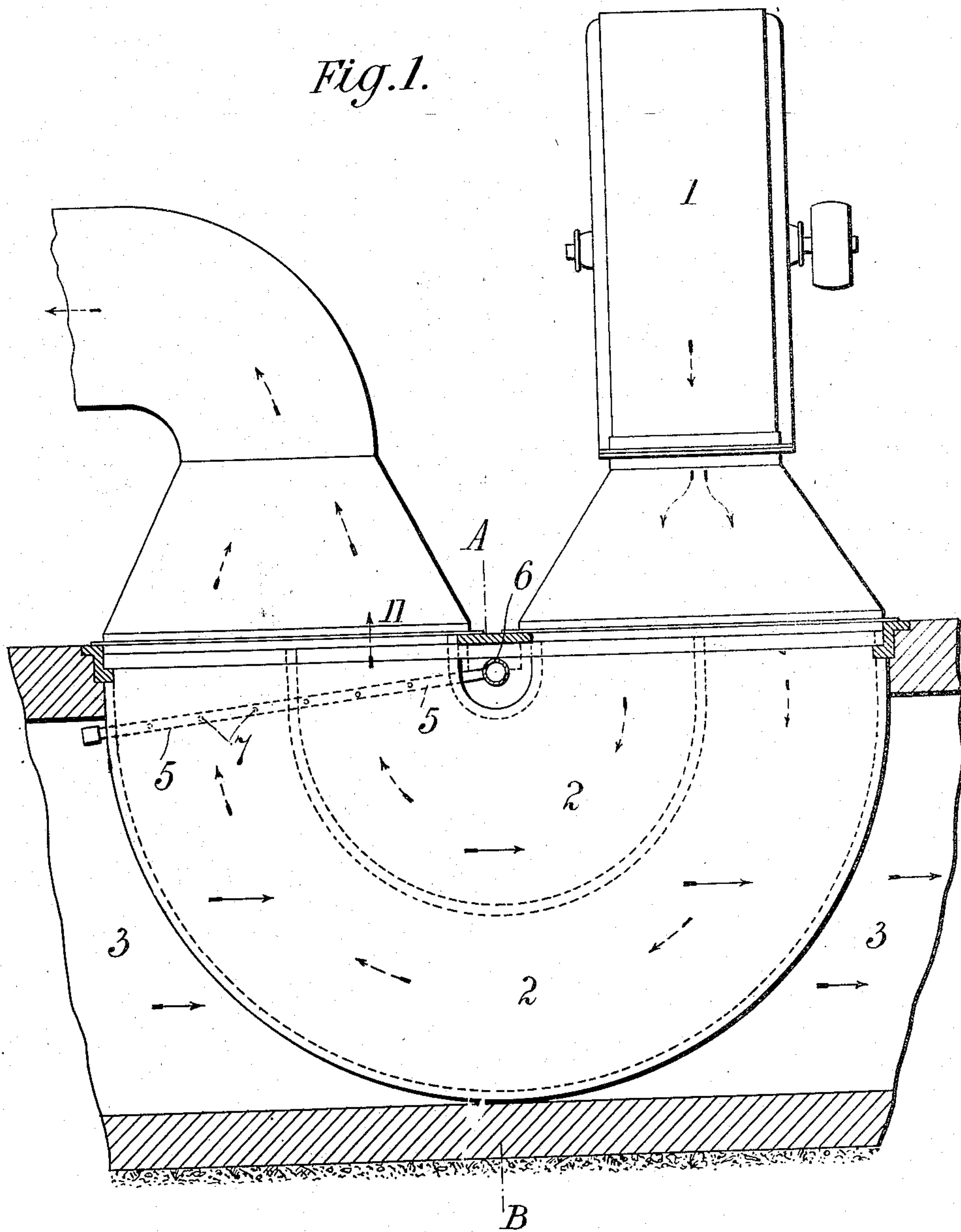


W. R. WOOD.
APPARATUS FOR HEATING AIR OR OTHER GASES.
APPLICATION FILED NOV. 16, 1908.

924,409.

