

# UNITED STATES PATENT OFFICE.

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## PROCESS OF CLEANING WOOL.

SPECIFICATION forming part of Letters Patent No. 420,315, dated January 28, 1890.

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*To all whom it may concern:*

Be it known that I, KARL F. STAHL, of Johnstown, in the county of Cambria and State of Pennsylvania, have invented certain new and useful Improvements in Processes of Utilizing Waste Liquors Containing Iron Salts for Regaining Woolen Fibers from Rags Containing Woolen and Vegetable Fibers, of which the following is a specification.

This invention relates to an improved process for utilizing waste liquors containing iron salts for the regaining of woolen fibers from rags containing woolen and vegetable fibers. These liquors have at present scarcely any value, and are in many localities run into the rivers.

The invention consists in subjecting said rags to the action of a heated solution of salt, sulphuric or muriatic acid, and a waste liquor containing iron salts until the vegetable fibers are disintegrated, and then recovering the woolen fibers by washing out the vegetable fibers.

In carrying out my invention I take, for instance, the so-called "pickling-liquor" which is obtained in wire-mills and galvanizing-works in cleaning iron rods, wire, or sheet-iron with sulphuric or muriatic acid, and oxidize it with nitric acid or bleaching-powder, by which the protochloride of iron is changed into perchloride of iron. This liquor has to be kept acid by adding muriatic or sulphuric acid; but generally the pickling-liquor contains enough free acid. This oxidized liquor is brought to a strength of 12° Baumé at 60° Fahrenheit, and twenty gallons of the same are mixed with twenty-five gallons of the original not oxidized liquor of a strength of 20° Baumé, fifty gallons of brine of 24° Baumé, and five gallons of sulphuric acid, 50° Baumé. Muriatic acid may be used in place of sulphuric acid; but then about ten gallons of muriatic acid have to be used and a correspondingly smaller quantity of brine. The relative proportions of the ingredients can be increased or diminished according to the quality of the material to be treated and the time within which the operation is to be completed. The best results are obtained if the liquor which is to be oxidized is taken from the tubs in which muriatic acid has been used for pickling.

Having prepared the solution, it is heated in a wooden or lead-lined vat, preferably by steam, to a temperature near the boiling-point, and the material to be treated—about a pound for each gallon of solution—is immersed in the same and frequently stirred until the vegetable fibers have become brittle, so that the woolen fibers can be readily separated from them. The time to accomplish this varies with the material, temperature, and composition of the bath. At 200° Fahrenheit, and when sulphuric acid is used, it takes about forty minutes, at 215° Fahrenheit it takes about fifteen minutes, and if muriatic acid is used it takes still less time. Sulphuric acid and a lower temperature give, usually, the best results. The vegetable fibers are then washed out with water and the woolen fibers treated with a weak solution of an alkali, preferably ammonia, and then washed again with water. The woolen fibers are then dried and carded and used again like new wool. The solution or bath can be used several times. A liquor which is most favorable for the rapid disintegration of the vegetable fibers, with the least injury to the woolen fibers and the color of the same, should contain about two per cent. of perchloride of iron, (or two and one-half per cent. of persulphate of iron,) four per cent. of protosulphate of iron, fifteen per cent. salt, and five per cent. sulphuric acid. This description will enable those familiar with chemical processes to adapt waste liquors which contain in part or entirely salts of iron for the recovery of wool from rags and other material.

I am aware that sulphuric acid and salt, or sulphuric acid, salt, and alum, have been used for the destruction of the vegetable fibers in half-woolen rags; but the wool produced by these processes is much impaired in strength and softness, and the color of it is generally destroyed, while in the wool produced by my process, with liquors containing iron salts a portion of which is oxidized, the fiber of the wool is scarcely affected, and the colors, and more especially the black and other dark colors, are not changed at all, so that the recovered wool can be used over again without dyeing. This process is not more expensive than the older ones, as it uses a material which is at present allowed to run to waste.

I am also aware that a liquid known as "spent salts," which arises from treating iron with muriatic acid, and which is a solution of protochloride of iron, has been proposed to  
5 be used with the addition of muriatic acid only; but, although this process is very simple and the cotton fiber is destroyed in a short time, the wool obtained is not soft and strong, and the dark colors are not as well preserved  
10 as when a solution containing iron salts of which a portion is oxidized, sulphuric acid, and brine is used.

What I claim is—

The process herein described of recovering

woolen fibers from rags containing woolen 15  
and vegetable fibers, which consists in treating them with a heated solution composed of oxidized pickling-liquor, unoxidized pickling-liquor, brine, and sulphuric or muriatic acid, substantially as set forth. 20

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

KARL F. STAHL.

Witnesses:

JNO. D. JONES,

JNO. S. TITTLE.