(No Model.) 3 Sheets—Sheet 1.

W. SWINDELL.

REGENERATIVE FURNACE.

No. 524,915. Patented Aug. 21, 1894.

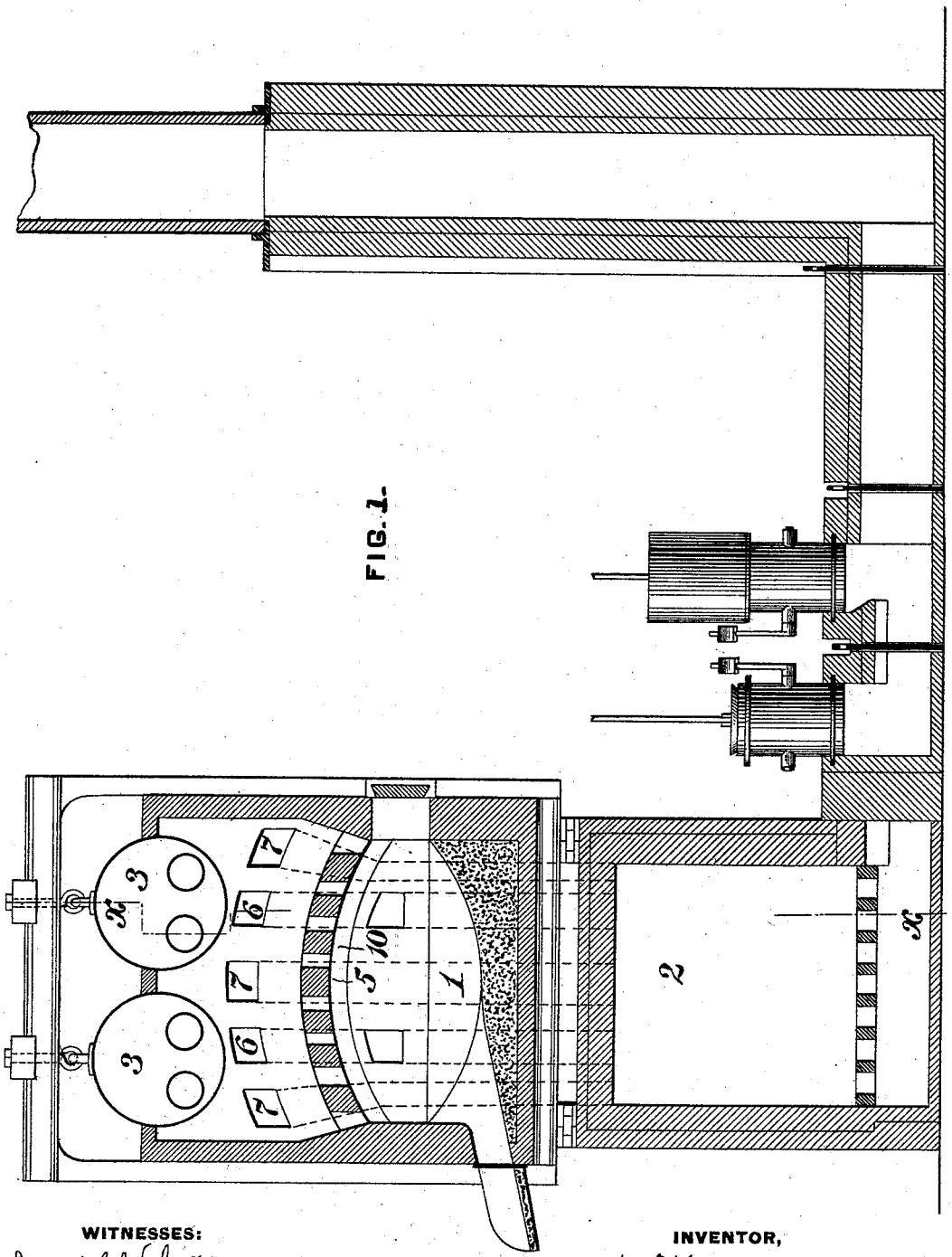

FIG. 1.

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(No Model.) 3 Sheets—Sheet 2.

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REGENERATIVE FURNACE.

No. 524,915. Patented Aug. 21, 1894.

