UNITED STATES PATENT OFFICE.

JAMES PARK, JR., OF PITTSBURG, PENNSYLVANIA.

IMPROVEMENT IN SOFT-CENTER INGOTS OR SLABS.

Specification forming part of Letters Patent No. **192,346**, dated June 26, 1877; application filed October 16, 1876.

To all whom it may concern:

Be it known that I, JAMES PARK, Jr., of Pittsburg, in the county of Allegheny and State of Pennsylvania, have invented a new and useful Improvement in Soft-Center Ingots or Slabs; and I do hereby declare the following to be a full, clear, and exact description thereof.

My invention relates to ingots or slabs having soft centers of wrought-iron or soft steel and outer faces of hard steel, applicable to the manufacture of plows, agricultural implements generally, and for various other purposes in the arts.

The object of my invention is to obtain an ingot or slab of the class specified, which shall be practically free of "blisters" and soft spots, and also one in which the union or weld of the metal composing the center and surfaces shall be thorough, whereby the great loss attending the present methods of manufacture are avoided, and a better article is obtainable from the ingot.

Heretofore in the manufacture of ingots or slabs having wrought-iron or soft-metal centers and hard-steel faces several methods have been practiced, as follows:

Slabs of wrought-iron or of cast-steel are raised to a good scaling-heat, and as much of the scale or oxide as possible removed, after which the slab, while still hot, is placed in a suitable cast-iron mold, and hard or highly-carburized steel cast upon one or both faces. In this process, however much care is taken, more or less of the oxide will adhere to the faces of the slab, and even if possible to remove all the scale, new scale will form in the interval between the placing of the slab in the mold and the "teeming-in" of the cast-steel, so that in either case, as soon as the "teemed" metal comes in contact with the oxide or scale, oxygen is liberated, which mixes with the liquid cast-steel and gives rise to blisters, rendering the ingot or slab honey-combed and undesirable, if not utterly useless.

Other methods practiced to avoid the blistering and honey-combing due to scale is to clean the slab by "pickling" in acid-baths, and by placing the slab in a heated condition in baths of water having sal-soda, borax, and like chemicals in solution.

Slabs thus cleaned or freed from scale are then placed cold in the mold, and the cast-steel teemed in, as before specified. By this method the boiling or disturbance of the teemed metal and the formation of blisters, &c., due to presence of scale are avoided, but the cast-steel coming in contact with the cold slab chills rapidly, and a perfect weld or union between the soft center and the hard-steel faces is not obtained. Ingots or slabs so produced frequently part in the rolls and in the tempering-bath, giving rise to great loss.

Up to the present time the experience of steel-manufacturers and implement-makers has been that it is not simply difficult but almost impossible to produce an ingot or slab with wrought-iron or soft-steel center and hard cast-steel faces or outer surfaces wherein the metals shall be perfectly welded and the steel faces free from blisters and other imperfections.

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

I first have made in the ordinary manner ingots of cast-steel of the proper temper or carburization. These ingots, after becoming cold, are taken to the forge, reheated, and hammered to clean them of scale and dirt, the hammering being preferably continued until the temperature of the ingot falls below a scaling-heat, and the ingot has been worked into a slab of the required dimensions—say two and three-fourths inches thick, ten inches wide, by fifteen inches to seventeen inches long. These slabs of hard cast-steel are then allowed to cool.

I next take wrought-iron slabs or plates, or ingots of soft cast-steel, according to the kind of material desired for the center, of the requisite dimensions—say one and five-eighths inch thick, ten inches wide, by fifteen inches to seventeen inches long—heat them to a high red or good scaling heat, remove the oxide or scale by scraping and "brooming," and place them in cast-iron molds, close to one side of the mold, so as to leave the desired space between the slab and the opposite side of the mold. The melted steel being ready is now teemed or poured into the space between the heated wrought-iron (or soft-steel)

slab and the side of the mold. The ingot thus formed is taken from the mold and allowed to cool, after which it and the hammered cast-steel ingot first described are taken to the forge and placed in a heating-furnace, where they remain until they reach a good welding-heat, termed borax-heat. As soon as the specified temperature is reached, the ingot having the wrought-iron or soft steel face is first removed from the furnace, and placed on the anvil-block of a suitable hammer with its hard or cast-steel face down upon the block. The cast-steel slab or hammered ingot first mentioned is then removed from the furnace, and after cleaning the scale from the wrought-iron or soft-steel face of the ingot on the anvil, and from both faces of the cast-steel slab, borax, or other welding compounds are spread upon the surfaces of the ingots which are to be welded together, the two ingots are placed one upon the other, and at once struck with the hammer, the strokes being continued until the two ingots are completely united.

By the above method an ingot or slab having a soft center and hard cast-steel outer faces can be made, which can be subsequently rolled into plates and worked into plows and like implements, and one better adapted for plows and other agricultural implements than anything heretofore manufactured or used.

Wherever in the above specification or in the claim I use the words "soft-center ingot or slab" I wish to be understood as referring to either a wrought-iron or soft-steel center.

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

The soft-center ingot or slab, having hard-steel faces or outer surfaces, one of said outer surfaces being wrought cast-steel and the other cast-steel unwrought, substantially as specified.

In testimony whereof I, the said JAMES PARK, Jr., have hereunto set my hand.

JAMES PARK, JR.

Witnesses:
JAMES I. KAY,
F. W. RITTER, Jr.