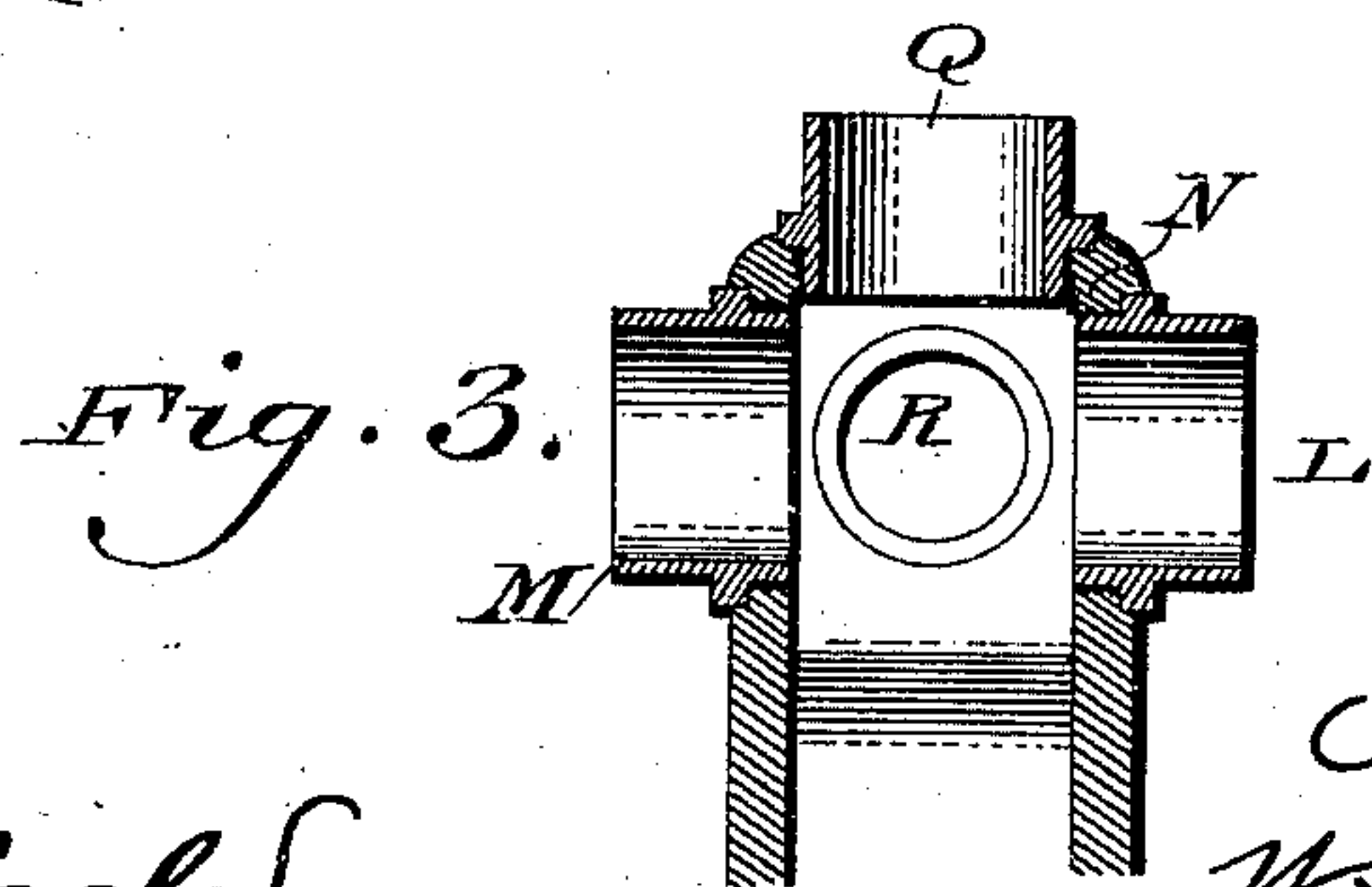
