

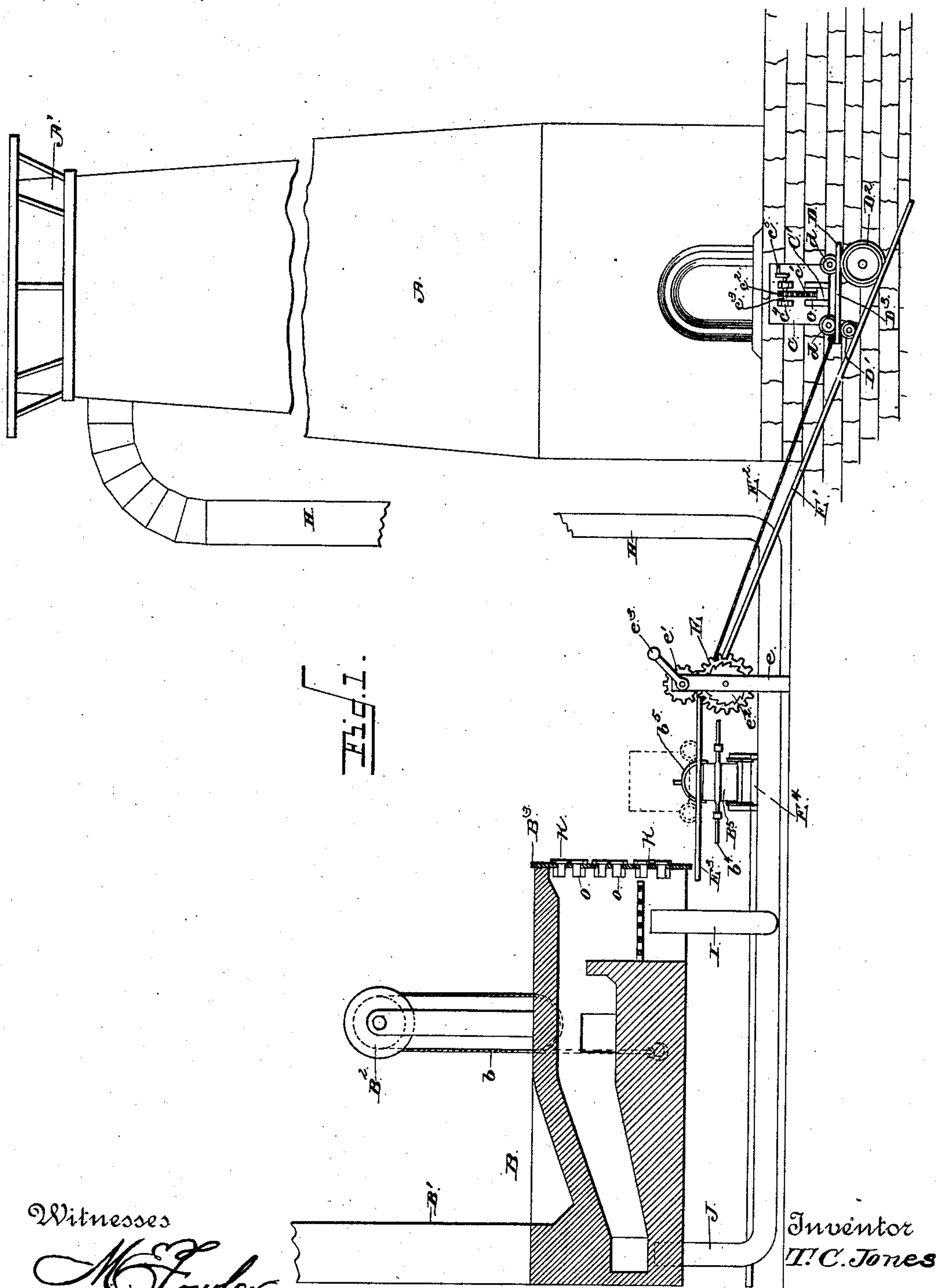
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3 Sheets—Sheet 1.

T. C. JONES.
PUDDLING FURNACE.

No. 389,574.

Patented Sept. 18, 1888.



