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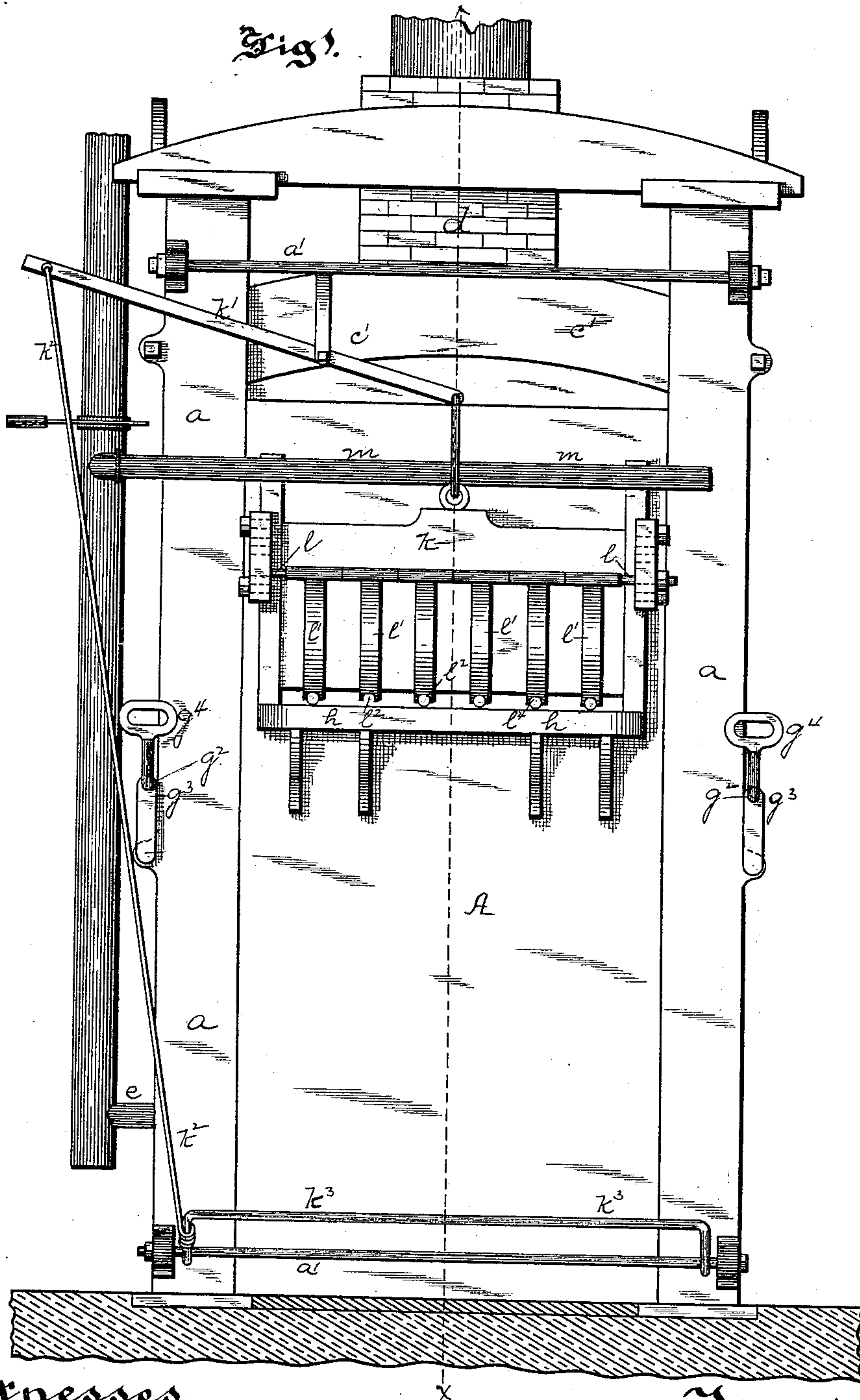
2 Sheets—Sheet 1.

A. J. LENNOX & J. KREPP.

FURNACE.

No. 335,367.

Patented Feb. 2, 1886.



Witnesses.

F. G. Shaw
James Cooke

Inventor.

