(No Model.)

# A. J. LUSTIG.

## PROCESS OF CASTING COMPOUND METAL INGOTS.

No. 324,712. Patented Aug. 18, 1885.

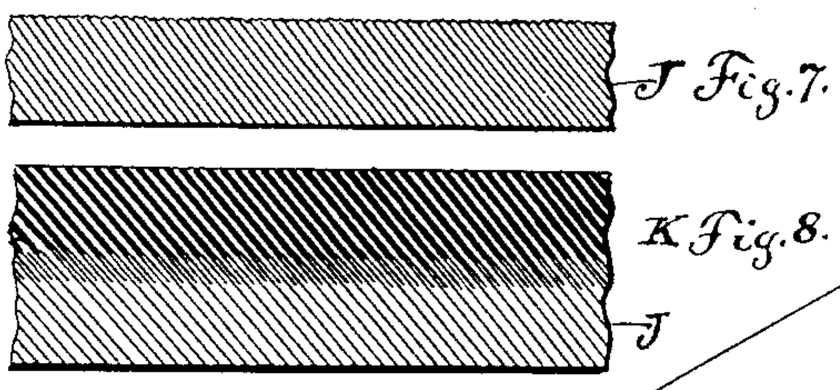


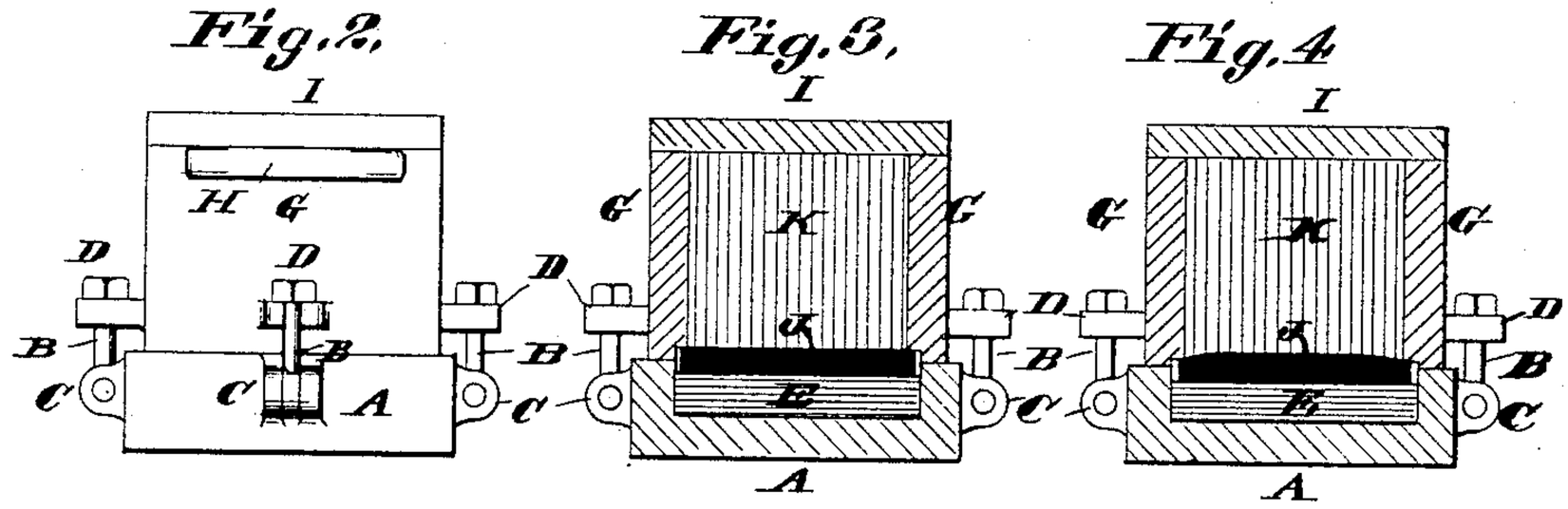


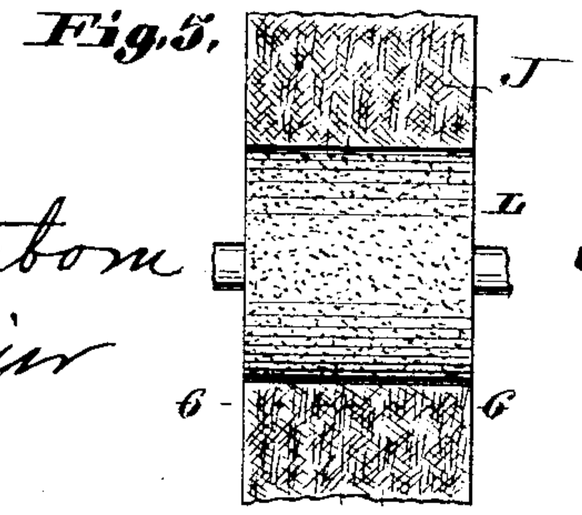


Fig. 1.




Fig. 9.



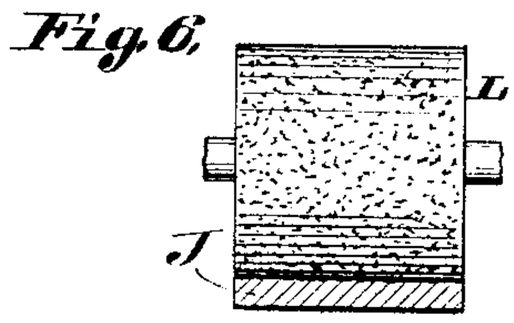




Attest:

Aug Kurtzebon
W. A. Barnier

Inventor:

Adolphus J. Lustig



# UNITED STATES PATENT OFFICE.

ADOLPHUS JOHN LUSTIG, OF ST. LOUIS, MISSOURI.

