J. R. COOPER.

CASTING BRASS AND OTHER METALS.

No. 192,114. Patented June 19, 1877.

Fig. 1.

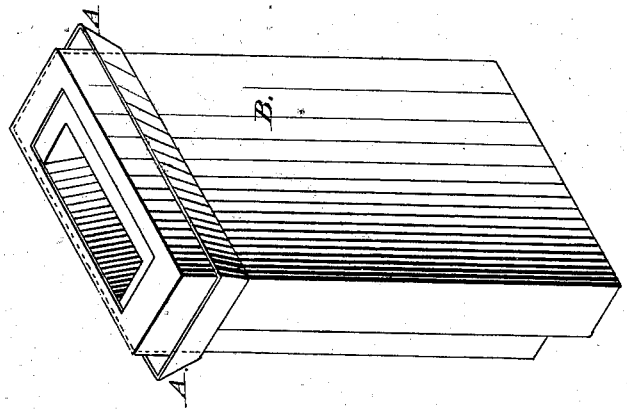


Fig. 2.

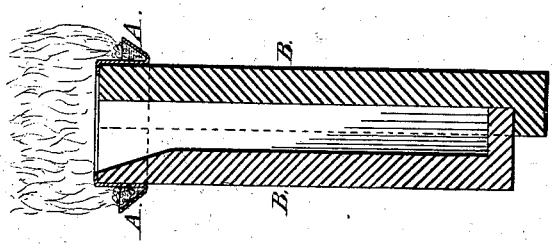
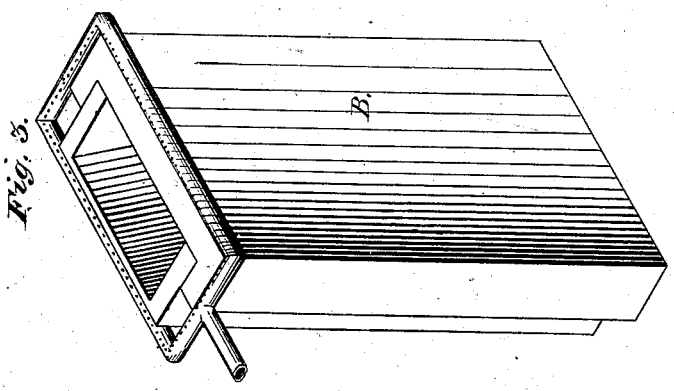


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

JAMES R. COOPER, OF FRANKLIN TOWNSHIP, OAKLAND COUNTY, MICH.

IMPROVEMENT IN CASTING BRASS AND OTHER METALS.

Specification forming part of Letters Patent No. **192,114**, dated June 19, 1877; application filed June 9, 1877.

To all whom it may concern:

Be it known that I, JAMES RENWICK COOPER, of Franklin township, in the county of Oakland and State of Michigan, have invented certain new and useful Improvements in Casting Brass and other Metals; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it pertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

My invention relates to the method of casting metals, but particularly brass for sheet, wire, or any purpose where the metal is to be afterward wrought.

In the ordinary way of casting brass for rolling purposes there is great loss and inconvenience from the fact that the metal unites with the oxygen of the atmosphere the moment it strikes it. As soon as the metal comes in contact with the atmosphere a coating of oxidized metal is formed instantly, and while the metal is being poured into the molds this oxidation still goes on as fast as new surfaces are exposed to the air. This oxidized portion is a thin film upon the surface of the metal, and when the metal is poured into the molds a coating of oxide forms about and encircles the stream of metal. The oxide thus formed is constantly breaking away and falling into the mold, where it becomes more or less broken up and mixed with the metal.

The molds for casting this metal in all its forms are made of cast-iron, and it is the practice of the manufacturers to grease the inside of the molds with some of the common and cheap kinds of grease. At the temperature necessary for the proper mixing and pouring of these metals, which usually ranges from 2,300° down to 1,800°, zinc is more or less given off from the metal as a vapor, and this continues until the metal solidifies, or until the heat is lowered to about the point at which the metal solidifies. While the metal is being poured into the molds, and while these vapors of zinc are being emitted, the surfaces of the molds are sufficiently cool to condense these vapors, and they are condensed and deposited in the heavy oil or grease that is used in greasing the molds. This grease burns to lamp-black, and this lamp-black, together with the condensed zinc-vapor, form a dark-gray powder upon the metal, which the workmen term "dirt." This admixture of zinc and carbon is liable to, and does at times, break away from the surface of the mold and float into the body of the metal, making unsound and porous places therein; but the most serious loss to the manufacturer is the extreme tendency of the metal to unite with the oxygen of the atmosphere. The tendency of this film of oxidized metal is to be deposited upon the outside of the bars; and if it were all there and lay smoothly upon the bar, it would do little or no harm, but much of it is inclosed in the metal, and that which is upon the outside is compressed and crimped together in such a manner that it sometimes extends to a depth of one-fourth of an inch, and at times to such an extent as to ruin the metal for the purpose for which it was designed.

