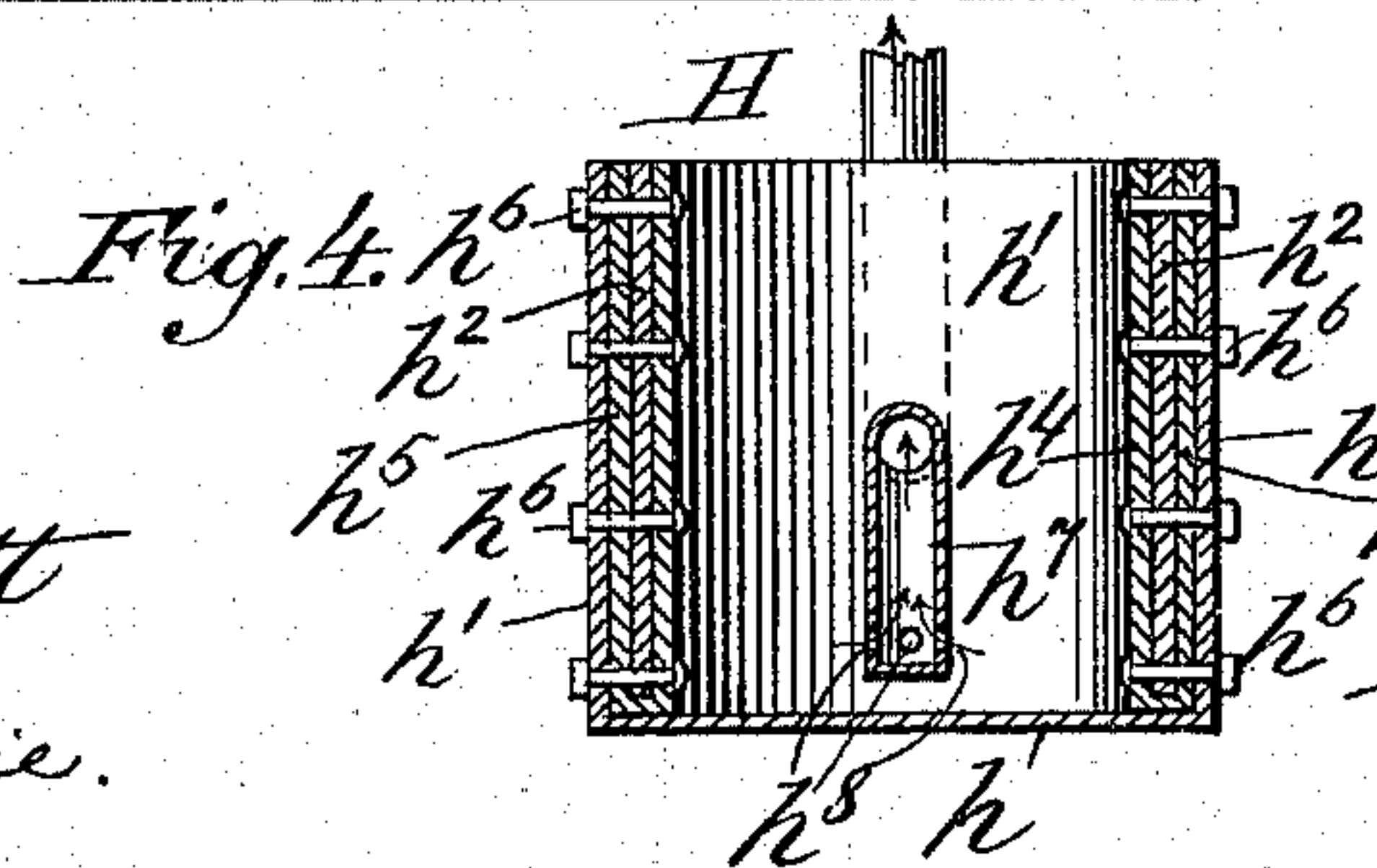
