

(No Model.)

F. W. SEAMAN.

INGOT OR BAR FOR TOOLS.

No. 383,192.

Patented May 22, 1888.

FIG. 1.

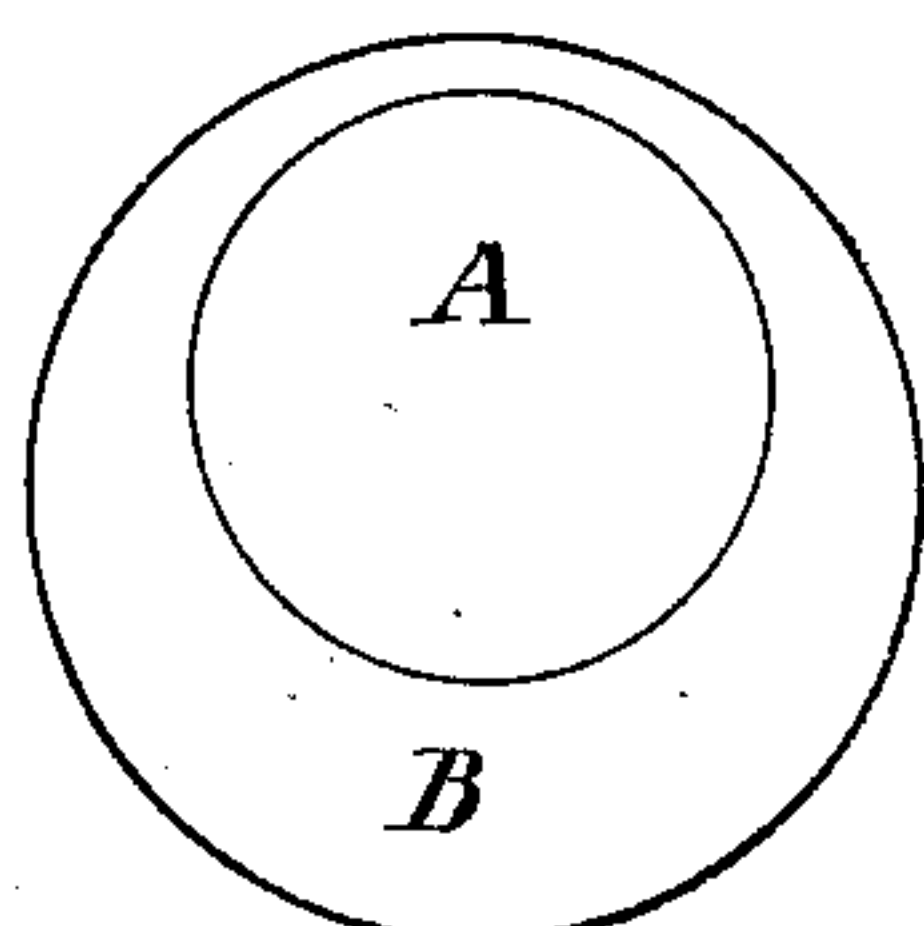


FIG. 2

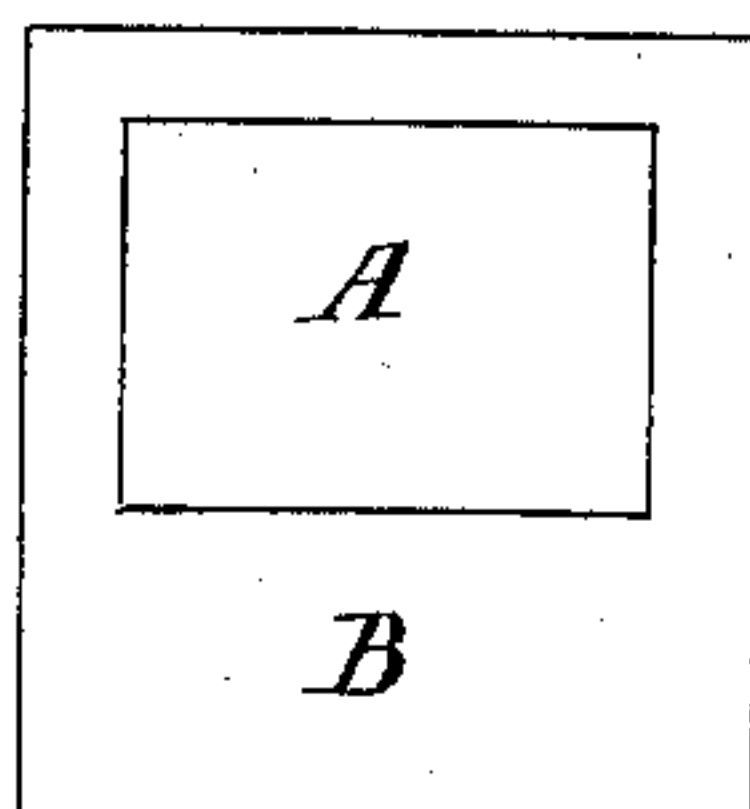


FIG. 3

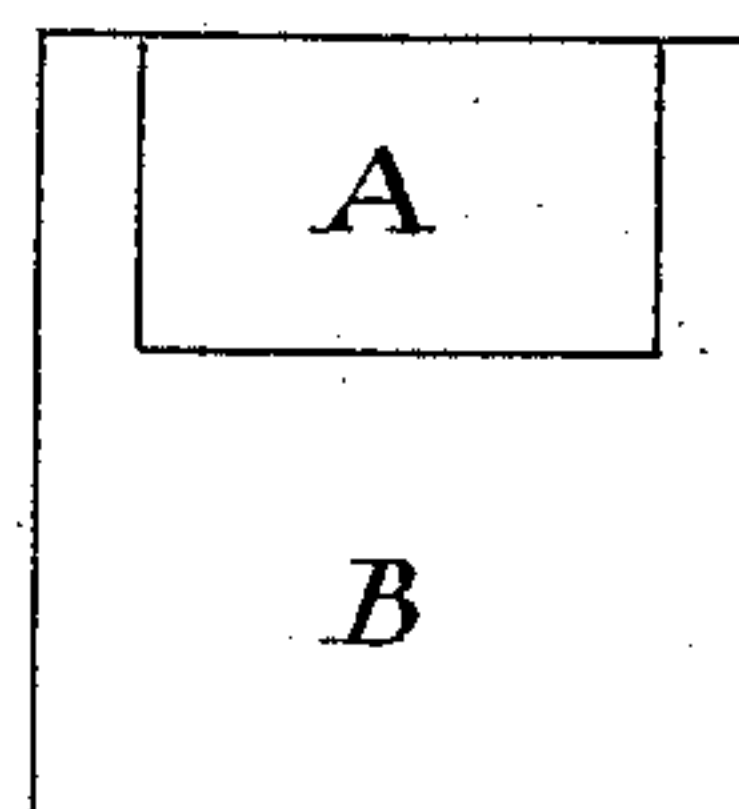


FIG. 4

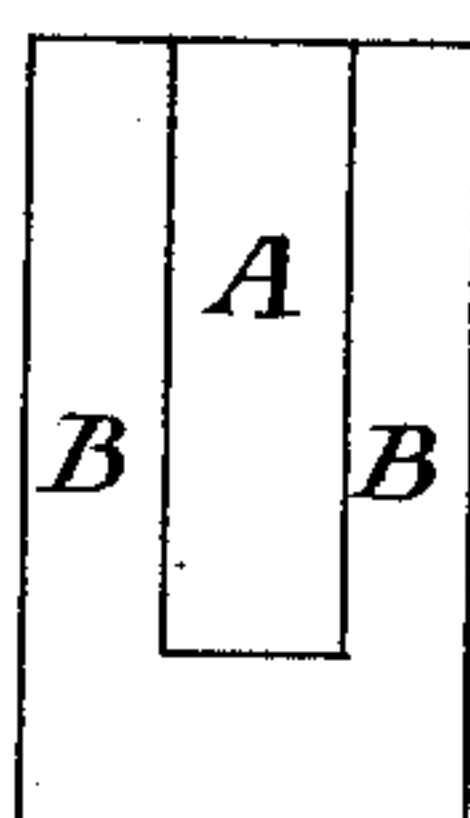


FIG. 5

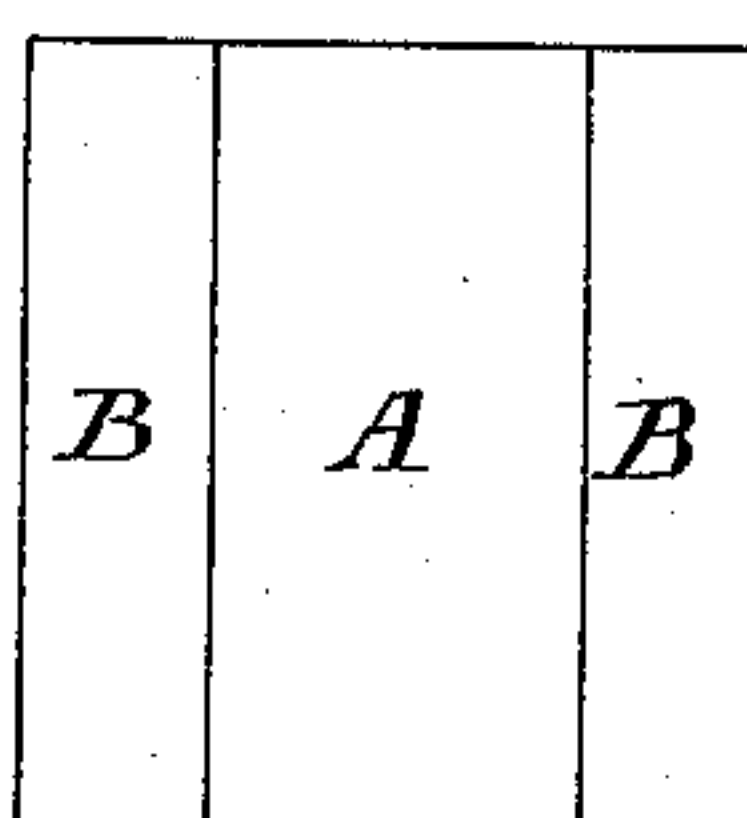


FIG. 6

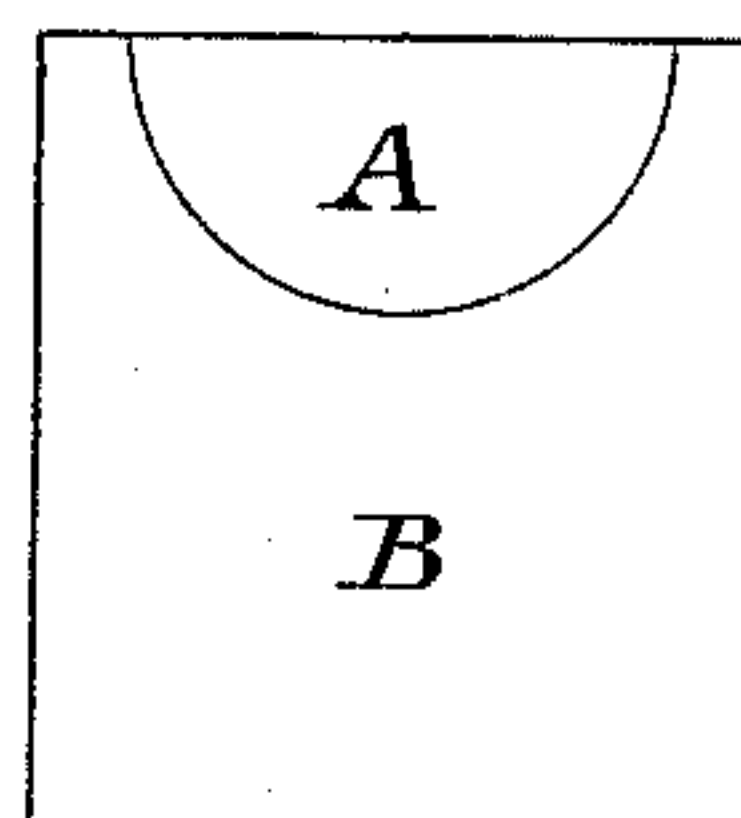
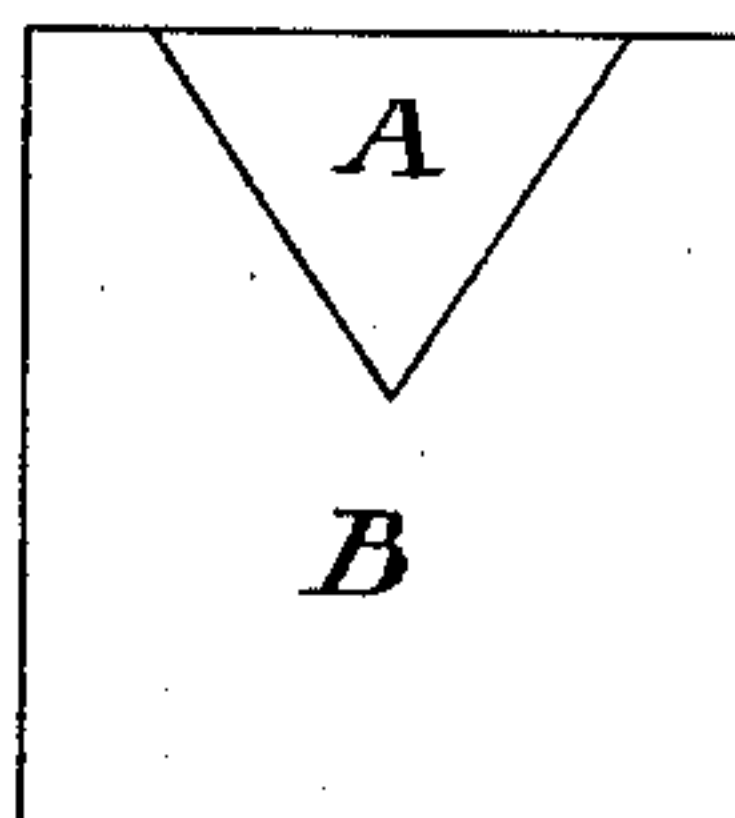


FIG. 7



Witnesses,

*Robt. F. Drury,*  
*Enos D. Drury,*

Inventor,

*Fred W Seaman*

