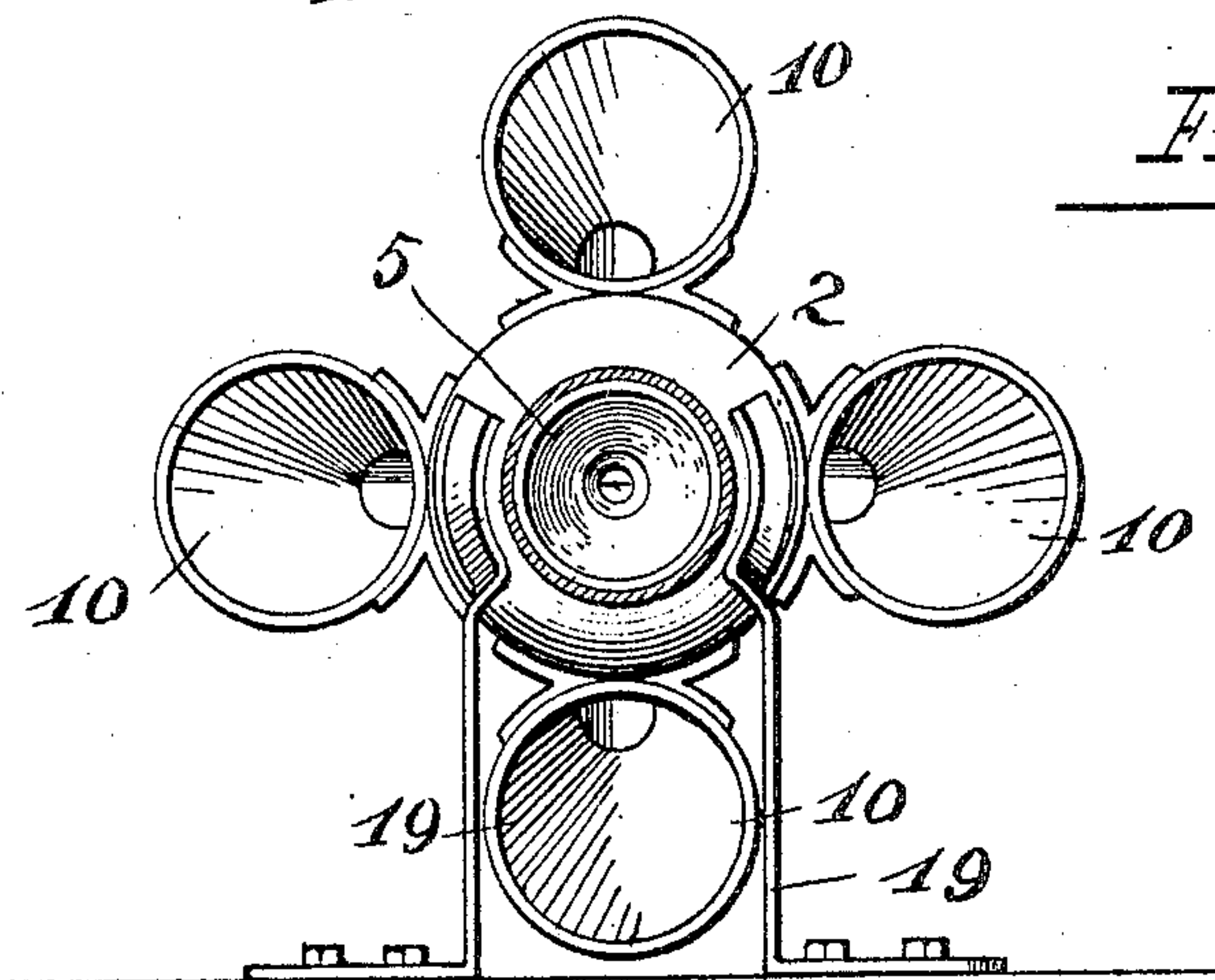
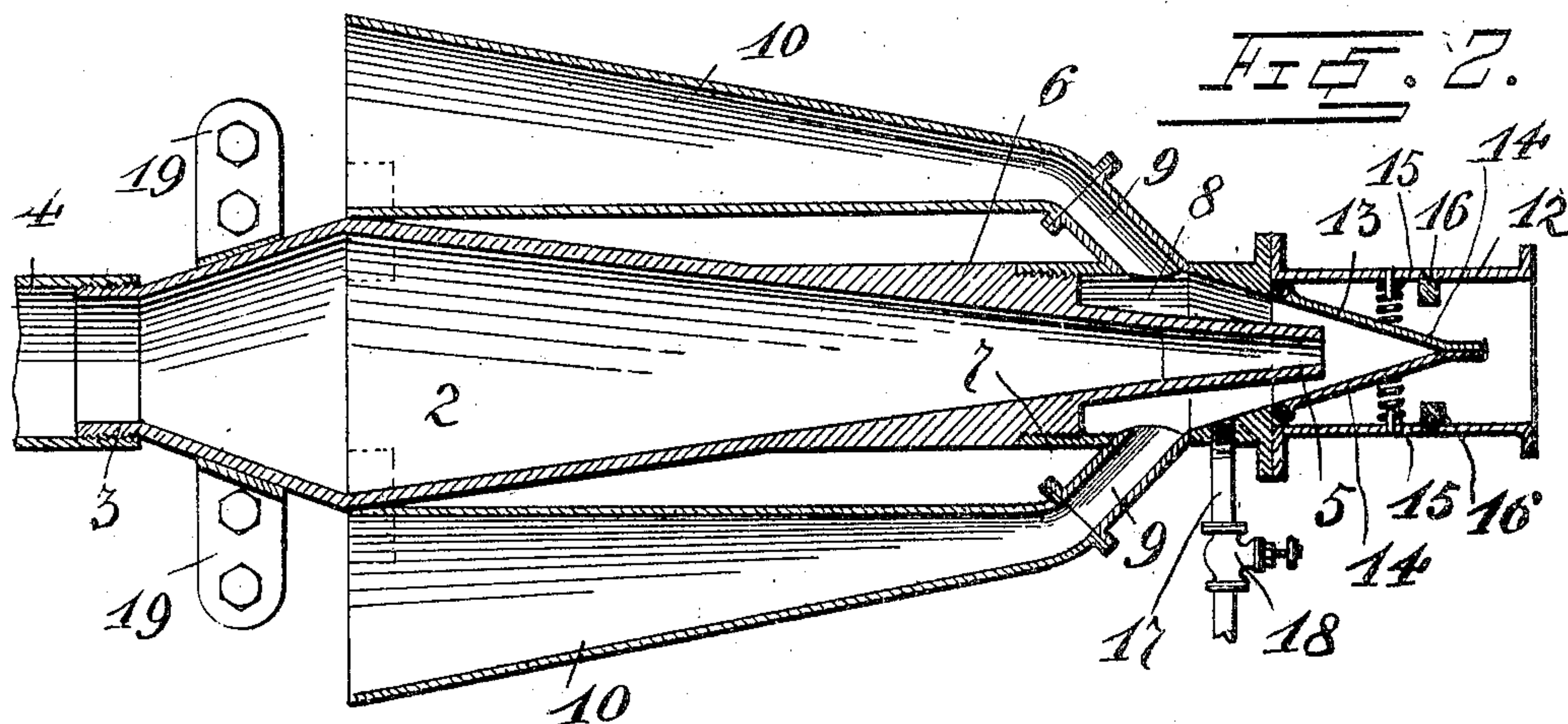
