

No. 654,516

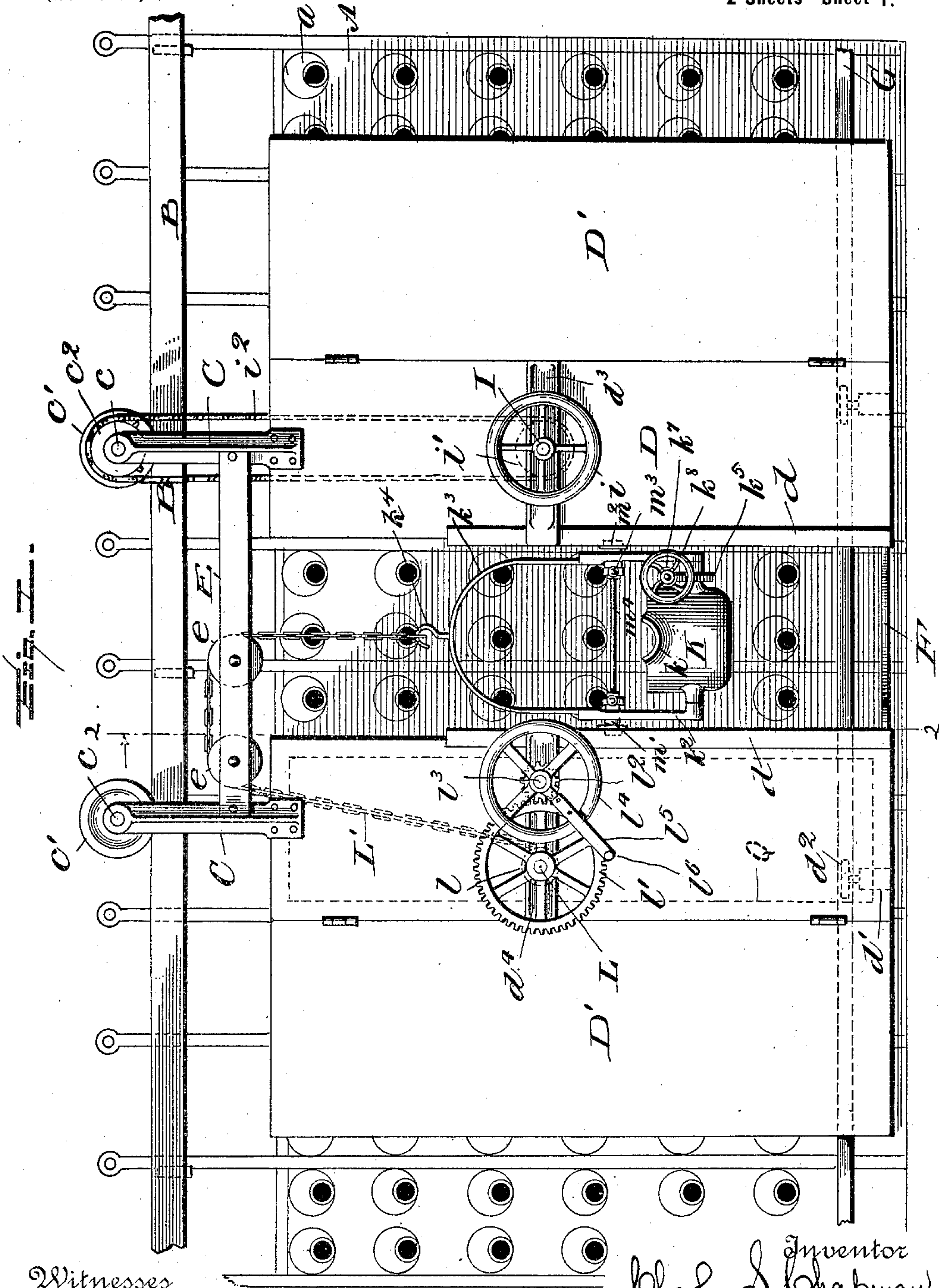
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C. S. CHAPMAN.  
SHIELD FOR FURNACES.

(Application filed Apr. 15, 1899.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses

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# UNITED STATES PATENT OFFICE.

CHARLES S. CHAPMAN, OF PITTSBURG, KANSAS, ASSIGNOR TO THE PITTSBURG FOUNDRY AND MACHINE COMPANY, OF SAME PLACE.

## SHIELD FOR FURNACES.

SPECIFICATION forming part of Letters Patent No. 654,516, dated July 24, 1900.

Application filed April 15, 1899. Serial No. 713,166. (No model.)

*To all whom it may concern:*

Be it known that I, CHARLES S. CHAPMAN, a citizen of the United States, residing at Pittsburg, in the county of Crawford and State of Kansas, have invented certain new and useful Improvements in Shields for Furnaces; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in an improved shield for use in connection with metallurgical furnaces hereinafter described, reference being had to the accompanying drawings, which illustrate one form in which I have contemplated embodying my invention, and said invention is fully disclosed in the following description and claims.

