

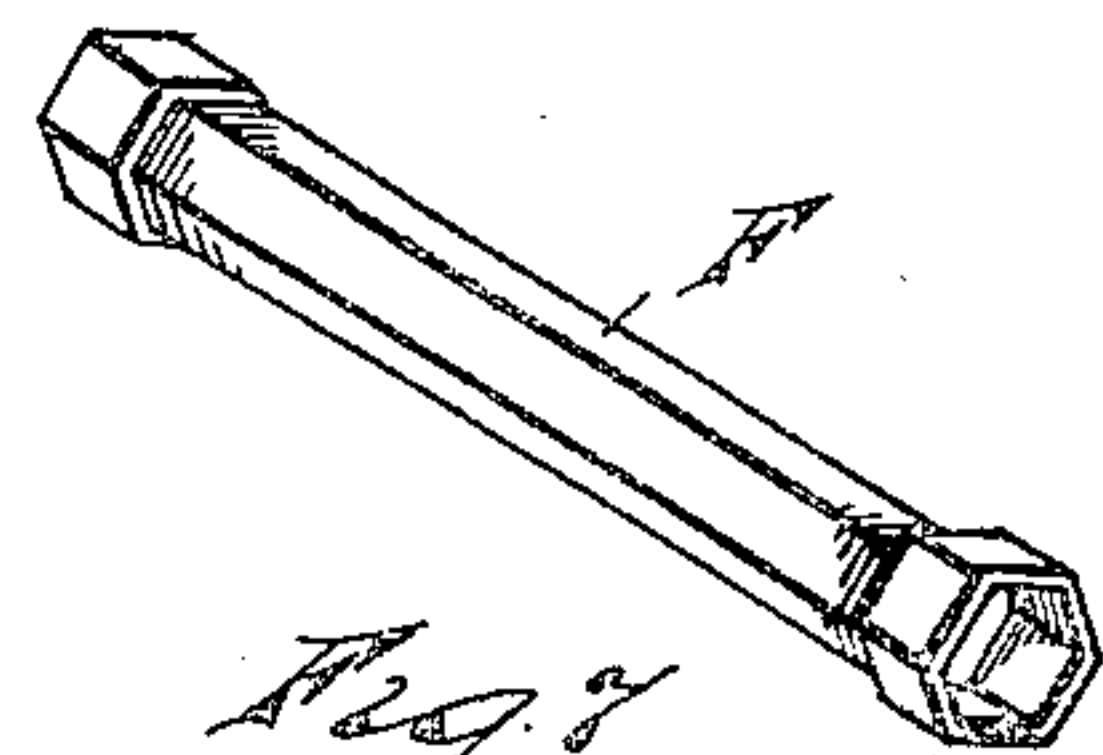