# UNITED STATES PATENT OFFICE.

FREDERICK WM. SEAMAN, OF SHEFFIELD, COUNTY OF YORK, ENGLAND.

## INGOT OR BAR FOR TOOLS.

SPECIFICATION forming part of Letters Patent No. 383,192, dated May 22, 1888.

Application filed September 28, 1887. Serial No. 250,939. (No specimens.)

*To all whom it may concern:*

Be it known that I, FREDERICK WILLIAM SEAMAN, a subject of the Queen of Great Britain, and a resident of Sheffield, county of York, England, have invented certain new and useful Improvements in Ingots or Bars for Tools, &c.; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, which form a part of this specification.

My invention, having for its object the removal of the many risks attendant upon the use of "self-hardening" steel in the manufacture of engineers' tools and other like implements, is directed especially to a means of protecting such self-hardening steel from various hostile influences which attack such excessively hard-natured steel while in a heated condition and during the processes of hammering and rolling from the ingot, the said protecting agency also enabling the smith to forge and shape the tools with much greater facility and certainty than is possible with self-hardening steel under ordinary conditions.

The mode of attaining the object mentioned above is shown in the accompanying sheet of drawings, in which—

Figures 1 to 7, inclusive, represent in cross-section ingots or bars of self-hardening and other steel, the self-hardening steel being marked A, while the other (protecting) steel is marked B in all the figures.