Patented June 8, 1909.
4 SHEETS—SHEET 1.



WITNESSES.
BC Rust
J. J. McCarthy

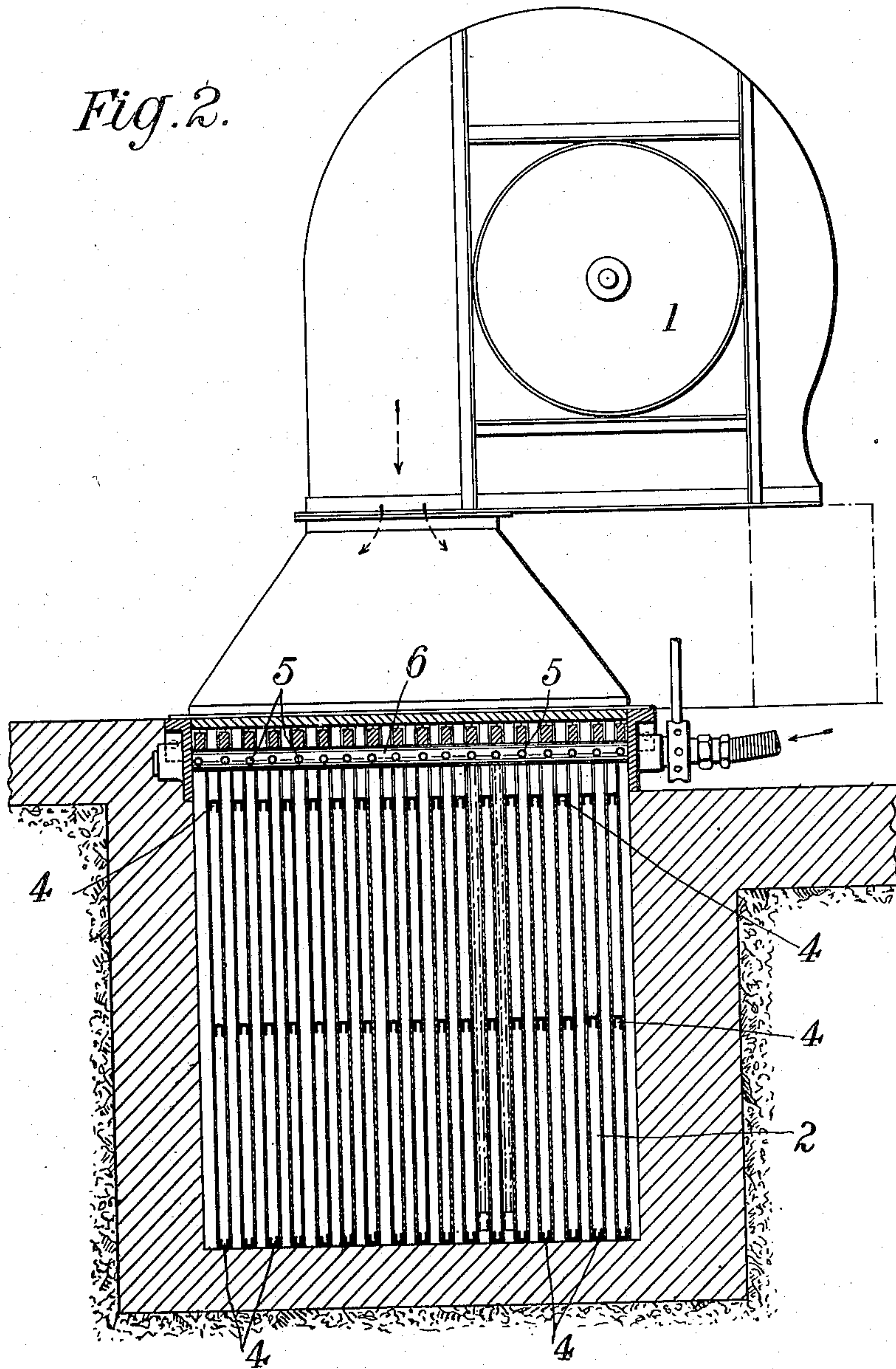
INVENTOR.
Wilfred R. Wood
by Foster Freeman Watson & Co.
Attorneys

