

R. R. MORENO.
 PROCESS FOR REMOVING COPPER FROM OTHER METALS.
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1,050,678.

Patented Jan. 14, 1913.

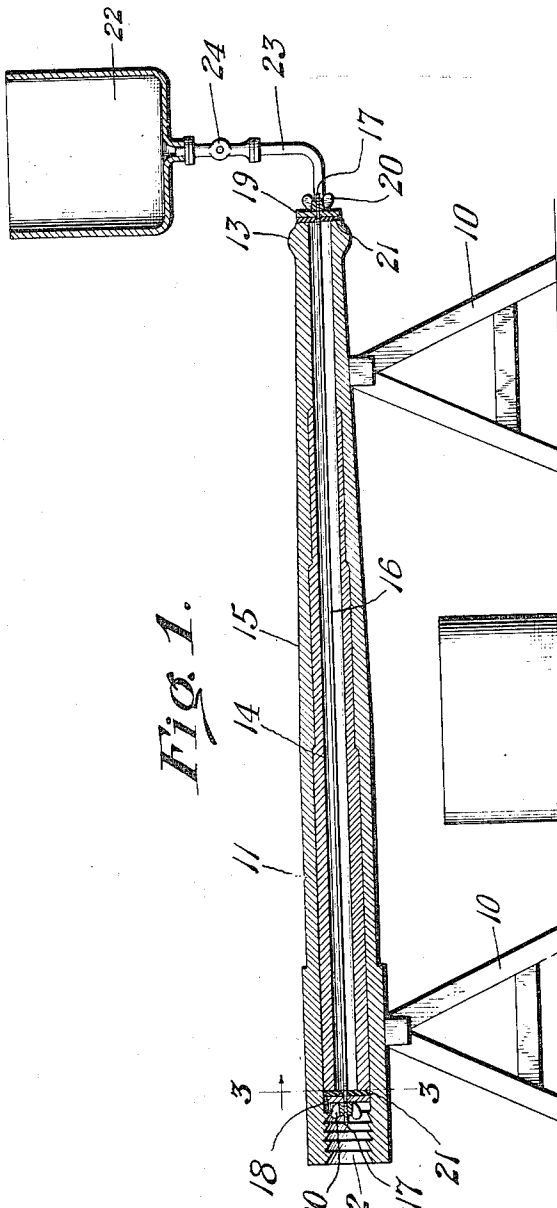


Fig. 1.

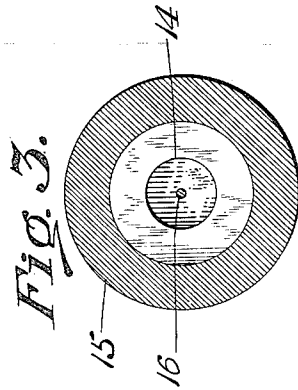


Fig. 3.

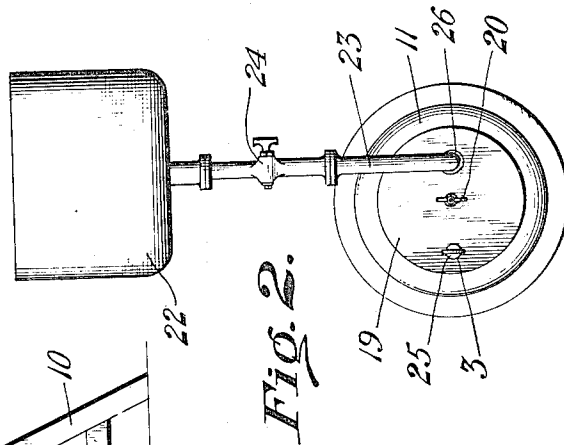


Fig. 2.

Witnesses
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UNITED STATES PATENT OFFICE.

RAUL R. MORENO, OF ALLENTOWN, PENNSYLVANIA.

PROCESS FOR REMOVING COPPER FROM OTHER METALS.

1,050,678.

