To all whom it may concern:

Be it known that I, Charles D. Irvin, a citizen of the United States of America, residing at Pittsburgh, in the county of Allegheny and State of Pennsylvania, have invented certain new and useful Improvements in Skimmers for Blast-Furnaces, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to certain new and useful improvements in skimmers and troughs for blast furnaces, and the invention has for its primary object the provision of novel means for conveying the residue of a trough to molds or ladles, thereby dispensing with a side gate heretofore used in a trough for removing the residue and forming "pigs" or pieces of iron.

It has been the practice, to provide a trough for conveying molten metal from a blast furnace to suitable molds or ladles and to provide a trough with a dam or bridge, to retard the flow of the metal and permit of cinders and foreign matter being removed from the surface of the metal. The use of a dam or bridge always prevented a certain quantity of molten metal from leaving the trough. Troughs have therefore been provided with side gates, through which the molten metal passes into earthen troughs and molds for forming "pigs" of the molten metal. This practice, always necessitated considerable space at one side of the skimming trough, and required the attention of three or four attendants in building and constructing the earthen troughs and molds for the reception of the residue molten metal. Considerable time and labor is lost in maintaining the earthen troughs and molds and in a great many instances, the forming of "pigs" at the side of the skimming trough has increased the waste product of a blast furnace causing a loss of many tons of molten metal.

To obviate the above defects in the present system of skimming and conveying molten metal to suitable molds or ladles, I have devised a novel means for retarding and checking the flow of molten metal through the trough, at the same time releasing the retarded metal at any time desired, thereby dispensing with the formation of "pigs" in the earthen molds at one side of the trough, and greatly facilitating the work performed when skimming molten metal.

The present invention is an improvement upon my invention for which an application for patent was filed March 15th, 1906, Ser. No. 306,315, and allowed July 5th, 1906. The allowed application sets forth a novel skimmer and trough, to which I have added certain attachments or elements that form the subject matter of this application.

The novel form of trough by which I accomplish the above results will be hereinafter more fully described and claimed, and referring to the drawings accompanying this application, like numerals of reference designate corresponding parts throughout the several views, in which:

Figure 1 is a perspective view of a trough constructed in accordance with my invention, Fig. 2 is a plan of the same, Fig. 3 is a perspective view of the movable section or gate of the skimmer of the trough, and Fig. 4 is a similar view of a movable auxiliary skimmer.

To put my invention into practice, I construct my improved trough of a channel shaped bar 1, which is preferably made of east iron and may be of any desired length. One of the side walls 2 of the trough is made of a greater thickness than the remainder of the wall, at its one end, as indicated at 3 forming a vertical shoulder 4.

The bottom 5 of the trough is provided with a dam or bridge 6 having an inclined outer end or side 7. The bridge or dam 6 is approximately one-half the height of the side walls 2 and 8 and said bridge extends from the side wall 8 into close proximity to the side wall 2, leaving a narrow passage way 9. In the passage way 9 is adapted to fit a movable section or gate 10 consisting of a head 16 having an upwardly extending hook 12, by which the section or gate is manipulated. In placing the section or gate within the passage way 9, ball or fire clay 14 together with sand is used for firmly securing the gate within the passage way, to prevent a leakage between said gate, the side wall 2 and the dam or bridge 6.

In close proximity to the dam or bridge 6 the side wall 8 is provided with a vertically disposed slot 15 extending in close proximity to the bottom 5 of the trough. In the slot 15 is mounted a gate 16 housing 17 by which the same is manipulated. This gate is also held within the slot 15 by clay and sand 18 which forms a tight connection between said gate, the side wall 2 and the dam or bridge 6.
between the gate and the side walls of the slot 15. The side walls 2 and 8 are also provided with vertically disposed slots 19, 19, said side walls being formed with vertical en-
largements 20, 20, forming guide ways in con-
junction with the slots 19, 19 for a skimmer 21. The skimmer 21 is provided with out-
wardly extending lugs 22, 22 adapted to rest upon the top of the enlargements 20, 20, while the body portion of the skimmer is
supported transversely of the trough within the slots 19, 19. The skimmer intermediate its ends is provided with an upwardly ex-
tending hook or handle 23 by which the skim-
mer may be easily manipulated.

Reference will now be had to an auxiliary skimmer 24, which is used when the gate 10 is removed. In order that the gate can be easily removed from the passage way 9, I provide the thickest portion 3 of the wall 2 with a revoluble stiurrup 25 in which is piv-
otted a lever 26 having a hook-shaped end 37, to engage in the hook 12 of the gate 10. By lowering the free end of the lever 26, the gate 10 can be raised and swung to one side.