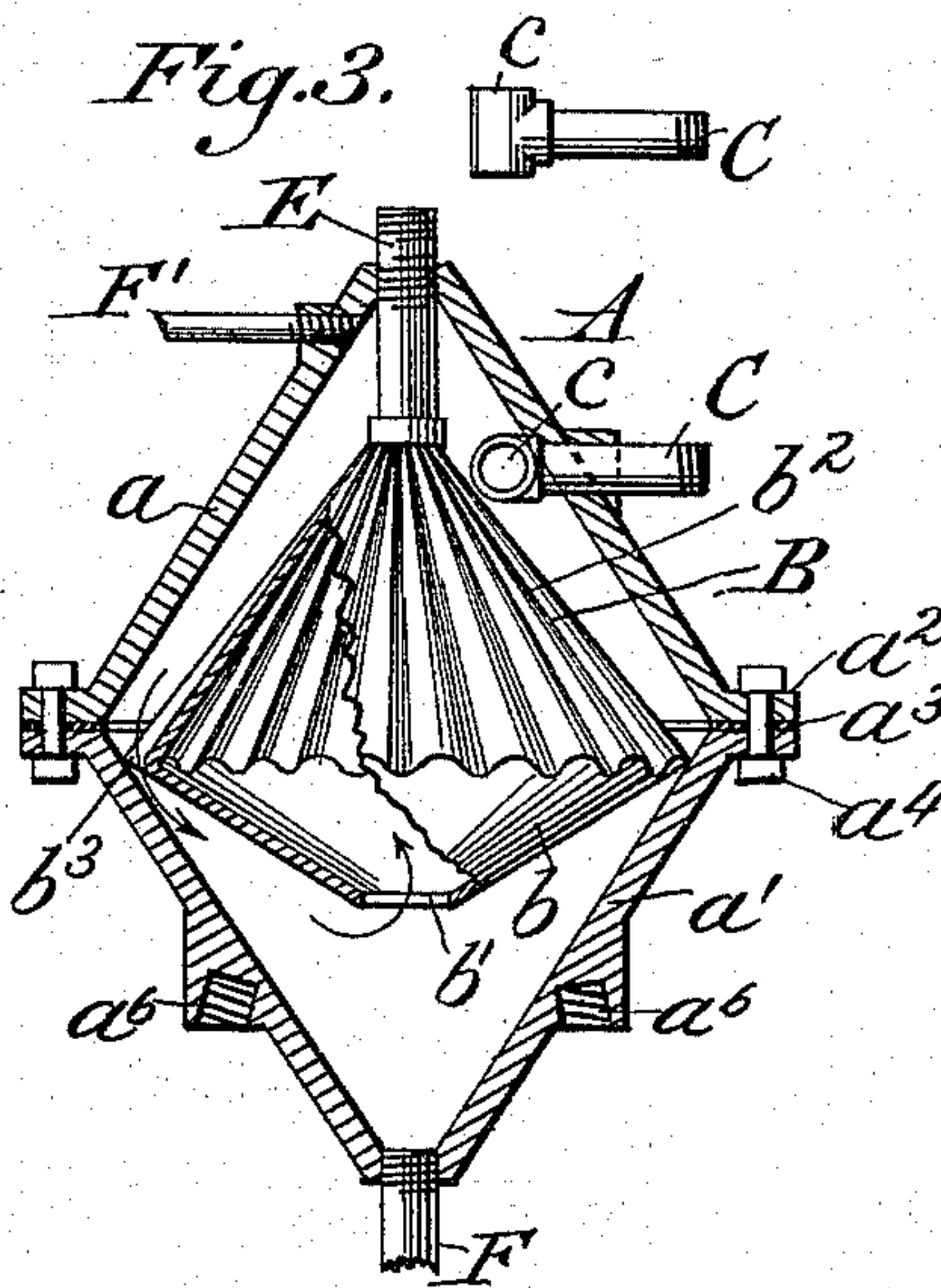
