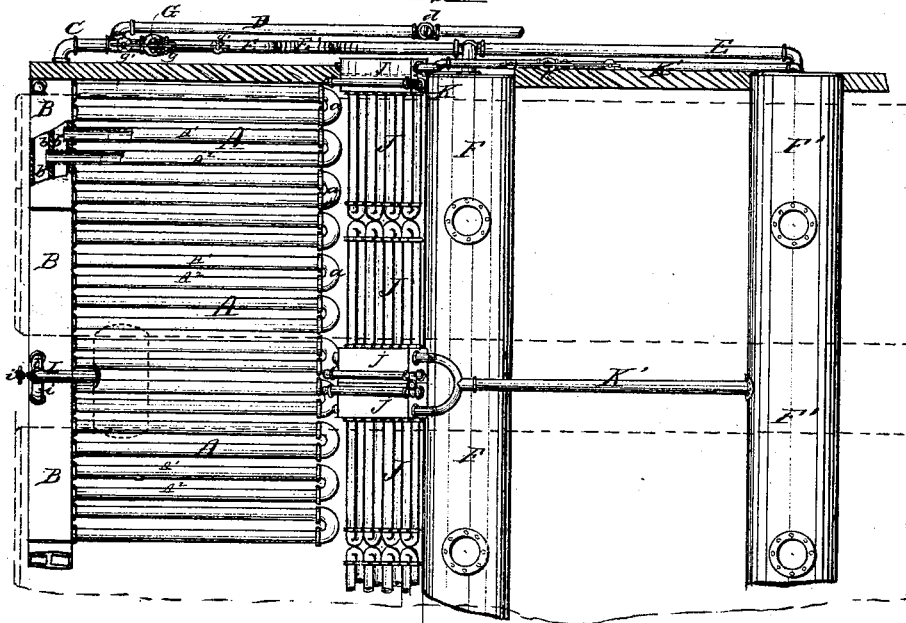


J. Ryan,

No. 111,387.

Figure 1.



William W. Hertel

Figure 2.

Joseph Ryan

2. Sheets, Sheet 2.

J. Ryan,
Water Grate.

No. 111,387.

Patented Jan. 31, 1871.

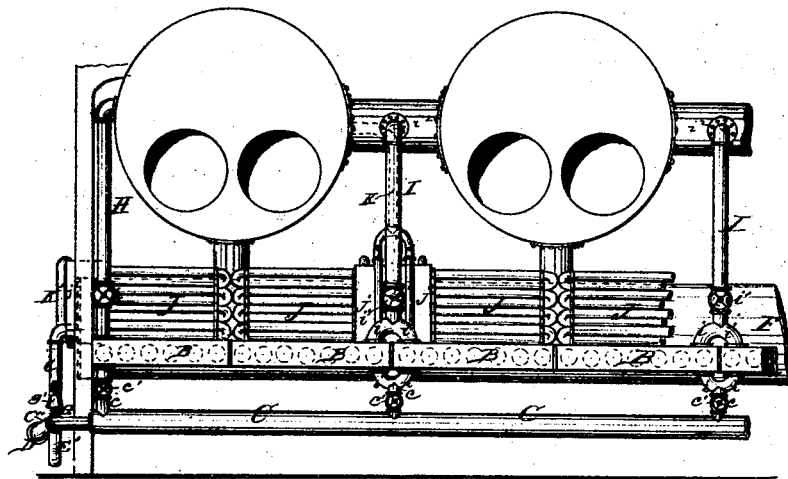


Figure 3.

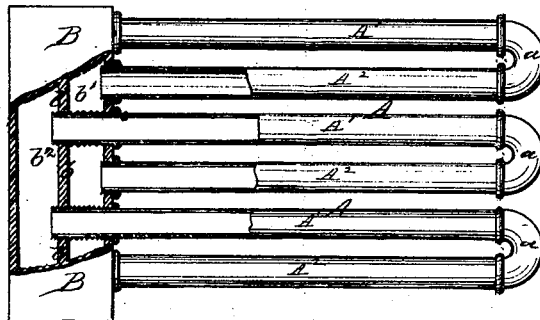


Figure 4.