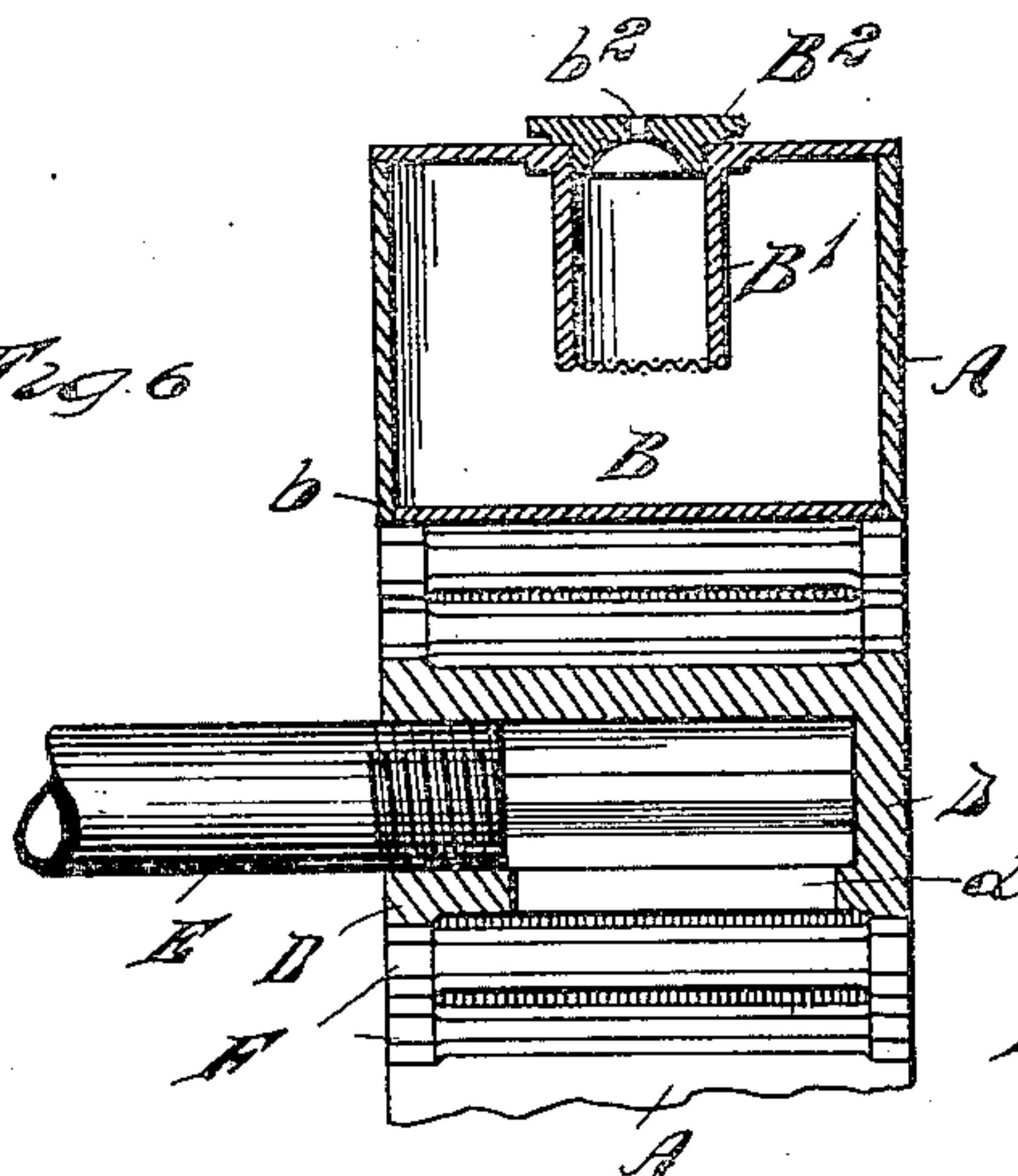
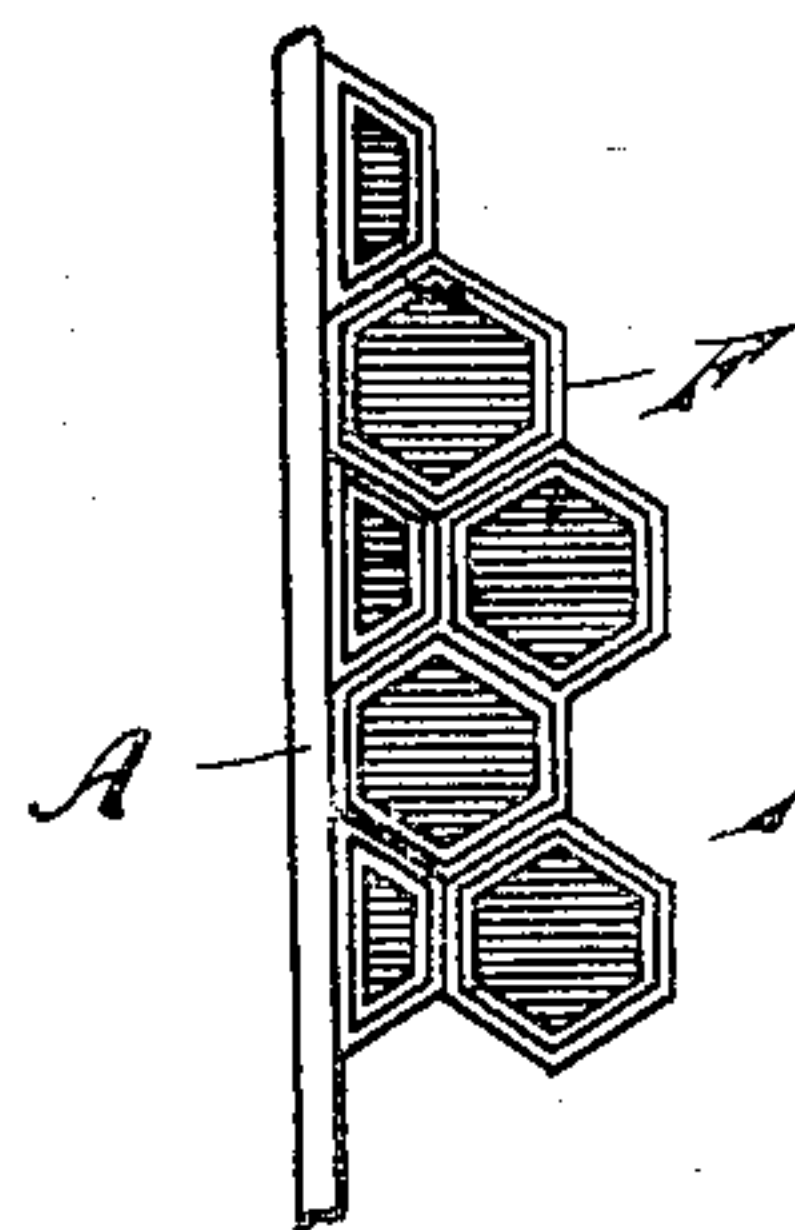