## PROCESS OF CASTING COMPOUND METAL INGOTS.

SPECIFICATION forming part of Letters Patent No. 324,712, dated August 18, 1885.

Application filed November 21, 1884. (No model.)

*To all whom it may concern:*

Be it known that I, ADOLPHUS J. LUSTIG, a citizen of the United States, residing at St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in the Manufacture of Compound Metal Ingots; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

My invention relates to a new and useful improvement in the process of manufacturing compound metal ingots; and the novelty consists in the peculiar steps taken in such process, as will be more fully hereinafter set forth, and specifically pointed out in the claims.

The essential object of the invention is to produce an ingot or plate composed of different metals of different texture, and having different degrees of temper and tenacity, the several strata being firmly united together to form a single body.

For convenience, and to clearly set forth the advantages of my improved process, I will describe the ingot to be produced as a plate to be used in burglar-proof safes; but it is obvious that similarly-produced ingots would serve with equal efficiency in other relations and arts.

It is well known that a drill tempered to allow an operator to work through a plate of one degree of temper will be useless for the same purpose in another plate of another degree of temper, whether the same be harder or softer. With this fact in view safes have been formed of different plates of metal of different degrees of temper secured together; but the joints between the plates being readily found, it has been easy to change the drill to suit the quality of the metal.

According to my invention the different plates will be firmly united together, and the joint will be formed of a homogeneous mass of metal differing from the metal of either of the plates thus united.

In carrying out my invention I take a plate of wrought metal and by any means approved I roughen one of its faces, so as to leave thereon numerous alternate projections and depressions. The face thus treated I then submit to a borax solution or other flux, and place the plate in a proper mold. Upon this face of the plate I then deposit a stratum of melted steel more or less highly carbonized. This molten steel seeks the depressions in the roughened face of the first plate and fuses the projections thereon to not only make a firm weld, but to produce at the touching surfaces a metal perfectly homogeneous, but differing from that of either stratum. The ingot thus prepared is allowed to gradually cool in the mold, and when nearly cool the outer face of the steel may be similarly roughened, the ingot placed in a larger mold, and a stratum of more-highly-carbonized steel may be cast thereon in a similar manner.

The operation of the flux in this art will be readily understood. The gradual cooling in the mold has peculiar advantages.

It is well known that in fused metal the currents of heat, seeking the nearest cool surfaces, cause a vibration of the atoms of metal, and hence a crystallized condition of the metal. The gradual cooling tends to retard this crystallizing process until the metal assumes a plastic state wherein crystallization is impossible.

The important feature of the invention I consider to be the roughening of the face upon which the melted deposit is to be made.

The drawings forming a part of this specification show a means by which I execute my process. In them Figure 1 is a perspective view of a mold, shown ready for pouring the melted steel in. Fig. 2 is an end view of mold. Fig. 3 is a transverse section of the mold with a flat plate in position in it. Fig. 4 is a transverse section with a plate in it having a convex surface on the upper side and a flat face on the lower side. Fig. 5 is a top view of the wrought-metal plate and an emery-wheel. Fig. 6 is a vertical transverse section on line 6 6 of Fig. 5. Fig. 7 represents a section of roughened wrought metal plated; Fig. 8, a section of an ingot of two layers, and Fig. 9 a section of an ingot of three layers, all made by my process.

A, base of mold; B, tie-bolt; C, lug; D, lug on upper section; E, fire-clay plate; G, upper

section of mold; H, handles; I, cover; J, wrought-metal plate, as iron or steel; K, molten metal; L, emery wheel or roller.

In the preparing of the wrought-metal plate preparatory for receiving the borax, I propose using a very coarse emery wheel or roller, the same being stationary and revolving rapidly, the wrought-metal plate being carried underneath and being pressed upward.

In applying the borax I propose to first cleanse the wrought-metal plate, either by a jet of air or water, the latter preferable, and then apply a borax solution consisting of sixteen parts of water and one part of borax. The plate being well covered with this solution is then placed over a charcoal fire until the borax has become dry, but not glazed. On this crust of borax I put then a composition of borax and finely-pulverized glass, the proportion being two parts borax and one part glass, and then subject the plate to a more intense heat until the surface of the plate shows an even and glazed appearance.

The use of the fire-brick under the wrought-metal plate is for the purpose of gradual cooling. The convex plate J in the mold is meant to be wrought-iron, the molten steel on it steel high in carbon. The purpose is to make a plow-plate having a sharp and hard cutting-edge sufficiently thick in the middle as not to be guttered out easily. The flat solid plate J is meant to be steel low in carbon; the molten metal, steel higher in carbon, for the purpose of producing a safe-plate by repeated operations that will have several strata of steel, the upper always harder than the lower one, for the purpose of getting the innermost strata so hard as to resist any drill except a diamond, while the outer one would be soft, so as to take an easy finish. This arrangement would give me, then, freedom of action for producing an ingot the solid part of which would be hard, while the molten part would be soft, for producing plates for cutting-dies and cutting-tools that are strained to a high degree. Such an ingot would also produce a rail that has a hardened crown and comparatively soft body.

What I claim as new is—

1. In the manufacture of compound ingots, the process described, which consists in first roughening the face of a plate or ingot of wrought-iron and applying an anti-oxidizing flux thereon, and then casting upon such face a stratum of steel, as set forth.

2. The process described, which consists in roughening a face of a wrought-metal plate and applying thereon a flux, then casting upon such face a stratum of steel and gradually cooling the whole while in the mold, as set forth.

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

ADOLPHUS JOHN LUSTIG.

Witnesses:

LOUIS BALTHASAR,

HERMANN H. SANDER.