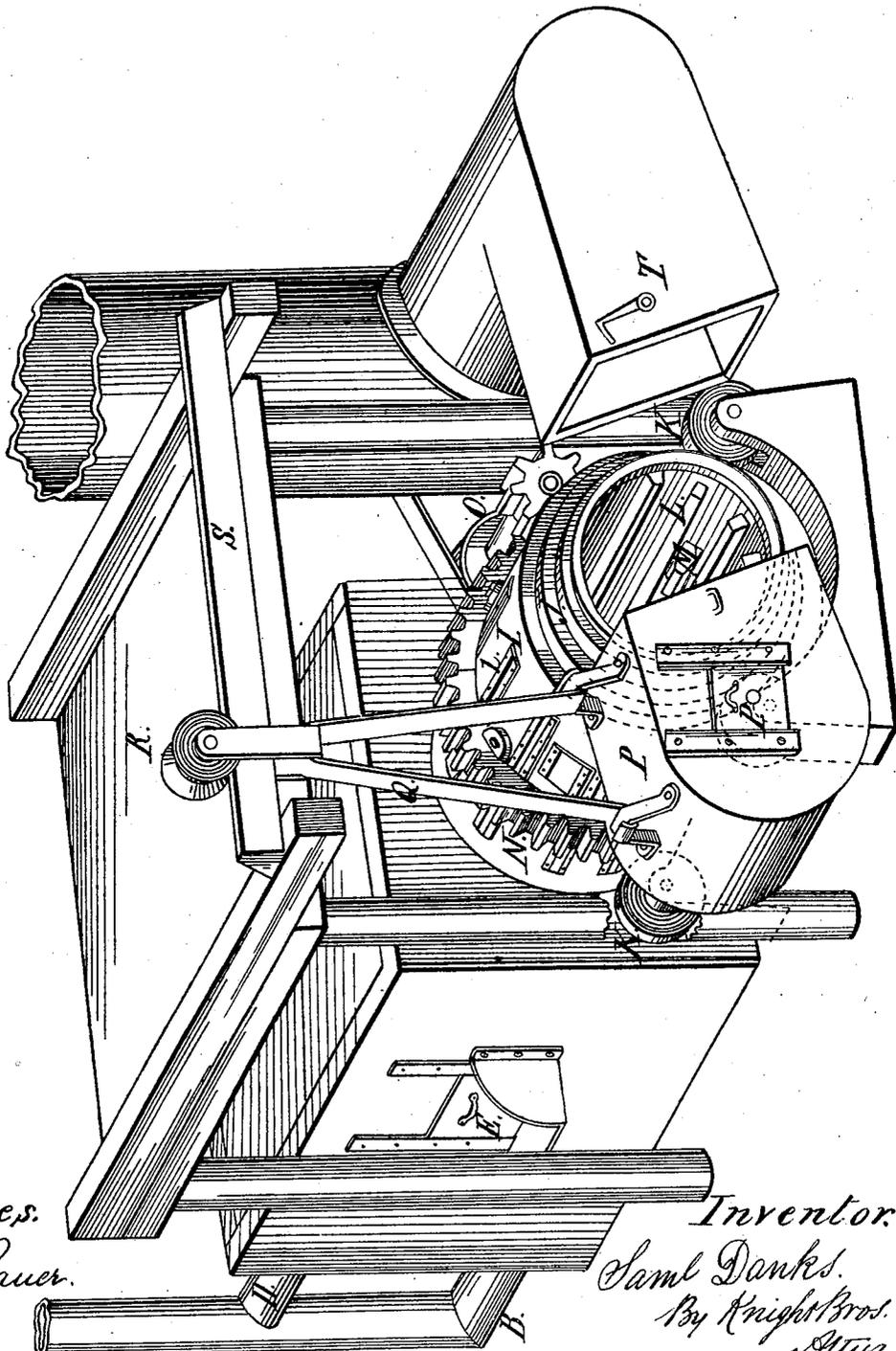


S. Danks. Sheet 1 of 4 Sheets

Revolving Puddling Furnace.

N^o 84,347. Patented Nov. 24, 1868.

Fig. 1.



Witnesses.
Charles Bauer.
William Bauer.

Inventor.
Saml Danks.
By Knight Bros.
Atty.

S. Danks. Sheet 2, 4 Sheets.

Revolving Puddling Furnace.

No. 84,347. Patented Nov. 24, 1868.

