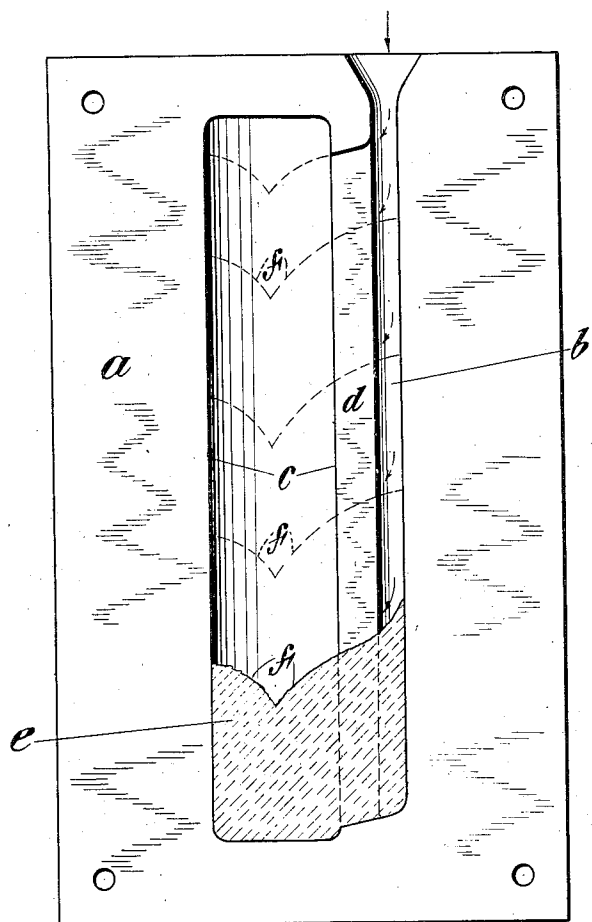


E. A. CUSTER.
ART OF CASTING STEEL.
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1,042,092.

Patented Oct. 22, 1912.



Witnesses:
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UNITED STATES PATENT OFFICE.

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SANDLESS CASTING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORA-
TION OF DELAWARE.

ART OF CASTING STEEL.

1,042,092.

Specification of Letters Patent.

Patented Oct. 22, 1912.

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To all whom it may concern:

Be it known that I, EDGAR A. CUSTER, a citizen of the United States, residing in the city of Philadelphia, in the State of Penn-
sylvania, have invented certain new and use-
ful Improvements in the Art of Casting
Steel, of which the following is a specifica-
tion, reference being had to the accompany-
ing drawing, forming a part hereof.

On account of the excessive shrinkage
which takes place in cast steel, when cooling
slowly in sand molds, from a molten condi-
tion, it has been necessary heretofore to pro-
vide for each mold one or more sink heads,
that is, temporary receptacles, connected
with the mold, to contain a body of molten
metal sufficient to fill the "pipe" or hollow
which otherwise develops in the casting dur-
ing the slow cooling. The casting thus be-
comes solid, the pipe or hollow being formed
in the sink head where it does no harm.
This process of casting steel, however, in-
volves much expense as compared with the
value of the metal in the casting; a much
larger volume of metal than is actually re-
quired for the casting must be prepared,
thereby involving additional expense in
melting, and the sink head must be cut off
from the casting and broken up for remelt-
ing, thereby involving much labor.

The present invention has for its object to
produce solid steel castings without the use
of sink heads and therefore to reduce very
largely the cost of making steel castings as
compared with methods now in use.

In accordance with the invention the steel
casting is cooled quickly, as by being cast
in an iron mold of sufficient bulk to rob the
casting swiftly of its heat, rather than
slowly, as in the usual method, and the point
of pouring of the molten metal into the
mold itself is moved progressively, so as to
keep pace with the point of setting of the
molten metal in the mold as it progresses
from the bottom to the top or from one end
to the other.

The invention will be more fully ex-
plained hereinafter with reference to the ac-
companying drawing which represents,
partly in outline and partly in section, so
much of a mold and of the process of casting
therein as is necessary to enable the inven-
tion to be understood.

The mold *a* is formed of such material,

preferably of iron, and is of such bulk that it
will rob the casting swiftly of its heat, caus-
ing the molten metal to cool so rapidly that
it will set as it is poured into the mold.
The mold is provided with a runner *b* which
extends practically throughout the full
length of the casting and communicates with
the chamber *c* of the mold practically
throughout its length, through a long gate
or a long succession of gates *d*. The metal
is poured into the mold somewhat slowly and
sets as it is poured. If the pouring of the
metal should be stopped at any point, when
only a portion of the chamber of the mold
had been filled, as indicated at *e*, the metal
would shrink and set with a conical cavity or
pipe *f* in its upper surface. The pouring of
the metal, however, is not checked but is con-
tinuous, keeping pace with the rise of the
line of setting of the metal in the chamber
of the mold until the chamber of the mold is
completely filled and the casting is fully
formed, the cavity or pipe which would
otherwise be formed at the top of the cast-
ing being filled from the top of the gate.
The volume of molten metal which may re-
main at the top of the casting when the cham-
ber is filled is small and the shrinkage is
therefore so slight in comparison with that
of the remainder of the casting that its ef-
fect is negligible and the final result is a
solid casting from end to end.

From the above description it will be un-
derstood that wherever it is stated that the
metal is poured so as to keep pace with the
progressive setting of the metal in the mold
that it is meant that the pouring of the
metal is continued as the setting of the
metal in the mold progresses and in propor-
tion to the progress of the line of setting of
the metal in the mold.

It will be understood that the pouring of
the metal so as to keep pace with the pro-
gression of the line of setting can be accom-
plished by varying the size of the runner
and gate or gates to suit the shape and size
of the chamber within the mold. It will
also be understood that one or more run-
ners with the necessary gates may be pro-
vided as the nature of the casting may re-
quire.

It will be seen that the upper part of the
runner or runners of the mold contains a
sufficient quantity of molten metal to in-

sure the complete filling of the mold chamber and that the quantity of metal which must be melted and poured for each casting, in excess of that which actually enters into the casting, is very small as compared with the quantity which must be melted and poured when the casting is allowed to cool slowly in a sand mold and a large sink head is necessary to insure the filling of the pipe formed by the gradual and consequent slow setting of the body of the casting, as in the methods heretofore generally in use. It will also be seen that the labor necessary to handle the superfluous metal and prepare it for remelting is small as compared with that necessary to handle and prepare for remelting the large masses of metal contained in the usual sink heads.

I claim as my invention:

1. The improvement in the art of casting steel which consists in cooling the metal as it fills the matrix of the mold so that the

metal will set throughout the casting at the same rate at which it is poured.

2. The improvement in the art of casting steel which consists in cooling the metal as it fills the mold quickly and progressively and pouring the metal so as to keep pace with the progressive setting of the metal in the mold.

3. The improvement in the art of casting steel which consists in continuously pouring the metal into the mold chamber through a long gate and cooling the metal as it fills the mold quickly and progressively, the pouring of the metal into the mold being at the same rate at which the metal sets.

This specification signed and witnessed this 26th day of May, A. D. 1910.

EDGAR A. CUSTER.

Signed in the presence of—

AMBROSE L. O'SHEA,
ELLA J. KRUGER.