W. R. WOOD.
APPARATUS FOR HEATING AIR OR OTHER GASES.
APPLICATION FILED NOV. 16, 1908.

924,409.

Patented June 8, 1909.
4 SHEETS—SHEET 2.

Fig. 2.



WITNESSES.

BC Rust
J. F. McCarthy

INVENTOR

Wilfred R. Wood
by *Frederic Freeman Watson & Coit*
Attorneys

W. R. WOOD.
 APPARATUS FOR HEATING AIR OR OTHER GASES.
 APPLICATION FILED NOV. 16, 1908.

924,409.

Patented June 8, 1909.
 4 SHEETS—SHEET 3.

Fig. 3.

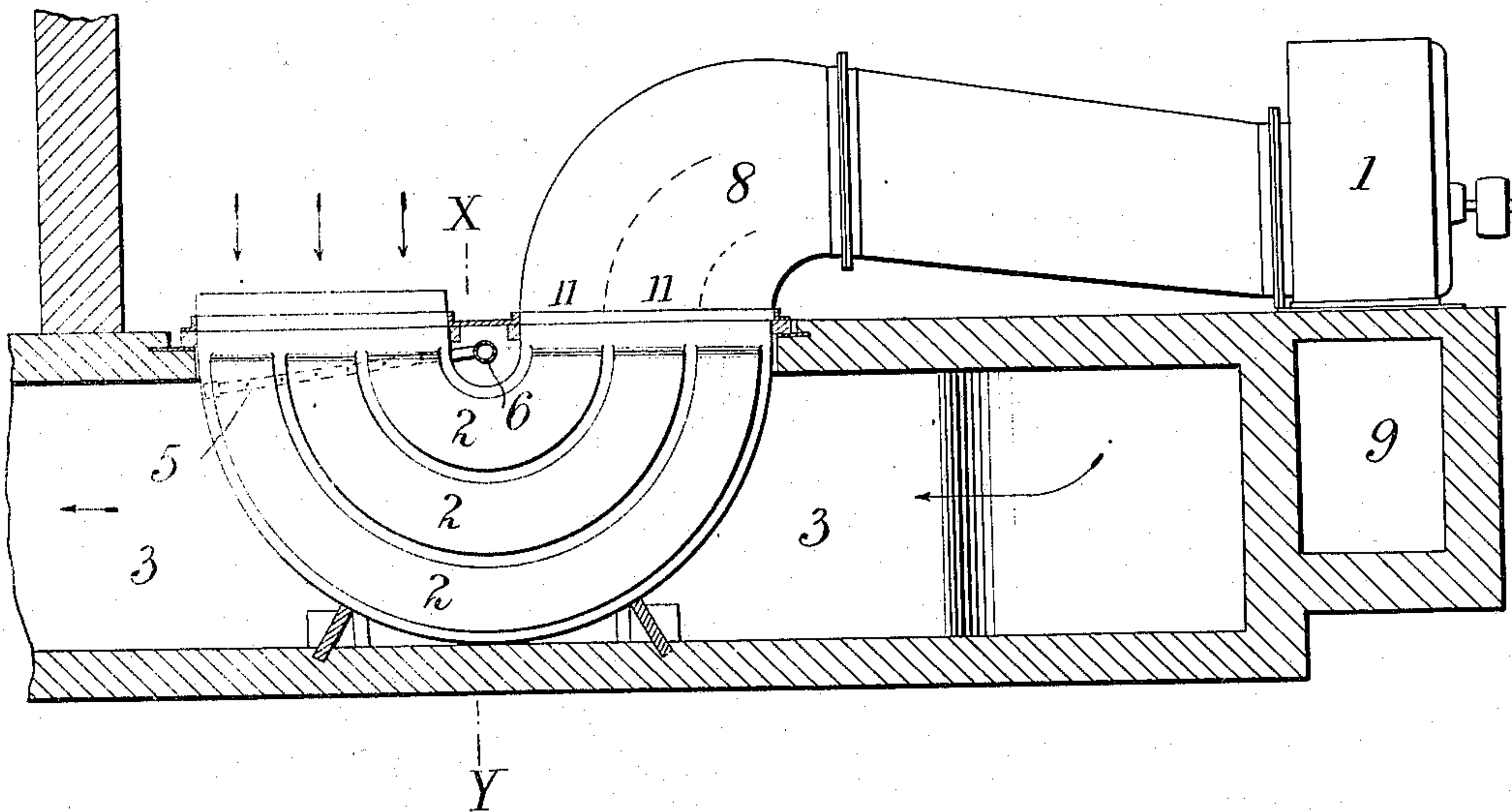
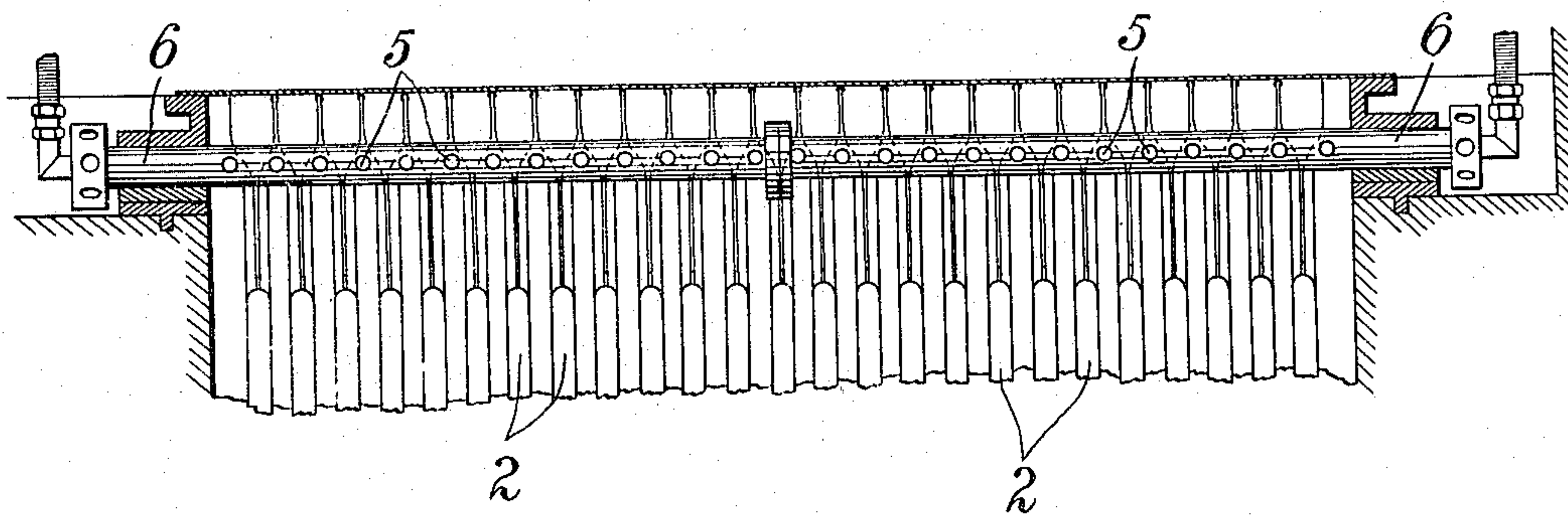


Fig. 4.



