CRANE & FOX.

Shell.

No. 57,870. Patented Sept. 11, 1866.

Fig 3.

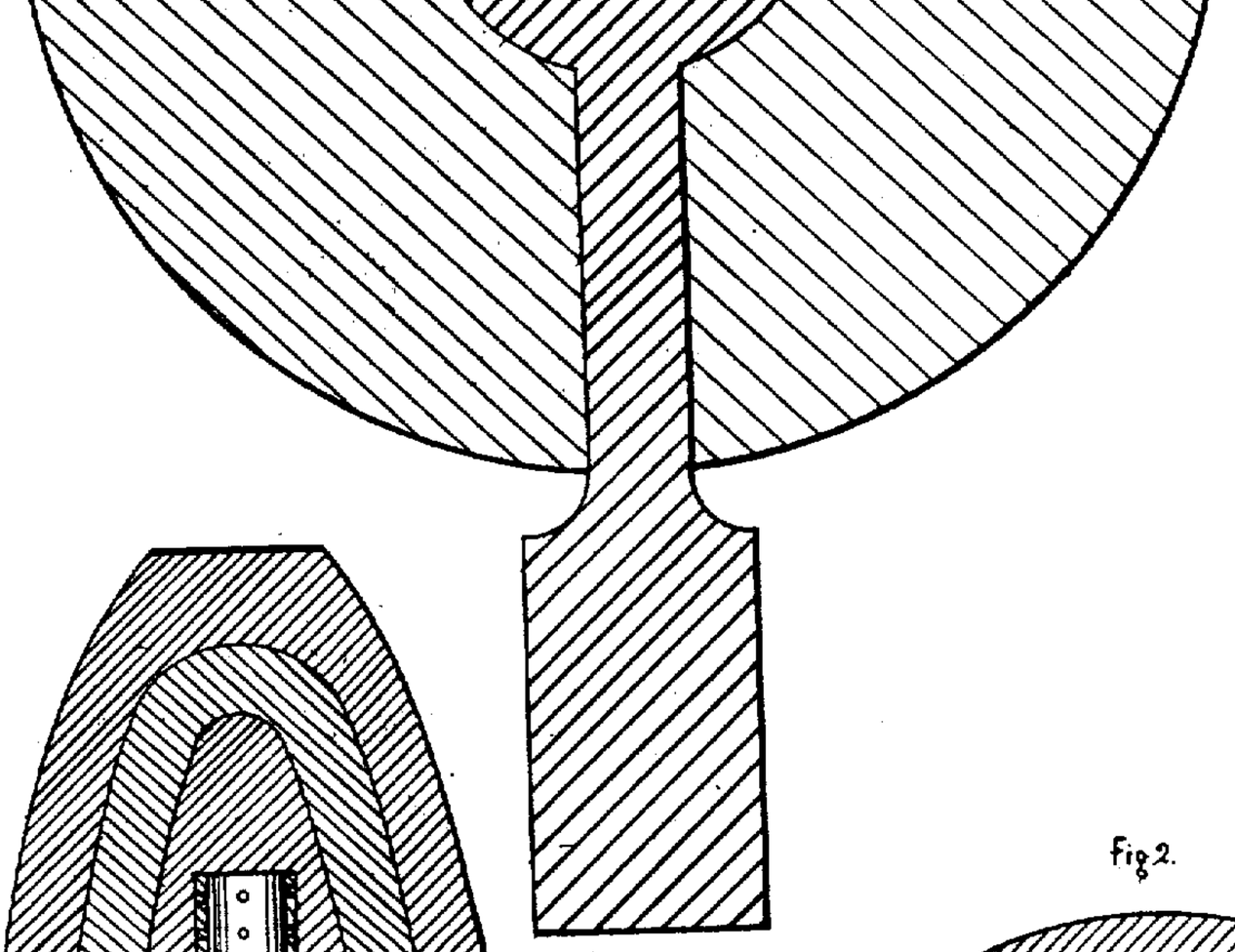


Fig 1.

