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Improvement in Apparatus for Tanning Leather.

It is a well-ascertained fact that the thorough rousing of the liquor in tan vats, during the progress of tanning, greatly accelerates the process and secures uniformity in the product proportionably to the thoroughness with which this detail is attended to. The old method of doing this, technically called "handling," is the most laborious of all the work done in a tannery, and when performed in the best manner possible, often leaves much to be desired in the quality of the leather.

For tanning small hides revolving perforated drums have been employed, rotating in vats containing the tan liquor, and this method, although expensive of power, has answered in the manufacture of inferior qualities of leather from sheepskins, etc., for bookbinding, trunk-making, and other purposes where the best leather is not always required.

The improvement herewith illustrated will not only do the same thing more effectually with a far less expenditure of power, but is of such a nature that it can be advantageously applied to the tanning of any kind of hides, large or small.

The advantages claimed for this invention are, that it will save at least one fourth of the heaviest labor in tanning; that it will produce a more uniform and better quality of leather than any process hitherto employed; that it is equally adapted to liming hides, leaching tan, and other similar processes; and is very effective and economical in all these operations.

The hides are hung on slats, as close together as usual, in the vats containing the tanning liquors. Then the air is forced into the bottoms of the vats through a series of pipes, A, leading from an air pump, B, and there discharged through a distributor, C. Then escaping through the supernatant liquors, it causes therein violent currents and ebullition. This insures a regular tannage of the hides.

The inventor informs us that no spots or traces can be found throughout hides tanned by this method that have not received equal tannage, and that the surfaces of the skins, when the operation is performed, present a perfect, smooth, and unbroken grain hitherto unknown among tanners.

In winter the air can be warmed by closing the cock, D, and opening the cocks, E and F. The air will then pass through a series of pipes inclosed in the steam cylinder, G, and heated to the temperature required—a process which will greatly accelerate the tanning, while it is totally free from the objections attending the use of hot liquors. In summer the cocks, E and F, being closed, and D being opened, the air does not pass through the heater, G, but enters the vat at the atmospheric temperature.

It will be seen that this adjustment, simple and cheap as it is, insures two very important requisites to speedy and efficient tanning; viz., the regulation of the temperature of the liquor to a nicety, and the thorough rousing of the contents of the vat; and we shall be greatly mistaken if it does not meet with a favorable reception from that very intelligent and enterprising class of men, American leather manufacturers.

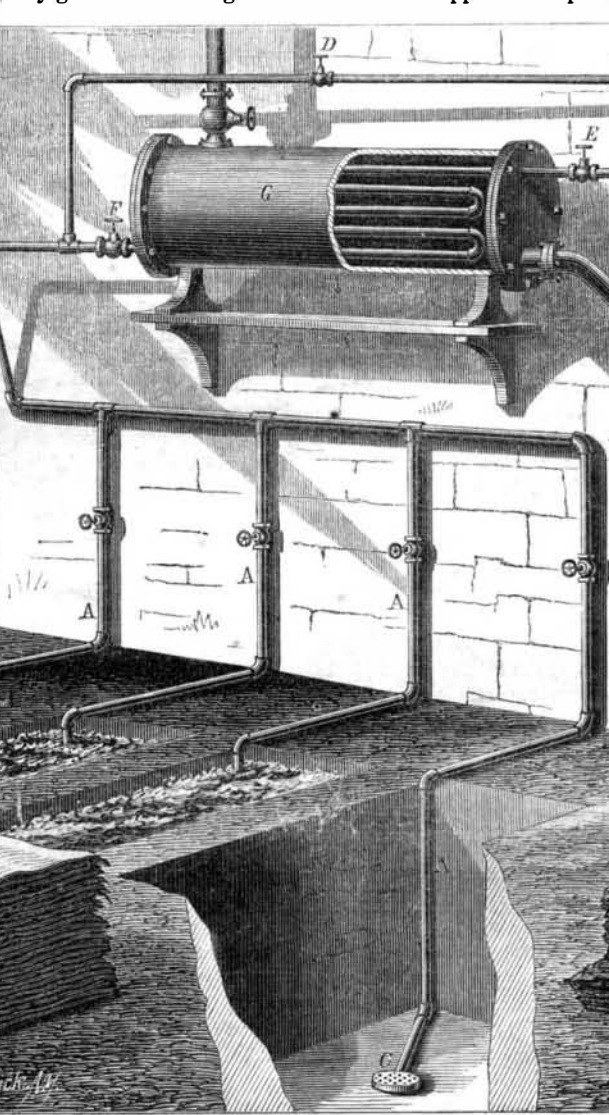
Patented through the Scientific American Agency, July 13, 1869, by John E. Kauffelt, Shrewsbury, Pa., to whom communications may be addressed.

Surmounting Inclines.

