

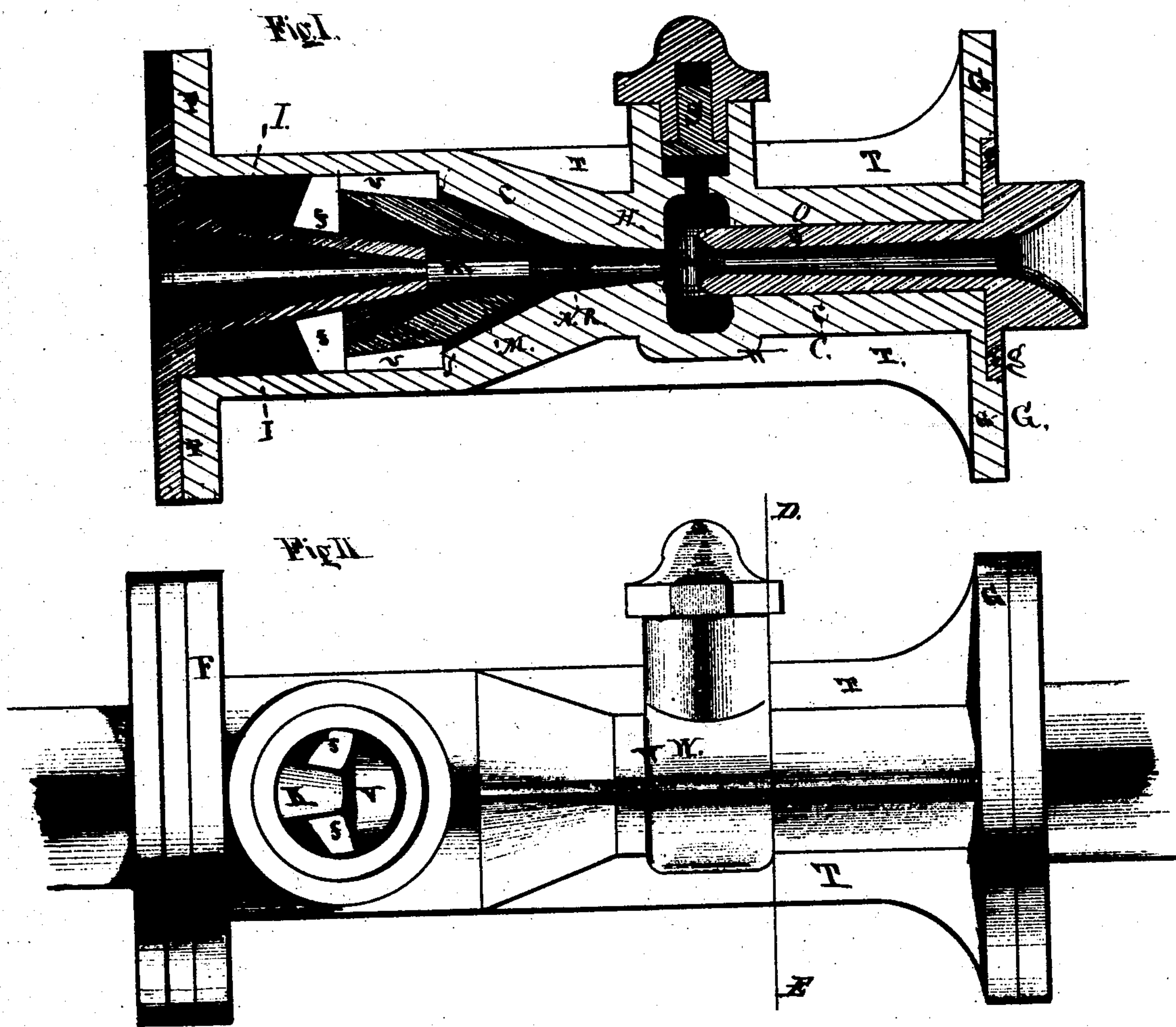
C. F. Root,

Injector.

2. Sheets, Sheet!

No. 110,289.

Patented Dec. 20, 1870.



Witnesses,

Francis Dan Koniglaer
G. Dudley Chapin

Inventor.

Charles F. Root
by his attorneys
Jardine & Rydman

C. F. Root,

2. Sheets, Sheet 2.

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Fig. III.

