

UNITED STATES PATENT OFFICE.

SELAH HILER, OF HARLEM, NEW YORK.

IMPROVEMENT IN THE MANUFACTURE OF GUN-BARRELS.

Specification forming part of Letters Patent No. **34,961**, dated April 15, 1862.

To all whom it may concern:

Be it known that I, SELAH HILER, of Harlem, in the county of New York and State of New York, have invented, made, and applied to use a certain new and useful Method of Making Barrels for Muskets and Hand Fire-Arms; and I do hereby declare that the following is a full, clear, and exact description of the said method, and of the differences existing between the same and the processes heretofore employed.

In making gun-barrels it is usual to bend or roll up a strip of wrought-iron and weld the same, and then subject the mass to successive rolling operations, and then to the boring and finishing. In all such barrels there is inequality in the texture of the iron, and the parts welded are never as strong to resist explosions as the rest of the iron. It has also been attempted to bore out the hole in a solid block of wrought-iron or steel, and then roll it down and finish as before. This, however, is not only costly and tedious, but the texture of the iron is injured by the various heating operations, and the rolling operations before and after boring, always being in one direction, render the fibers liable to separation lengthwise of the barrel.

The nature of my said invention consists in a method of preparing and working a cast ingot of iron or steel in such a manner as to produce a very strong barrel for muskets, rifles, and other hand fire-arms without seam or weld and of a very homogeneous and dense fibrous texture. This method involves the employment of four features or operations to produce the desired result: first, the casting of an ingot of iron or steel with a hole in it; second, the decarbonization of that ingot, or the casting of it in such a manner that there will not be sufficient carbon present to prevent rolling the same; third, the rolling or extension of the ingot in length; and, fourth, the compression of the ingot in rolling, so as to considerably reduce the hole therein. By these various operations the particles of metal are caused to assume the requisite homogeneous and fibrous character without these fibers becoming too much attenuated or separated by excessive rolling.

In order to prepare a cast ingot of a character to be rolled, I take a good quality of wrought-iron, cut it in moderately small pieces,

and introduce them with carbon or suitable flux into a crucible, cover the same up airtight, and apply sufficient heat to liquefy the said iron, and cast as usual in any known mold, with a sand or other suitable core to form a hole of about seven-eighths of an inch diameter, in ingots adapted to the ordinary muskets or rifles. If too much carbon remains to allow the ingot to be rolled, it is to be removed by the application of heat for a sufficient length of time in the usual and well-known manner of decarbonizing. I then submit the ingot to the operation of rollers, which compress the same and extend it in length, and I introduce mandrels of smaller diameter, successively, in order that the barrel shall be solidified by the particles being compressed together as the size of the hole is reduced. These mandrels are fitted in such a manner as to be held stationary while the barrel is drawn off by the action of the rollers, and I prefer that the diameter of each mandrel should be slightly the largest at the part which is in position to remain between the rollers, in order that the barrel may be easily entered on the mandrel, and I find that the successive rolling operations on stationary mandrels aid in the consolidation of the metal in a manner that would not be effected if the mandrel remained in the barrel and passed with it through the rollers, besides which the difficulty of withdrawing the mandrel after the rolling has been completed is prevented.

The operations of heating and rolling, as aforesaid, also aid in the removal of any excess of carbon, so that the barrel, when ready for turning and boring, is almost pure iron, with a strong homogeneous and fine fibrous texture, that works very well under the operation of tools, and is actually stronger and better adapted to resist the concussion of an explosion than any heretofore produced, and makes a much handsomer barrel.

The mold employed in casting these ingots, being of any desired or well-known character, does not require further description. I however prefer metallic half-molds each with semi-cylindrical cavities or grooves, which, when set together, form a cylindrical hole for the ingot, and the length of the said hole and core may be varied for casting one or more ingots at a time; and if a metal core is employed the same should be made in tapering sections, or

the whole tapering, to allow of being driven out before the metal cools. In such a case the mold should also be tapering to maintain the same sectional amount of metal throughout the ingot, and this ingot may be hammered or swaged down to a uniform size previous to rolling.

The melting of the wrought-iron, as aforesaid, converts it partially into steel, and I find that either scrap-steel alone or mixed with iron and thoroughly melted and then decarbonized after casting makes an ingot that will work in the aforesaid manner, the casting of the ingot with a large hole in its center, and the small quantity of carbon present previous to rolling, and the rolling constituting the necessary elements of my method of manufacturing gun-barrels.

I am aware that Letters Patent have been granted to Henry Bessemer in Great Britain,

October 17, 1855, for the manufacture of ordnance by casting an ingot and reducing the same by rolling on a mandrel; but I am not aware that barrels for muskets and other hand fire-arms ever have been or could be made according to his mode alone.

I do not claim any of the separate features herein set forth; but

What I claim, and desire to secure by Letters Patent, is—

Manufacturing barrels for muskets, rifles, or other hand fire-arms of iron or steel by the combined operations, substantially as specified.

In witness whereof I have hereunto set my signature this 25th day of January, 1862.

S. HILER.

Witnesses:

LEMUEL W. SERRELL,
THOS. GEO. HAROLD.