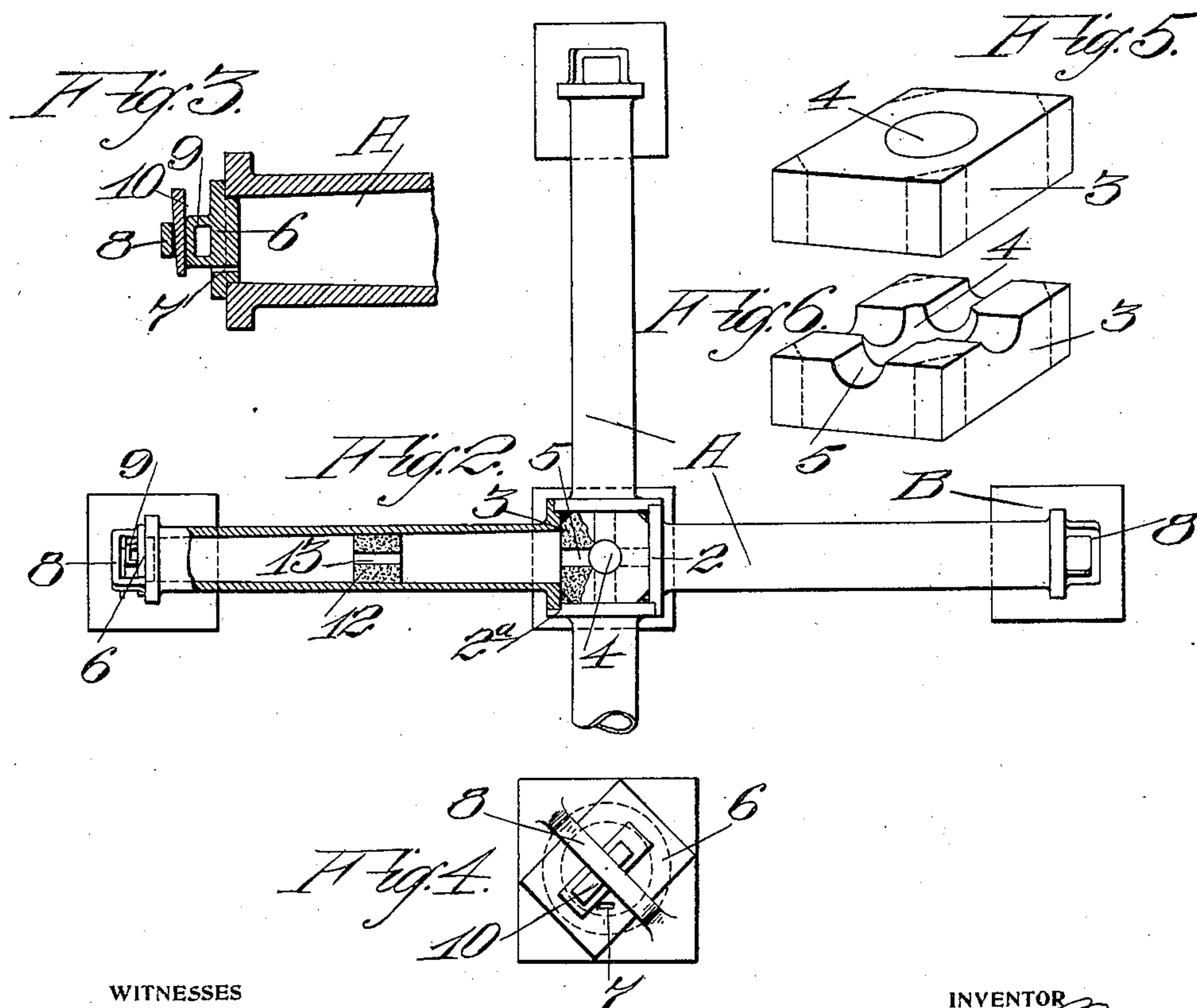