The bars of brass, after leaving the casting-room, are taken to the rolls and brought down to a certain thickness. They are then taken to machines with curved sharp "scratchers" or scrapers, which cut the metal into thin shavings and work upon any part of the bar that the operator may direct. They are then passed to workmen with sharp instruments to be scraped by hand until they are considered sufficiently clean to produce a good article of manufacture. There is often ten, fifteen, or twenty per cent. of the metal scraped away. That portion of the oxidized metal that is inclosed in the body of the bar causes a cavity, and when rolled into a thin sheet is very much enlarged, and when annealed the sheet blisters at that point, and is rendered worthless except for resmelting.

My invention has for its object the remedying of the defects above enumerated, which exist in the modes of casting metal, as heretofore practiced. In order to remedy these defects it is not only necessary to expel the air from the mold, but quite as necessary to keep it from the mouth of the crucible while the metal is being poured therefrom into the mold; and to effect this my invention consists in creating and maintaining at the mouth

of the mold a flame that will encircle or partially encircle the molten metal during the whole time that the mold is being filled therewith.

In the accompanying drawing, Figure 1 is a perspective view of the mold; Fig. 2, a section thereof, and Fig. 3 a modification of the channel for supplying gas to the mouth of the mold.

The letter A designates a grooved collar or cap, which is susceptible of being easily placed in position around the mouth of the mold B, or removed therefrom, and is to contain alcohol, benzine, or any light oil that will produce a reducing-flame a sufficient length of time to allow the workman to fill a mold in the ordinary time required therefor.

Immediately before the mold is filled I throw around its mouth a light spray of alcohol, benzine, or any light substance that will produce instantly a flame, so that the flash thus created will expel the air from the mold, and also from about the exit of the superposed ladle, and the flame which is maintained will create sufficient heat to carry off any vapors of zinc that may be emitted from the metal, and thereby prevent their condensation upon the inside of the mold, which condensation would be productive of the pernicious and vicious results set forth in the first part of this specification.

It would be well that whatever is used to produce the flame for the protection of the metal being poured into the mold should be sufficiently inflammable to produce a flame from the heat of the crucible or pot at its ordinary temperature, whereby is avoided the necessity for lighting the material, and the best results insured, inasmuch as the flash is produced at the exact time that it is needed.

I do not confine myself to the materials named, nor to any particular material, for the production of the reducing-flame; nor do I confine myself to any special mode or apparatus for holding the material, although I prefer to use the grooved cap shown in the drawing. Where gas can be had there could be a convenient device—something like that shown—for furnishing the flame, so that, by means of a tube connecting this channel with a gas-reservoir, the necessary supply will be furnished.

A wick or some fibrous material is usually placed in the groove of the cap, which is at the mouth of the mold, so as to prevent the oil from running over the edge of the groove if the mold should be tilted.

I am not the inventor of the method of expelling air and gases or vapors from a mold by producing a momentary flash or flame while the metal is being poured, nor of the method of expelling the air and gases or vapors from a mold by producing one or more momentary flashes or flames within the mold, or at the mouth of the mold, while the metal is being poured; but

What I do claim is—

1. The within process of casting brass and other metals, which consists in creating and maintaining at the mouth of the mold a flame that will encircle or partially encircle the molten metal during the whole time that the mold is being filled therewith, so as to expel air from the mold and carry off the vapors evolved from the metal, thereby preventing their condensation within the mold, as well as preventing the oxidation of the molten metal, substantially as set forth.

2. A mold for casting brass and other metals, provided with a device for maintaining a reducing-flame at the mouth of the mold, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

JAMES R. COOPER.

Witnesses:
WM. G. HENDERSON,
WILLIAM FITCH.