Witnesses

M. Fowler
E. G. Siggers

Inventor
T. C. Jones

By his Attorneys

Chas. H. H. H. H.

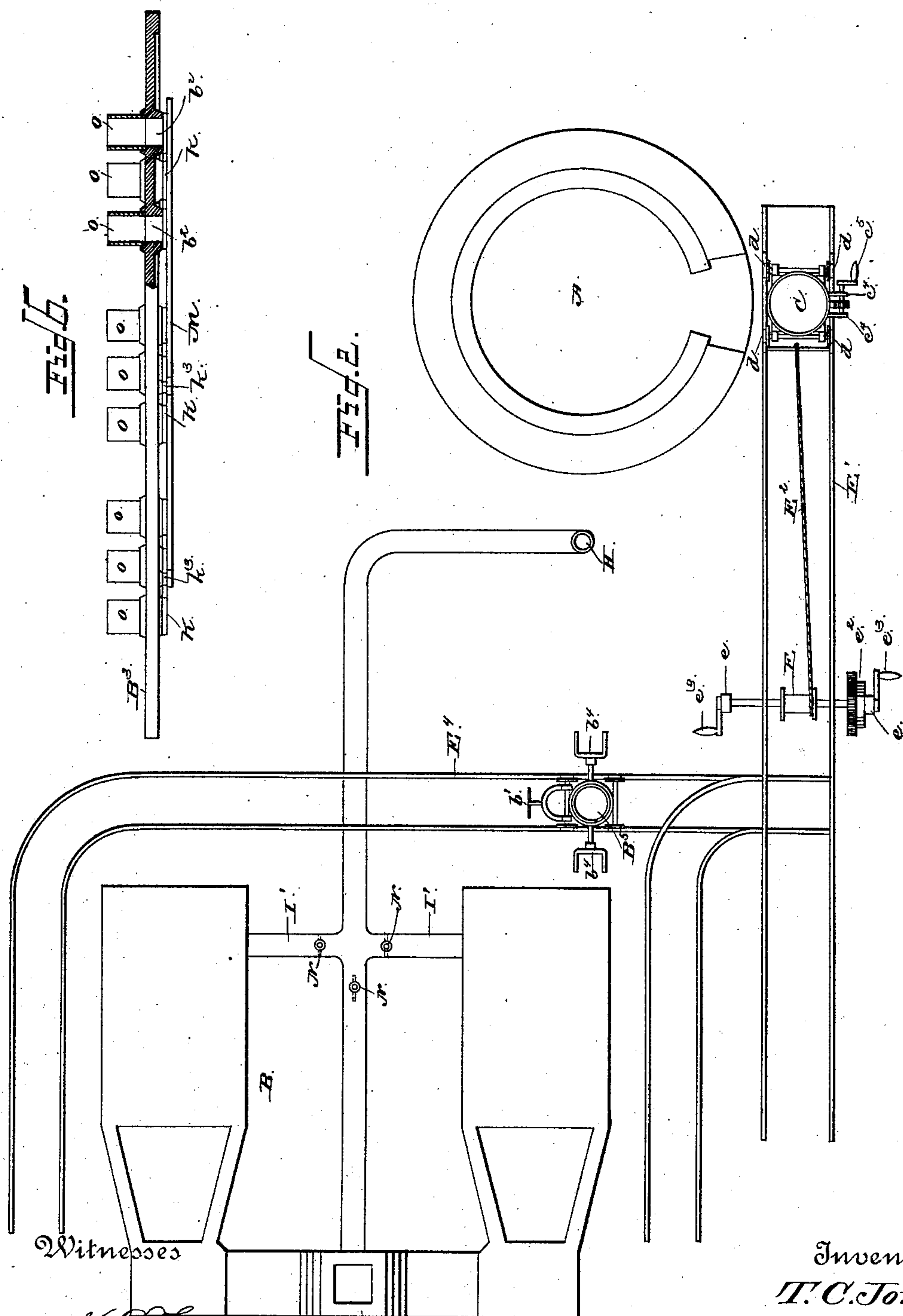
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