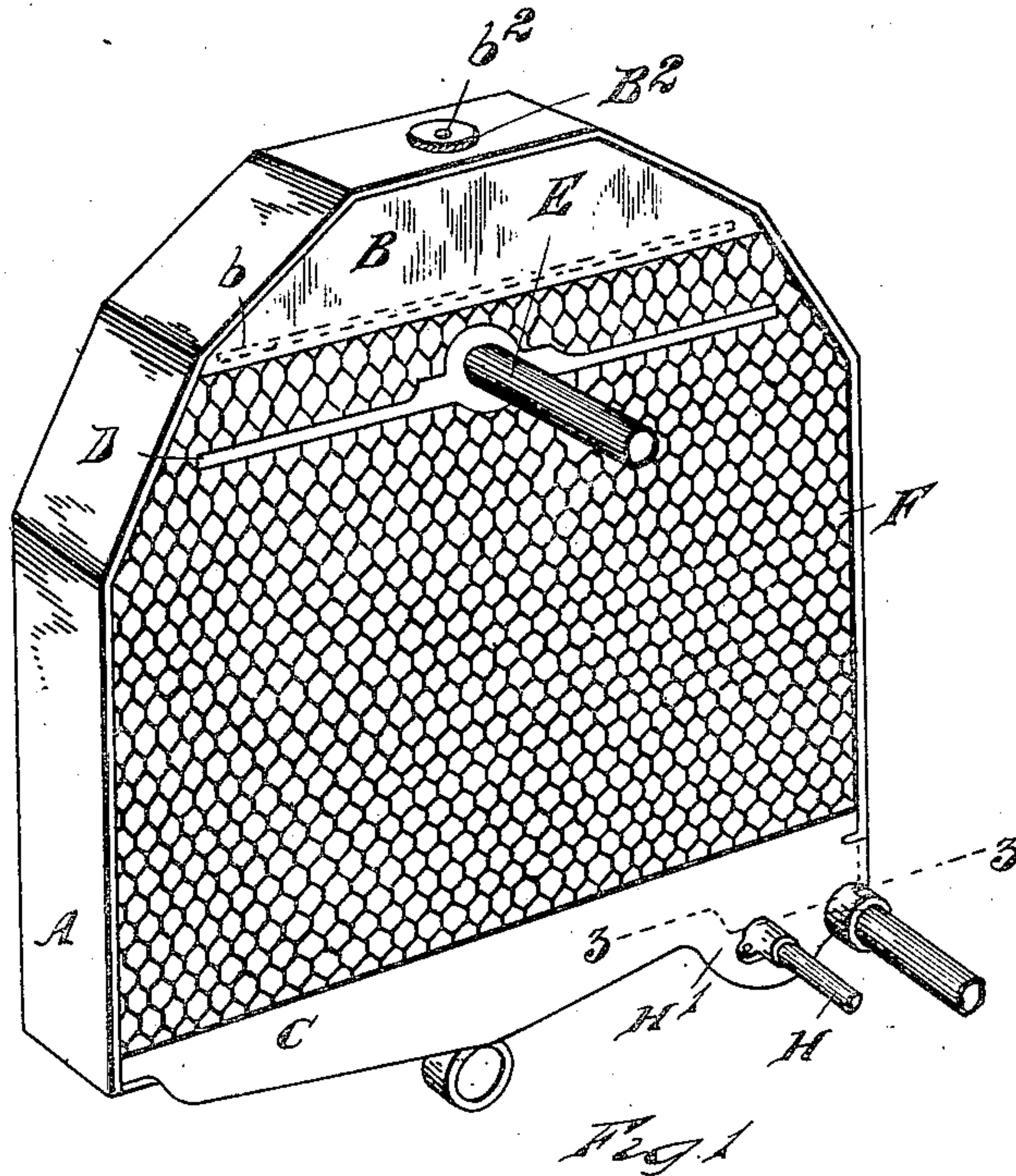
No. 863,337.