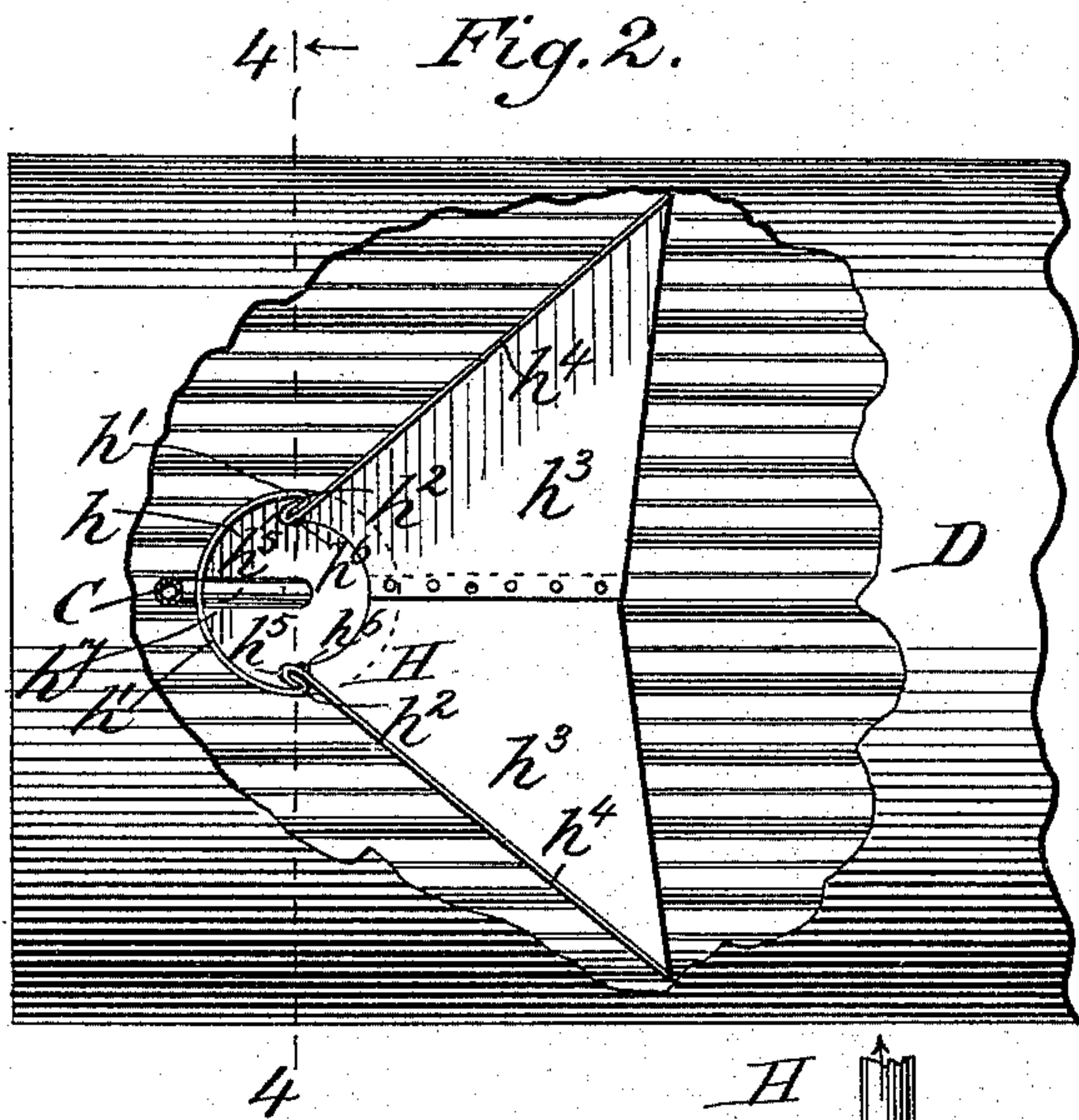