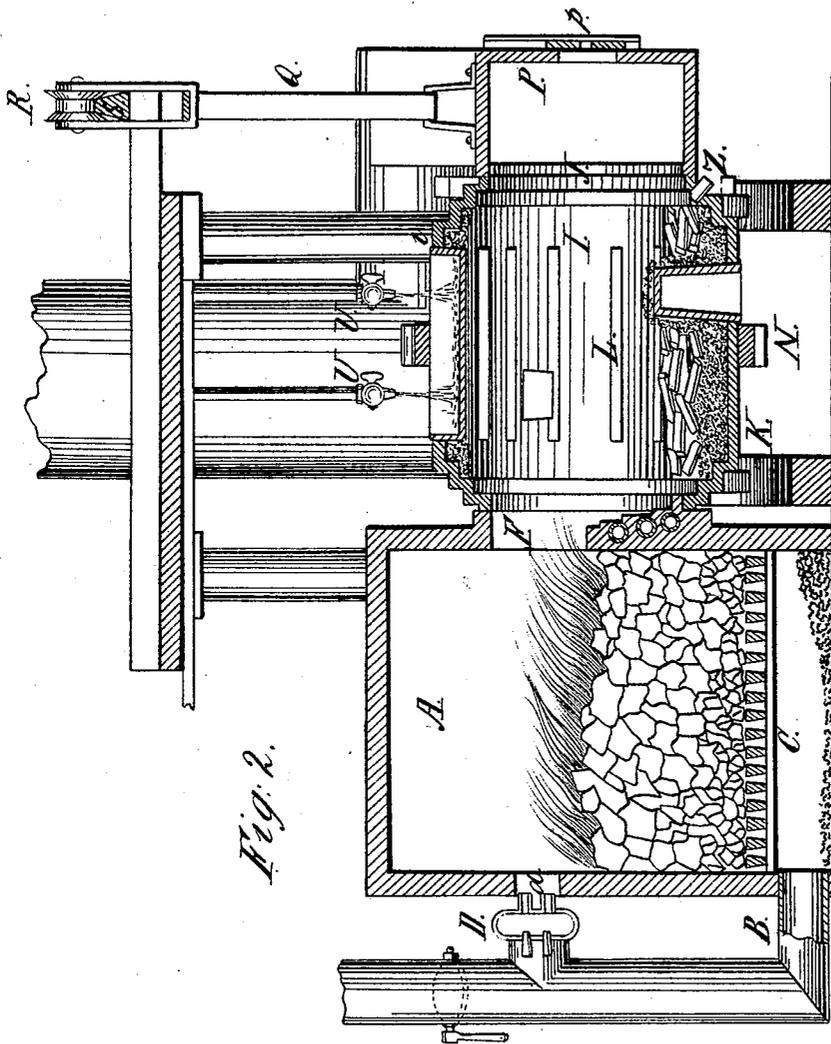


Fig. 2.

Witnesses.
Charles Bauer.
William Bauer.

Inventor.
Saml. Danks.
By Knight Bros.
Attys.

S. Danks. Sheet 3, of 4 Sheets.

Revolving Puddling Furnace.

N^o 84,347. Patented Nov. 24, 1868.

Fig. 5.

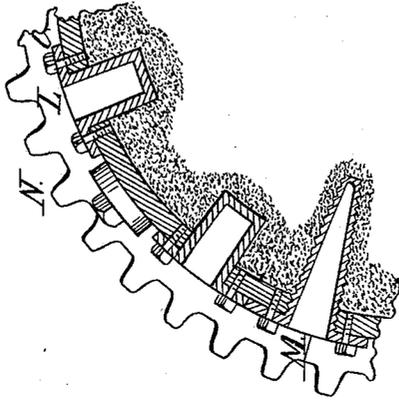
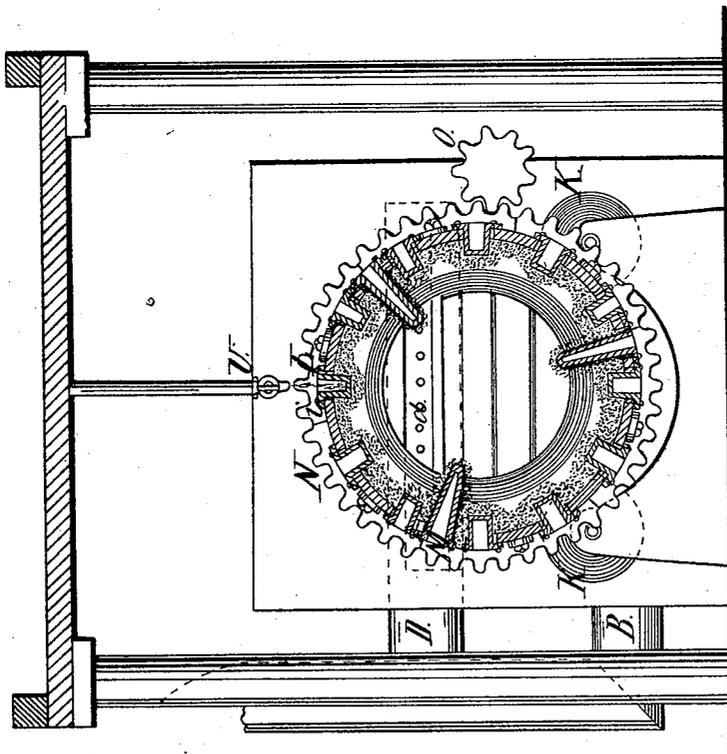


Fig. 3.