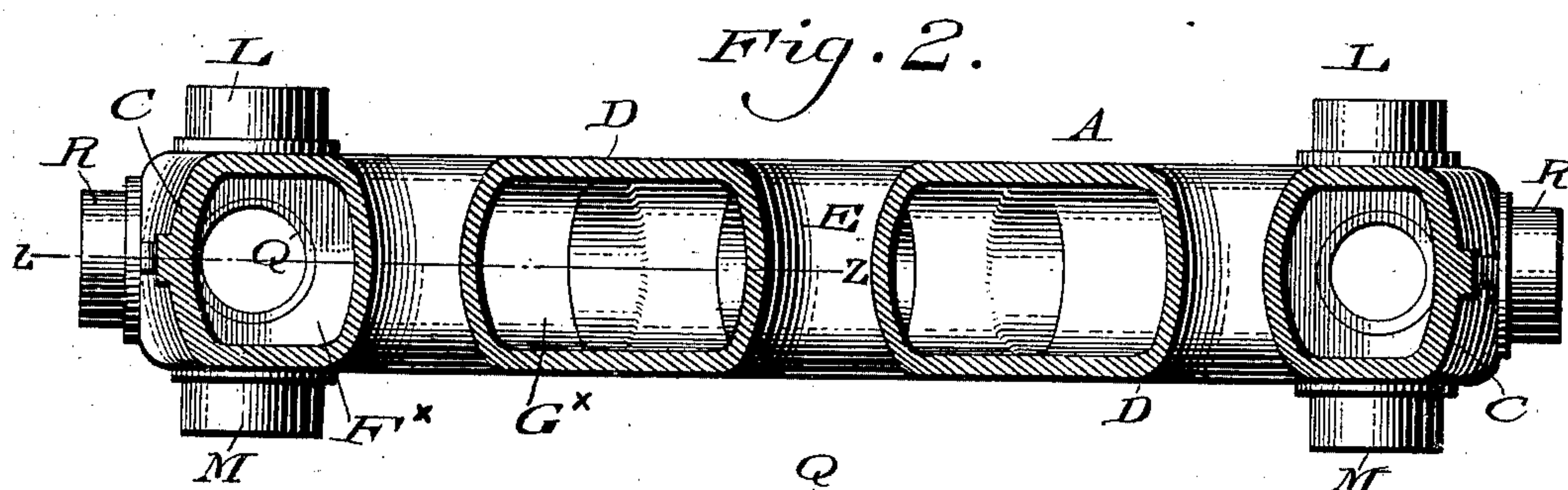