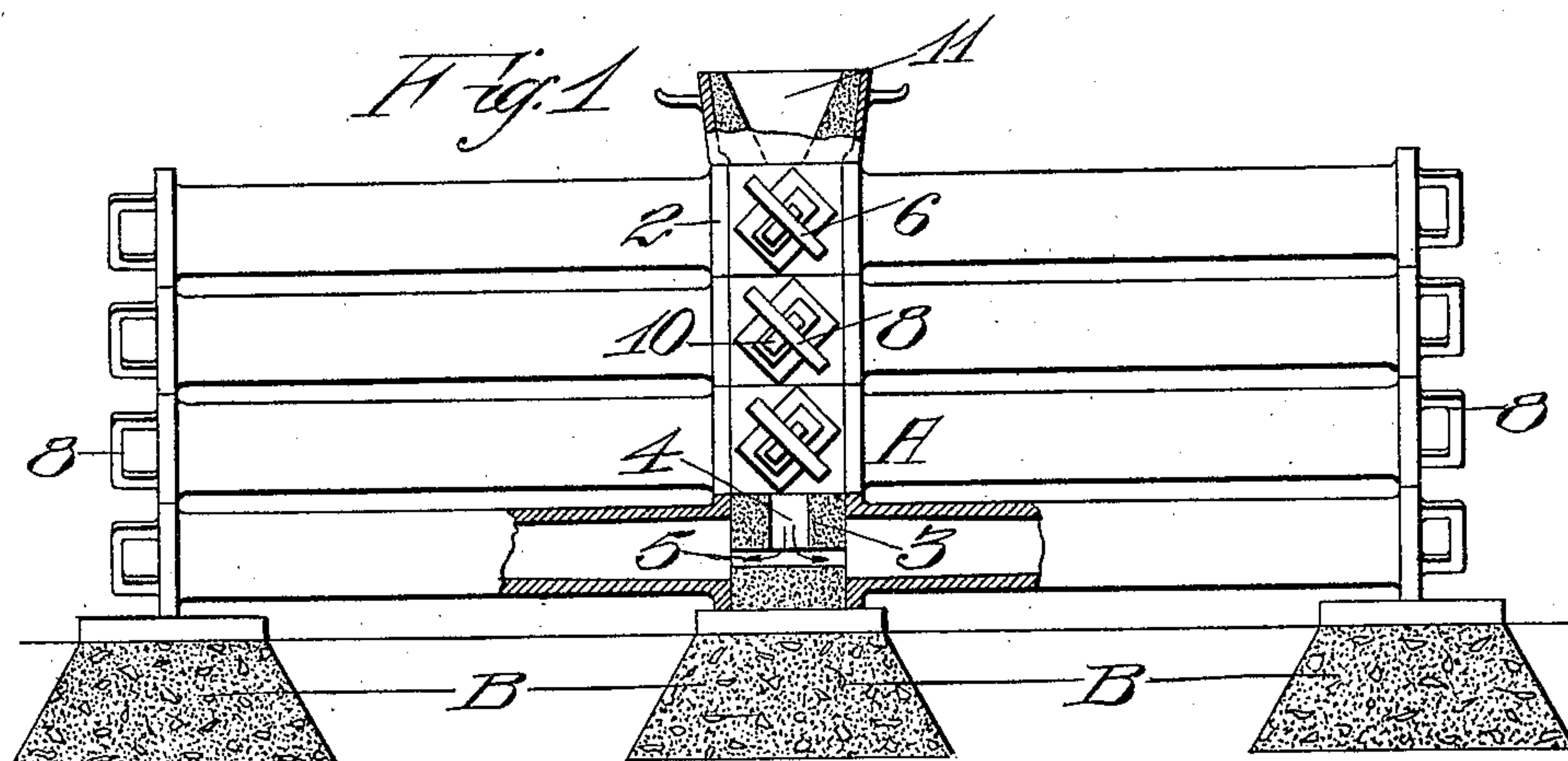