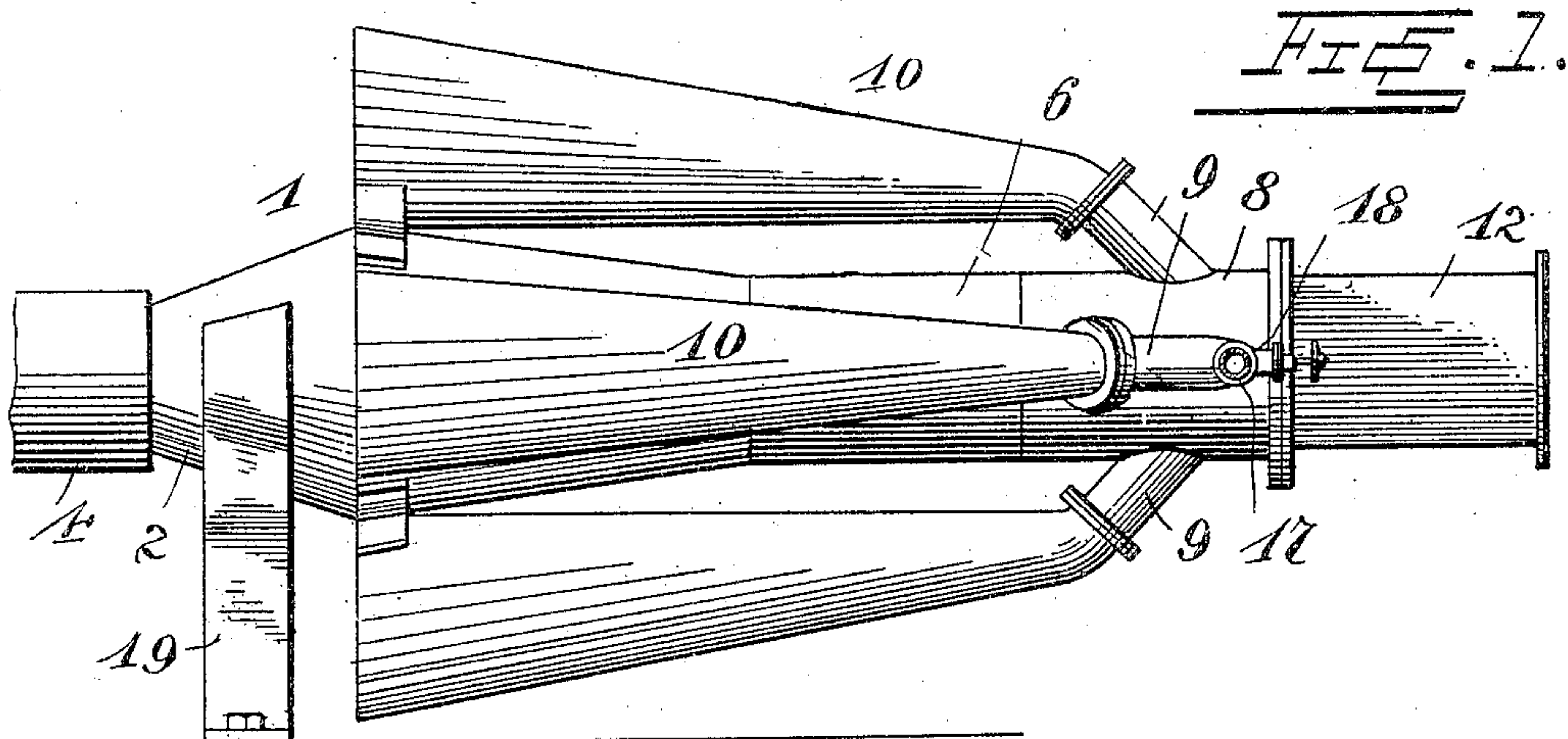