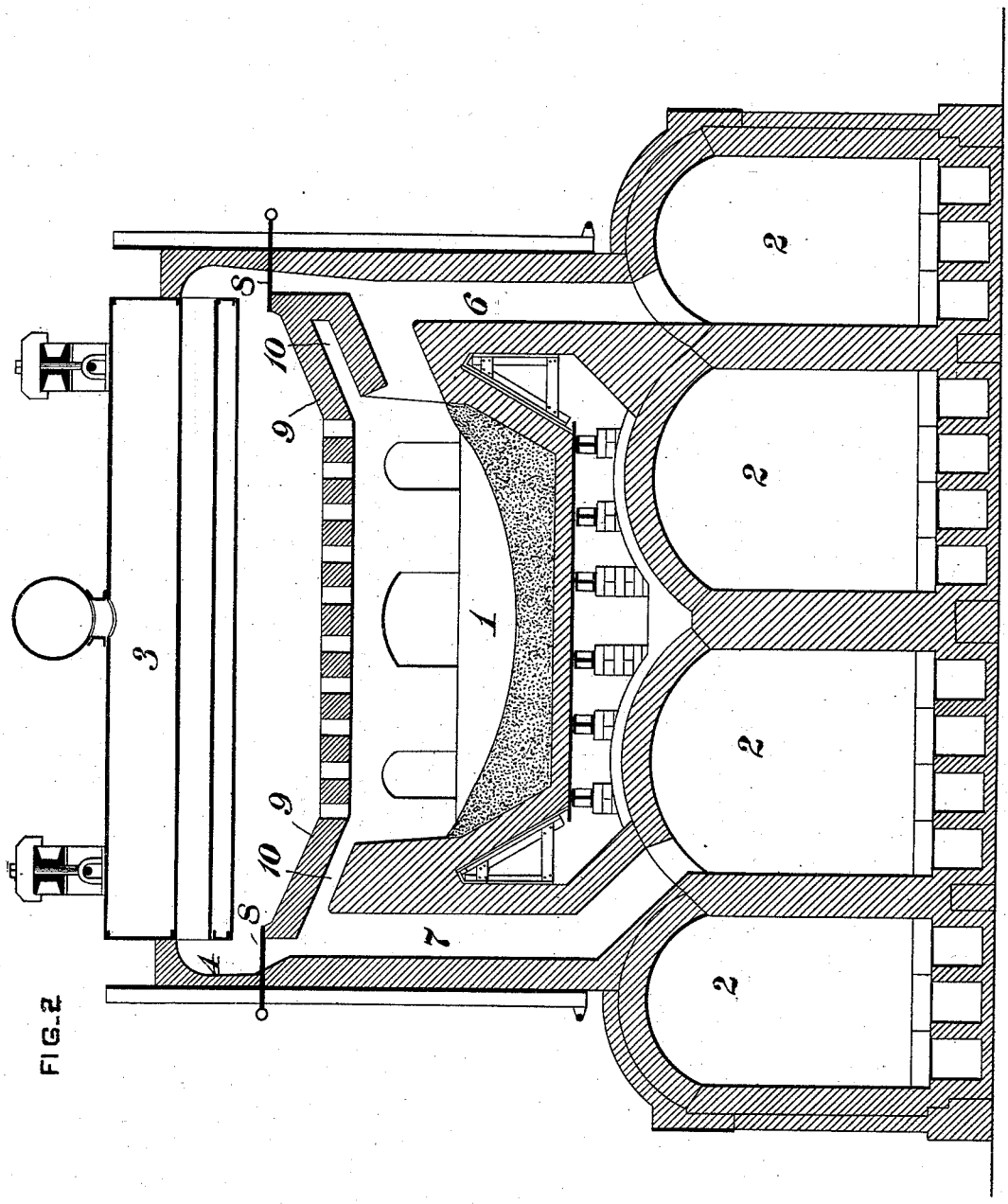

FIG. 2

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(No Model.) 3 Sheets—Sheet 3.

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REGENERATIVE FURNACE.

No. 524,915. Patented Aug. 21, 1894.

FIG. 3.

