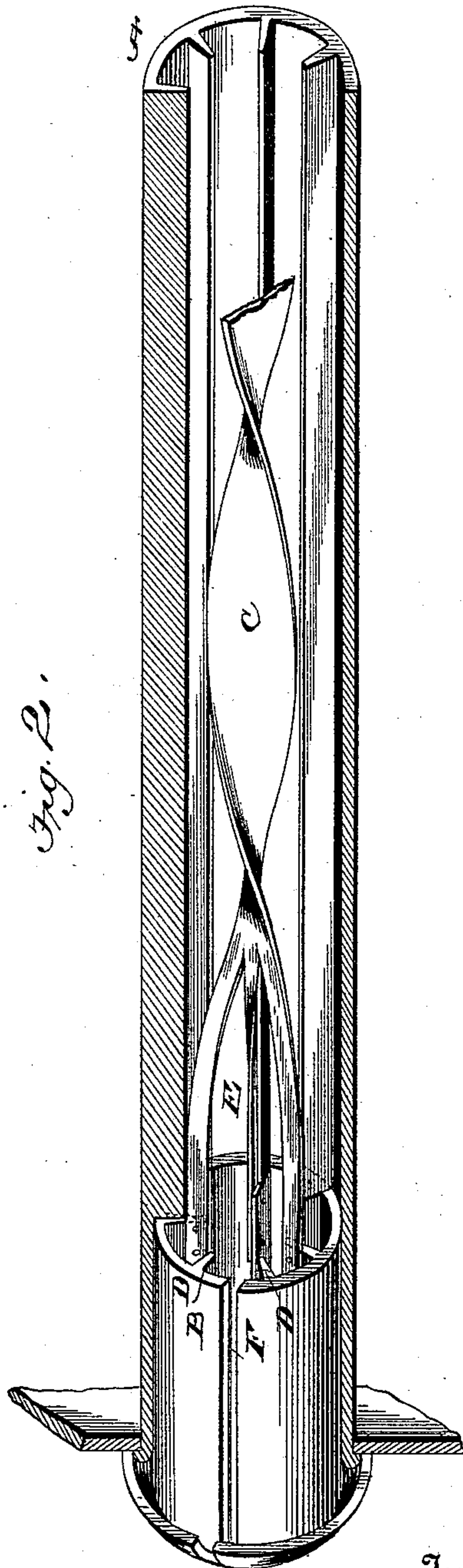
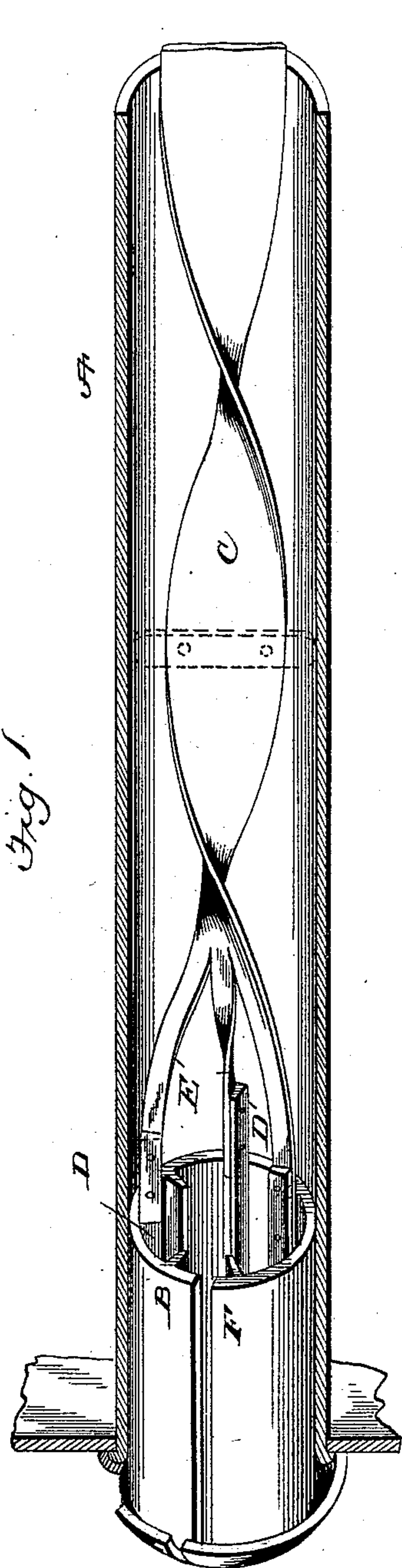


(No Model.)

C. W. WHITNEY.  
BOILER TUBE ATTACHMENT.

No. 525,932.

Patented Sept. 11, 1894.



Witnesses  
*John J. Irvine*  
*W. E. Clendaniel,*

Inventor  
*Charles W. Whitney*  
By *T. J. W. Robertson*  
Attorney



# UNITED STATES PATENT OFFICE.

CHARLES W. WHITNEY, OF NEW YORK, N. Y.

## BOILER-TUBE ATTACHMENT.

SPECIFICATION forming part of Letters Patent No. 525,932, dated September 11, 1894.

Application filed December 27, 1893. Serial No. 494,865. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES W. WHITNEY, a citizen of the United States, residing at New York city, in the county and State of New York, have invented certain new and useful Improvements in Boiler-Tube Attachments, of which the following is a specification, reference being had therein to the accompanying drawings.