The skimmer 24 is detachably suspended from the hook shaped end 28 of a lever 29, said lever being suitably suspended adjacent to the trough 1, preferably from the frame work of the building in which the trough is lo-
cated. The skimmer 24 has a lower beveled edge 30 and a projection 31. When the gate 10 is removed, the skimmer 24 is adapted to lie against the bridge or dam 6, the projec-
tion 31 thereof bearing against the shoulder 4 and preventing the molten metal from twisting the skimmer side wise.

In practice, the molten metal is adapted to flow within the trough 1 and overflow the dam or bridge 6, said dam or bridge serving to retard the molten metal until the metal is raised within the trough to a sufficient height to be engaged by a skimmer 21, said skimmer preventing cinders and all foreign matter carried by the surface of the molten metal from passing over the bridge 6 and into the molds or ladles into which the molten metal passes. After the cinders and foreign matter has been removed from the molten metal contained within the trough 1, the sec-

It is not actually necessary, that my im-
proved troughs be constructed with gates in their side walls.

I do not care to confine myself to the size, proportion or minor details of construction, and such changes as are permissible by the appended claims, may be resorted to without departing from the spirit and scope of the inven-
tion.

What I claim and desire to secure by Let-
ters Patent, is:-

1. A skimmer trough for a blast furnace consisting of a channel-shaped trough, a bridge arranged transversely of said trough and forming a dam, a movable gate mounted between the end of said bridge and one of the side walls of said trough, a stirrup revolu-

What I claim and desire to secure by Let-
ters Patent, is:-

2. A skimmer trough for a blast furnace consisting of a channel-shaped trough, a bridge arranged transversely of said trough and forming a dam, a movable gate mounted between the end of said bridge and one of the side walls of said trough, a lever pivoted in said stirrup and en-
gaging said gate, the other side wall of said trough having a slot formed therein, a gate detachably mounted in said side wall, a skimmer arranged transversely of said trough in close proximity to said bridge, an auxiliary skimmer movably mounted in said trough, and means to move said auxiliary skimmer, substantially as described.

3. A skimmer trough for a blast furnace consisting of a channel-shaped trough, a bridge arranged transversely of said trough, and forming a dam, a movable gate mounted between the end of said bridge and one of the side walls of said trough, a skimmer arranged transversely of said trough, an auxiliary skimmer sus-

4. A skimmer for blast furnaces, embody-
ing a channel-shaped trough, a bridge ar-
ranged transversely of said trough and form-
ing a dam adapted to partially close said trough, a gate detachably mounted between the end of said bridge and one of the side walls of said trough, and skimmers detach-
ially supported in said trough, substantially as described.

5. A skimmer for blast furnaces embody-
ing a channel shaped trough, a bridge ar-
ranged transversely of said trough and form-
ing a dam adapted to partially close said trough, a gate detachably mounted between
the end of said bridge, and one of the side walls of said trough, and a skimmer detachably supported transversely of said trough in close proximity to said bridge, substantially as described.

6. A skimmer for molten metal consisting of a channel-shaped trough, a dam or bridge mounted in the bottom of said trough, a gate adapted to fit between the end of said dam or bridge and the adjacent wall of the trough, and skimmers supported in said trough, substantially as described.

7. A skimmer for molten metal consisting of a channel-shaped trough, a dam or bridge mounted in the bottom of said trough, a gate adapted to fit between the end of said dam or bridge and the adjacent wall of the trough, and a skimmer bar mounted transversely of said trough, substantially as described.

8. A skimmer for molten metal consisting of a trough, a dam extending partly across said trough, a gate fitting between the end of the dam, and the adjacent side of the trough, and an adjustable skimmer bar arranged transversely of the trough.

9. A skimmer for molten metal consisting of a trough, a dam extending partly across said trough, a gate fitting between the end of said dam and the adjacent side of the trough, and a vertically adjustable skimmer bar extending transversely of the trough, and having end lugs to support the bar upon the sides of the trough.

10. A skimmer for molten metal consisting of a trough, a dam extending partly across said trough, a gate fitting between the end of the dam and the adjacent side of the trough, and skimmers arranged transversely of the trough.

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

CHARLES D. IRVIN.

Witnesses:
MAX H. SROLOVITZ,
A. J. TRIGG.