2 Sheets, Sheet 1.

A. Wanich,

Balance Valve.

No. 113,600. Patented Apr. 11. 1871.

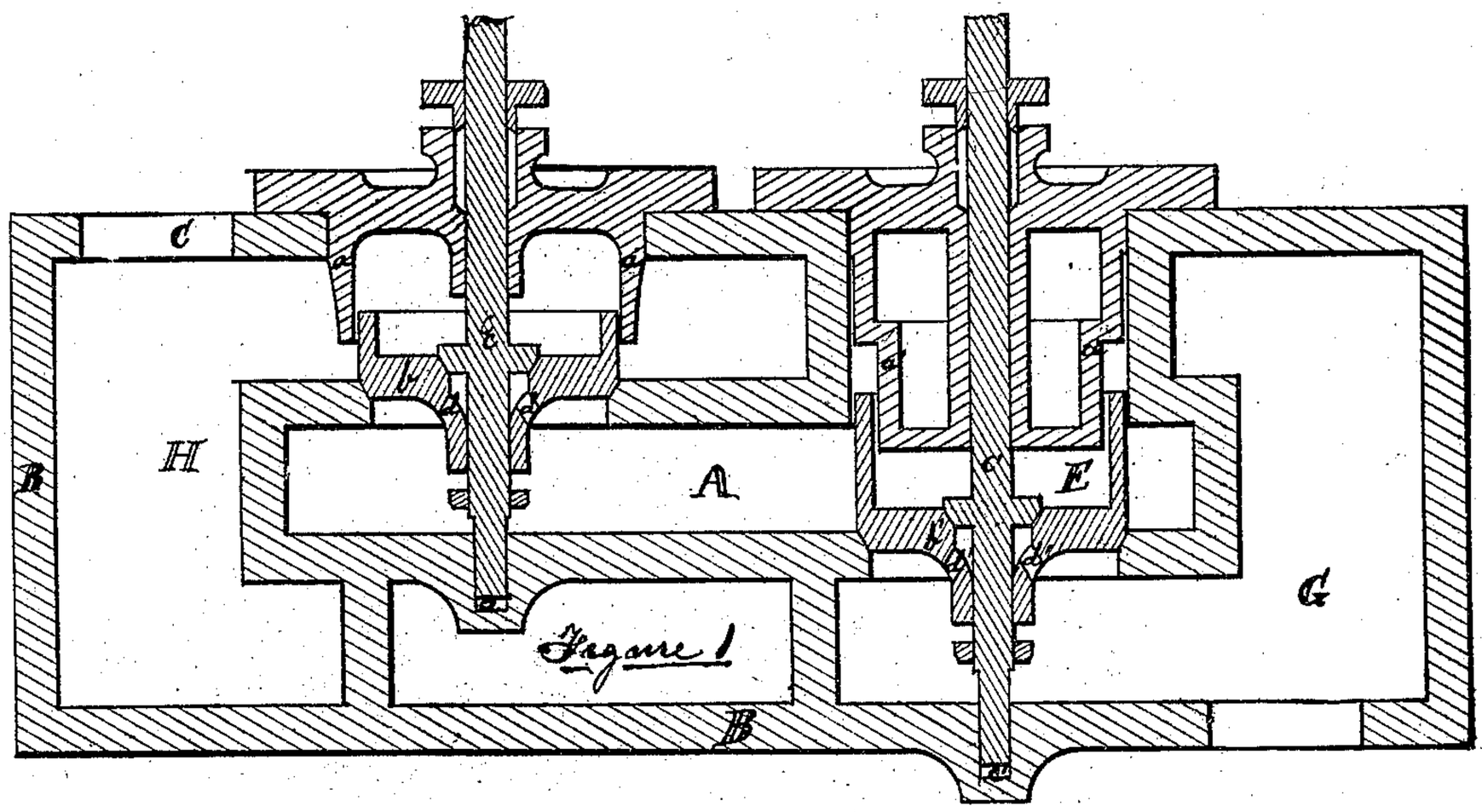

Figure 1

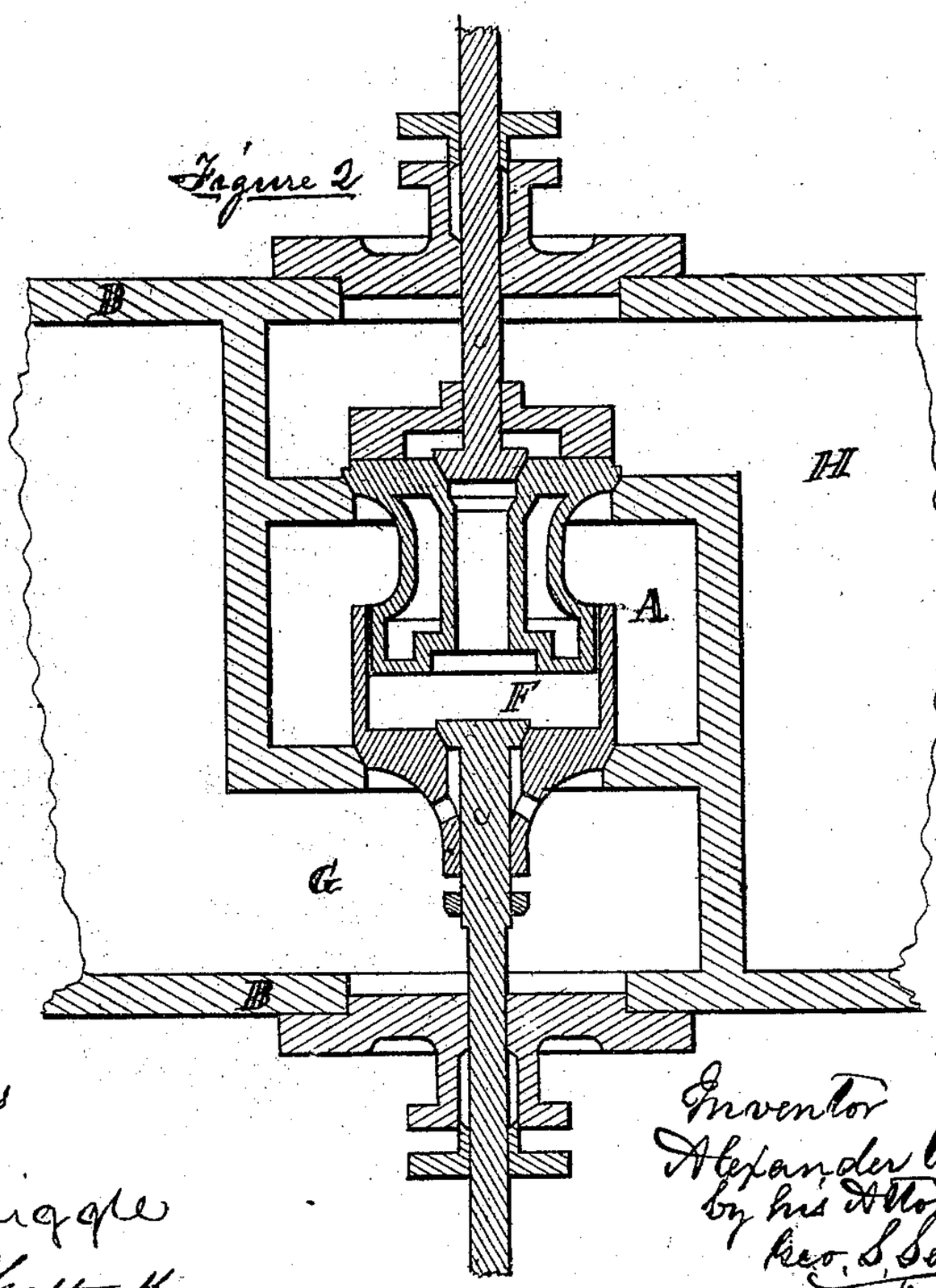

Figure 2

Witnesses

J. W. Quigley

Wm. L. Shattuck

Inventor

Alexander Wanich

by his Attorney

Geo. S. Selden

2. Sheets. Sheet. 2.

A. Wanich,

Balance Valve.