Witnesses:

William H. Herthel

Robert Burns,

Inventor:

Joseph Ryan.

United States Patent Office.

JOSEPH RYAN, OF ST. LOUIS, MISSOURI.

Letters Patent No. 111,387, dated January 31, 1871.

IMPROVEMENT IN WATER-GRATES.

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, JOSEPH RYAN, of St. Louis, in the county of St. Louis and State of Missouri, have made certain new and useful Improvements in Circulators and Steam-Generators; and I do hereby declare that the following is a full and true description thereof, reference being had to the accompanying drawing and to the letters of reference marked thereon.

This invention relates—

Firstly, to an improved arrangement of supply-pipes for feeding the water to the grate-bars, and the manner of regulating the supply and flow of the water to said grate-bars;

Secondly, to the peculiar arrangement and construction of the grate-bars proper;

Thirdly, to the arrangement of the parts forming an improved circulator, by means of which a continuous circulation of the water from the boilers and through the grate-bars is achieved; and

Lastly, said invention relates to certain detail construction of parts, hereinafter to be more fully described.

To enable those herein skilled to make and use my said invention, I will now more fully describe the same, referring to the accompanying

Figure 1 as a side elevation; to

Figure 2 as a top plan in general; to

Figure 3 as a front elevation, representing my improvements adapted to two or more boilers; and to

Figure 4 as an enlarged detail part section and top plan of the grate-bars.

The grate-bars A are supported in the usual-constructed furnace-chamber. Said grate-bars consist of hollow pipes arranged in duplicate sections, A¹ and A², joined at their rear ends by proper "return bends," a, and connected at their front ends to a partitioned pipe, B, arranged in front of the furnace, and constructed as follows:

To form a receiving and discharging-pipe I construct the pipe B, having arranged within the same a vertical diaphragm, b. Said pipe B, thus divided, forms a cold-water sectional-pipe, b¹, and the steam, or steam and hot water, sectional-pipe b², as clearly shown in figs. 2 and 4.

Suspended from the partition-pipe B, in the ash-pit chamber, I have arranged the cold-water supply-pipe C, communicating with the cold-water sectional-pipe b¹ of said pipe B by means of short tubes c, as shown in fig. 3.

Each of said tubes c I have provided with proper globe-valves, c', whereby the operator is enabled to "cut off" the supply of water to the grate-bars; also, said valves serve as "blow-off" valves to discharge impurities and foreign matter in said grates and through pipe C.

To feed the water to the grate-bars A, the pipe C is connected, by means of a proper joint side-pipe, C', to a cold-water feed-pipe, D, coming from the ordinary tank, pump, or other cold-water supply source. In said pipe D is a suitable stop-cock, arranged to shut off the supply of water from the tank.

To form an improved circulator for the grate-bars A, I connect with the side-pipe C', and in communication with the cold-water feed-pipe D, the circulating-pipe E; by means of proper joint-pipes, e, said pipe E is made to connect with the respective mud-drums F and F', as clearly shown in fig. 1.

By such an arrangement of parts a continued circulation of the water from the boilers and through the grate-bars A is achieved, and thus said pipe E also serves as a feed-pipe to said grates, conjointly with the cold-water feed-pipe D.

Close to the joint of the respective pipes D and E I provide the latter with a balance check-valve, G. Said valve has its stem and hub connected to a proper lever, g, bearing the centerpoise-weights g', and said valve is so constructed that in its operation it shall be self-acting, remaining closed by the equalization of pressures from the respective pipes D and E, but opening its valve to permit uninterrupted circulation of the water from the boiler to the grate-bars A. Thus the cold-water supply from the feed-pipe D is directly regulated to enter the grate-bars A, and prevented from entering the circulator E.