Witnesses.

Charles Bauer

William Bauer

Inventor:

Saml Danks.

By Knight Bros.

Atty.

S. Danks. Sheet 4, 4 Sheets.

Revolving Puddling Furnace.

N^o 84,347.

Patented Nov. 24, 1868.

Fig. 4.

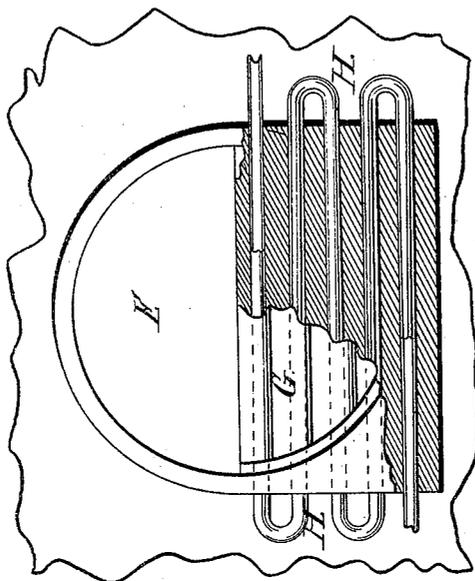
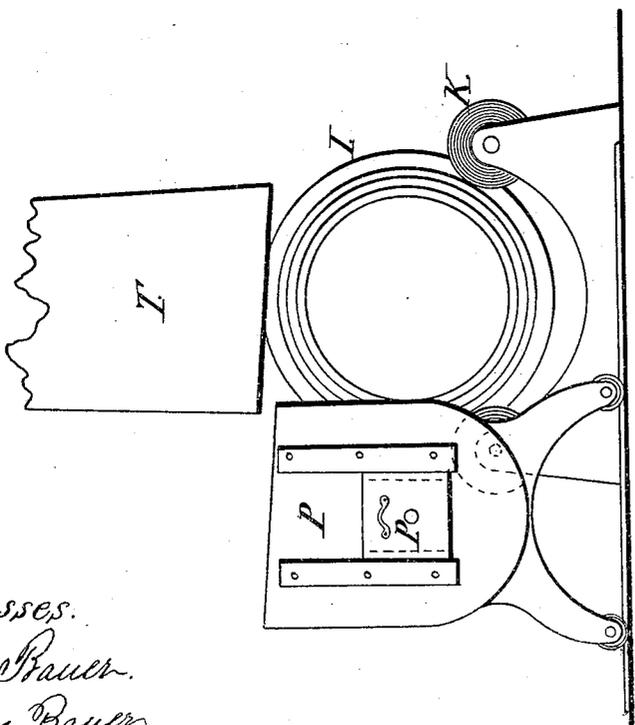


Fig. 6.



Witnesses.
Charles Bauer.
William Bauer.

Inventor.
Saml. Danks.
By Knight Bros.
Atty

UNITED STATES PATENT OFFICE.

SAMUEL DANKS, OF CINCINNATI, OHIO.

IMPROVEMENT IN REVOLVING PUDDLING-FURNACES FOR TREATING IRON AND STEEL.

Specification forming part of Letters Patent No. 84,347, dated November 24, 1868.

To all whom it may concern:

Be it known that I, SAMUEL DANKS, of Cincinnati, Hamilton county, Ohio, have invented certain new and useful Improvements in Mechanical Puddling and Boiling Furnaces; and I hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings, making part of this specification.

My improvements are chiefly designed for the kind of puddling-furnace in which the mass or ball of iron is formed by the mechanical action of a rotary refining-chamber; and the first part of my invention consists in a form of the rotary refining-chamber adapted to hold and properly preserve the fettling, and so constructed as to be preserved from overheating, by means of water.

The second part of my invention consists in making removable that portion of the flue which fronts the rotary refinery, so as, by turns, to discharge the functions of a flue and the functions of a door.

The third part of my invention consists in the combination of a water-back with a rotary refining-chamber, in the manner hereinafter described.