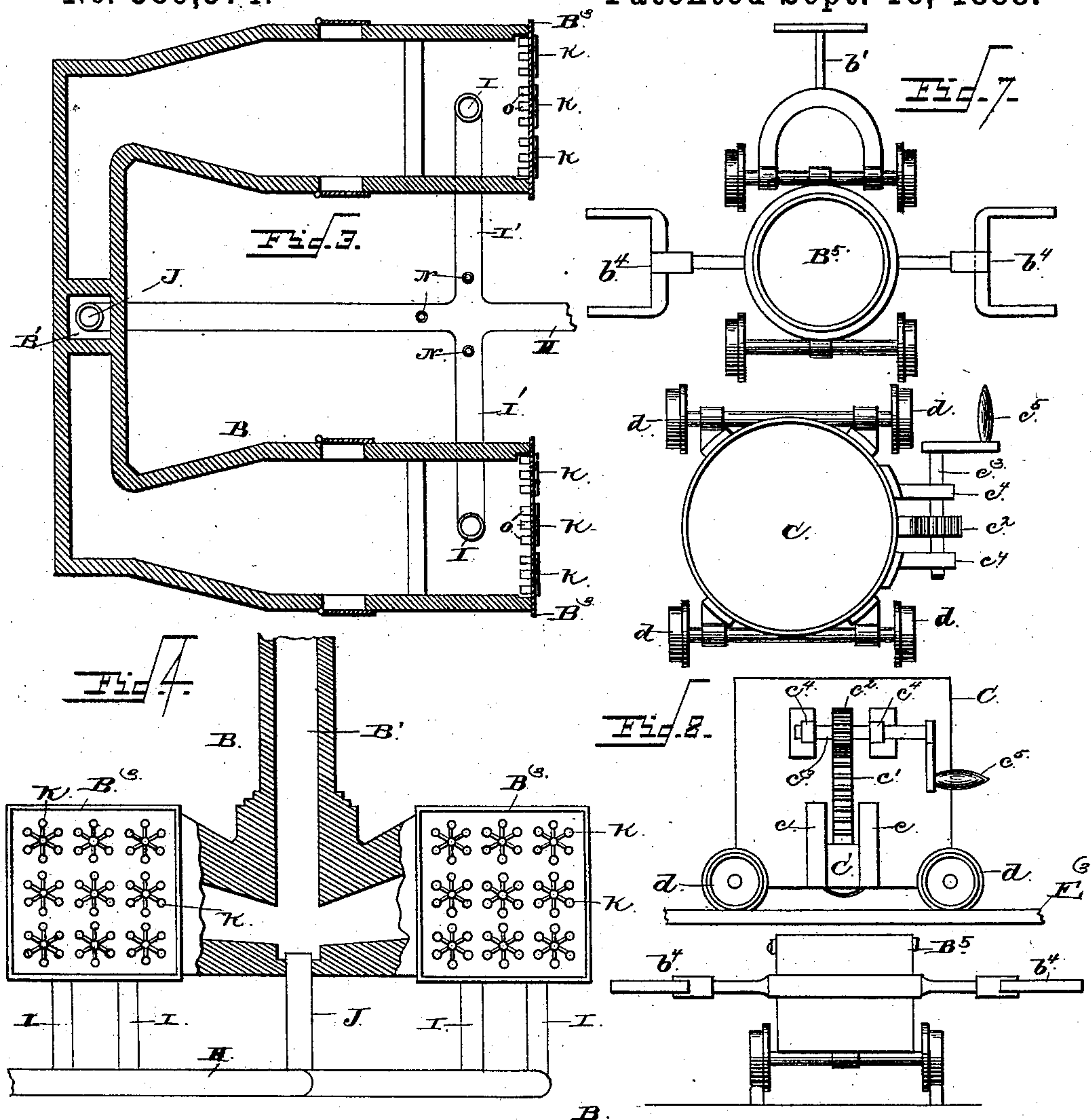
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UNITED STATES PATENT OFFICE.

THOMAS CATESBY JONES, OF LYNCHBURG, VIRGINIA.

PUDDLING-FURNACE.