WITNESSES.

B. C. Rust
 J. J. McCarthy

INVENTOR

Wilfred R. Wood
 by Foster Freeman Watson & Co.
 Attorneys

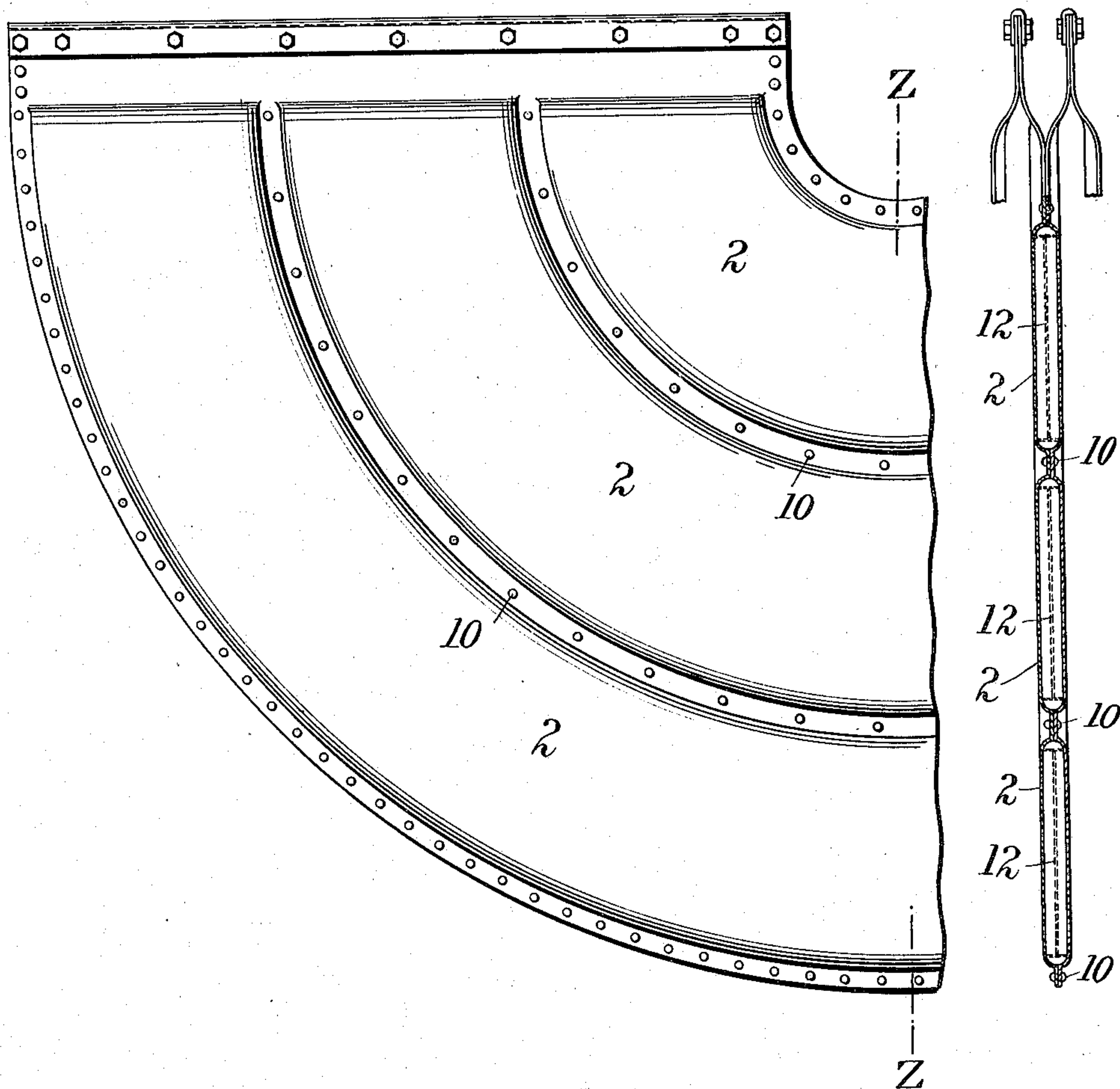
W. R. WOOD.
 APPARATUS FOR HEATING AIR OR OTHER GASES.
 APPLICATION FILED NOV. 16, 1908.