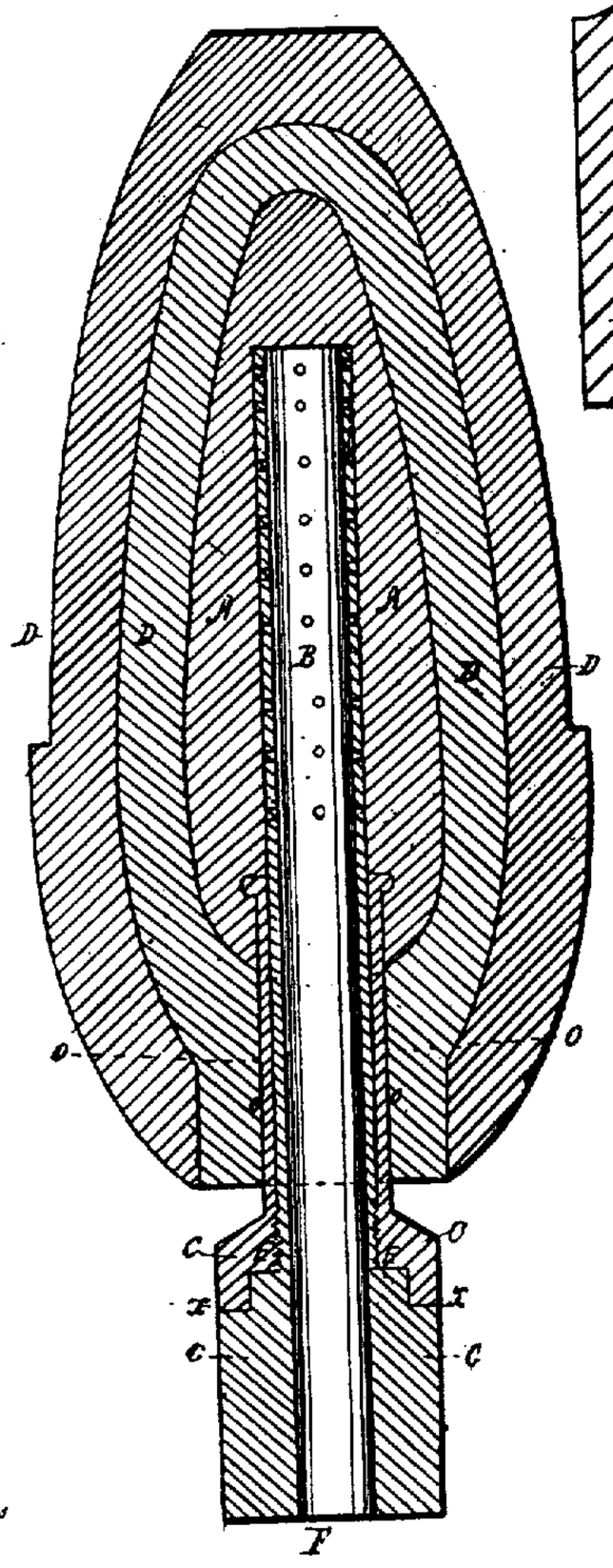
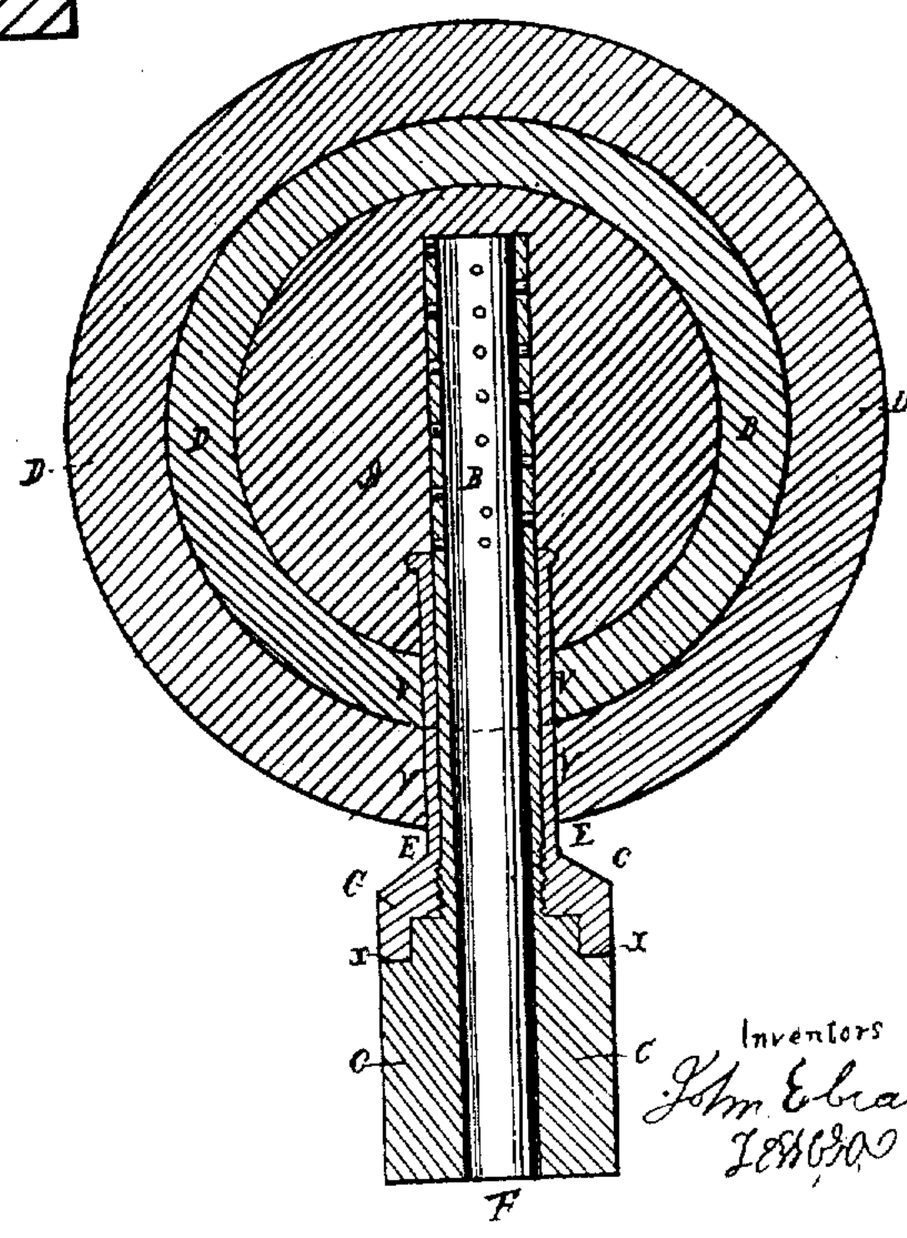