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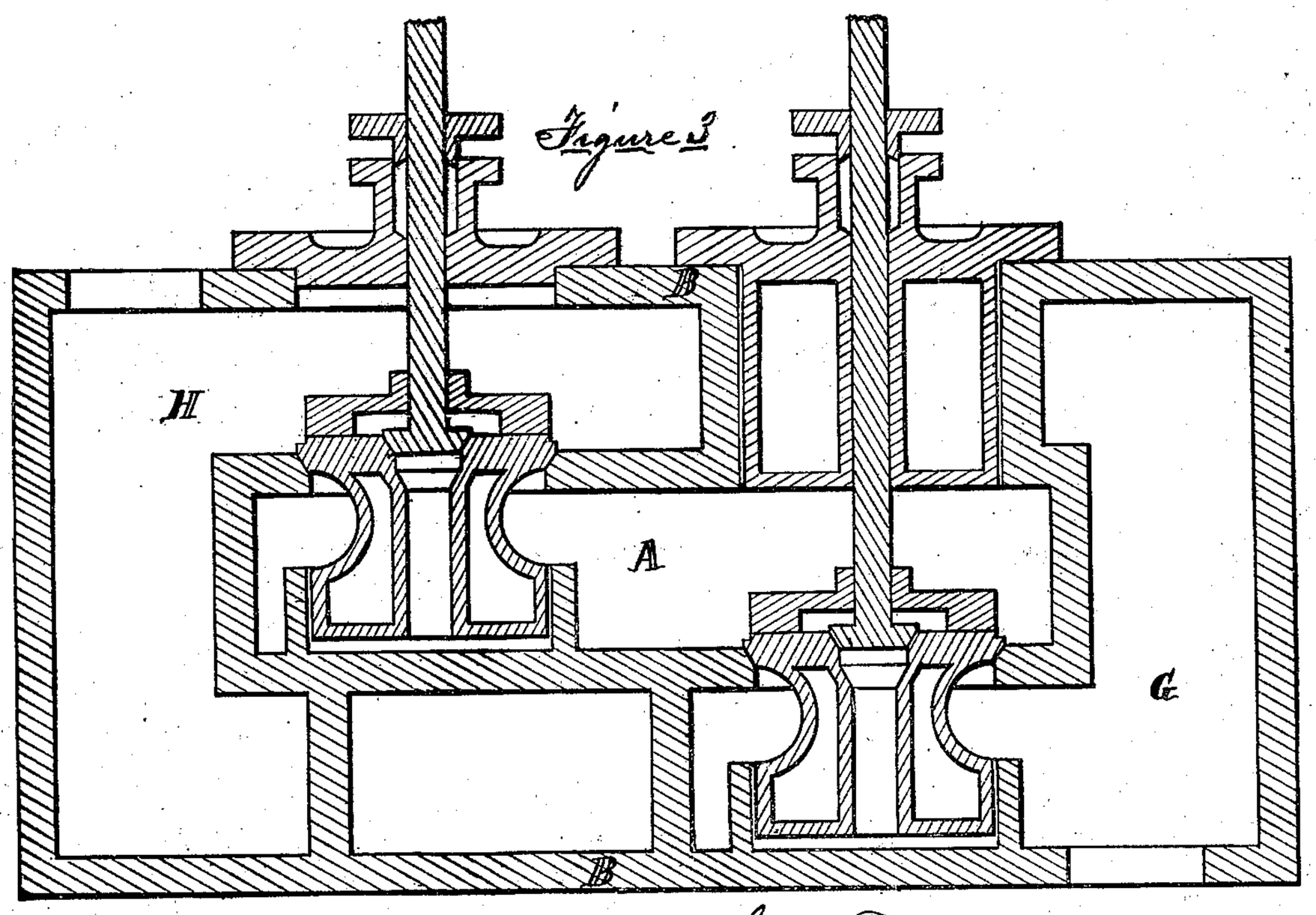
Figure 3



Witnesses
J. W. Quiggle
Wm. L. Shattuck

Inventor
Alexander Wanich
by his Attorney
Geo. S. Selden

United States Patent Office.

ALEXANDER WANICH, OF PHILADELPHIA, PENNSYLVANIA.

Letters Patent No. 113,600, dated April 11, 1871.

IMPROVEMENT IN BALANCE-VALVES.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that I, ALEXANDER WANICH, of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain Improvements in "Balance-Valves," of which the following is a specification, reference being had to the accompanying drawing in which like letters represent like parts.

This invention relates to the construction and operation of balance-valves for steam-engines, whereby the pressure on both sides of the valve is nearly equalized, and consequently operated without any great loss of power.

Figure 1 is a vertical sectional view through the center of both the receiving and exhaust-valves.

Figure 2 is a vertical sectional view through the center of both valves, but differently arranged.

Figure 3 is a vertical sectional view through the center of both valves, showing a still different construction.

B B is the steam-chest, substantially constructed of suitable material, and partitioned into three parts;

H, the receiver;

G, the exhaust-chamber; and

A the opening into the cylinder, connecting with both the receiver and the exhaust.

In the top of the steam-chest are two circular openings, one for the receiving and one for the exhaust-valves.

Into the opening for the receiving-valve I insert an inverted cup with a flange around the edge of its closed end, by which it may be secured to its place, the outer edge or surface of the cup *a* filling the opening made for it. Under this opening, and parallel with the top of the steam-chest, is the partition separating the interior of the steam-chest from the cylinder, through which partition, and directly under the opening aforesaid, I make another circular opening a little smaller than the opening in the top of the steam-chest, around the edge of which inner and smaller circular opening I make a valve-seat, to fit on which I set a cup, *b b*, the shell of which cup should just enter and fit loosely into the cup *a a* when it is in its seat.