924,409.

Patented June 8, 1909.
 4 SHEETS—SHEET 4.

Fig. 5.

Fig. 6.



WITNESSES.

B.C. Rust
 J.J. McCarthy

INVENTOR.

Wilfred R. Wood
 by Foster Freeman Watson & Coit
 Attorneys

UNITED STATES PATENT OFFICE.

WILFRED ROTHERY WOOD, OF LONDON, ENGLAND, ASSIGNOR TO UNDERFEED STOKER COMPANY LIMITED, OF LONDON, ENGLAND, A CORPORATION OF GREAT BRITAIN.

APPARATUS FOR HEATING AIR OR OTHER GASES.

No. 924,409.

Specification of Letters Patent.

Patented June 8, 1909.

Application filed November 16, 1908. Serial No. 462,903.

To all whom it may concern:

Be it known that I, WILFRED ROTHERY WOOD, a citizen of the United States of America, and a resident of London, Eng-
land, have invented a certain new and useful
Improvement in Apparatus for Heating Air
or other Gases, of which the following is a
specification.

This invention relates more particularly
to that class of apparatus employed for heat-
ing air or gases by the waste heat from fur-
naces but is also capable of being used for
heating by other methods.

The invention consists of an arrangement
of plate heater, that is the air or the gases
are carried between plates as distinguished
from pipes. Heretofore in this class of
heater it has been proposed that the air and
heating gases should travel practically at
right angles to each other, and it has also
been proposed to employ plate heaters in
which the gas and air pass through a rec-
tangular box provided with plate divisions
the gas and air flowing in contrary direc-
tions in alternate layers. In this latter con-
struction the flow of either the gas or air or
both is seriously restricted by the sharp
changes in the direction of flow in addition
to which much of the heating surface is in-
efficient owing to more or less dead corners
in such boxes.

According to the present invention it is
proposed that one of the gases shall pass
through the heater in practically straight
lines while the other shall pass in a curved
or semi-circular line and preferably in a gen-
erally contrary direction.

For the purpose of illustration assume
there is a straight rectangular flue through
which furnace gases are escaping to a chim-
ney and it is desired to heat air for the pur-
pose of supporting combustion in the fur-
nace chamber. Then according to this in-
vention a series of semi-circular plate boxes
suitably separated so as to allow the furnace
gases to pass between would be placed in the
flue and would be connected at either side of
the center of the radius with the air pipes
while the inlet side would preferably be that
nearest the chimney. Or if the flue hap-
pened to bend at the point where it was de-
sired to insert the heater the same result
could be obtained by placing the inlet air
pipe on one side of the bend and the outlet
on the other. In either case it is desirable

to mount cleaning radial blades between the
boxes formed by the plates and to arrange
that such blades can be oscillated at will so
as to remove any adhering material, such as
soot. An alternative method for cleaning
is to use perforated hollow arms secured to
a pipe capable of being oscillated and ad-
mitting steam thereto so as to cause jets of
steam to play over practically the entire sur-
face of the boxes.

It is obvious that boxes formed of the
plates as described may be used either as the
air heater or for the discharge of furnace
gases and in the latter case the air would
pass between the boxes while the cleaning
blades would be placed therein. The latter
construction will however have certain dis-
advantages over the former particularly in
case of cleaning, so that in the accompany-
ing drawings the preferable construction is
shown, in which the air passes through the
boxes, and in same:—

Figure 1 is a side elevation partly in sec-
tion of a construction in which the air is
forced through the boxes, Fig. 2 a sectional
elevation on line A B of Fig. 1, Fig. 3 a side
elevation in which the air is drawn through
the boxes, Fig. 4 a sectional elevation on a
larger scale on line X Y of same, Fig. 5 a
side elevation on a larger scale of a portion
of a box section, and Fig. 6 a sectional ele-
vation on line Z Z of same.