In the drawings, Figure 1 represents a side view of a portion of a zinc-smelting furnace, showing my improved shield in connection therewith. Fig. 2 represents a vertical transverse sectional view of the shield on line 2 2 of Fig. 1 looking in the direction of the arrow in that figure and showing one of the buckstaves and a vertical series of condensers of the said furnace. Fig. 3 is a detail view of a portion of the shield and ladle supporting devices shown in Fig. 2, illustrating the mechanism for moving the ladle horizontally toward and from the furnace. Fig. 4 is an enlarged detail view of a portion of the shield and one of the levers and connected devices for moving the ladle horizontally.

The object of my invention is to provide a shield for protecting the operator or operators while attending to the furnace, and particularly while drawing off the condensed metal from the condensers thereof, the said shield being provided with mechanism for moving it longitudinally of the furnace and being also provided with mechanism for supporting the ladle, for raising and lowering the same, and for moving the ladle horizontally toward and from the furnace.

In the drawings, A represents one side of a zinc-smelting furnace provided with a series of retorts, (not shown,) each retort being provided with a condenser  $\alpha$ .

B represents a supporting-track which extends longitudinally the whole length of the furnace and is supported at intervals by means of brackets  $b$ , which are preferably secured to certain of the buckstaves  $A'$  of the furnace. I prefer to provide these buckstaves with supporting-lugs  $a' a'$ , adapted to engage the bracket  $b$  above and below the same, and the brackets are bolted or otherwise secured to the buckstaves.

C C represent vertical hangers provided at their upper end with studs  $c$ , upon which are mounted grooved rollers  $c'$ , which engage the supporting-track B. One of these rollers  $c'$  is provided with a sprocket-wheel  $c^2$ , cast integrally therewith or formed separately and secured thereto, as preferred, as shown at the right in Fig. 1.

D D represent vertically-disposed plates secured at their upper ends to the hangers C C, the said plates being stiffened on the side toward the furnace by means of a suitable strengthening-framework  $d$ , of angle-iron or other structural iron, as indicated in dotted lines in Fig. 1. The hangers C C are connected by means of a horizontal bar E, which is bolted or otherwise secured thereto, and the lower ends of the plates D D are held in fixed relation with each other by means of a bar F, which is curved inwardly toward the furnace, as indicated in Figs. 1 and 2, in order that it shall not interfere with the ladle.

G represents a guide-rail secured to the buckstaves of the furnace, near the bottom of the same, and extending the whole length of the furnace and provided with a vertical outer face, and the plates D D are provided on their inner faces with brackets  $d' d'$ , carrying rollers  $d^2 d^2$ , which bear against the vertical face of the guide-rails G and guide the lower ends of the plates D D when the shield is moved longitudinally of the furnace. The weight of the shield tends to throw the lower end thereof inward toward the furnace, thus keeping the rollers  $d^2 d^2$  always in contact with the guide-rail G.

D' D' are wings formed of sheet metal and connected to the outer edges of the plates D D, preferably by hinge connections, as indicated in Fig. 1, and forming extensions of the



plates D. One of the plates D, in this instance the one at the right in Fig. 1, is provided with a horizontal shaft I, mounted in a suitable bearing provided in this instance  
 5 in a horizontally-arranged brace-bar  $d^3$ , secured to the plate D and the framework thereof. The shaft I is provided on the outer side of the plate D with a hand-wheel  $i$  or other operating device and on the inner side of the  
 10 plate with a sprocket-wheel  $i'$ , which is connected by means of a sprocket-chain  $i^2$  with the sprocket-wheel  $c^2$ , before described. It will be seen that by turning the hand-wheel  $i$  the sprocket-wheels  $i'$  and  $c^2$  can be rotated,  
 15 thus rotating the roller  $c'$  on the track B and propelling the shield along said track in either direction.

K represents the ladle, provided with a spout  $k$  on its inner and outer sides and with later-  
 20 ally-projecting trunnions  $k'$   $k'$ , which are pivotally connected with the lower ends of vertical arms  $k^2$   $k^2$ . The upper ends of the arms  $k^2$   $k^2$  are connected by a bail  $k^3$ , having a hook  $k^4$  at its upper end. One of the plates D, in  
 25 this instance the one at the left in Fig. 1, is provided with a horizontal brace-bar  $d^4$ , in which is mounted a horizontal shaft L, carrying on the inner side of the plate a winding-drum  $l$  and on the outer side of the plate a  
 30 large gear-wheel  $l'$ , which meshes with a pinion  $l^2$ , mounted on a stud  $l^3$ , secured to the bar  $d^4$ , said pinion having operatively connected with the same a hand-wheel  $l^4$ , to which is advantageously secured an operating lever  
 35 or arm  $l^5$ , provided with a handle  $l^6$ . The horizontal cross-bar E is provided with one or more (two being shown) grooved rollers  $e e$ , and a chain  $L'$  extends from the winding-drum  $l$  over said rollers  $e e$  to the hook  $k^4$  of the la-  
 40 dle-supporting bail. By means of this mechanism just described the ladle is supported between the two plates D D of the shield and can be raised and lowered by the operator to bring it beneath any one of a vertical series  
 45 of condensers  $a$  for the purpose of drawing off the condensed metal from the condensers into the ladle.