No. 798,177.

PATENTED AUG. 29, 1905.

C. FERRO, SR.
INJECTOR.

APPLICATION FILED DEC. 19, 1904.



Witnesses

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UNITED STATES PATENT OFFICE.

CHARLES FERRO, SR., OF BAY CITY, MICHIGAN, ASSIGNOR OF ONE-HALF
TO JACOB P. BENDER AND ONE-THIRD TO FRANK W. HASTINGS, OF
BAY CITY, MICHIGAN.

INJECTOR.

No. 798,177.

Specification of Letters Patent.

Patented Aug. 29, 1905.

Application filed December 19, 1904. Serial No. 237,524.

To all whom it may concern:

Be it known that I, CHARLES FERRO, Sr., a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Injectors; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to improvements in air or water injectors.

One object of the invention is to provide an injector for forcing air into a steam-boiler and to create a pressure from the expansion of the air when heated; also, to provide an injector for forcing both air and water into the boiler for the purpose of creating a pressure by heating and expanding the same.

Another object is to provide an improved check-valve through which the air or water is forced.

A further object is to provide a device of this character which will be simple, strong, and durable in construction, efficient in use, and well adapted to the purpose for which it is desired.

With these and other objects in view the invention consists of certain novel features of construction, combination, and arrangement of parts, as will be hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of an injector constructed in accordance with the invention. Fig. 2 is a longitudinal sectional view of the same, and Fig. 3 is an elevation of the outer end of the injector.

Referring more particularly to the drawings, 1 denotes a steam-funnel, the outer end of which is provided with an oppositely-tapered cap 2. On the smaller end of said cap 2 is an exteriorly-threaded coupling 3, with which is adapted to be connected a steam-supply pipe 4. On the smaller or inner end of the steam-funnel is formed a discharge nozzle or jet 5.

On the end of the funnel 1 adjacent to the nozzle 5 is formed an annular enlargement 6, having a reduced threaded portion 7, on which is adapted to be screwed a suction-box 8, through which said nozzle or jet projects. The suction-box 8 is provided with an annu-

lar series of outwardly-projecting obliquely-disposed nipples 9.

Arranged around the steam-funnel 1 is an annular series of radially-disposed air-funnels 10, which are open at their outer ends, as shown. The inner smaller ends of the funnels 10 are connected to the nipples 9, whereby air may pass through said funnels and nipples into said suction-box. The outer or larger ends of the nipples are bolted or otherwise connected to the outer larger end of the steam-funnels, as shown.