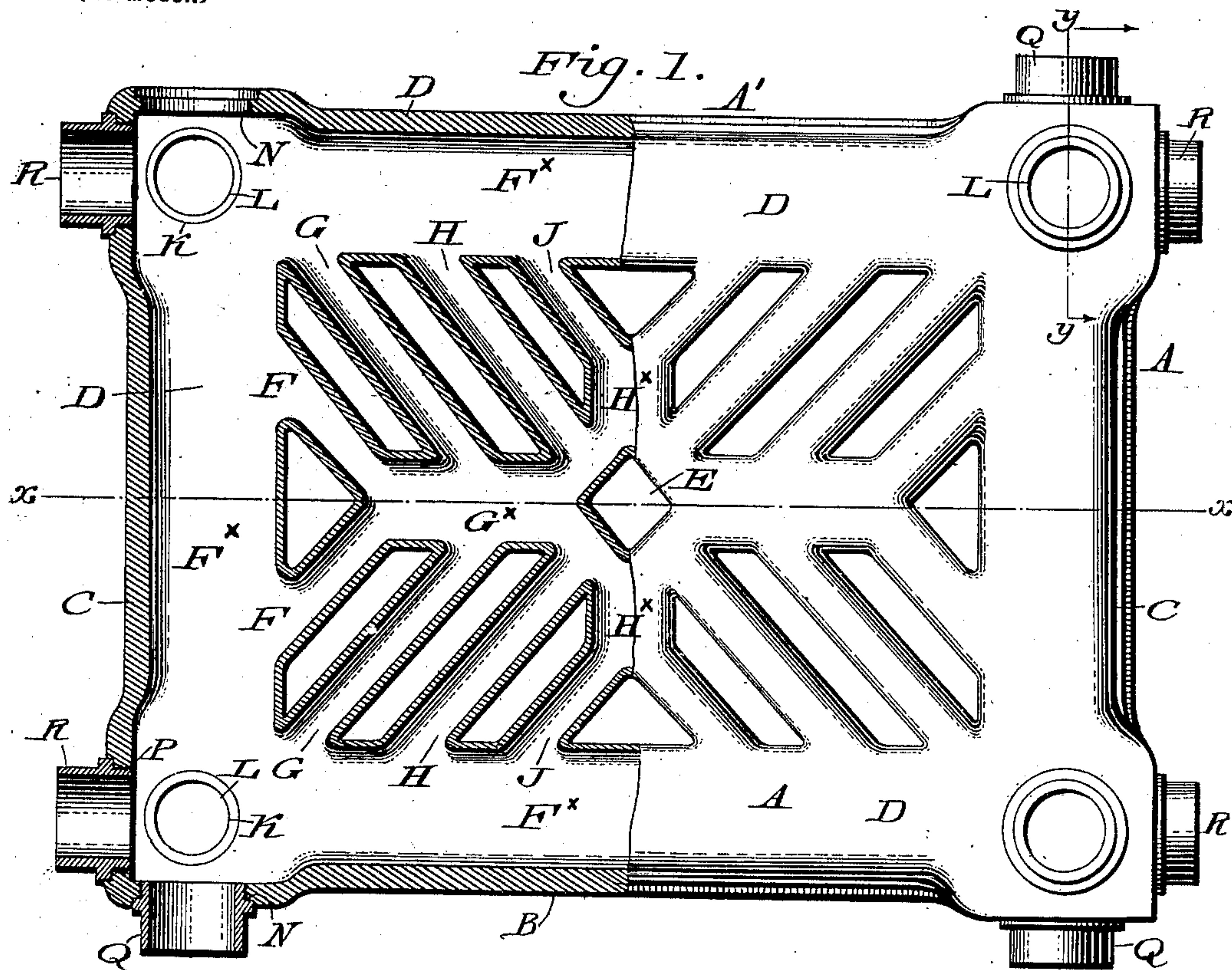
No. 663,658.