SPECIFICATION forming part of Letters Patent No. 389,574, dated September 18, 1888.

Application filed June 18, 1887. Serial No. 241,759. (No model.)

To all whom it may concern:

Be it known that I, THOMAS CATESBY JONES, a citizen of the United States, residing at Lynchburg, in the county of Campbell and State of Virginia, have invented a new and useful Improvement in Puddling-Furnaces, of which the following is a specification.

My invention relates to an improved apparatus for puddling molten iron from blast-furnaces; and it consists in the construction and arrangement of the parts of the mechanism employed in connection therewith, which will be more fully hereinafter described, and particularly pointed out in the claims.

In the accompanying drawings, which fully illustrate my invention, Figure 1 is a front elevation of a blast-furnace, the puddling-furnace showing my improved mechanisms in connection therewith, and also showing the puddling-furnace in section. Fig. 2 is a top plan view of the blast-furnace, with the improvement shown in connection therewith. Fig. 3 is a horizontal sectional view of the puddling-furnace. Fig. 4 is a front elevation of the puddling-furnace, with the stack shown in section. Fig. 5 is a front view of a portion of the said puddling-furnace, on an enlarged scale, showing the damper mechanism and the adjustment therefor. Fig. 6 is a top plan view, on an enlarged scale, of the damper and draft attachments, a portion thereof being shown in section. Fig. 7 is a top plan view of the two ladles. Fig. 8 is a side elevation of the receiving and supply hand-ladles in position to receive a charge.

A indicates the blast-furnace, and B the puddling-furnace, which are constructed in the ordinary manner and have a common chimney through the medium of the exit-pipe H, which connects the blast-furnace with the puddling-furnace. The gas issuing from the top portion of the blast-furnace passes through the pipe H, and by means of the branch pipe I a portion thereof passes into the fire-chamber of the puddling-furnace B and is consumed, and the remaining portion through the branch pipe J into the stack B' of the puddling-furnace, through which it escapes into the open air, together with the products of combustion issuing from the fire-chamber of the puddling-furnace. The blast-furnace A has a closed

top or cap-cover, A', and by which construction the gas must of necessity be forced through the pipe H, which is connected to the upper portion of the blast-furnace. I thus utilize the blast-furnace gas to heat the puddling-furnace.

The essential feature of my invention is the conveyance of a metal while in a molten state from the blast-furnace to the puddling-furnace by means of receiving supply and hand ladles, which are adapted to move upon trucks running upon tramways. To this end I construct a truck, D, having wheels D' and D², the forward wheels, D', being of smaller diameter, while the rear wheels, D², are of larger diameter, for a purpose which will be hereinafter set forth. The frame-work of this truck D is constructed of two longitudinally-arranged track-irons, D³, upon which suitable flanged wheels, d, are mounted, which are in connection with the receiving-ladle C. This receiving-ladle is constructed of a configuration well understood in the art, but upon one side thereof is provided with an outflow-gate, C', moving in vertical ways cc, and adapted to be raised and lowered when desired, through the medium of a rack-bar, c', connected to the upper portion of said gate, which rack-bar is operated by a spur-pinion, c², mounted upon a shaft, c³, having movement in journal-boxes c⁴, and provided with an operating winch or handle, c⁵.

The forward end of the truck D is provided with a very small wheel, as hereinbefore set forth, and the rear of the truck with a very large wheel. The wheels of the said truck as thus constructed are adapted to be mounted upon an inclined track or tramway, E', and through the inclination of the said track or tramway is due the construction of the truck with the small forward wheels and the enlarged rear wheels, whereby the ladle supported thereon is held in an upright position with a true horizontal base for the purpose of receiving the molten metal from the blast-furnace. To the forward portion of the said truck D a cable or chain, E², is secured, which at its other end passes over and is wound, when operated, upon a drum or windlass, E, which is mounted in the upper portion of suitable standards, e, and is set in motion by a

suitable gearing, e' , and ratchet mechanism e^2 , which is operated by a winch or handle, e^3 , projecting from each side of the standards e , and secured to the shaft upon which the drum or windlass E is mounted. In revolving the handles e^3 the cable or chain E^2 is wound upon the windlass or drum E, and when such operation is effected the truck D is drawn up the inclined tramway E' , said truck always assuming a horizontal position, which is due to the construction of the large and small wheels, upon which the same is mounted. When the ladle C, with its frame-work, is drawn to the standards e , and the chain of the truck B is wound upon the windlass E, and the truck drawn up in proximity to said windlass and over the same, the said ladle C and its frame-work are pushed over on another tramway, E^3 , under which a third tramway, E^4 , is arranged, running to the tramway E^3 at right angles.