In order to guide the ladle K in its vertical movements and also to enable it to be moved  
 50 toward and from the furnace, which is frequently necessary to avoid parts projecting from the face thereof, I provide the following mechanism, (illustrated in Figs. 2, 3, and 4 particularly:) Each of the arms  $k^2$  is pro-  
 55 vided with a short shaft  $m$ , extending through the same, to which is rigidly attached an arm  $m'$ , provided with a friction-roller  $m^2$ , adapted to engage a vertical guiding-groove  $d^5$ , formed in the inner edge of each plate D, in any de-  
 60 sired way. The shaft  $m$  is also provided with an operating-lever M, having a handle  $m^3$ , and the two operating-levers M M are preferably connected for joint movement by a cross-bar  $m^4$ . By means of these levers M  
 65 the ladle K can be swung outwardly from the furnace, as indicated in Fig. 2. One of the trunnions  $k'$  of the ladle K is provided with

a worm-wheel  $k^5$ , and the adjacent arm  $k^2$  is provided with a worm-shaft  $k^6$ , having a worm  $k^7$  in engagement with the worm-wheel  $k^5$  and  
 70 provided at its outer end with a hand-wheel  $k^8$ . By means of this construction the ladle can be tilted to pour its contents into a mold or other receptacle.

In using my improved shield for the pur-  
 75 pose of drawing off the contents of the condensers the operator will, by means of hand-wheel  $i$ , move the shield until the ladle is in line with the vertical row of condensers which it is desired to empty. By means of the ladle-  
 80 hoisting mechanism before described the ladle can be placed in position to receive the contents of any one of the condensers of the row, and the contents of said condensers will be successively withdrawn into the ladle. The  
 85 shield will then be moved to the next row of condensers, and so on. If for any reason it should be desired to use the shield without the ladle, the latter can be disengaged there-  
 90 from and disconnected from the chain  $L'$ .

The shield is capable of use without the ladle when found desirable to protect the operator while performing any kind of work  
 close to the sides of the furnace, removing the condensers, and cleaning out the retorts  
 95 preparatory to recharging, in which case the ladle would not be needed and would only be in the way.

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

1. The combination with a furnace, of an upper and lower track arranged adjacent thereto, a furnace-shield provided with rollers engaging the upper track, and with inwardly-extending arms provided with rollers  
 105 engaging the lower track, substantially as described.

2. The combination with a supporting-track, of a furnace-shield provided with rollers engaging said track, propelling mechanism carried by said shield, operative connections between said mechanism and one of said supporting-rollers for moving the shield along  
 110 said track, substantially as described.

3. The combination with a supporting-track, of a furnace-shield provided with rollers engaging said track, a driving-shaft carried by said shield and provided with a hand-operated device and gearing connecting said shaft with one of said rollers, for propelling  
 120 said shield along the track, substantially as described.

4. The combination with an upper supporting-track and a lower guide-rail having a vertical face of a furnace-shield provided with  
 125 rollers engaging said supporting-track, and having at its lower end friction-rollers bearing against the vertical face of said guide-rail, the weight of the shield holding said friction-rolls in engagement with the guide-  
 130 rail, substantially as described.

5. The combination with a supporting-track, of a furnace-shield provided with a vertically-arranged aperture therein, and hav-



ing rollers engaging said track, a ladle carried by said shield located in said vertical aperture, and having guiding devices engaging the shield at each side of said aperture, and  
5 means for raising and lowering said ladle in said aperture, substantially as described.

6. The combination with a supporting-track of a furnace-shield supported therefrom and movable longitudinally thereof said  
10 shield being provided with a central vertical aperture, a ladle carried by said shield and having guiding devices engaging the shield at each side of said aperture, mechanism for raising and lowering said ladle, and mechanism for moving said ladle transversely of the  
15 shield, substantially as described.

7. The combination with a supporting-track, of a furnace-shield supported therefrom and movable longitudinally thereof, said  
20 shield being provided with a central vertical aperture, a ladle carried by said shield and located in said aperture, arms pivotally connected with said ladle and provided with friction-rolls engaging guiding portions of said  
25 shield, operating-levers connected to said arms, for moving said ladle horizontally transversely of the shield, and mechanism for

raising and lowering the ladle, substantially as described.

8. The combination with a supporting-track of a shield supported therefrom, and  
30 movable longitudinally thereof, said shield being provided with a central aperture, driving mechanism carried by said shield, for moving the same longitudinally along said  
35 track, and wings hinged to and forming continuations of said shield, substantially as described.

9. The combination with a supporting-track of a shield supported therefrom and  
40 movable longitudinally thereof, said shield being provided with a central vertical aperture and a guiding-groove at each side of said aperture, a ladle provided with guiding-rollers engaging said groove, and mechanism for  
45 raising and lowering said ladle, substantially as described.

In testimony whereof I affix my signature in the presence of two witnesses.

CHARLES S. CHAPMAN.

Witnesses:

C. ALBERT WETTENGEL,  
C. G. EMERSON.