In the use of one boiler I connect, in communication with the steam sectional pipe b² of the partition-pipe B, at each end thereof, the steam-pipe H. The steam, or steam and hot water, generated in the grates A, passing through said steam-pipe H, enter into the boiler or other receiver thereof, as shown in fig. 3.

The joint of said pipe H with the boiler will be in any proper manner so as to form the needed steam-tight joint. In said steam-pipe H is a proper valve to cut off the supply of steam and regulate the passage thereof to the boiler.

In case of two or more boilers, and in the use of additional grate-bars, the same are united in communication with the cold-water supply-pipe C and the steam-pipe I by means of proper bifurcated joints i, as clearly shown in figs. 2 and 3, a shut-off-valve, i', being arranged in said pipe I to regulate through the same the supply of steam to the boiler and prevent reflux.

The steam-pipe I, I arrange furthermore to communicate with a connecting-drum or ordinary "chock-joint," i², arranged betwixt the boilers for the equalization of steam-pressures from boiler to boiler, as shown in fig. 3.

To facilitate the generation of the largest quantity

of steam, I furthermore arrange grate-bars J, and support additional sections thereof upon the inclined bridge-wall of the furnace-chamber. Said grate-bars J are similar in construction to those of A, and provided with partitioned pipe *j*, into which the cold water and generated steam are separated independently, the former to enter the grate-bars and the latter to enter the steam-pipe K to be discharged into the boiler.

To feed the bridge-wall grates with a supply of water, the cold-water sectional-pipe of the partitioned pipe *j* connects with the feed or circulating-pipe K', arranged in communication with the rear mud-drum F'.

To prevent reflow of water to said mud-drum and boiler, I provide said pipe K' with a balance check-valve, *k*, self-acting, and constructed similarly to the valve G, as previously described.

The inclined grates J will connect by proper bifurcated joints to the circulating-pipe K' and the steam-pipe K, respectively, in case of two or more boilers, as previously described in case of the grate-bars A, and as shown in figs. 1 and 2.

The pipes D and E may be arranged within or without the fire-bed. When arranged within the fire-bed it is plain said pipes utilize the heat of the fire-bed, serving as additional grate-bars or heaters.

By providing the pipe E with a spring-bend, E', as shown in fig. 1, the bad results of unequal contraction and expansion caused by varying temperatures are sufficiently guarded against.

It will be observed that as each duplicate section of grate-bars discharges its generated steam, or steam and hot water, independently of the remaining sections, said grate-bars are not liable to become disabled by fuel and by oxidation, as the ungenerated water serves

as a protector to said bars; at the same time the attachment of said grate-bars is such that the same are readily removable in case of necessity.

The construction and arrangement of all said parts are such that steam may be generated in the most rapid manner and with the most practical advantages of safety, utility, and economy.

Having thus fully described my said improvements,

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

1. The grate-bars A, formed in duplicate sections A¹ and A², having return-bend *a*, when arranged in combination with the cold-water sectional-pipe *b*¹ and steam-sectional-pipe *b*² of the partitioned pipe B, and steam-pipes H and I, substantially as set forth.

2. The grates A, partitioned pipe B, tubes *c*, valves *c*¹, ash-pit pipe C, joint-pipe C', in combination with the feed-pipe D and circulating-pipe E, substantially as set forth.

3. The circulator E, spring-bend E', balance check-valve G, and feed-pipe D, when arranged within or without the fire-bed, in combination with the pipes C C', partitioned pipe B, and grate-bars A, substantially as and for the purpose set forth.

4. The grates J, acting as a bridge-wall, partitioned pipe *j*, bend or steam-pipe K, in combination with the circulating or feed-pipe K', balance check-valve *k*, and mud-drum F', substantially as set forth.

In testimony of said invention I have hereunto set my hand in presence of—

JOSEPH RYAN.

Witnesses:

WILLIAM W. HERTHEL,
ROBERT BURNS.