10 The object of my invention is to provide a device for distributing or circulating the heated gases in tubular boilers, so that instead of their passing through the tubes in solid bodies, into which they are usually drawn  
15 by the action of the draft, they will be broken up and forced into contact with the walls of the tubes, thereby more certainly utilizing the heat they contain before it passes out of the tubes and into the smoke-stack, the vast majority of the heat being lost with ordinary tubes in this way.

My improvement is more especially designed for use in plain tubes and with or without the ribbed tube-end protectors shown  
25 in my Patent No. 508,793, but it may be used with ribbed tubes and without the especial form of tube-end protectors before referred to.

In the accompanying drawings—Figure 1 is a perspective view of a distributor constructed according to my improvement and set in an ordinary plain boiler tube which is represented broken away the better to show my invention. Fig. 2 is a similar view of the same in a ribbed tube.

30 Referring now to the details of the drawings by letter—A represents the boiler-tube in both figures; B, a holder in the form of a tube-protector, preferably substantially like that shown in my Patent No. 508,793 before  
40 referred to, although I do not limit myself to this form, as others may be used. Attached to this protector is a spiral distributor C, made of a strip of any suitable metal, which may be secured to it in any desirable manner, but  
45 I prefer to secure it to the ribs D as shown. This I believe is best done by dividing the end of the distributor into narrow strips E, each strip being riveted or otherwise secured to one of the ribs, three of which extend beyond the end of the protector for this purpose, but I may adopt some other plan. I  
50 prefer to make a slot or opening down one

side of the protector or thimble as shown at F, so that there may be sufficient elasticity to allow of its being reduced slightly in diameter in order to readily enter a tube and then expand again to fit tightly therein, by which means the tubes will be less likely to leak, as the joint of the tube with the tube-sheet will be braced and protected from the direct action of the gases. To prevent the heat distributor from sagging in horizontal boilers and from swaying in vertical boilers, I may rivet on cross pieces the length of the internal diameter of the tube, at such spaces as may prove necessary, as shown in dotted lines in the drawings, which will keep the heat distributor positively in the center of the tube, but this is not always necessary especially in vertical boilers, because the protector will hold the distributor central in the tube if the tube protector and distributor be properly made and secured together, and particularly is this so where the distributors are short.

My distributors may be very advantageously used in vertical boilers and will overcome one of the main objections to them, which will cause such boilers to be used in many places where they are not now used, notwithstanding the favor in which they are held for many purposes, from the small floor space they occupy, the fact that the heat is all used on the inside, (instead of outside, where part of it is lost as in the ordinary brick-set horizontal boiler) their lower cost, and their freedom from clogging of the tubes. The "disadvantage" connected with them, which prevents their use in many cases, notwithstanding the great demand for them otherwise, is the enormous loss of heat, owing to the short tubes necessarily used in vertical boilers (as otherwise they would be inconveniently high) and the short time the products of combustion remain in them. This disadvantage will be readily overcome by my improvement, as the distributors will cause the heated gases to pursue a serpentine course through the tubes, thus in effect lengthening them, or actually increasing the time which the gases take to pass through them, and thereby obviating the disadvantage above alluded to. By securing to the end of the spiral distributor a means for holding it in the



tube, the distributor may be readily dropped into the top of a vertical tube and held suspended there by the collar of the tube end protector, which collar will rest on the top tube sheet and hold the distributor in the center of the tube; or it may be inserted from the fire end and held fast by the expansion of the tube of the protector, as before described. Where the cross pieces are used in horizontal tubes they should be set horizontally.

As shown in Fig. 1 of the drawings the tube is of the plain form, but the distributor may be used with ribbed tubes as shown in Fig. 2, in which case it may be found convenient to have the ribs begin at a greater distance from the end than is usual and the distributor should be narrower.

I am aware that spiral distributors, or more properly speaking, "retarders," have before been employed, but where they are used with plain tubes they rest on the bottom and the heat cannot therefore circulate around them; and thus resting they increase the tendency to fill up this portion of the tubes, which, even without this, are almost rendered useless as a means of generating steam by the accumulation of soot and particles of ashes which are carried into the tubes by the draft and naturally fall to the bottom. My distributor on the contrary does not touch the inner wall of the tube at any point, but is held firmly in the center of the tube, so that it admits of the circulation of the gases all around it, opens up the gaseous currents and forces them against the walls of the tube where they do some

good, instead of allowing them to pass through the tube in a solid stream to be largely wasted by passing undisturbed into the smoke-stack.

I do not intend to limit myself to the use of my tube-end protector in connection with the heat distributor, as any form of protector or thimble may be used, or any other form of attachment which will hold the distributor clear of the bottom of the tube. Nor do I limit myself to any particular length or width of distributor, as it may be found desirable to vary these with different lengths and diameters and descriptions of tubes or styles of boilers.

What I claim as new is—

1. A heat distributor for boiler tubes provided with a holder at its end, fastened thereto and constructed to hold it free from the walls of the tube, substantially as described.

2. In combination with a tube protector, a heat distributor having one end divided and attached to said tube protector, substantially as described.

3. As a new article of manufacture, a combined tube protector and heat distributor constructed and arranged substantially as shown and described.

In testimony whereof I affix my signature, in presence of two witnesses, this 26th day of December, 1893.

CHARLES W. WHITNEY.

Witnesses:

JAMES J. QUINLAN,  
STEPHEN L. PURDY.