If the inclines on railways could be so arranged that every ascending gradient should be preceded by a descending one, in other words, that the two should meet at the lower level, the impetus acquired in the descent would materially assist the subsequent ascent. There are, undoubtedly, some instances where this desirable result obtains, but they are, in all probability, occasioned more by accident or necessity, than by design. The steeper the incline, the greater must be the adhesion of the wheels on the rails. Hence the innumerable

patents and inventions for accomplishing this purpose, which climaxed in the introduction of the middle rail and extra wheels. In one sense, weight and adhesion are synonymous terms, but to gain the necessary amount of adhesion by simply increasing the weight, would be to employ a remedy worse than the evil, as the difficulty is to get the weight itself up the hill. The experiments at Mont Cenis have quite thrown into the shade anything that has been done at home in the way of surmounting inclines, although we have, in latter days, distinguished ourselves in the art of making steep railway gradients to a degree that would have appalled our pre-

decessors in that particular branch of engineering. A trial is to be made on the French side of Mont Cenis of the system of an Italian engineer, M. Agudio, for working sharp inclines on mountain summits. This principle has been employed for some years upon the Turin and Gênes Railway, and the experience gained during its application there has enabled the inventor to remedy the imperfections, correct the errors, and introduce those modifications and improvements which are indispensable to the success of every newly-tried mechanical invention.



KAUFFELT'S IMPROVED ATMOSPHERIC TANNING APPARATUS.

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Steep gradients are essential to the system of M. Agudio. He reconciles the differences of level by inclines of 1 in 10, and presses into his service the resources that nature has placed at his disposal, instead of employing means wholly artificial for accomplishing his purpose. The natural forces or motive power to be found in mountainous districts is utilized by hydraulic machines placed one at the summit, and the other at the bottom of the incline. From these the power is transmitted by the agency of steel telodynamical cables, working at a high velocity, to a locomotive, or, rather, locomotor, which is placed at the head of the train. As no boiler is required, the weight is very small in comparison with that of an ordinary locomotive, being restricted solely to that necessary to provide for the moving parts. At the same time, a certain amount of adhesion is absolutely indispensable, especially on inclines of the steepness already mentioned. In order to effect this, there is, first of all, the weight of the engine. Secondly, this weight is rendered more serviceable by being carried on eight wheels; and, thirdly, there are six horizontal wheels introduced, which, by means of springs, are caused to press against a central rail, similarly to the well-known Fell system. Powerful brakes are supplied to guard against contingencies in descending the inclines. A grant has been made by the Imperial Government of nearly £10,000

for carrying out this principle at Mont Cenis, and a similar subvention of the same amount has been given by the Italian Government. The particular section of the Mont Cenis Railway, to which this system is to be applied, commences at Lanslebourg, a station on the Fell road, crosses the river Arcq, and ascends the sides of the hill by nearly the same route as that occupied by the lines of telegraph. A succession of sharp curves from 450 ft. to 900 ft. radii, and an equal number of heavy gradients, bring the new section to the summit, where it rejoins the line of Fell. This route has been adopted by M. Agudio in order to demonstrate the great advantage of his system over others in use in similar arduous localities. The total difference of level between the starting point and the summit level is 2,296 ft., and this is accomplished in a distance of 2.2 miles, whereas 7.5 miles is the distance required by Mr. Fell to rise the same height. The length of line, and, *ceteris paribus*, the cost is, therefore, in the latter instance, about three and a half times that in the former. One of Fontaine's turbines constitutes the prime motor. It is fed by the waters of the Arcq, which are collected and stored in a reservoir containing 900,000 gallons of that fluid, the whole of which is capable of being run off and replenished six times a day, thus affording six ascents and six descents in the twenty-four hours. Each ascent will occupy about a quarter of an hour, and will of course be made without any interruption *en route*. The load taken up, will, in round numbers, equal sixty tons. It is stated that the Fell locomotive requires an hour to perform the same journey, that is, so far as the difference of level is concerned, and conveys only one fourth of the load between the same termini. M. Agudio calculates that the ordinary passenger trains, which will weigh considerably less than sixty tons, will "do" the journey in ten minutes. At the present day, when engineers have exchanged the old principle of adapting the road to the locomotive for the more modern practice of suiting the locomotive to the road, any proposed improvement in that direction is deserving of careful and impartial consideration.

THE LATEST ACHIEVEMENTS OF ENGINEERING SCIENCE.

Extract from the address of C. W. Siemens, F.R.S., before the British Association.

In viewing the latest achievements in engineering science, two works strike the imagination chiefly by their exceeding magnitude, and by the influence they are likely to exercise upon the traffic of the world. The first of these is the great Pacific Railway, which, in passing through vast regions hitherto inaccessible to civilized man, and over formidable mountain chains, joins California with the Atlantic States of the great American republic. The second is the Suez shipping canal, which, notwithstanding adverse prognostications and serious difficulties, will be opened very shortly to the commerce of the world. These works must greatly extend the range of commercial enterprise in the North Pacific and the Indian seas. The new waterway to India will, owing to the difficult navigation of the Red Sea, be in effect only available for ships propelled by steam, and will give a stimulus to that branch of engineering.

Telegraph communication with America has been rendered more secure against interruption by the successful submersion of the French Transatlantic cable. On the other hand, telegraphic communication with India still remains in a very unsatisfactory condition, owing to imperfect lines and divided administration. To supply a remedy for this public evil the Indo-European Telegraph Company will shortly open its special lines for Indian correspondence. In northern Russia the construction of a land line is far advanced to connect St. Petersburg with the mouth of the Amoor river, on completion