PATENTED AUG. 13, 1907.

A. R. & F. S. WELCH.  
FLUID COOLER.

APPLICATION FILED JUNE 6, 1905.

2 SHEETS—SHEET 1.



WITNESSES  
G. E. Day.  
Lotta Lee Hayton.

INVENTORS  
Allie R. Welch.  
Fred Stimson Welch  
By Parker & Burton.  
Attorneys.

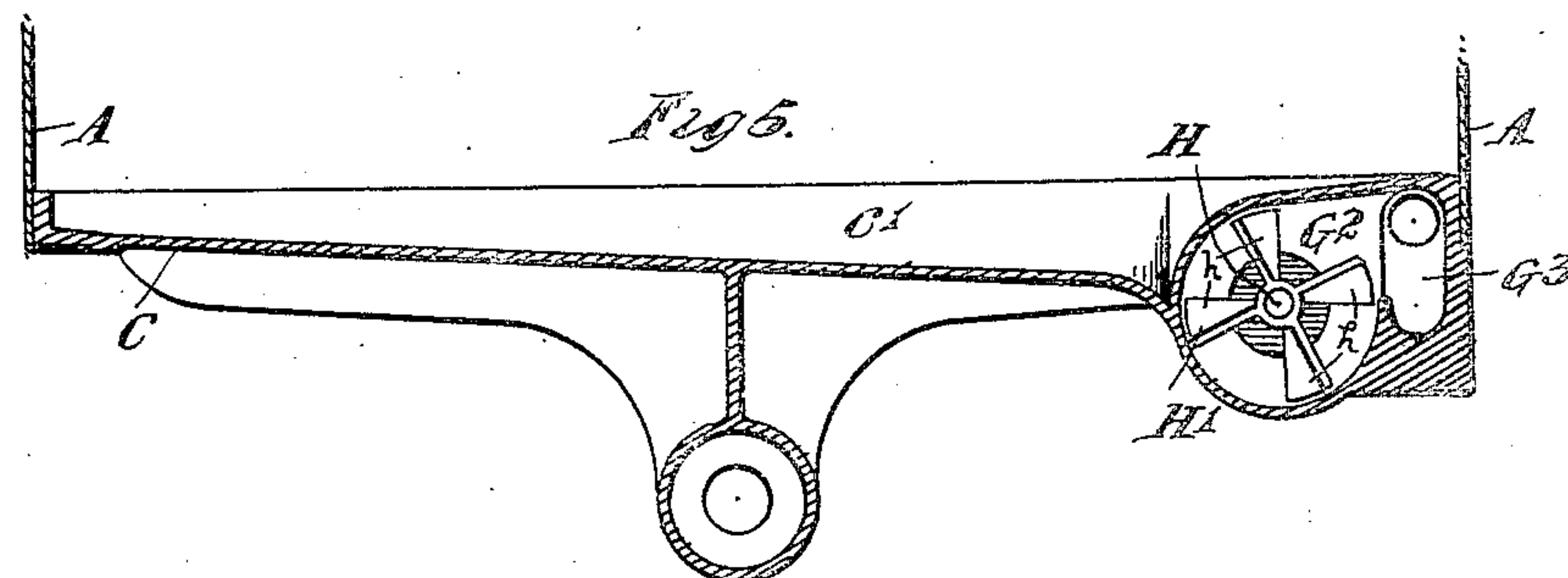
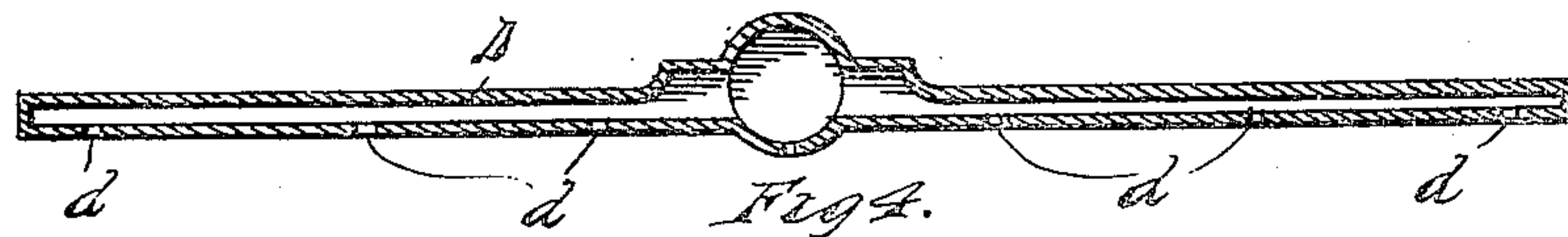
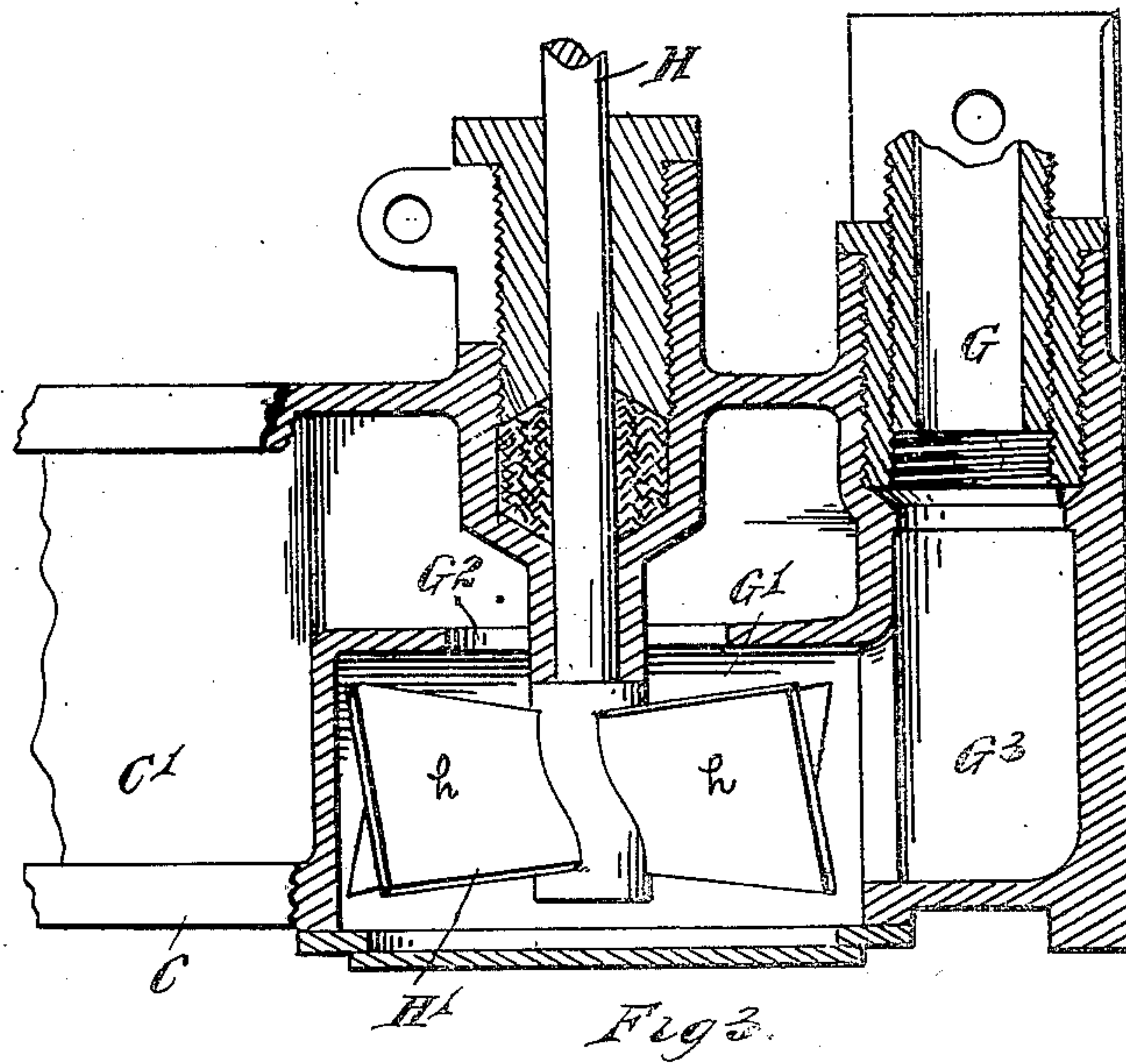
No. 863,337.