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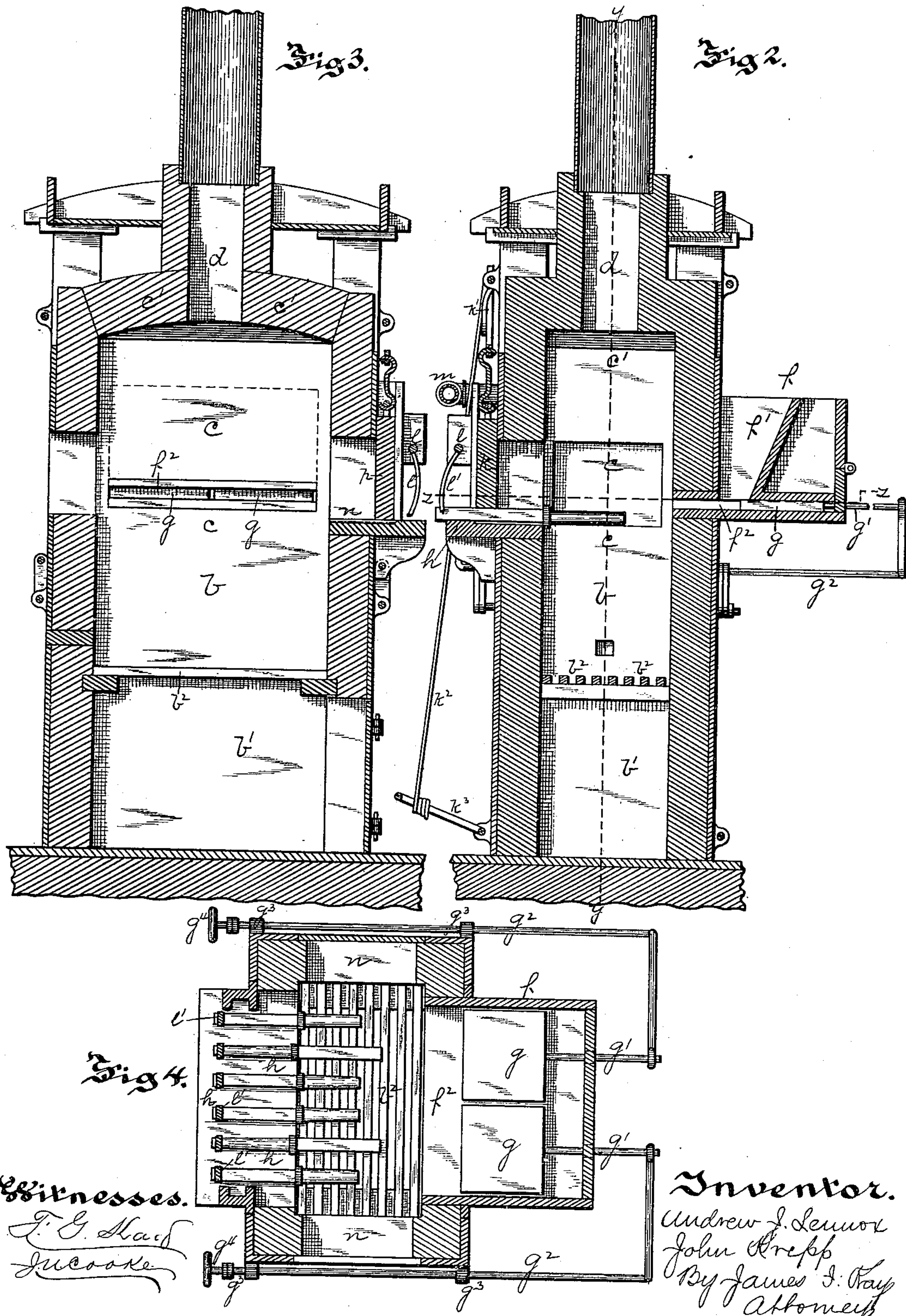
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UNITED STATES PATENT OFFICE.

ANDREW J. LENNOX AND JOHN KREPP, OF ALLEGHENY, PENNSYLVANIA.

FURNACE.

SPECIFICATION forming part of Letters Patent No. 335,367, dated February 2, 1886.

Application filed July 20, 1885. Serial No. 172,102. (No model.)

To all whom it may concern:

Be it known that we, ANDREW J. LENNOX and JOHN KREPP, of Allegheny city, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Furnaces; and we do hereby declare the following to be a full, clear, and exact description thereof.

Our invention relates to furnaces for heating metals, having special reference to furnaces for heating blanks for forging purposes, such as blanks for the manufacture of wagon and carriage axles, and other blanks in which it is desired to heat a portion of the blank while the remainder thereof is kept comparatively cold, this being termed "short-heating."

In the manufacture of these carriage-axles it is customary to heat and forge one part of the axle to shape and substantially finish the same, and it is then desirable to heat and forge another part thereof without raising the part finished to such heat as to injure the same. The heat necessary for these forging operations is, especially on thick blanks, such as for heavy wagon-axles, necessarily high, the blanks being raised to a white heat to weld the metal if cracks or flaws are formed therein, and if the portion of the blank previously finished is raised to such high heat it is sometimes melted out of shape or otherwise injured, and for these reasons a furnace which will allow of the high heating of the metal close to the part which is to be kept cold is very desirable.