Specification of Letters Patent.

Patented Jan. 14, 1913.

Application filed September 1, 1911. Serial No. 647,297.

To all whom it may concern:

Be it known that I, RAUL R. MORENO, a lieutenant of the Argentine Navy, a citizen of Argentina, residing at Allentown, in the county of Lehigh and State of Pennsylvania, have invented new and useful Improvements in Processes for Removing Copper from other Metals, of which the following is a specification.

10 This invention relates to the process of removing copper or other metallic fouling from the bore of guns by dissolving the same by an ammoniacal solution in the presence of air, thereby producing ammoniacal
15 oxid of copper.

The principal object of my invention is to provide for quickly and effectively dissolving and removing from the bore of guns the fouling of copper which adheres more particularly to the compression slopes and
20 rifled parts, without causing the sharp angles of said rifled parts to be worn or rounded, or any steel part of the bore to be removed and thereby vary in the slightest degree the true bore of the gun.

Before acceptance of guns they must be subjected to proof firing tests with charges of progressively increasing size. In these tests copper bands of the projectiles or
30 cartridges used become abraded or scraped by the compression slopes and rifled parts, till such parts become fouled by a very adherent deposit or coating of copper which increases with the number of rounds fired.

35 In order to secure a satisfactory result this coating must be removed without injury to the rifled parts or any variation in the bore. In my process this copper coating is dissolved and reduced to ammoniacal oxid of copper in order to prepare the bore for a searchlight inspection which is intended to detect the presence of tears or holes which may appear in the bore after the firing tests. The bore of the gun is then subjected to a
45 micrometer test, by means of which measurements are taken with an approximation of 0.0005 of an inch. These measurements are recorded to be compared with measurements taken before the firing tests. From

the difference in the above measurements 50 can be determined the character of construction of the gun, and therefore these measurements decide the acceptance or rejection of the gun.

Various methods have been employed for 55 removing the above mentioned copper deposit from the bore of guns and one of the methods consists in introducing lead or leather plugs into the bore of the gun, such plugs having their peripheral surfaces 60 adapted to conform to the rifling, a solution of powdered emery and oil being introduced with the plugs, which are moved along the bore of the gun to grind away the copper deposit. This method, however, is 65 tedious and unsatisfactory, since it results in wear and rounding of the sharp corners of the grooves and rifled parts. Electrolysis has also been employed for removing the copper coating, but this method is not 70 efficient, inasmuch as the copper coating does not extend uniformly throughout the length of the bore and a greater duration of the electric current upon a part of the bore not coated will result in an attack of 75 the current upon the basic structure of the gun barrel, causing removal of part of the steel and producing defects which will be quite evident when the gun is afterward measured by means of a suitable microm- 80 eter, thus resulting in the total rejection of a gun which otherwise would have remained in perfect condition.

In carrying out my process I subject the bore of a gun which has been fouled with 85 copper to the joint action of an ammoniacal solution and oxygen or air. I have found in practice that ammoniacal liquor or gas is much more effective and quicker in action when commingled with air to produce the 80 desired dissolving and oxidizing effect, and reduce copper deposits or coatings to ammoniacal oxid of copper. I take care, therefore, to dispose the gun to be cleaned, 95 in a horizontal position, then close both ends with covers, one cover being provided with a supply pipe for ammoniacal solution and a plug for admitting and discharging air,

so arranged that the bore can be filled about one-half full of the solution while the remaining space is filled with air.

The details of the process will be set forth in connection with the accompanying drawing illustrating the preferred arrangement of a gun and connecting devices for most effectively and economically carrying out the process, and in which,—

Figure 1 represents a longitudinal sectional view of a gun mounted to horizontally repose on a pair of trusses with means for introducing the ammoniacal solution into the bore of the gun. Fig. 2 represents a view looking at the muzzle end of the gun. Fig. 3 is an enlarged transverse sectional view on the line 3—3 of Fig. 1.