PATENTED AUG. 13, 1907.

A. R. & F. S. WELCH.  
FLUID COOLER.

APPLICATION FILED JUNE 5, 1905.

2 SHEETS—SHEET 2.



WITNESSES

T. J. Massey  
C. F. Hoy

INVENTOR

Allie R. Welch  
By Fred Stinson Welch  
Parker & Burdon Attorneys.



# UNITED STATES PATENT OFFICE.

ALLIE R. WELCH AND FRED STIMSON WELCH, OF PONTIAC, MICHIGAN.

## FLUID-COOLER.

No. 863,337.

Specification of Letters Patent.

Patented Aug. 13, 1907.

Application filed June 5, 1905. Serial No. 263,724.

*To all whom it may concern:*

Be it known that we, ALLIE RAY WELCH and FRED STIMSON WELCH, both citizens of the United States, residing at Pontiac, county of Oakland, State of Michigan, have invented a certain new and useful Improvement in Fluid-Coolers, and declare the following to be a full, clear, and exact description of the same, such as will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification.

This invention relates to fluid coolers and has for its special object, to provide an improved apparatus for cooling the fluid from the jacket of a gas engine. The present application is in the nature of an improvement upon the device described in my co-pending application, Serial No. 141,108.

In the drawings:—Figure 1, is a perspective view of a cooler embodying our invention. Fig. 2, is a central vertical cross section of the upper part of the cooler. Fig. 3, is a detail sectional view on the planes, indicated by the line 3—3 of Fig. 1. Fig. 4, is a detail sectional view of the receptacle into which the cooling fluid is delivered. Fig. 5, is a detail sectional view of the base of the cooler. Figs. 6 and 7, are details indicating the construction of the cooler to form the cooling surfaces.

The cooling surfaces consist of a nest of tubes preferably of hexagonal form and cross section having their ends expanded and laid contiguous, as indicated at F, Figs. 1, 6 and 7, and more particularly described in the specification of my application above referred to.

D, is a receptacle which may be a hollow casting located near the top of the nest of tubes F.

C, is a hollow casting forming a base upon which the nest of tubes F rest. A, A, is a metal strip connecting the base C with the top B. The strip A passes over the top down the sides of the tubes and bends under the base where it may be secured by screws. The top B, base C, and inclosing strip A, A, form a frame inclosing the tubes F and joined to said tubes along the edges of the front and back faces thereof by water tight joints. The interstices between the tubes F at the top communicate with the cavity of the top compartment B and at the bottom with a cavity C<sup>1</sup> of the base C. The top B is separated from the spaces between the tubes by a partition b, except near the sides at which point said partition is discontinued.

B<sup>1</sup>, Fig. 2, is a short piece of tube extending down from the top and opening to the outside through an aperture in said top, which may be partly closed by a screw stopper B<sup>2</sup>, having a small hole b<sup>2</sup> therein. A gauze strainer extends across the bottom of the tube B<sup>1</sup>. The cooling fluid is introduced into the system by pouring it into the cooler through the tube B<sup>1</sup>.

H<sup>1</sup>, is a centrifugal pump, the chamber G<sup>1</sup> of which

may be formed in the base casting C and have its inlet opening G<sup>2</sup> communicating with a cavity C<sup>1</sup> of said casting.