Upon the tramway E^4 the receiving-ladle B^3 is mounted, being connected to a suitable truck having wheels of equal diameter in a manner similar to the ladle C. The ladle B^3 is constructed in the form of a hand-ladle, having handles b^4 projecting outwardly from each side thereof, as will be readily understood by those skilled in the art. In addition to the handles b^4 , connected to the ladle B^3 , a bail, b^5 , is also secured in connection therewith, by which the ladle may be elevated. The tramway E^4 passes in close proximity to the puddling-furnace B, and when the said ladle B^3 has received a supply of the molten metal from the supply-ladle C it is moved along the tramway E^4 until it arrives in the proper position with respect to the puddling-furnace B, when the bail b^5 thereof is secured to an elevating chain or cable, b , which is mounted in connection with a windlass or drum, B^2 , and by which the said ladle B^3 is elevated and its contents deposited in the chamber of the puddling-furnace.

When the receiving supply-ladle C is mounted or is placed in a position upon the tramway E^3 , connecting with the tramway E' , to be engaged by the hand supply-ladle B^3 , the gate of said ladle C is opened by means of the mechanism hereinbefore set forth, and a quantity of the molten metal allowed to run into the ladle B^3 , when it is shifted in proximity to the puddling-furnace B, as hereinbefore stated, and its contents deposited in the said furnace.

It will be understood that a series of the ladles B^3 will be used, so that the contents of the receiving-ladle C will be quickly deposited in the chambers of the puddling-furnace B. When the ladle C shall have been relieved of its contents, it is run back on the truck D, which will have remained in position, and the said truck lowered on the inclined tramway E' in relative proximity to the tap-hole or gate of the blast-furnace, when the same operation will be repeated as hereinbefore described. It will be understood that the ladles

B^3 will be provided with suitable draw-bars and handles, b' , by which they are conveyed and transported upon the tramway E' .

The gases coming through the pipe H from the blast-furnace are conveyed to the puddling-furnace B, and either passed through the fire-chamber thereof through the medium of the branch pipe I or into the flue or chimney of the said puddling-furnace by means of the branch pipe J. As shown in Fig. 4, a series of the pipes I will be used, which are of smaller diameter than the main pipe H, while the branch J is of equal diameter to the said pipe H. The branch pipes I are secured to branches I' , running outwardly from the main pipe H at right angles thereto. At the point of intersection of the pipes I' with the pipe H, and in the pipe H beyond said point of intersection, dampers N are mounted, by which the gas passing through the pipe H may be controlled in its speed to the puddling-furnace B and be directed either straight to the stack of the said puddling-furnace through the branch J or through the branches I' to the pipes or branches I into the fire-chamber of the said puddling-furnace, as indicated by the arrows. By this means it will be seen that means are provided whereby the gas from the blast-furnace may be consumed in the puddling-furnace or be carried directly to the smoke-stack of said furnace and escape into the outer atmosphere.

The front plates of the puddling-furnace are provided with a series of dampers. These plates B^3 are constructed with a series of apertures b^2 , which are arranged in circular form, and, as shown, being six in number. As shown, the said series of openings or apertures b^2 are arranged in series and individually situated. To the inner portion of each of these apertures a short cylinder, O, is secured, which projects some distance into the fire-chamber of the said puddling-furnace, so that the draft is carried thereinto over the flame, which materially aids combustion, as will be readily understood. On the outer side of the plates B^3 a series of dampers, K, are mounted, which are adapted to engage with the apertures b^2 . These dampers K consist of a series of radial arms, k , pivotally connected at a common center, and have disks k' secured upon their outer ends, which are adapted to engage with the apertures b^2 to close the same when desired. These dampers may be operated separately to open or close any one of the series, or they may be opened or closed together in connection with a number of said series. I preferably construct said dampers, however, so that each series thereof on the same horizontal line shall be operated together, and to accomplish this projections k^3 are secured to the said dampers K to which bars M are attached and operated from one side of the plate B^3 to control the said damper and operate the same in unison, as will be readily understood. I do not, however, make any claim to the damper