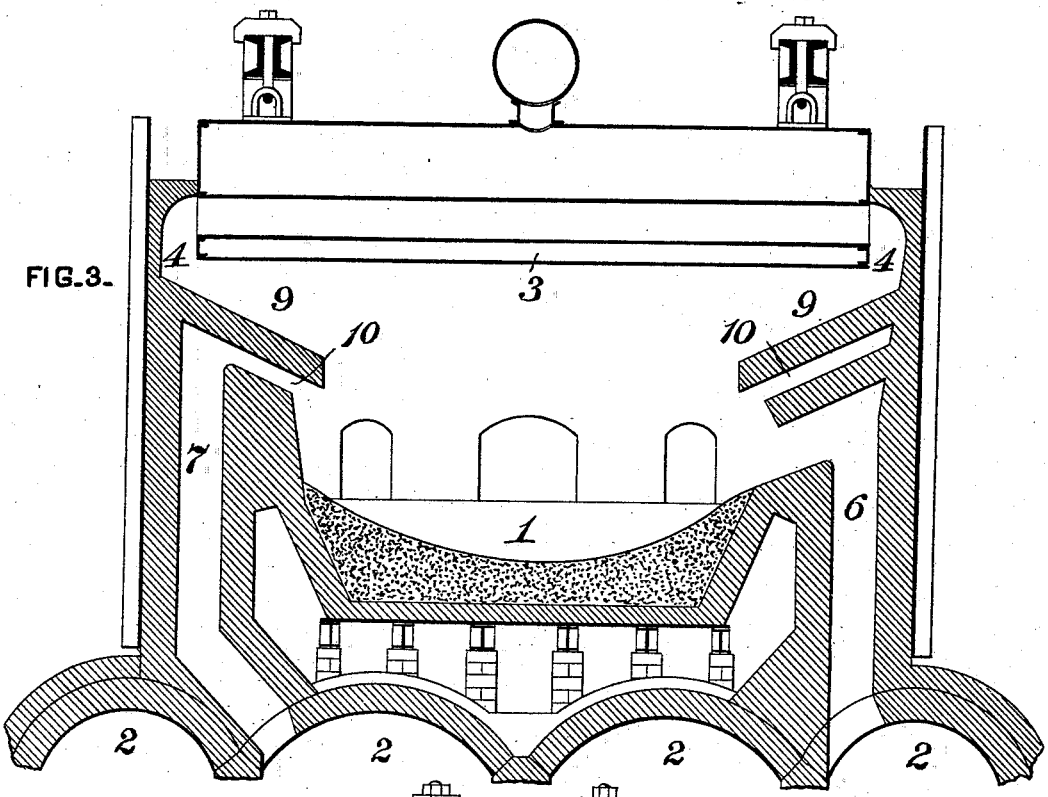
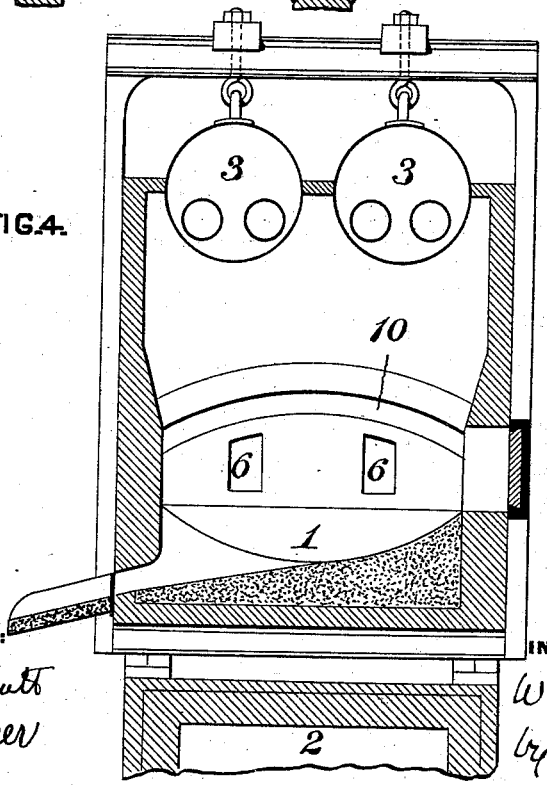


FIG. 4.



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UNITED STATES PATENT OFFICE.

WILLIAM SWINDELL, OF ALLEGHENY, PENNSYLVANIA.

REGENERATIVE FURNACE.

SPECIFICATION forming part of Letters Patent No. 524,915, dated August 21, 1894.

Application filed December 12, 1892. Serial No. 454,945. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM SWINDELL, a citizen of the United States, residing at Allegheny, in the county of Allegheny and State of Pennsylvania, have invented or discovered certain new and useful Improvements in Regenerative Furnaces, of which improvements the following is a specification.

