

It is a little singular that the boiler should have given way in the direction in which, by theory, it is considerably the strongest. For a tearing strain in the direction of the axis of the boiler, the resistance would have been equivalent to but 25 atmospheres, (347 lbs. per square inch,) if we take 50,000 lbs.

A very simple calculation will suffice to show that the pressure within the boiler at the moment of explosion was enormous. In fact, if we suppose the boiler lying quite horizontal, the projectile force was sufficient to carry the eastern fragment over 112 feet, while it fell 12 feet by the action of gravity, that is in 0.866 sec. The projectile force, therefore, gave to a mass of about 300 lbs, a velocity of 130 feet per second.

In the opinion of the committee, therefore, the explosion of this steam boiler was owing to an excessive pressure of steam, probably generated instantaneously by the admission of water to overheated metal, and the line of fracture was determined by the weakening of the iron at the junction of two of the plates, by the careless use of the caulking-tool.

By order of the Committee,

WILLIAM HAMILTON, *Actuary.*

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*Report on MM. DURAND & PECQUEUR's process for manufacturing various articles from Leather.*

The Committee on Science and the Arts, constituted by the Franklin Institute of the State of Pennsylvania for the promotion of the Mechanic Arts, to whom was referred for examination the process for manufacturing various articles from Leather, invented by MM. DURAND & PECQUEUR, Paris,

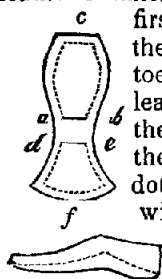
REPORT—

That they have examined with much satisfaction the various articles which have been brought before them by Mr. Rabeau, manufactured in leather by the process invented by MM. Durand & Pecqueur of Paris, of which process Mr. Rabeau is the patentee in the United States. They have likewise inspected the machine by which the various manufactures are produced. The patent is claimed for a method of manufacturing various hollow articles of leather without seams, such as fire-hose, sword, and bayonet scabbards, canteens, shot pouches, cartridge boxes, military caps, boots and shoes, cigar, and spectacle cases, &c., &c. The principle of the method is to divide the leather in a moistened state, in the direction of the plane of its length and breadth, making in the case of fire-hose, a slit through its entire length, leaving a border on both edges of the strip uncut. This is performed by means of a short knife at the end of a steel rod to which an alternate lateral motion is communicated by a peculiar mechanism; and this operation is performed with so much accuracy, that the slit is made directly through the centre of the strip of leather, leaving the two sides everywhere of the same thickness, supposing the original strip to be of a uniform thickness. In the case of sword

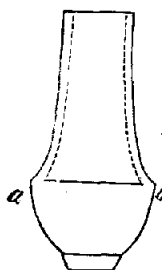
and bayonet scabbards, a mandrel is introduced, by which the piece can be made to assume the proper form and stiffness when dried.

In the manufacture of canteens, a piece of leather is taken of the requisite shape, which is a little broader than the vertical section of the canteen through its length and greatest breadth, in which a slit is cut so as to leave the uncut border everywhere of the same breadth. The leather is in the wet state when cut, and is filled with sand and a plug driven into the mouth, then dried, after which it retains the shape thus given to it, and may then be finished according to any of the ordinary methods. Melted wax, or a preparation of wax, is poured in the inside, which fills the pores of the leather, and prevents the infiltration of the liquids which it is intended to contain, and further from acquiring any unpleasant taste from it. Mr. Rabeau proposes to finish his canteens by subjecting them when filled with sand to pressure in proper moulds, by means of an hydrostatic press. His helmets and military caps are fitted on blocks, from which they take the proper shape.

Mr. Rabeau manufactures by this process a shoe, of a single piece of leather, excepting the heel-tap, even to the ties. A piece of sole-leather is taken of the form represented in the figure. The knife is first introduced along the line *a b*, slitting the leather in the shape of the dotted line to the end *c*, thus forming the toe. It is again introduced along the line *d e*, slitting the leather according to the shape given by the dotted line to the end *f*, forming the heel. When a last is introduced, the uncut border assumes the position represented by the dotted line in the figure. This border is then pared down with the knife so evenly, that in the finished shoe, the edge cannot be distinguished from the sides of the leather. A very neat article of the species of overshoes, called *clogs*, is fabricated by this method. There is not a seam in the shoe being all of one piece, except the heel.



The legs and uppers of boots are made likewise without seams. The original piece of leather is of the form given in the figure on the margin. The knife is entered at the line *a b*, and the heel and leg are formed by a slit of the shape given by the dotted line. The method generally adopted, however, is to have two short seams on each side of the boot-leg, near the sole. The boot is then finished in the ordinary manner. A very neatly finished boot was shown to the committee, the upper leather of which was finished in this manner. Also a shoe, the leather of which however, was not curried or dressed. Mr. Rabeau proposes to furnish a common kind of boot only by this method. The shape is given to the boots



and shoes by the trees and lasts, while the leather is wet, and Mr. Rabeau thinks that when the leather is dressed and oiled, after the shape is given to the boot or shoe, it will always be retained in all circumstances of moisture and wear.

It is the opinion of the committee, that the process of M. M. Durand & Pecqueur, is a great improvement over the old method of the manufacture of scabbards, canteens, and articles of a like description, avoiding as it does, all seams, and thus freeing it from the greatest liability of damage, and wear and tear, in use. The inner surface is perfectly clean and smooth.

Their method of manufacturing fire hose is one saving the labor of rivetting to a great extent; rivets being used only to join the strips after they have been slit. Whether, however, the leather in this state of diminished thickness, will be found sufficiently strong to meet the exigencies of the fire service in our cities, or in other large cities, the committee are not prepared to say. Experience can only pronounce with certainty. It is observed that the common hose wear most at the lines of rivets running across the general length of the hose. This of course will take place in the hose made according to the new process. Mr. Rabeau thinks his hose has an advantage over the common in reeling off and on the carriages, from the fact of its being nearly, if not perfectly flat, when not filled with water. A section of hose manufactured by Mr. Rabeau, was subjected to a pressure of 120 lbs. on the square inch, which it withstood successfully.

Another important application of this invention, is the covering of the draw-rollers of cotton spinning machines. There are objections to the old methods of wrapping the leather around the cylinder, and then sewing or glueing it as tightly as possible. It is found that the leather gradually stretches and works loose, and then is obliged to be removed or tightened. And further, it is found that it is difficult to get a perfectly round cylinder, on account of the seam. And as uniformity in the size of the thread depends upon this latter circumstance, any method which may overcome the difficulty is important. By the new process a slit is cut in a piece of leather of the proper size, and driven on to a metallic cylinder, which it is made to fit very tightly, and then placed in a lathe and turned perfectly smooth and round. It may be objected that the leather thus embracing the metallic cylinder so tightly, may lack the requisite degree of elasticity to accommodate any irregularity in its surface to the size of the thread. But it may be answered, that from the perfectly cylindrical shape which may be given to the roller, the leather does not require the same degree of elasticity. It seems to be an important improvement, and worthy the attention of those engaged in that branch of manufactures.

By order of the Committee,

WILLIAM HAMILTON, *Actuary.*

*Philadelphia, May 11, 1848.*