As shown in Figs. 1 and 2 the air from the
fan or blower 1 passes down through a series
of semi-circular plate boxes 2 located in the
flue 3 said boxes being held in position by
channel irons 4 the central one of which is
here shown as dividing the box into two sec-
tions through which the air passes in a direc-
tion contrary to the flow of the gases in the
flue that is the exit side from the plate boxes
or sections are the first to absorb the heat
from the flue gases. Between the plate
boxes are mounted a series of radial pipes 5
mounted on a steam pipe 6 capable of being
rotated so as to cause pipes 5 to travel over
practically the entire surface of the boxes
and by the discharge of steam through open-
ings 7 to cleanse the outer faces of the boxes
from any adhering soot or other matter, or
in lieu of steam, scrapers or brushes may be
mounted on pipes or rods for attaining the
same end.

In Fig. 3 the air is induced through the
box sections 2 (here shown as three in num-

ber but a lesser or greater number may be employed) and this construction has the advantage that should it be necessary to remove any of the box sections this can be done after removing pipe section 8 without stopping the supply of air from fan or blower 1 to air duct 9 but in other respects the construction and operation is as described with reference to Figs. 1 and 2 except that as shown in Figs. 4 to 6 the box sections are formed of stamped sheet metal bolted or riveted at 10.

It will be obvious that the air in the upper box section would normally be subjected to the heat for a shorter time than that passing through the lower sections but this can be prevented by somewhat checking the flow as by placing wire gauze or other retarding means at points 11 and when a longer subjection of the air to the heat is desired the heater may be doubled that is from the outlet of a single heater the plates or sections may be again carried into and out of the flue. If it is desired to further utilize the heat radiated from the inner sides of the plate boxes this end may be attained by inserting separate sheets of metal 12 into said boxes as shown by dotted lines in Fig. 6.

What I claim is:—

1. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers.

2. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, such inlet and outlet from the chambers being on the same side of the flue.

3. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers the separate chambers of which are connected to a common inlet and outlet.

4. In apparatus for heating air or gases of

the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, the chambers of the heater carrying internal plates adapted to absorb the heat radiated by the outer plates of the chambers.

5. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, and means for cleaning the heater and freeing it from adhering material.

6. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, such inlet and outlet from the chambers being on the same side of the flue, the separate chambers being connected to a common inlet and outlet.

7. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, such inlet and outlet from the heater being on the same side of the flue, the chambers of the heater carrying internal plates adapted to absorb the heat radiated by the outer plates of the chambers.

8. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chamber, such inlet and outlet from the heater being on the same side of the flue, and means for cleaning the heater and freeing it from adhering material.

9. In apparatus for heating air or gases of

the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, the separate chambers of which are connected to a common inlet and outlet, the chambers of the heater carrying internal plates adapted to absorb the heat radiated by the outer plates of the chambers.

10. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, the separate chambers of which are connected to a common inlet and

outlet, and means for cleaning the heater and freeing it from adhering material. 25

11. In apparatus for heating air or gases of the plate heating class, a heater constructed of plates forming a series of separated substantially semi-circular chambers through which one of the gases can pass, a flue or chamber adapted to receive the heater and to conduct the other gas between the chambers of the heater in a direction substantially normal to the inlet and outlet flow of the gas in the chambers, the chambers of the heater carrying internal plates adapted to absorb the heat radiated by the outer plates of the chambers, and means for cleaning the heater and freeing it from adhering material. 30 35 40

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

WILFRED ROTHERY WOOD.

Witnesses:

B. HENDERSON,

H. C. WOODCRAFT.