

UNITED STATES PATENT OFFICE.

AARON J. NELLIS, OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN MOLDS FOR CASTING METALS.

Specification forming part of Letters Patent No. **198,852**, dated January 1, 1878; application filed November 6, 1877.

To all whom it may concern:

Be it known that I, AARON J. NELLIS, of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Molds for Casting Metal; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to the material employed for forming molds, cores, &c., employed in casting steel and other metals, and is especially adapted to the casting of cast-steel, though generally useful where time and the perfection of the casting are desirable.

It consists in mixing the sand or core material for the formation of either sand molds, cores, or sections of molds, with a highly-combustible and readily-ignitable fluid, which will burn at the time of casting, whereby a perfect casting, and one devoid of "blows," is obtained.

In the present method of mixing sand-molds, cores, &c., water or like liquid is commonly employed, necessitating the thorough drying of the mold before it can be used, which consumes from thirty hours to ten days, dependent on the size and shape of the mold. To overcome this delay is one object of the present invention.

In other instances the mold has been composed of sections of metal with interposed sections of core material, and in such cases, where the cores were not specially prepared, as set forth in a prior patent granted to me, but were built into the mold, it necessitated the keeping on hand of a large number of molds, in order that the compound mold could be subjected to suitable means for drying the sand section.

Another object of my invention is, therefore, to reduce the number of molds required.

It is well known that neither with iron molds, molds composed in part of iron, with sand sections, or composed entirely of sand, is it possible to obtain a fair percentage of perfect cast-steel castings, where the pattern is of irregular form, or the pouring-hole of the mold is of limited size. With either or all of the molds specified there is a tendency to "blow," owing either to imperfect vent for the gases or from other cause.

The main object of the present invention is

to insure a perfect vent or combustion of gases, &c., as the case may be, and, as a result, a perfect casting.

I will now proceed to describe my invention, so that others skilled in the art to which it appertains may apply the same.

The material which composes the mold or core, as the case may be, is mixed with a highly inflammable and combustible liquid, or one that will ignite at the time of casting, for which purpose benzine or like light hydrocarbon is preferable, both owing to its cost and the readiness with which it is obtained; but turpentine, alcohol, and other combustible fluids have been employed and found to answer well.

As many of the combustible liquids are not sufficiently binding of themselves, some of the well-known adhesive substances may be employed therewith, such as sugar, flour, &c., and the sand preferred is a clean sharp sand, ordinary molder's sand not being desirable, though capable of use.

For purposes of this specification the following proportions may be stated as giving a satisfactory mass, either for cores or flask-molds, though I do not intend or expect to be limited thereby: Sharp sand, one-half bushel; brown sugar, three pounds; rye flour, three pounds; benzine, or its equivalent, two gallons; to which, if desired, may be added, fire-clay, one quart.

Where the material for the core, sand mold, or matrix is mixed with a highly inflammable, combustible fluid, as specified, the mold may be used immediately, thus avoiding the delay incident to the drying of molds, and the possibility of using the molds at once permits of the reduction in the number kept on hand, where metal section-molds are used.

To this extent the invention is useful for all classes of casting.

In casting cast-steel into irregular form with small pouring-holes—as, for instance, in the casting of plowshares, &c., in the molds prepared in the ordinary way—the invariable blowing renders the casting imperfect unless a highly-carburized steel is employed, which necessitates subsequent treatment of the casting to render it fitted to the purposes intended.

In a mold prepared in accordance with my invention the combustion which takes place at the time of casting insures a vent for the gases, frees the mold of air, and results in a perfect casting, devoid of blows, which especially adapts my invention to the production of cast-steel castings.

Repeated experiments with castings produced in molds wherein the sand, &c., was mixed with a highly-inflammable, combustible liquid, as specified, have shown that the casting can be readily drawn and worked under the hammer in the same manner as tool steel, and that they possess a toughness much in excess of any other castings of like character known.

In cases where the mold is used more than once it is desirable to moisten or sponge the matrix, cores, &c., with benzine or equivalent liquid, as, after the combustion of the liquid

employed in forming the mixture, the casting is liable to be less perfect. The same result is attendant upon the use of molds long made, and from which the liquid has evaporated; in both of which latter cases the mold will act more like an ordinary well-dried sand mold.

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

Sand molds, cores, and matrices for casting metal, composed of sand, with or without binding or adhesive materials, and of benzine, or its equivalent highly-combustible and readily-ignitable liquid, substantially as specified.

In testimony whereof I, the said AARON J. NELLIS, have hereunto set my hand.

AARON J. NELLIS.

Witnesses:

JNO. K. SMITH,
JAMES I. KAY.