No. 890.934.

PATENTED JUNE 16, 1908.

A. RUDGEAR.  
MANUFACTURE OF SMALL STEEL INGOTS.  
APPLICATION FILED NOV. 16, 1907.



WITNESSES

*Thasberg*  
*St. Louis*

INVENTOR

*Andrew Rudgear*  
BY *Geo. H. Strong*  
ATTORNEY



# UNITED STATES PATENT OFFICE.

ANDREW RUDGEAR, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO A. MERLE CO., OF SAN FRANCISCO, CALIFORNIA, A CORPORATION OF CALIFORNIA.

## MANUFACTURE OF SMALL STEEL INGOTS.

No. 890,934.

Specification of Letters Patent.

Patented June 16, 1908.

Application filed November 16, 1907. Serial No. 402,388.

*To all whom it may concern:*

Be it known that I, ANDREW RUDGEAR, citizen of the United States, residing in the city and county of San Francisco and State of California, have invented new and useful Improvements in the Manufacture of Small Steel Ingots, of which the following is a specification.

My invention relates to the manufacture of small steel ingots.

It consists in a novel arrangement of molds, combination of parts, and in details of construction, which will be more fully explained by reference to the accompanying drawing, in which—

Figure 1 is an elevation showing a series of molds. Fig. 2 is a plan view. Fig. 3 is a sectional view of the outer end of the molds. Fig. 4 is an end view of one of the molds showing the locking means for the cover. Fig. 5 is a perspective view of the body of the core 3. Fig. 6 is a perspective view of the core showing the intersecting grooves in the face thereof.

It is the object of my invention to provide an improved means and apparatus for the casting of small steel ingots, in which the apparatus may be set up and dismantled more rapidly, and the ingots separated, with less stumps, less sprue, and less waste, than when such ingots are cast in vertical molds.

The molds A are made of cast iron of any suitable size, shape, and interior diameter, and having sufficient taper, enlarging from the outer to the inner ends so that the ingots when cast can be readily disengaged therefrom. These molds may be set up on any suitable base. I have here shown concrete or equivalent bases B upon which the molds are laid substantially horizontal, or they may be, if desired, set at an angle, tilting upwardly and outwardly. These molds radiate from a common center, and have the inner ends formed with plates 2, each plate having a flange projection at one side, as shown at 2<sup>a</sup>; and these flanges and plates fit together when the molds are laid in position radiating from a common center, as shown in Fig. 2. In the space thus formed between the contiguous ends of the molds, I fit cores, which may be made of clay, silica, sand, or other suitable core material. These cores or bricks are formed as plainly shown in Fig. 3, the body of the core 3 having a central vertical hole made in it, as at 4; and this central

hole intersects semi-circular grooves made transversely across either the upper or lower face of the core, as shown at 5. These grooves radiate from the opening 4 and connect with the inner ends of the molds. The molds may be superposed one above the other, as shown in Fig. 1, and each succeeding core correspondingly superposed upon the core below, forms a closure for the radial grooves below. It will be understood that the superposed cores may have corresponding grooves, so as to make cylindrical channels, but we have found that the semi-circular grooves are sufficient to carry the metal into the molds, and they form much smaller gates, which are easily broken apart when the ingots are to be removed from the molds. Therefore, I have in the present case shown no grooves as being made in one of the surfaces of each core, and this surface resting against the grooved surface of the next core, forms a closure for the open side and completes the channel. The corners of these bricks or cores may be cut away angularly, and after being placed, this space may be filled with loose sand, or other material. This insures the fitting of the cores independent of any expansion, contraction, or warping of the molds, and with the corner filling, prevents any escape of the metal into the angles and joints formed between the ends of the plates 2<sup>a</sup>.

The outer ends of the molds are closed by plates or covers 6. These covers or plates fit over the open ends of the molds A, and joints are closed by means of clay lutes which prevent any escape of the metal, and the forming of fins. These covers may have small air vents, at 7, which will allow the escape of the air while the mold is filling, without being of such size as to allow any metal to pass through, if the metal be not sufficiently cooled to prevent its passing when it reaches the cover.

8 are yokes formed or fixed on the ends of the molds, and these yokes extend diagonally across the rectangular ends from corner to corner, so that when the molds are superposed with their straight sides resting one upon the other, there will be an open space accessible for the introduction and removal of the closing covers in a diagonal direction, and without being interfered with by the position of the molds. These covers may have raised lugs or surfaces, as shown at 9,



and they are firmly locked in place by means of wedges 10 which are driven between the yokes 8, the lugs 9 thus clamping the covers and securely closing the ends of the molds.

When a sufficient number of the molds have been superposed, a pouring funnel 11 is placed upon the top of the center cores, the bottom opening of the funnel registering with the vertical passages 4 of the cores, and the metal being poured will flow horizontally through the various molds with a substantially even flow on account of the position of the molds, and with very much less waste, or what is known as "stumps," than in any other form of casting of which we are aware.

In some cases, if it be desirable to separate the ingots into lengths, cores made as shown at 12, may be introduced into the molds at any desired distance apart, these cores having open grooves or channels 13 which allow sufficient of the metal to pass the core to insure the filling of all parts of the mold; and when the ingots are to be removed this small gate is easily broken so as to allow the two parts of the ingot to separate.

In dismantling and separating the apparatus after the castings are made, chains may be passed around the molds from a traveling crane, and when the strain of lifting is brought upon the chains, the small central gates will be readily broken apart and the ingots separated. The taper of the mold is such that the ingots may be immediately removed, and the apparatus again set up in a very short time.