What are known as "self-hardening" steels are of a nature so dense and hard that they will cut or otherwise operate upon other steel or hard metals without being hardened in the manner ordinary tools usually are. Self-hardening steel is likewise not softened by the heat generated by friction when used in operating, as before mentioned, and as would be the case with water-hardened tools of ordinary steels. These desirable and valuable qualities are not, however, found coexistent with strength, toughness, and malleability, and such steel is very stubborn in resisting the action of the tilt or steam-hammer or the rolls, and it is especially difficult for the smith to forge into the desired shape or form of tool. Further, it is very liable to damage while being heated and to have small cracks formed across its corners or angles, which, however small, form points

of weakness from which the tool may fracture, and considerable damage to machinery and danger to work-people result therefrom.

The terms "self-hardening" and "air-hardening" as employed herein are merely other names for or designations of that type of steel and distinct article of commerce known as "Mushet" steel, and its special characteristic distinguishing it from the other classes of tool-steel is that it is used without any hardening by water or oil. It is an alloy of eight to ten per cent. of wolfram metal with iron, carbon, manganese, silicon, &c.; but hardly any single make of this steel is identical with any other make of it, and definite proportions cannot, therefore, be stated.

To avoid the drawbacks incident to the use of self-hardening steel in its ordinary condition, I combine such steel (whether known as "self-hardening," "Mushet's," or my own "air-hardening" steel, or other like steel or alloy of same of sufficient hardness to work other metals without water-hardening) with a covering or partial covering of milder strong-bodied steel, such combination being made in the ingot-mold by any of the methods at present in use and capable of producing the desired form of the combination. The metal employed for the covering or partial covering is ordinary cast-steel, consisting of an alloy of iron, carbon, manganese, silicon, &c., but its composition may be modified or varied, according to the qualities required.

The self-hardening or air-hardening steels have the serious drawbacks of being very difficult to forge from the ingots into bars, and even dangerous to forge from large bars into tools, as their peculiar nature makes them very susceptible to overheating or unskillful heating. The object of my invention is to remedy this difficulty by protecting the very hard special steel with a surrounding of tougher ordinary steel that is less easily injured by heating, and this surrounding has the further decided advantage of giving the hard steel great support, and so preventing the bars snapping in pieces under the forge-hammer, as at present is often the case when the bars have been slightly flawed during the process of forging down the ingots, and my invention will greatly prevent such flaws being made. This



combination of a steel having sufficient density and hardness to enable the usual process of water-hardening to be dispensed with, and from which the cutting-edge of the tool is to be made, with a covering or support of tough, strong steel is of decided public utility—first, in reducing the cost of producing engineers' and other tools having a cutting-edge of self-hardening steel; second, in the increased resilience of such tools; and, third, the increased strength and reliability and consequent safety in the use of such tools.

The two kinds of steel may be combined either by pouring molten milder steel around an ingot of self-hardening steel or by pouring molten self-hardening steel into a suitable recess in an ingot of mild tough steel, or otherwise by forming the compound ingot in an ordinary "lump-mold" in a steel-melting furnace, or by "teeming" or pouring the two steels simultaneously into a mold suitably divided by a diaphragm of sheet-iron, which affords a better welding between the two dissimilar metals.

In the current methods one of the steels is cast first and becomes solid, and while it is white hot the other steel is cast in contact with the first, and a thorough weld of the two together is obtained.

What I therefore claim as my invention, and desire to secure by Letters Patent of the United States, is—

1. An ingot or bar composed of a self-hardening steel and a tougher steel, substantially as hereinbefore set forth.

2. The combination, in an ingot or bar, of a self-hardening steel and a tougher steel, the latter surrounding or partially surrounding the former, substantially as hereinbefore set forth.

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

FREDK. WM. SEAMAN.

Witnesses:

ROBT. F. DRURY,  
ENSOR D. DRURY.