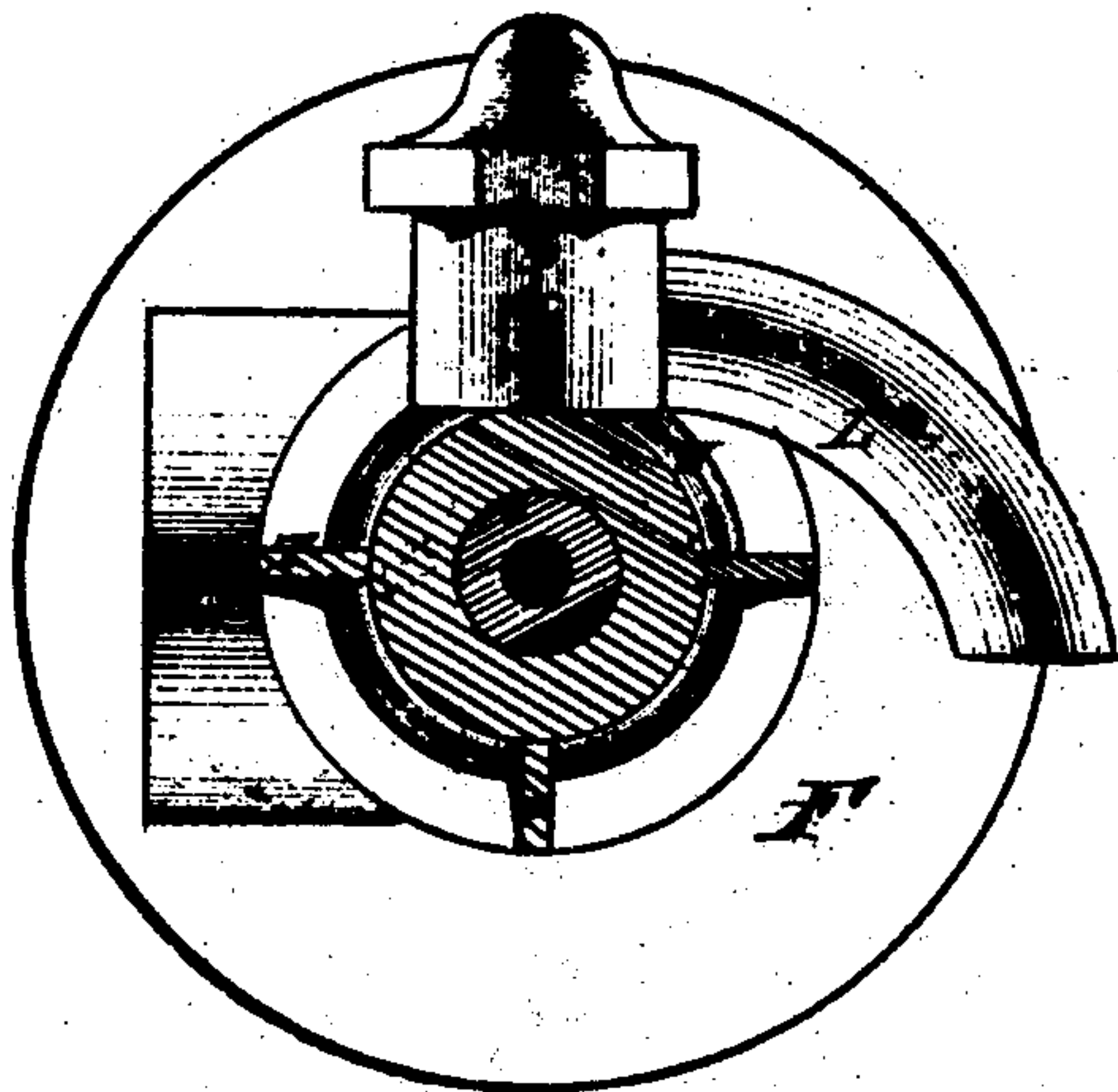
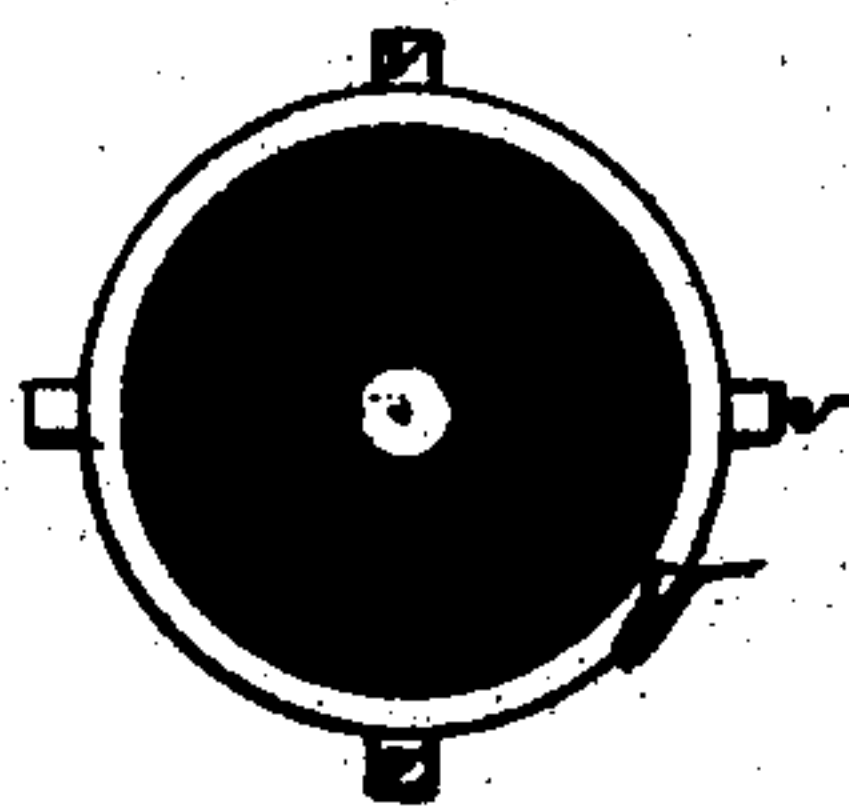


Fig. IV.