It will be understood that various modifications may be made in the internal shape of the molds, which may be cylindrical or polygonal, and any form of cores may be employed which will allow the molten steel to flow properly.

Having thus described my invention, what I claim and desire to secure by Letters Patent is—

1. The improvement in apparatus for casting small steel ingots, said improvement consisting of radially disposed molds meeting at a common center, the inner end of each of said molds being provided with a plate and each plate having a flange projection at one side and adapted to be fitted to a companion plate and flange of another mold, and means whereby molten steel may be delivered simultaneously to all of said molds.

2. The improvement in apparatus for casting steel ingots, said improvement consisting of substantially horizontal and radially disposed molds meeting at a common center, the inner end of each of said molds being provided with a plate and each plate having a flange projection at one side and adapted to be fitted to a companion plate and flange of another mold, and cores fitted between the meeting ends of the molds, said cores having channels through which molten

metal may be delivered simultaneously into the molds.

3. In an apparatus of the character described, substantially horizontal and radially disposed molds, means by which the contiguous ends of said molds are fitted to form a central opening, said means comprising plates on the inner ends of the molds having flange projections at one side, said flanges and plates adapted to be fitted together, and cores fitting said opening, said cores having vertically and horizontally intersecting openings, said horizontal openings registering with the inner open ends of the molds.

4. In an apparatus of the character described, approximately horizontal and radially disposed molds, means by which the inner ends of said molds are united to form central boxes, said means comprising plates on the inner ends of the molds having flange projections at one side, said flanges and plates adapted to be fitted together, cores adapted to fit the boxes, said cores having vertical channels and horizontal intersecting channels registering with the inner open ends of the molds, said cores having the angles cut away, and a filling of sand for said angular spaces.

5. In an apparatus of the character described, a plurality of approximately horizontal molds having their inner ends united to form open boxes, the inner ends of said boxes having plates with flange projections at one side, said flanges and plates adapted to be fitted together, cores fitting said boxes and having vertical and horizontal channels whereby metal may be delivered into the molds, covers whereby the outer ends of the molds are closed, and removable means for locking said covers in position.

6. In an apparatus of the character described, radially disposed molds having central cores and conducting passages there-through, covers fitting the outer ends of the molds, with yokes and wedges whereby said covers may be removably locked in position, said covers having openings forming escapes for the air in the molds.

7. In an apparatus of the character described, radially disposed molds having open spaces formed between their meeting ends, the inner ends of said molds being formed of plates and each plate having a flange projection at one side, said flanges and plates being fitted together to form a common center, cores having conducting passages there-through registering with the inner ends of the molds, yokes fixed diagonally upon the outer ends of the molds, covers adapted to slide diagonally into said yokes, and wedges whereby the covers are removably locked in place.

8. In an apparatus of the character described, a plurality of radially disposed molds having their inner contiguous ends united to



form boxes, said inner ends of the molds being provided with plates each of which has a flange projection at one side, said flanges and plates being fitted, cores fitting said boxes  
5 having vertical and horizontal passages to direct molten metal into the molds, covers, and means for locking the covers upon the outer ends of the molds, said covers having air vent passages formed therein.  
10 9. In an apparatus of the character described, a plurality of radially disposed tapering molds having inner and outer ends provided with supporting polygonal flanges, said inner flanges having a flange projection  
15 at one side and said flanges and plates being fitted together to form a box-like center from which the molds radiate, said molds being superposed to form a series, cores fitting the boxes formed by the junction of the inner  
20 flanges of the molds, said cores having openings for the conduction of molten metal, a pouring funnel upon the top of the series, said funnel registering with the vertical open-

ings of the cores, and detachable covers closing the outer ends of said molds. 25

10. In an apparatus of the character described, approximately horizontal and radially disposed molds with means for connecting the inner ends and forming open spaces, cores fitting said spaces and having passages  
30 to conduct the molten metal and deliver it into the contiguous ends of the molds, removably fixed covers upon the outer ends of the molds, and cores adapted to fit within the molds between the inner and outer ends, said  
35 supplemental cores having passages for the flow of the metal into the outer ends of the molds, and air escape openings formed in the closing covers.

In testimony whereof I have hereunto set  
40 my hand in presence of two subscribing witnesses.

ANDREW RUDGEAR.

Witnesses:

JAMES F. LEAHY,  
F. P. LIMMIN.