In the accompanying drawings, Figure 1 is a perspective view of a puddling-furnace embodying my invention, the flue-section being shifted from the mouth of the refinery. Fig. 2 is a longitudinal view in the plane of the refinery's axis. Fig. 3 is a transverse section of the refinery, looking rearward or toward the fire. Fig. 4 is a front view, partly in section, of my water-bridge. Fig. 5 is a transverse section, to an enlarged scale, of a portion of the refinery. Fig. 6 represents a modification of my shiftable flue-section.

A represents the grate or fire-chamber, having one blast-inlet, B, below the grate, and another blast-inlet in rear of the grate and above the fire. This latter inlet consists of a pipe, D, which communicates, by a number of small tuyeres, *d*, with the interior of the fire-chamber, at the rear side thereof.

The grate or fire-chamber may have the customary construction of fire-bricks inclosed by iron plates, and has one or more customary side doors, E, and has on its front an opening

or passage, F, which communicates with the interior of my rotary refinery.

The under side of the passage F is formed into a bridge, G, within which circulates a coil of cold-water pipes, H.

My refinery proper, or puddling-chamber, consists, essentially, of an open-ended cylinder, I, of either wrought or cast iron, and having, preferably, the stepped or conical ends J, for the reception of rollers K, so arranged as to both properly support and hold in place while permitting the free rotation of the cylinder.

The cylinder I is, at equal distances around its periphery, slotted longitudinally to receive ribs L, preferably in the form of troughs, which open outward, as shown, and have flanges *l*, to maintain their proper place in the cylinder. These trough-like ribs serve the double purpose of key-pieces to hold the fettling, and of receptacles for water, steam, or air, to preserve the cylinder and fettling, and the ribs themselves, from burning out.

The cylinder may also be pierced for the reception of one or more protuberances, M, made hollow and opening outward, for the reception of water, steam, or air, and corrugated on that portion of their surface which is presented to the interior of the cylinder, in order more effectually to hold and retain the enamel, of slag or vitreous matter, whose comparative infusibility and slow conduction serve to protect the said protuberances. Said enamel is also useful in that its weaker affinity for the metal enables the latter to roll easily off, instead of sticking to the ribs, and protuberances, as it would do were the latter not thus protected.

Encircling the cylinder I may be a cog-wheel, N, with which meshes a pinion, O, by which this cylinder is rotated.

That portion or section, P, of the flue immediately in front of the cylinder may be suspended, by hangers Q and roller R, to a track or way, S, along which the said section is capable of being slid or shifted, so as either to close the mouth of the cylinder, for puddling and balling, or to open the same, for removing the ball and inserting a new charge.

The section P may have a customary stop-

per-hole, *p*, for inspection or manipulation of the ball, when so desired.

The section *P* communicates, when closed, with a stationary portion, *T*, of the flue.

Water may be conveyed to the ribs *L* and to the protuberances *M*, and to any other portion required to be kept cool, by means of faucets *U*.

The neck *i* of the cylinder may be thus cooled, or by one or more water-scoops shrunk or otherwise secured upon it.

Z is a tapping-hole, to enable the attendant to discharge the slag or cinder after a heat, or at any other time when in superabundance.

The cylinder having been lined with suitable fettling, as above explained, its rotation temporarily arrested, and the blast closed, the flue-section *P* is slid open, and the charge being inserted, said section is again closed. The blast is then turned on and the cylinder set again in motion.

Communication between the grate and rotary cylinder being at no time broken or disturbed, the heat is retained within the furnace, instead of escaping into the face of the operator, and allowing the ingress of cold air, which retards the puddling and wastes the heat, as experienced in those forms of mechanical puddlers whose cylinders are shifted bodily at every charge.

The shiftable flue-section may be supported upon a ground-track, as in Fig. 6, so as to allow the stack to be placed immediately over the furnace, which stack may be made effective to heat the blast, &c.

I have described my improvements in their application to a puddling-furnace, but may apply the same, in whole or part, to various forms of heating and refining furnaces used in the manufacture of wrought-iron and steel.

I am aware that rotary refining-chambers have before been used in puddling-furnaces, and also that they have been constructed with internal longitudinal ribs to agitate the iron, and have been made removable from the furnace to expose their ends. These devices, therefore, I do not claim; but

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

1. The hollow ribs *L* and protuberances *M* (either or both) in the metal shell of the rotary refining-cylinder *I*, forming, on the outside, troughs or pockets for the reception of water, in the manner and for the purposes set forth.

2. The shiftable piece *P*, employed, in combination with a rotary refinery, for the double purpose of a door and a flue, as described.

3. The arrangement and adaptation, substantially as described, of the water-bridge *G* *H*, in combination with the fire-chamber *A* and rotary puddling-chamber *I*, for the purpose set forth.

In testimony of which invention I hereunto set my hand.

SAMUEL DANKS.

Witnesses:

GEORGE H. KNIGHT,
JAMES H. LAYMAN.