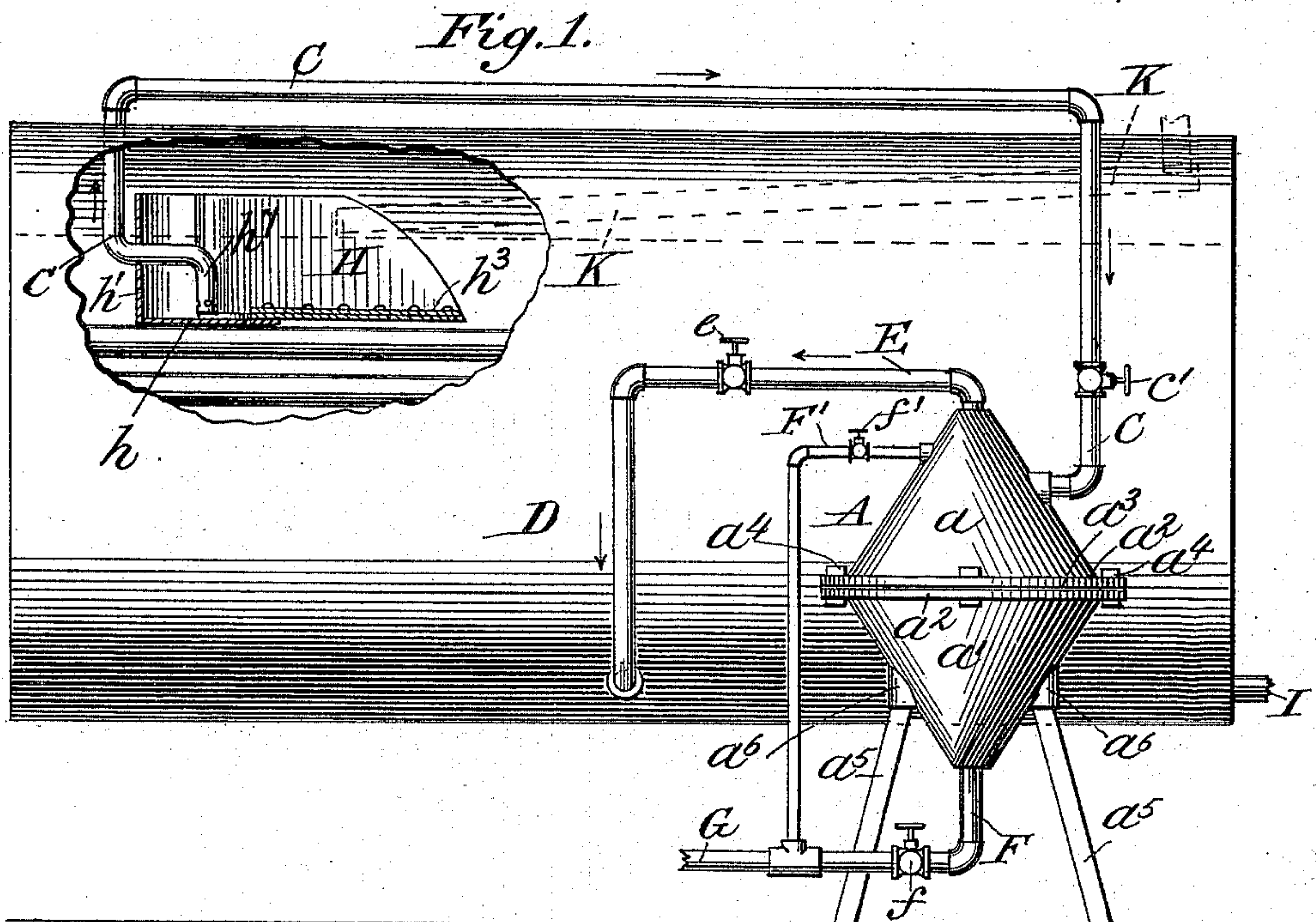