Witnesses.

E. Dudley Chapin
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Inventor.

Charles F. Root
by his attorneys
Gardner & Hyde

UNITED STATES PATENT OFFICE.

CHARLES F. ROOT, OF WEST SPRINGFIELD, MASSACHUSETTS.

IMPROVEMENT IN INJECTORS.

Specification forming part of Letters Patent No. 110,289, dated December 20, 1870.

To all whom it may concern:

Be it known that I, CHARLES F. ROOT, of West Springfield, Hampden county, Commonwealth of Massachusetts, have invented an Improvement in Injectors, of which the following is a specification.

My invention relates to the construction and arrangement of nozzles, in an injector, as hereinafter described, so that the feed-water flowing over and around them shall be able to condense and take up all of the momentum of the jet of steam used for the propulsion of the water to the boiler, and to render, by an auxiliary nozzle, the condensing surface of the water against which the steam acts so great as to render unnecessary the screw-rods, and other mechanical contrivances for the purpose of regulating the passage of the steam through the single nozzle in general use.

In the accompanying drawings, Figure I is a sectional view. Fig. II shows an external view with the relative positions of the auxiliary nozzle and feed-pipe. Fig. III is a cross-section through the line D E, Fig. II, showing the pipe for the escape of the water, and Fig. IV is a detail view of the additional nozzle.

C is the outside shell or case of the injector, which I make of metal, and as light as is consistent with strength. It is provided with flanges F G for the purpose of securing it to flanges upon the pipes supplying it with steam and connecting it with the boiler, the flange G being strengthened by resting against ribs T T when the diameter of the shell is smaller. At a point, W, upon the case C the stock is increased to make room for an air-chamber, H, within the injector, over which air-chamber is the check-valve S, communicating with same, and provided with a spout, L, Fig. III, for the purpose of discharging the waste water coming through the valve S clear of the injector. Upon the case, near the flange F, is the opening and attachment for the feed water and its pipe.

The internal construction of the case is as follows: Under the check-valve, and communicating therewith, is the air-chamber H, into which projects the nozzle O, said nozzle being provided with a flange, g, which is let into flange G, so as to be securely held in place by the pipe and its flange connecting immediately with the boiler. The nozzle O is

sleeved into the injector so as to be easily removed for cleaning. The air-chamber and the rest of the injector, when the injector has ceased to work, become filled with water, so that when the jet of steam is turned on again the water is forced through the check-valve until the current of moving water is established, when it closes of itself, there being no more pressure against it. In the chamber H, opposite the nozzle O, ends the conical passage R, which from its mouth or base widens to the largest and cylindrical space I within the injector, ceasing before reaching the same to leave a shoulder, j, for a purpose hereinafter described. This cylindrical space I extends to the end of the injector, and contains within it the steam-nozzle K proper, and the auxiliary nozzle V, which I will now describe.

The general form of this nozzle is conical without and within, the width of the base from the outsides being less than the diameter of the space I in which it is inserted, so that when it is held in position by the ribs v a space between each of the ribs is left between the outside surface of the nozzle and the inside of the injector. The ends of these ribs v are seated against the shoulder j, from opposite which shoulder and from ends of ribs v the nozzle slopes to its smaller end opposite the larger part of the passage R. The inside consists of a larger and smaller cone, the nozzle K entering this auxiliary nozzle V until opposite the bore of the annular opening M. This is seen in Fig. I.

In Fig. IV is seen an end view of the nozzle V, showing the ends of the ribs. The nozzle K is also provided with ribs f, to hold it in its relative position with nozzle V, so that there can be no possibility of the current of steam hitting in any but the right place, as is often the case in injectors where the screw-rod is used, when from the rod being bent or otherwise untrue the jet of steam is diverted from the proper course.

The action of my injector is as follows: The end of the feed-pipe being opposite both the nozzle K and the larger end of nozzle V, a jet of steam coming through the one K, the water is forced through the nozzle M, drawing with it the water surrounding the nozzle V through the passage R and on into the boiler, having in effect the capacity for percussion and condensation of two nozzles instead of one. As

the body of water receiving the momentum of the head of steam comes equally from around the nozzle and through it, whereas with the single nozzle now in use being of arbitrary size, only a small column of water can take up the momentum of a column of steam, any increase of the head of steam beyond a certain point acting to destroy condensation. By these means I make an injector without any cumbersome attachments, that has nothing to get out of order within it, and that can be made to occupy very little more space than a hose-coupling, the model being working size for an ordinary locomotive-boiler.

Having described my invention, what I claim is—

An injector consisting of the case C, having the flanges F and G and ribs T T and C, and check-valve S, with its spout L, in combination with the nozzles K V and O, the parts being arranged and constructed substantially in the manner and for the purpose shown and described.

CHARLES F. ROOT.

Witnesses:

R. F. HYDE,
EDWARD MORRIS.