The object of our invention is to provide a suitable furnace for short-heating heavy blanks, in which the portion of the blank to be heated extends over a sill-plate in the upward draft from a fuel-pot to the stack above the furnace-chamber, while the portion resting on the sill-plate is protected thereby from the heat of the furnace, and in which the blanks are supported in this position by means independent of the furnace-door, so that the door may be raised and lowered without displacing them.

In the accompanying drawings, Figure 1 is a face view of our improved furnace. Fig. 2 is a longitudinal section on the line $x x$, Fig. 1. Fig. 3 is a longitudinal section on the line yy ,

Fig. 2; and Fig. 4 is a cross-section on the line $z z$, Fig. 2.

The furnace A is built of brick-work supported within buck-staves a , which are formed of angular plates bolted together by bars extending across the face and sides of the furnace, as shown at $a' a'$. At the base of the furnace is the ash-pit b' , above which are the grate-bars b^2 , by means of which fuel is supported within the fuel-pot b , and above the fuel-pot b is the furnace or working-chamber c , this furnace-chamber c being formed vertical, the chamber having an arched roof, c' , extending up from the center of which is the stack-flue d . The grate-bars employed may be of any suitable construction, according to the fuel used, whether it is desired to employ a shaking-grate or not, and leading into the ash-pit under the grate-bars is the blast-pipe e , by means of which air under pressure is furnished to the furnace for promoting combustion. Above the fuel-pot in the back of the furnace is the fuel-box f , by means of which fuel is fed to said pot, this box having the hopper f' communicating at the top with a chute, (not shown,) by means of which the fuel is directed into said hopper, and extending from said hopper into the furnace is the horizontal passage f^2 , this passage entering the furnace-chamber c above the fuel-pot b . Sliding within this horizontal passage and the lower part of the hopper f' is the feeding-plate g , said feeding-plate having the bar g' at the rear thereof, which bar is secured by any suitable means, extending to the forward part of the furnace, by means of which it may be drawn forward and back within the horizontal passage f^2 to feed the fuel to the furnace, the plate being drawn back far enough to allow a small portion of fuel to pass in front of it, and when it is pushed forward through said horizontal passage f^2 , pushing said fuel into the fuel-pot and scattering it over the surface of incandescent fuel therein, thus serving to feed a small portion of fuel to the furnace at a time, and so scatter it over the surface of burning coals as to prevent the chilling of the fire and cause the rapid heating of the new fuel fed thereto and the generation of gas and a high heat within the furnace. Two of these feeding-plates are employed within the hori-

zontal passage, as shown, so that the fuel may be fed to either side of the furnace, and while the new fuel is being heated thereby the other side of the furnace is maintained at the high heat necessary for the operation of the furnace. These feeding-plates g in the construction shown are operated by means of the rod g^2 , sliding in suitable guides, g^3 , secured to the plate or buck-staves a , the rod g^2 being secured to the end of the bar g' or the feeding-plate, and having at the other end the handle g^4 , by which the operator can feed the fuel to the furnace, the operator simply pulling on this handle and so drawing forward the feeding-plate and feeding the fuel and then shoving it back to place, when the fuel will enter from the chute in front of the feeding-plate ready for the next feeding operation. In the front of the furnace is the sill-plate h , this sill-plate extending into the furnace at about the center of the chamber c , and being made of tile, or metal protected by tile. Above said sill-plate is the door k , which slides in suitable guides and is hung in any suitable manner. In the construction shown the door is hung from the lever k' , at the opposite end of which is the bar or chain k^2 , secured to the foot-lever k^3 , so that the operator can raise and lower this door by his foot while operating the furnace. Extending across the furnace in front of the door is the rod or bar l , from which depend the finger-bars l' , by means of which the axle-blanks or other articles to be heated are supported within the furnace, the blanks resting on the sill-plate and extending out beyond the same into the furnace-chamber the distance it is desired to heat them, while the finger-bars press on the upper surface of the blank and hold them down upon the sill plate, this supporting them within the furnace. The lower ends of these finger-bars have a slight depression, as at l'' , the body of the blank fitting within these depressions, which act to hold them in their proper position, extending out into the furnace-chamber and prevent their being displaced by any slight pressure on the ends extending out in front of the furnace.

In order to introduce the blank within the furnace the door is raised, the blank pushed into the furnace between two finger-bars, and then rolled under one of them, the finger-bar then catching thereon, when it holds it in position until it is withdrawn by the operator; and to draw out the blank he simply catches it with his tongs, raises the door sufficiently to allow it to be drawn out and pulls backward, when it will be drawn out and the finger-bar will swing back until it releases it, and thus allow the blank to be withdrawn. The sill-plate h extends out a sufficient distance into the furnace-chamber to hold the blank to be heated within the heat and flame thereof, and the heat and flame rising from the fire-pot will strike the part of the blank extending beyond the sill-plate and heat it rapidly, while the part of the blank resting on the sill-plate is protected thereby from the heat of the furnace

and remains perfectly cold, the furnace thus acting to "short-heat" the blank, raising it to a very high heat close to the sill-plate, and yet holding the part protected thereby at a comparatively low temperature. The sill-plate is protected from rapidly burning out by the tile or brick work underneath it. The sill-plate is grooved on its face, if necessary, to hold the blanks in proper position.