(No Model.)

A. M. LAWSON.
BOILER CLEANER.

No. 573,226.

Patented Dec. 15, 1896.



Attest:
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UNITED STATES PATENT OFFICE.

ALONZO M. LAWSON, OF WASHINGTON, DISTRICT OF COLUMBIA.

BOILER-CLEANER.

SPECIFICATION forming part of Letters Patent No. 573,226, dated December 15, 1896.

Application filed June 2, 1896. Serial No. 594,032. (No model.)

To all whom it may concern:

Be it known that I, ALONZO M. LAWSON, a citizen of the United States, residing at Washington, District of Columbia, have invented certain new and useful Improvements in Boiler-Cleaners; and I do hereby 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.

My invention relates to an improvement in boiler-cleaners.

The object of my invention is to produce an apparatus in which the water, circulating from the boiler and back again, will practically be brought to rest in the cleaner and thus allowed to deposit the sediment which it may hold in suspension, while the lighter particles will float to the surface and may be blown off.

Another object of my invention is to provide means for the collection of the greater portion of the impure water within the boiler and for the conveyance of it to the boiler-cleaner.

My invention consists in the features, details of construction, and combination of parts which will first be described in connection with the accompanying drawings and then particularly pointed out in the claims.

In the drawings, Figure 1 represents a side elevation of an improved cleaning device embodying my invention connected to a boiler, the latter being partly broken away to show the skimming or collecting device, which appears in section; Fig. 2, a plan view of the skimming or collecting device in place in the boiler, which is partly broken away; Fig. 3, an enlarged sectional view, partly in elevation, of the cleaner; and Fig. 4 is a detail sectional view of the skimmer on the line 4 4, Fig. 2.

Referring to the drawings, A is a casing formed of two hollow cones a and a' , set with their bases together, said bases being provided with flanges a^2 , between which is placed a suitable packing-ring a^3 , of rubber or the like, the flanges being held together by bolts a^4 . One cone, a , forms the top of the casing, while the other cone, a' , forms the bottom.

Within the casing A is arranged an inner sediment-collector B, which rests upon the

inner surface of the lower cone a' and is composed of two parts, preferably cast integral with each other, these two parts comprising a tray b in the form of an inverted cone having its apex removed to produce an opening b' , and a collecting-cone b^2 , whose slant sides are corrugated externally, and, under that form of my invention illustrated, internally also. Since the slant sides of the collecting-cone b^2 are corrugated, the inner sediment-collector will rest with the highest points of the said corrugations bearing upon the inner surface of the bottom cone a' , and hence spaces will be left between the edge of the sediment-collector and the inner surface of the cone at the lowest points of the corrugations, as indicated at b^3 , whereby the water may flow from the upper part of the cleaner to the lower part, as shown by the arrows in Fig. 3.

A short distance below the upper end of the top cone a an inlet-pipe C enters the casing A, and is provided just inside the same with means for distributing water in opposite directions, this consisting, in the present instance, of a T, as shown at c , the said inlet-pipe being connected to the boiler D and serving to convey the water to the boiler-cleaner.

The upper end of the collecting-cone b^2 is attached to a return-pipe E, which passes through the apex of the top cone a of the casing A and leads the water back to the boiler.

At the apex of the lower cone a' is attached a blow-off pipe F, having a valve f , while the upper end of the top cone a and above the end of the inlet-pipe C is connected a surface blow-off pipe F', having a valve f' , the said pipe F' uniting with the lower blow-off pipe F, in order that both pipes may discharge through a common outlet-pipe G.

In the boiler D at the end of the pipe C, which conveys the water to the cleaner, is placed a skimmer H, which is constructed as follows: A circular plate h is provided with a wall h' at one side, which wall is curved concentrically with the plate and extends partly around the circumference of said plate, preferably about half-way, the ends of said wall being turned inward, as shown at h^2 , for a purpose hereinafter described. The wall h' and the circular plate h are preferably cast integral, but they may be made separately, if desired, and then secured together in any