Referring to the views, I provide two or more trusses 10 on which a gun 11 is horizontally mounted to repose, the gun having ends 12 and 13 and a bore 14 formed within the barrel 15. A rod 16, having threaded ends 17, is passed through the bore of the gun and to the ends are applied covers 18, 19, which are adapted to close the bore 14 of the gun and they are retained in position by thumb nuts 20 engaging the screw threaded ends of the rod 16 and abutting against the covers. The covers 18, 19 are preferably provided with flexible rubber disks 21 which tend to efficiently close the bore 14 of the gun 11.

An elevated tank 22 has a pipe 23 connected therewith, an end of the said pipe being extended through an aperture in the cover 19, and the said pipe being provided with a valve 24. The cover 19 is also provided with a second aperture 3 into which is removably fitted a plug 25, said aperture, when the plug is removed therefrom, serving to permit the entrance of air into the bore 14, or to permit the escape of air when liquid is flowing into the bore. The tank 22 is filled with ammoniacal solution, and by opening the valve 24 and removing the plug 25, said solution will flow by gravity into the bore 14 of the gun. The pipe 23 is preferably connected by a swivel joint 26 with the cover 19 so as to permit the gun to be turned. The ammoniacal solution is allowed to flow into the bore until it flows out through the hole 3, when the plug 25 is inserted. The bore will now be half filled with the solution in a horizontal body and the space above will be filled with air.

As a solvent for the copper fouling I may use a solution of ammonia in water, or a solution of methylamin in water. Methylamin is a colorless gas (NH_2CH_3) having a strong ammoniacal odor and resembling ammonia in many of its reactions. The term ammoniacal solution used in this description is intended to include both a solution of ammonia and a solution of methyl-

amin in water. The gun, after being filled half full of solvent solution is allowed to rest a few hours, after which it is turned one hundred and eighty degrees and again allowed to rest approximately the same length of time, thus treating the entire surface of the bore. The commingled air and ammonia act rapidly to reduce the copper to an ammoniacal oxid of copper which may be readily wiped or brushed out of the bore. This oxid of copper does not affect the steel, and therefore it will free the compression slopes and rifled part from copper without injury, and permit the operator to see whether any tears or holes have been made in these parts due to proof-firing. The treatment with ammonia solution may be extended through a shorter or longer period to remove the copper as it will not in any way effect the bore, inasmuch as the ammonia will not attack the steel, but on the contrary its presence will prevent oxidation of the exposed steel parts. The strength of the copper solution used will be dependent upon the grade of copper and the thickness of coating or deposit.

From the foregoing description, it will be seen that an efficient process for removing copper coating or deposit is provided and which, aside from performing the desired purpose, will not affect the sharp corners of the rifling grooves in the bore and will not increase the diameter of the bore of the gun, any variations of this kind being due to a deformation of the gun.

It is to be noted that my process involves practically no labor and no expense for a pump or other machinery for applying the solvent solution, and is therefore quite economical. Several guns can be treated at the same time under the supervision of one man.

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

1. The process of removing copper deposit or coating from the bore of a gun, which consists in disposing the gun horizontally, partly filling the bore throughout its length with ammoniacal solution, while the remaining space is filled with air, allowing the gun to remain at rest subject to the action of ammonia and oxygen, and after a suitable interval turning the gun to bring the solution into contact with the remaining surface of the bore whereby the copper is converted into ammoniacal oxid of copper.

2. The process of removing copper deposit or coating from the bore of a gun, which consists in disposing the gun horizontally, closing the ends, but providing a vent at approximately the height of one-half the diameter of the bore for admitting

or discharging air, then supplying the ammoniacal solution till it appears at the vent, then closing the vent and allowing a period of rest subject to the action of ammonia and
5 oxygen, and turning the gun to bring the solution into contact with the remaining surface of the bore, whereby the copper is converted into ammoniacal oxid of copper.

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

RAUL R. MORENO.

Witnesses:

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DALMIRO SAENZ.