Extending across the front of the furnace, just above the door, is the blast-pipe m , which has suitable openings on the undersurface thereof, through which a current of cold air is blown down upon the door and the sill-plate and blanks resting thereon, so as to prevent their being raised to a high heat, and this blast entering under the door and around the blanks prevents the flame from passing out under the door when it is raised to insert the blanks by forming a current in the opposite direction, this current of air acting at the same time to feed air for combustion to the flame or unconsumed gases rising around the ends of the blanks extending into the furnace and serving to increase the heat of the furnace at this point.

In order to arrange the furnace for short-heating long blanks we have provided it with similar sill-plates, n , and doors p , in one or both of the side walls, these doors being supported in substantially the same manner, and the finger-bars being employed with them, if necessary, and, if desired, where it is necessary to heat the center of a long bar, it may be passed through the furnace across the furnace-chamber, the ends of the bars extending out through the side doors thereof.

In the operation of the furnace the hammer-man or other operator feeds the fuel to the furnace gradually by means of the sliding plates before referred to, the fuel being scattered thereby over the surface of the burning coals in the fire-pot, and the furnace being thus raised in a short time to an exceedingly high heat. He then raises the furnace-door k and introduces the blanks, the blanks extending beyond the sill-plate the desired distance for heating, and being held in position by the finger-bars l' , and he can, by feeding a fresh blank as each one is withdrawn, arrange the furnace for heating blanks so that the forge can be operated continuously. As the flame and heated products rise from the fire-pot through the furnace-chamber to the stack, they pass around the ends of the blanks extending beyond the sill-plate and heat them rapidly, practical experiences showing that thick blanks can be heated to a white or welding heat within an exceedingly short time. During the operation of the furnace, as it is necessary to feed the fuel thereto he draws on the bar g^2 , as above described, and scatters the fresh fuel over the surface of the fire-pot on one side or the other of the same, and as the fuel is not fed to the furnace in large masses, as is the case in shoveling it into the same, he is enabled to maintain the furnace at a high and even heat and to op-

erate the same with a small amount of fuel, the furnace requiring only from twelve to sixteen bushels of slack per day in doing the same work as the ordinary reverberatory furnace which requires from four to five times that amount of fuel. It can also be operated with fine slack, which is exceedingly inexpensive. As the blanks are protected from heating by the sill-plate, as before described, practical experience has shown that a white or welding heat can be obtained in the part extending into the furnace-chamber, while the balance of the blank is cold enough to touch with the hand.

The furnace requires about one-fourth the space necessary for the ordinary reverberatory furnace, as the fire-pot, furnace-chamber, and stack are arranged vertically above each other.

Where it is desired to employ our furnace with natural gas or similar fuel, the fuel-box *b* may be filled with fire-brick or other heat-supporting material and the gas pass up through the fuel-pot, the heat being sustained by this means, as is usual in using this gas as fuel.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. A furnace for heating metal articles, having a furnace-chamber provided with a sill-plate and a fire-pot at the base of the furnace-chamber, in combination with a supporting-bar adapted to press upon the upper surface of the article where it extends beyond the furnace, substantially as and for the purposes set forth.

2. The combination, with the furnace having the sill-plate *h*, the finger-bar *l'*, swinging above the sill-plate and adapted to press upon the article to be supported, substantially as and for the purposes set forth.

3. In combination with the furnace, having the fuel-pot *b*, furnace-chamber *c* above it, stack-flue *d*, leading from the top of the furnace-chamber, and sill-plate *h*, the finger-bar depending above the sill-plate and adapted to press upon the article to be supported, substantially as and for the purposes set forth.

4. In combination with the furnace having the fuel-pot *b*, working-chamber *c* above it, sill-plate *h*, and door *k*, the blast-pipe *m*, adapted to induce an air-current under the door into the working-chamber, substantially as and for the purposes set forth.

5. In combination with the furnace having the working-chamber *c* and sill-plate *h*, the depending finger-bar *l'*, having the depression *l''* therein, substantially as and for the purposes set forth.

In testimony whereof we, the said ANDREW J. LENNOX and JOHN KREPP, have hereunto set our hands.

ANDREW J. LENNOX.
JOHN KREPP.

Witnesses:

JAMES I. KAY,
J. U. COOKE.