suitable manner. To the wall h' are attached two wings h^3 , each having an upward-extending flange h^4 , the said flanges being provided at their converging ends with lips h^5 , bent outward and arranged to hook over the inward-turned ends h^3 of the curved wall h' , being held to the said ends by small bolts or screws h^6 . The wings h^3 overlap each other, as shown, and lie upon the circular plate h , the outer ends of their flanges extending toward and contacting with the opposite sides of the boiler, being rounded where necessary to conform to the curvature of the said boiler. Through the curved wall h' extends a pipe h^7 , which is bent downward at one end, approximately over the center of the circular plate, and is provided with one or more openings or perforations h^8 , whose area is less than the area of the pipe h^7 , for a purpose hereinafter explained. The extreme lower end of said pipe h^7 is closed in any suitable way and is located slightly above the upper surfaces of the wings h^3 . The openings h^8 , if more than one are employed, are arranged so that at least one faces the curved wall h' , while the others, or some of them, face the sides of the boiler, it being preferable to have no openings in the pipe on that side which faces away from the curved wall h' . In the construction shown only three holes are illustrated, but more may be employed, if desired, it being important, however, that, as before stated, the combined area of all the holes be less than the area of the pipe h^7 . The opposite end of the said pipe h^7 extends upward parallel with the curved wall and connects to the pipe C, which leads the water to the cleaner, and which, therefore, I have termed the "inlet-pipe."

The skimming device H is put in place in the boiler in sections and then assembled inside the said boiler, the greatest width of the wings being, for this purpose, made slightly less than the major axis of the manhole of the boiler, as will be fully understood by those skilled in the art. The skimming device is supposed to rest upon the upper tubes or flues of the boiler, though it may be slightly raised therefrom, if desired.

The return-pipe E is connected to the boiler near the bottom and is provided with a valve e , the pipe C being also supplied with a similar valve c' .

To support the cleaner, suitable legs a^5 are employed, these legs being preferably of pipe threaded into sockets a^6 , cast on the outside of the casing A.

The operation of my invention is as follows: In the beginning, when the water is pumped into the boiler or when the valve e is opened, the water will fill the cleaner. The ebullition of the water in the boiler and the circulation from the bottom toward the top keeps all the impurities of the same or greater specific gravity than the water in suspension, while those impurities of less specific gravity float on or near the surface. The continu-

ous circulation of the water forces the latter, with the impurities, through the openings h^8 into the pipe h^7 , and thence by way of the inlet-pipe C into the cleaner within the casing A and above the sediment-collector B. The water enters this part of the cleaner through the two open ends of the T c, thus passing in opposite directions and serving to prevent any rotary action of the water in the cleaner. The water descends outside the corrugated surface of the collecting-cone b^2 , and, owing to the fact that the area around said collecting-cone is much greater than the area of the inlet-pipe, it moves so slowly as to deposit some of the sediment upon the outer surface of said cone, said sediment falling into the depressions in the corrugations and rolling down through the openings b^3 into the lower part a' of the casing. The movement of the sediment toward the bottom is accelerated by the downward motion of the water, which also passes through said openings b^3 and then turns upward, entering the opening b' in the bottom of the tray b , the area of which is much greater than the area of the return-pipe E, whereby the water moves slower through said opening than through the return-pipe. On entering the inside of the sediment-collector the water gradually decreases in speed until at the widest part of the said sediment-collector it is almost though not quite brought to rest. At this point practically all of the remainder of the sediment is deposited, falling upon the inner surface of the tray b , where it accumulates until its weight becomes sufficient to cause it to drop down through the opening b' , notwithstanding the water coming up through the same, and falls into the bottom of the lower cone a' . As the water rises through the interior of the sediment-collector it comes in contact with the converging corrugated walls of the upper collecting-cone b^2 , and the small remaining portions of sediment, if any such exist, are held back by the friction of the said walls. The purified water then passes from the cleaner by the return-pipe E to the lower part of the boiler.

It will be seen that as the water passes through the cleaner it is somewhat cooled, of course, and hence readily returns through the pipe E, thereby establishing a circulation, which also causes a circulation in the boiler toward the skimming device, thereby carrying the impurities toward the same, the wings of said device tending to converge the impure water to the end of the pipe h^7 . Owing to the fact that the openings h^8 in said pipe are of less area than the area of said pipe h^7 , the water is drawn through said opening with great rapidity, thereby preventing said openings from clogging up and also sucking the water in the skimmer toward the end of the pipe h^7 . Owing to the circulation of the water in the boiler toward the skimmer, a small amount of sediment is deposited upon said skimmer, and this is caught by the wings,

whereby it is held from being deposited on the boiler tubes or flues, and may be readily removed at occasional intervals.