in this application, the same being claimed in a separate application filed by me July 16, 1887, Serial No. 244,526.

By my improved method of treating the molten metal in the puddling-furnace conveyed directly thereto from the blast-furnace, as hereinbefore described, a great saving in fuel is the result.

By my improvement the molten metal from the blast-furnace is placed directly in the puddling-furnace, and a great saving in fuel necessarily resulting from the fact that a greater amount of heat would be required to be generated to convert the pig-iron into a molten state. By my method that amount of heat only is required which is necessary to retain the metal in a molten state.

The novelty and utility of my improvement are obviously apparent and appreciable, and it is unnecessary to further enlarge upon the same herein.

It is obvious that many minor changes in the construction and arrangement of the several parts may be made and substituted for those herein shown and described without in the least departing from the nature and principle of my invention.

Having thus described my invention, I claim—

1. A plant for puddling metal, consisting of a blast-furnace, a puddling-furnace, inclined and horizontally-arranged tramways between said furnaces, and receiving and supply ladles mounted on and moving over the tramways from the blast-furnace to the puddling-furnace, substantially as described.

2. A plant for puddling metal, consisting of a blast-furnace, a puddling-furnace, inclined and horizontally-arranged tramways between said furnaces, receiving and supply ladles mounted on said tramways, mechanism for moving said ladles over the tramways between said furnaces, and a hoisting device for raising the supply-ladles and discharging the contents thereof into the puddling-furnace, substantially as described.

3. In combination with the blast-furnace, the tramway E' , leading therefrom, the truck D, carrying the receiving-ladle C, the latter to receive the supply of molten metal from the

blast-furnace, the tramway E^4 , leading to the puddling-furnace, and the ladle B^5 , mounted upon a truck to run on tramway E^4 , the ladle B^5 receiving the metal from the ladle C and conveying the same to the puddling-furnace, as set forth.

4. A plant for puddling metal, comprising a blast-furnace, puddling-furnaces, tramways between the two, and wheeled ladles mounted on said tramways to convey the molten metal from the blast-furnace to the puddling-furnaces, as set forth.

5. In combination with the blast-furnace, the puddling-furnace, the ladle C, mounted upon a truck to run on one of the tramways, the ladle B^5 , mounted on the truck to run on another tramway, and the sliding gate C' in the ladle C, with actuating mechanism to move the gate to allow the contents of the ladle C to flow into the ladle B, as set forth.

6. In combination with a blast-furnace, the puddling-furnace, the inclined tramway E' , the truck D, running on the tramway and carrying the ladle C, the elevating mechanism for raising the truck D with the ladle up the tramway E' , the horizontal tramway E^3 , connecting with the inclined tramway E' , the tramway E^4 below the tramway E^2 and leading to the puddling-furnace, and the ladle B^5 , mounted upon a truck running on the tramway E^4 , said ladle B^5 receiving its supply from the ladle C while the latter is upon the tramway E^3 , as set forth.

7. In combination with the blast-furnace, the tramway E' , leading therefrom, the truck D, supporting the ladle C, the tramway E^4 , leading to the puddling-furnace, the ladle B^5 , supported upon a truck, said ladle B^5 receiving the molten metal from the ladle C, and the elevating mechanism to raise the ladle B^5 from off its truck and allow the contents of said ladle to be poured into the puddling-furnace, as set forth.

In testimony that I claim the foregoing as my own I have hereto affixed my signature in presence of two witnesses.

THOMAS CATESBY JONES.

Witnesses:

JOHN L. ADAMS,

W. C. N. RANDOLPH, Jr.