Through the center of each of the cups *a* and *b* there should be a hole through which the pilot-valve rod *c* can work, the upper or inverted cup having a space for packing around the rod *c*.

In the center of the bottom of the cup *b* is an opening into and larger than the hole through which the rod *c* works, which opening has a valve-seat for a small valve on the rod *c*.

Below this valve-seat there is a small space around the rod *c*, into which are openings *d d* communicating with the opening into the cylinder A, the area of which openings should be several times the area between the inside of the inverted cup *a* and the outside of the cup *b*, the rod *c* projecting clear through the center of the bottom of the valve *b* into a step or socket, *e*.

Just below the bottom of the valve *b* I place on the rod *c* a nut or projection, leaving just room enough between the bottom of the cup and the nuts or projection to operate the pilot-valve *c* into the opening for the exhaust-valve, which opening is separated from the opening for the receiving-valve by a partition.

I insert a flanged disk, or, by preference, a flanged cylinder, *a'*, secured to the top of the steam-chest B, just below this opening in the partition, separating the opening into the cylinder A from the exhaust-chamber. I make a circular opening a little less in diameter than the opening in the top of the steam-chest B just above it, around the edges of which I make a valve-seat to receive the cup *b'*, constructed in all respects similar to the cup *b* with its pilot-valve and all.

When these valves are ready for use steam is let into the steam-chest B at C, or other convenient place, the steam surrounding the shell or rims of the cups *a* and *b*; and as the rim *b* does not fit closely to the rim *a* the steam enters the chamber formed by the two cups aforesaid, pressing the valve *b* down to its seat. The pilot-valve *c* is then lifted, when the opening *d d*, being larger than the opening between the cups, the steam in the chamber formed by the two cups rushes through the openings *d d* to the cylinder, thereby relieving the valve *b* from pressure, so that, when the nuts or projections on the valve-rod strike the bottom of the valve *b* in its upward motion, the valve B is easily lifted from its seat and the steam rushes into the cylinder. The pilot-valve is then dropped or allowed to fall into its seat, simultaneously with which, or just a little before the valve or cup *b* drops or falls into its seat, shutting off the steam from the boiler into the cylinder, when the operation is repeated as before.

It is found that the steam admitted from the boiler into the chamber formed by the two cups, through the space between the shells or rims of said cups, will escape so much more rapidly through the openings *d d* on lifting the pilot-valve than its admission through the smaller area created by the space between the rims of the two cups, as to equalize the pressure on the upper and under side of the valve *b*, so that, when the nuts or projections on the pilot-valve rod strike the bottom of the valve *b* in its ascent, it lifts the valve *b* with little if any more than its own weight.

The stem or pilot-valve *c'* is made to begin to rise, allowing the steam in the chamber E to escape through the openings *d' d'*, relieving the upper pressure from the valve *b'*, because, by reason of the discharge-openings *d' d'* having a greater area than the inlet-opening around the cup *b'*, as soon as the nuts

or projections on the pilot-valve *c'* come in contact with the valve *b'* it is easily raised from its seat, allowing all the steam in the cylinder to escape into the exhaust-chamber. The pilot-valve is then lowered, the valve *b'* returned to its seat, and the operation repeated as before.

In fig. 2 the receiving or inlet-valve being in its seat the pilot-valve is raised and, the steam rushing in fills the chamber F, thereby immediately almost equalizing the pressure on both sides of the valve, so that, when the nuts or projections on the pilot-valve come in contact in its upward course with the main valve, it is lifted with ease, allowing the steam to fill the cylinder. The pilot-valve is then dropped or allowed to fall into its seat, cutting off communication between the boiler and chamber F. When the lower pilot-valve is made to begin to rise the steam in the chamber F escapes into the exhaust-chamber, allowing the inlet-valve to find its seat, and the exhaust-valve, when the nuts or projections come in contact with it, to raise it, and allow the steam from the cylinder to escape into the exhaust-chamber, and so on.

In fig. 3 is represented the duplication of the upper part of the valve in fig. 2.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. An inverted cup, *a*, in combination with an upright cup, *b*, pilot-valve *c*, and openings *d d*, constructed and operated substantially as described.

2. The combination of the two valves D C, fig. 2, constructed and operated substantially as described.

3. The combination of the two valves E F, fig. 3, constructed and operated substantially as described.

ALEXANDER WANICH.

Witnesses:
JOHN W. KELLBERG,
GEO. S. SELDEN.