The lighter impurities, which float on the water, will be sucked through the openings h^8 and drawn into the pipe h^7 , from whence they pass into the upper portion of the cleaner and float at the upper end of the upper cone. Since the surface blow-off pipe is above the end of the inlet-pipe C, the said lighter particles may be blown off by opening the valve f' without stirring up the sediment at the lower end of the cleaner, and this operation is assisted by the conical shape of the upper portion of the casing A, which keeps all the said lighter impurities in the path of discharge of the moving water when the surface blow-off valve is opened.

The sediment at the bottom of the cleaner is blown off, after the surface impurities have been discharged, by opening the valve f , whereby the water will flow from the boiler through both pipes C and E and will wash out not only the sediment at the lower end of the casing A, but also any deposits either on the outside of the sediment-collector B or on the inside of the same.

By corrugating the surfaces of the collecting-cone b^2 the area of the same is increased, and hence there is a larger surface for the water to contact with, which results in an increased opportunity for the sediment to be deposited by frictional contact with the collecting-cone. Moreover, these corrugations serve to support the inner sediment-collector B upon the inner surface of the lower cone a' and at the same time produce openings between the collecting-cone b^2 and the said lower cone a' , through which the water and sediment may pass to the lower part of the casing. It is to be understood that the corrugations may be of any suitable cross-sections, and I do not desire to confine myself to the wavy or curved corrugations illustrated.

In Fig. 1 I have shown the feed-water-supply pipe as entering at I, this being preferable in order to cause a circulation in the boiler toward the skimming device H, and in some cases it is preferable to have the return-pipe E connected to the boiler at about the same point, this being particularly essential if the feed-water-supply pipe I is connected to the boiler at any other point than as shown.

While I have illustrated and described the inlet-pipe C as provided with a T c at its end, this may be omitted and the inlet-pipe arranged so as to project the incoming water against the top of the collecting-cone b^2 , whereby the water will be spread each way and thereby distributed within the casing, so as to prevent any continuous whirling motion.

Instead of putting the feed-water-supply pipe I at the lower front end of the boiler, I may under another modification of my invention place the said pipe at the top of the boiler at or near one end and allow the said pipe to discharge into a conductor or trough

K, as shown in dotted lines in Fig. 1, said conductor or trough discharging the feed-water onto the wings of the skimmer, the water being heated by flowing down said trough and being at once taken up by the pipe h^7 and led to the cleaner, returning thence to the boiler by way of the return-pipe E. By this arrangement the impure feed-water has but little chance to deposit sediment on the boiler tubes or shell.

In constructing a device in accordance with my invention I consider it important that the surface blow-off pipes F' should be located as close to the apex of the coned top a of the casing as is possible, consistent with leaving a free exit for the scum and grease which float at the top of the water, in order that there may be no place where any of the said scum and grease may remain out of the path of the water which is being discharged by the opening of the blow-off valve f' . I also consider it essential that the opening b' be of such area relative to both the inlet-pipe C and the return-pipe E that the water will move through said opening slowly in order to give the sediment a better opportunity to deposit itself.

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

1. In a boiler-cleaner, the combination, with a casing, of a hollow sediment-collector within the casing and provided with an opening at its bottom, a return-pipe communicating with the interior of the sediment-collector, an inlet-pipe communicating with the interior of the casing above the opening at the bottom of the sediment-collector, and a surface blow-off device connected to the casing above the inlet-pipe, and outside the sediment-collector, substantially as set forth.

2. In a boiler-cleaner, the combination, with a casing having a conical top, of a hollow sediment-collector within said casing and having an opening at its bottom, a return-pipe communicating with the interior of the collector, an inlet-pipe communicating with the interior of the casing above the opening at the bottom of said collector, and a surface blow-off device connected to the conical top of the casing above the inlet-pipe, and outside the sediment-collector, substantially as set forth.