G<sup>3</sup>, is the exit passage from the pump H<sup>1</sup>.

G, is the pipe leading to the engine, the passage G<sup>3</sup> communicates with the pipe G.

H, is a spindle extending through a stuffing box on the casting C by means of which the centrifugal pump H<sup>1</sup> is operated.

h, are vanes upon the spindle H in the chamber G<sup>1</sup>.

D, is a receptacle which may be a casting adapted at its center to receive the intake pipe E. The casting D is hollow and is provided with holes d through its walls. The casting D is of a breadth equal to the length of a tube F and of depth about equal to the diameter of one of said tubes. Of course the casting D may be made of a depth about equal to two or three times the diameter of a tube, and two or three rows of tubes may be removed to be replaced by it. The tubes F are secured together to form the nest by soldering or brazing their ends together, and may be easily removed by melting the binding material when required. A number of said tubes are removed below the top of the nest to leave a space of the approximate form and size of the casting D and said casting is inserted therein and secured in place by soldering or brazing; the pipe E is then connected with said casting.

The operation of the above described device is as follows:—The spindle H is rapidly rotated by power from the engine through a belt, gearing, or the like to operate the centrifugal pump H<sup>1</sup>, this draws the cooling fluid from the cavity C<sup>1</sup> of the base C, which fluid is supplied from the passages between the tubes F along the entire lower surfaces of said nest of tubes. The pump delivers the fluid through the passage G<sup>3</sup> to the circulating pipe G from whence it is conveyed to the engine in the well understood method, which is therefore not illustrated, and after it has withdrawn heat from said engine, it returns to the cooler through the pipe E and is delivered into the casting D and distributed through the apertures d beneath the upper edges of the nest of tubes, thus any steam that may be formed will be condensed before it can pass up through the tubes above the casting D and along the partition b to the openings at the end of said partition and therefore will not be discharged through the opening b<sup>2</sup>. The hot fluid then descends through the passages between the tubes, being cooled in said passages and again delivered to the cavity of the base C, and the operation above described is repeated.

What we claim is:—

1. In a cooler consisting of a plurality of tubes for the passage of a cooling medium and having circulating passages therebetween and an inclosing frame, a hollow casting forming a part of said frame having its hollow communicating with said passages, a pump chamber forming part of said casting and having a passage communicating



with said hollow through which passage the pump is adapted to cause a fluid to flow.

2. In a cooler consisting of a plurality of tubes for the passage of a cooling medium and having circulating passages therebetween and an inclosing frame, a hollow casting forming a part of said frame having its hollow communicating with said passages, a cylindrical chamber formed in said casting, a central passage leading from said cylindrical chamber to the hollow of said casting, a peripheral aperture leading from said chamber and opening to the outside of said casting, and a rotatable vane in said cylindrical chamber.

3. A cooler consisting of a plurality of tubes for the passage of a cooling medium and having circulating passages therebetween, said cooler being provided with a hollow receptacle intermediate said tubes, said receptacle being provided with a pipe opening to its hollow, said receptacle being also provided with openings through its wall communicating with said circulating passages.

4. In a cooler, consisting of a plurality of tubes for the passage of a cooling medium, and having circulating passages therebetween, a receptacle located intermediate said tubes and secured to the same to hold it in place, said receptacle being adapted to receive the fluid to be cooled as

it enters said cooler and to distribute the same to said circulating passages.

5. In a cooler consisting of a plurality of tubes for the passage of a cooling medium and having circulating passages therebetween and an inclosing frame, a hollow casting forming a part of said frame, a pump chamber forming part of said casting and having a passage communicating with the hollow therein through which it is adapted to actuate a fluid.

6. In a cooler consisting of a plurality of tubes for the passage of a cooling medium and having circulating passages therebetween and an inclosing frame, a hollow casting forming a part of said frame having its hollow communicating throughout its length with said passages, a pump chamber forming part of said casting and having a passage communicating with said hollow through which it is adapted to actuate a fluid.

In testimony whereof, we sign this specification in the presence of two witnesses.

ALLIE R. WELCH.  
FRED STIMSON WELCH.

Witnesses:

FLORENCE S. LOCKWOOD,  
FLORA McLEAN.