The object of the present invention is to provide for the heating of steam boilers by what may be termed the waste heat of a regenerative heating or melting furnace.

It is quite common to arrange steam boilers in such relation to the ordinary form of heating or puddling furnaces that the heat and products of combustion after passing through the hearths of such furnaces, will pass under the boiler. As the gases in such a furnace are at a very high temperature even after they have passed through the hearth, no special difficulty is encountered in utilizing this waste heat for raising steam. In regenerative furnaces, however, the gases pass from the hearth into and through the regenerating chambers, and are so reduced in temperature in the regenerating chambers as to be practically useless for heating boilers.

It has been discovered that the roof of the heating chamber of regenerating furnaces may be made considerably higher than has been the practice without reducing the efficiency of the furnace for heating or melting, and with a decided gain in the durability of the roof as it is removed from the cutting action of the heat and products of combustion as they flow through the chamber, and is only subjected to a dead stagnant heat.

In the present invention I propose to employ this high but stagnant heat which is not at present utilized, for heating steam boilers, and, in general terms, the invention consists in the construction and combination substantially as hereinafter more fully described and particularly claimed.

In the accompanying drawings forming a part of this specification, Figure 1 is a sectional elevation of a regenerating furnace having my improvements applied thereto, the section at right hand being through a gas flue and port, and at the opposite end, through an air flue and port. Fig. 2 is a sectional elevation on the line *x*, *x*, Fig. 1. Figs. 3 and 4 are views similar to Figs. 1 and 2, and illustrate a modified construction of furnace.

In the practice of my invention, the furnace as regards the hearth 1, the regenerating chambers 2, and the flues leading to and from the regenerating chambers are constructed in the usual or any suitable manner. The side walls of the heating or melting chamber are extended up a short distance farther than is customary in the old form of furnace. In lieu of a brick arch, the roof of the heating or melting chamber is formed by one, two or more boilers 3, which may be suspended as shown in the drawings or supported on the side walls of the chamber in any suitable manner. The spaces between the boilers and the side walls of the chamber and between the boilers, themselves, when more than one is used, is closed by brick work as is customary. The walls of the chamber adjacent to the ends of the furnace are cut away or otherwise constructed as shown at 4, to permit the heat to flow through the flues of the boilers.

If desired, a supplemental roof 5 having openings therethrough may be interposed between the hearth and the boilers. This supplemental roof can be employed in case there is any tendency of an upward rise in the current of flame flowing through the furnace. In case sufficient heat does not pass up through the openings in the supplemental roof, the gas and air flues 6 and 7 may be extended up sufficiently high to discharge gas and air into the space between the boilers and the supplemental roof. These flue extensions are provided with valves 8, so that they may be closed when sufficient heat is obtained through the openings in the supplemental roof.

As shown in Figs. 3 and 4, the supplemental roof may be entirely omitted. In which case the wall 9 forming the top of the air port 10, which is continuous across the heating chamber as shown in Figs. 2 and 4, is given a down inclination, and extends a considerable distance into the heating or melting chamber, in order to direct the flames upon the hearth. This arrangement of the boilers immediately above the hearth will not in any way interfere with the normal operation of the furnace, and the heat rising from the main volume of flame and heat passing directly through the heating or melting chamber will be sufficient

to properly heat the boilers. And further, by using the boilers as the top or roof of the furnace, the labor and annoyance experienced in maintaining a brick roof is avoided.

If a considerable circulation of heat is desired in the space between the boilers and supplemental roof, the valve in the extension of the air and gas flues, which are for the time being employed as exit flues, may be opened, whereupon the heat flowing up through the openings in the supplemental roof will be drawn to the end of the furnace having the open valve.

I claim herein as my invention—

1. The combination of a regenerative furnace, one or more boilers arranged above the hearth of the heating or melting chamber and forming the roof or top of said chamber, and a supplemental roof provided with openings for the upward passage of heat and products of combustion, and arranged between the boiler and hearth, substantially as set forth.

2. The combination of a regenerative furnace, one or more boilers arranged above the hearth of the heating or melting chamber, a supplemental roof arranged between the boiler and hearth and provided with openings therethrough, and extensions of the gas and air flues extending up above the supplemental roof and provided with regulating valves, substantially as set forth.

In testimony whereof I have hereunto set my hand.

WILLIAM SWINDELL.

Witnesses:
J. L. RALPH,
DARWIN S. WOLCOTT.