3. In a boiler-cleaner, the combination, with a casing, of a hollow sediment-collector within said casing and provided with a conical top and an inverted-cone-shaped bottom having an opening, of a surface blow-off device connected to the casing above the sediment-collector, an inlet-pipe connected to the casing between the surface blow-off device and the sediment-collector, a return-pipe communicating with the interior of the collector, and a sediment blow-off below the sediment-collector, substantially as set forth.

4. In a boiler-cleaner, the combination, with a casing, of a hollow sediment-collector having its diameter enlarged at one point, and

provided with an opening in its bottom of less area than said enlargement, a return-pipe, communicating with the interior of the sediment-collector and having an area less than that of said opening, and an inlet-pipe communicating with the interior of the casing above the sediment-collector, substantially as set forth.

5. In a boiler-cleaner, the combination, with a casing, of a sediment-collector within the casing, an inlet-pipe communicating with the interior of the casing, and means held in fixed relation to the inlet-pipe and in rigid connection with the end of the same, for distributing the water in both directions, whereby a continuous circulatory motion of the water is prevented, substantially as set forth.

6. In a boiler-cleaner, the combination, with a casing, of a sediment-collector within the casing, an inlet-pipe communicating with the interior of the casing, and a water-distributor secured to the inlet-pipe and provided only with opposite laterally-projecting openings, whereby a continuous circulatory motion of the water is prevented, substantially as set forth.

7. In a boiler-cleaner, the combination, with a casing, of a sediment-collector within the casing, an inlet-pipe communicating with the interior of the casing and a T on the end of the inlet-pipe and arranged to discharge the water into the casing in opposite lateral directions, substantially as set forth.

8. The combination with a boiler of a pipe extending into said boiler and provided with an apertured end the open area of said apertured end being less than the internal cross-sectional area of said pipe.

9. In a skimming device for boiler-cleaners, the combination, with a plate having a wall, of a pipe provided with a downward-extending apertured end, the open area of said apertured end being less than the internal cross-sectional area of the said pipe, substantially as set forth.

10. In a skimming device for boiler-cleaners, the combination, with a plate having a wall, of a pipe projecting through said wall and provided with a downward-extending end having an opening, said opening having a less area than the internal cross-sectional area of the pipe, substantially as set forth.

11. In a skimming device for boiler-cleaners, the combination, with a plate having a wall, of a pipe provided with a plurality of openings, the total area of all the openings being less than the internal cross-sectional area of the said pipe, substantially as set forth.

12. In a skimming device for boiler-cleaners, the combination, with a plate having a curved wall, said wall being provided with inward-extending ends, of a pair of wings arranged to overlap each other and having flanges provided with hooked ends engaging the inward-extending ends of the curved wall, substantially as set forth.

13. In a skimming device for boiler-cleaners, the combination, with a circular plate having a concentrically-curved wall provided with inward-extending ends and a pair of wings arranged to overlap each other and provided with flanges having hooked ends engaging the inward-extending ends of the curved wall, of a pipe projecting through the curved wall and provided with a downward-bent end, said end having holes at or near the bottom, one of the holes facing the wall and one hole on each side of the pipe facing the inward-bent ends, the combined area of all the holes being less than the area of said pipe, substantially as set forth.

14. In a boiler-cleaner, the combination, with a casing, of a sediment-collector having a corrugated top and located inside the casing, and an inlet-pipe connected to the casing above the sediment-collector, substantially as set forth.

15. In a boiler-cleaner, the combination, with a casing, a hollow sediment-collector within the casing and provided with a conical top corrugated inside and out, and having an opening, of an inlet-pipe communicating with the interior of the casing above the sediment-collector, and a return-pipe communicating with the interior of the sediment-collector, substantially as set forth.

In testimony whereof I affix my signature in presence of two witnesses.

ALONZO M. LAWSON.

Witnesses:

EDW. P. SCHWARTZ,
C. F. GOODCHILD.