Secured to the inner end of the suction-box 8, over the discharge-opening formed therein, is a valve-casing 12, which is preferably rectangular in cross-section, and within the same is arranged a check-valve 13. The valve 13 preferably consists of a pair of wings or blades 14, the outer ends of which are hingedly or pivotally connected to the inner walls of the valve-casing 12, adjacent to its connection with the suction-box 8. The inner ends of the wings or blades 14 are adapted to normally engage each other in a line with the end of the discharge nozzle or jet 5. The wings or blades 14 are so arranged that a V or wedge shaped space is formed between the pivoted ends of the same, and into said space projects the discharge end of said nozzle or jet 5. The adjacent inner walls of the suction-box 8 are inclined or tapered to form a continuation of the wedge-shaped space between the wings or blades of the valve. The wings or blades 14 of the valve are normally held in closed position by means of coil-springs 15, which are arranged between the same and the adjacent walls of the valve-casing 12, as shown. On the walls of the valve-casing are arranged stops 16, which limit the outward movement of the wings or blades 14, thus preventing the valve from being opened farther than is necessary. It will be understood that when the wings or blades 14 of the valves are closed or in engagement with each other that the passage through the valve-casing will be closed.

Connected with the suction-box 8 is a water-supply pipe 17, in which is arranged a cut-off valve 18. The injector may be provided with laterally-projecting apertured lugs 19 or with other suitable means, whereby the same may be attached to a boiler or other support. In practice the steam-funnel 1 is adapted to be

connected up with a steam-supply pipe, which may be, if desired, and preferably is the exhaust-pipe of the engine, and when steam is turned on in said pipe the same will rush
 5 through the steam-funnel 1 and jet or nozzle 5, forcing open the wings or blades 14 of the check-valve 13, through which it passes into the supply-pipe connected with the casing of the valve and running to the boiler. The pas-
 10 sage of the steam from the jet or nozzle 5 and through the valve-casing will create a suction in the suction-box 8, which will draw air through the funnels 10 and carry the same into the boiler. Should it be desired to sup-
 15 ply water to the boiler, the valve 18 in the water-supply pipe 17 will be opened, thus permitting water to be sucked through the pipe 17 and into the box 8, where it will be carried by the suction of the steam through
 20 the valve and into the supply-pipe and boiler of the engine. As soon as the pressure of steam is removed from the discharge spout or nozzle of the steam-funnel the wings or blades of the valve 12 will automatically
 25 close, thus preventing said air, water, or steam from coming back into the suction-box.

From the foregoing description, taken in connection with the accompanying drawings, the construction and operation of the inven-
 30 tion will be readily understood without requiring a more extended explanation.

Various changes in the form, proportion, and the minor details of construction may be resorted to without departing from the prin-
 35 ciple or sacrificing any of the advantages of this invention.

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

40 1. In an injector, the combination with a steam funnel and jet, of a suction-box arranged on the end of the same, a series of air-funnels arranged on said steam-funnel and connected to said suction-box, and a check-valve ar-
 45 ranged at the end of said steam-jet, substantially as described.

2. In an injector, the combination with a steam funnel and jet, of a suction-box arranged on said steam-funnel, means whereby the op-
 50 posite end of said funnel is connected with a steam-supply pipe, a suction-box arranged on

the jet end of said steam-funnel, an annular series of radially-disposed air-funnels arranged around and connected to said steam-funnel and having their inner or discharge
 55 ends connected with said suction-box, a valve-casing arranged on the discharge end of said box and a check-valve arranged in said casing, substantially as described.

3. In an injector, the combination with a
 60 steam funnel and jet, of a suction-box arranged on the end of the same, a series of air-funnels arranged on said steam-funnel and connected to said suction-box, a valve-casing arranged on the outer end of said box, a check-valve
 65 arranged in said casing, said valve consisting of a pair of wings or blades hinged at their outer ends to the sides of said casing, means whereby the opposite ends of said wings are closed together, and means whereby the open-
 70 ing movement of the same is limited, substantially as described.

4. In an injector, the combination with a
 75 steam funnel and jet, of a suction-box arranged on the end of the same, a series of air-funnels arranged on said steam-funnel and connected to said suction-box, a valve-casing arranged on the outer end of said box, a check-valve arranged in said casing, said valve consisting
 80 of a pair of wings or blades hinged at their outer ends to the sides of said casing, springs adapted to close the inner ends of said wings together opposite to the discharge end of said steam-jet, and stops to limit the outward move-
 85 ment or opening of said wings or blades, substantially as described.

5. In an injector, the combination with a
 90 steam funnel and jet, of a suction-box arranged on the end of the same, a series of air-funnels arranged on said steam-funnel and connected to said suction-box, a check-valve arranged at the end of said jet, and a valved water-sup-
 95 ply pipe connected with said suction-box, substantially as described.

In testimony whereof I have hereunto set
 my hand in presence of two subscribing wit-
 nesses.

CHARLES FERRO, SR.

Witnesses:

W. A. COLLINS,
 ELBERT V. INGERSOLL.