Fig 2.



Witnesses.
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JOHN E. CRANE AND JESSE FOX, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN COMPOUND PROJECTILES.

Specification forming part of Letters Patent No. **57,870,** dated September 11, 1866; antedated September 5, 1866.

To all whom it may concern:

Be it known that we, JOHN E. CRANE and JESSE FOX, both of Lowell, in the county of Middlesex and State of Massachusetts, have invented a new and Improved Compound Projectile; and we do hereby declare the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a longitudinal section of one of our elongated hollow projectiles. Fig. 2 is a longitudinal section of one of our round hollow projectiles. Fig. 3 is a section of one of our solid projectiles.

Similar letters of reference indicate corresponding parts in Figs. 1 and 2, except those letters indicating where the shell comes in contact with the bouching—viz., O O, Fig. 1, and V V V V, Fig. 2.

Our invention consists of a compound projectile composed of two or more thicknesses or layers of cast-iron or other metal, one thickness or layer cast upon another when the said thicknesses or layers are all of one kind of metal.

All ordinary hollow projectiles are formed or cast of one thickness of metal, which admits of only a limited number of fragments at explosion, and in the ordinary solid projectile for heavy ordnance a shrink-hole of considerable size occurs at or near its center, which not only weakens the shot, but frequently makes one side so heavy that the shot cannot be fired or projected with any degree of accuracy.

In carrying out our invention we make our projectile of two or more thicknesses or layers, D D, of cast-iron or other metal, all of the said thicknesses or layers being of one kind of metal. The inside thickness of our hollow projectile is cast upon a sand core, A, as in the ordinary shell; but each succeeding thickness or layer D is cast upon the outside of the preceding layer.

The core A A is suspended in a mold, and the first thickness or layer D D cast upon it. The said layer coming in contact with the bouching C C at O O, Fig. 1, or at V V, Fig. 2, is secured to the bouching C C, thus holding the core A A and spindle B firmly together.

The first shell or layer D D is then removed from the mold, with the spindle B and core A A firmly held within it. The sand or other substances are removed from the outside surface, and it is then suspended in a larger mold, and another thickness or layer, D D, cast upon the first.

The third or more thickness are cast in the same way, without removing or disturbing the spindle B, thus preserving the center during the entire operation of casting each shell, and producing a shell of uniform thickness.

The spindle B, upon which our hollow projectile is cast, is a hollow tube, and perforated through its sides, where the core A A comes in contact with it, for the purpose of allowing the gas which is generated by the melted metal to escape from the core A A through the spindle B, and out at the end F.

The bearing or stem G G of the spindle B is for the purpose of holding it firmly in the mold in a bearing or cavity made to receive it while each layer of metal is being cast on.

In constructing our solid projectile, as shown in Fig. 3, we make the core a solid ball of metal, two inches, or more or less, in diameter, with a stem projecting from one side of it, by which it is held in its proper position in the mold while the outside portion of metal is being cast upon it. By this process we avoid the shrink at the center so common in large solid shot.

Experiments have demonstrated that a hollow projectile of two or more thicknesses or layers of metal will at explosion produce two or more times the number of fragments of a projectile made of only one thickness. The outside layer or thickness of our projectile is considerably thicker than the inside layer or layers, and by this means we produce a projectile that will penetrate nearly or quite as effectually as those of only one thickness, and do far greater execution to surrounding objects or to the substance which it penetrates. It will therefore be easily seen that the fragmentary effect of our hollow projectile or shell will render it a very efficient instrument of warfare, and that our solid projectile will not have a shrink-hole at its center.

We are aware that shells for ordnance have been covered with lead or other soft metal, to serve as packing, by upsetting into the grooves of rifled guns, and therefore we wish it to be understood that we disclaim having invented the equivalent in principle or action of the above-described shell.

We claim—

Constructing shells and shot for ordnance substantially in the manner and upon the principle herein set forth, for the purpose of increasing the fragments from shells and avoiding the shrink at the center of shot, as specified.

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Witnesses:
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