Patented Dec. 11, 1900.

H. D. KELLOGG.  
RADIATOR.

(Application filed Aug. 24, 1899.)

(No Model.)



Witnesses

*P. F. Nagle.*  
*L. Howille.*

*Hosford D. Kellogg.*  
*Wiedersheim Fairbanks*  
Inventor  
By  
Attorneys



# UNITED STATES PATENT OFFICE.

HOSFORD D. KELLOGG, OF PHILADELPHIA, PENNSYLVANIA.

## RADIATOR.

SPECIFICATION forming part of Letters Patent No. 663,658, dated December 11, 1900.

Application filed August 24, 1899. Serial No. 728,282. (No model.)

*To all whom it may concern:*

Be it known that I, HOSFORD D. KELLOGG, a citizen of the United States, residing in the city and county of Philadelphia, State of Pennsylvania, have invented a new and useful Improvement in Radiators, which improvement is fully set forth in the following specification and accompanying drawings.

My invention relates to radiators; and it consists of a novel construction of the circulating tubes, passages, or compartments, whereby the water, steam, or other medium will circulate therethrough with minimum friction and uniformly and directly, as will be hereinafter fully described and claimed.

Figure 1 represents a view, partly in side elevation and in vertical section on the line  $z z$  of Fig. 2, of a radiator embodying my invention. Fig. 2 represents a section on line  $x x$ , Fig. 1. Fig. 3 represents a section on line  $y y$  of Fig. 1.

Similar letters of reference indicate corresponding parts in the figures.

Referring to the drawings, A and B designate the sides of the radiator, C the ends thereof, and D the top and bottom walls. The body thus formed is divided by partitions into a continuous marginal compartment or tube  $F^x$ , an inner compartment or compartments  $G^x$  and  $H^x$ , and a plurality of tubes or passages F, G, H, and J connecting the continuous marginal compartment or tube at intervals longitudinally thereof with the inner compartment or compartments. In the instance illustrated the inner compartment or compartments  $G^x$  and  $H^x$  are right-angular tubes extending from the center of the radiator, although it is understood that the form of the compartment can vary and also that the centrally-arranged partitions extending between the sides A and B and forming the central opening E can be omitted equally as well, so long as an inner compartment or compartments separate from the continuous marginal compartment, but connected therewith by the connecting tubes or passages, is formed. The connecting tubes or passages F, G, H, and J are diagonally arranged and are not necessarily straight, as I have illustrated. The outer ends of the connecting tubes or passages are arranged at intervals longitudinally of the marginal compartment

or tube, and the inner end of each connecting tube or passage communicates with the inner compartment, so that direct communication is provided as between the marginal compartment at the outer end of each connecting-tube and such inner compartment.

The arrangement of the connecting tubes or passages I term "diagonal" because they are oblique or otherwise than right angular relative to the continuous marginal compartment or tube  $F^x$ . In the radiator illustrated while all of the connecting-tubes extend diagonally series of them are angular to each other; but it will be noted that the tubes or passages of adjacent series all converge toward the inner compartment. I have found that by this diagonal arrangement of the connecting tubes or passages the circulation of the heating medium is so facilitated that the effectiveness of the radiator is materially increased. The friction opposed to the circulation that is present in radiators where the tubes and passages are at right angles is obviated by this diagonal arrangement, since the currents within the radiator are uniform and direct and a free circulation takes place, so that the heat units in the heating medium may be utilized to the greatest extent. It is obvious that a portion of the continuous marginal compartment or tube affords direct path for the circulation, while the gradually-deflected paths through the diagonally-arranged connecting-tubes from the marginal to the inner compartment and from the latter to the former gives as free circulation as is consistent with the object in view. The corners of the radiator-section are conveniently provided with threaded openings K to receive nipples L and M and with threaded openings N and P to receive nipples Q and R, whereby the same may be set up with its long or short side horizontal, said openings serving as an inlet and outlet for the heating medium, as the case may be, or two or more of said sections connected together. Of course the openings that are not in use may be plugged or otherwise suitably closed.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A radiator comprising a continuous marginal tube, provided with an inlet and an out-



let, and a plurality of openings on the inside, an intermediate tube, and a series of diagonally-arranged connecting-tubes between the marginal and intermediate tubes, said connecting-tubes being arranged to provide direct communication between said openings through the intermediate tube.

2. A radiator consisting of a marginal tube, inlets and outlets, and tubes diagonally arranged relative to the marginal tube and providing a direct communication between said inlets and outlets.

3. A radiator comprising a continuous marginal tube, provided with an inlet and an outlet, an intermediate tube, and a plurality of connecting-tubes arranged diagonally in re-

verse order between the opposite members of the marginal tube.

4. A radiator comprising a continuous marginal tube, provided with a plurality of openings, arranged at intervals on the inside, an inner tube, and a series of diagonally-arranged connecting-tubes between the marginal and inner tubes, said diagonally-arranged connecting-tube being so placed relative to the marginal openings and the inner tube that direct communication is provided between said marginal openings and inner tube.

HOSFORD D. KELLOGG.

Witnesses:

JOHN A. WIEDERSHEIM,  
E. HAYWARD FAIRBANKS.