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NEW SERIES.

## NEW STEAM EXCAVATOR.

The millions of dollars that are annually expended in excavating earth have attracted the attention of inventors to devise modes of aiding the operation by machinery; and large and costly machines have been made for excavating in certain situations, especially in deep cuts of soft sand, which work well, and perform the labor of many men. In all of the excavators which we have seen, the earth was deposited in carts for removal.

The use of the ponderous machine here illustrated is to excavate earth, and transport it to the desired place of deposit, it being intended to work in ground free from large stones or nearly so, and where the hills are not too steep for the ascent and descent of a locomotive running on broad wheels on the ground.

The rectangular frame, A, is supported on four wheels, two of which, B B, are the driving wheels propelled by the engine, C C. The two forward wheels are joined to the frame by means of a king bolt, and are connected by rack and pinions with the steering wheel, D, so that the machine may be guided in its course. As the machine is driven along, the plow, E, turns up the dirt, and rolls it into the radial chambers of the elevating wheel F. As the wheel, F, revolves, the dirt is held in the chambers by the plate, G, till it is carried above the edge of the plate, when it slides down by its own gravity, and falls into the car, H. The car shown in the cuts is only one of a series intended to surround the machine on a railway having turning tables at the corners; as each car is filled it is pushed along by hand, and thus

all receive their loads, when the wheel, F, is raised so that it will not operate to lift the earth, and the machine is propelled under the guidance of the operator to the place of deposit, when the cars are emptied in the usual manner. The shaft of the wheel, F, runs in journal boxes, which are secured in the upright guides, i i, and are suspended by chains which are wrapped around the shaft, k, so that the wheel, F, may be raised by the power of the engine, by throwing the clutch, m, into operation, and thus turning the shaft, k. The wheel, F, is rotated by means of the chains; n and o, and the pulleys, p and r, as shown.

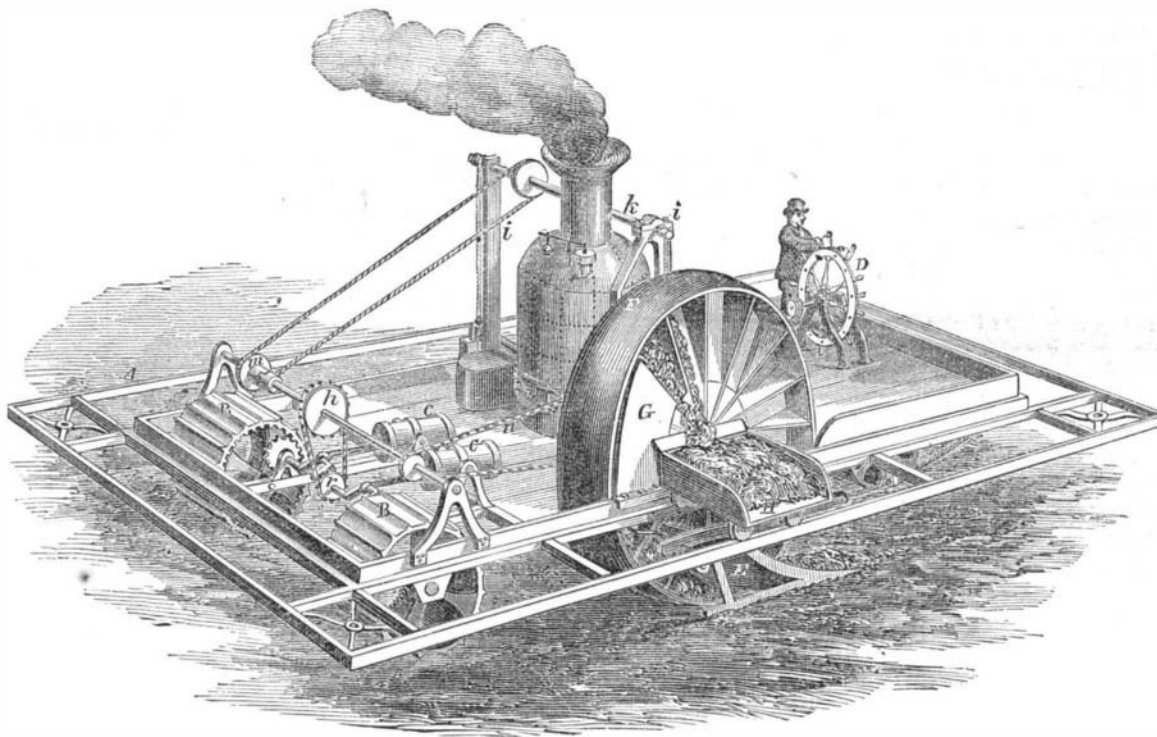
This machine is the invention of W. G. Goodale and R. L. T. Marsh, to whom a patent was issued through the Scientific American Patent Agency, Dec. 20, 1859, and persons desiring further information in relation to it will please address Messrs. Goodale & Marsh, at Centralia, Ill.

## THE ART OF TANNING.

The following extracts are taken from the second lecture of the Hon. Gideon Lee, on the above subject as published in the *Shoe and Leather Reporter*. The substance of his first lecture we published on page 384, Vol. I. (new series):—

“Saving is the order of the day. Each pound of gluten wasted, incapacitated, expunged, consumed, or otherwise lost, involves the loss or prevents the gain of nearly an equal weight of tannin, which the gluten so lost would otherwise have combined. I am satisfied that excessive soaking and softening is the incipient waste. But we must be equally careful to avoid the opposite extreme; for if our theory be correct, short or deficient softening is no less a cause of loss or waste than overdoing. The purest glue and the purest tannin have no more chemical affinity in a perfectly *dry* state than the two most repellent substances in nature. It is only in a state of solution, or extreme softness approximating solution, that

ing the fatty particles, and distending and swelling the whole hide to double its natural thickness. It must be obvious to the most ordinary mind that a menstrum so cogent should be used with great discretion; we have good reason to apprehend it has done great waste to our trade in consuming the soft gelatine of which the raw hide is composed. Every tanner knows that all high limed leather is loose, porous, pervious to water, weighs light and wears out quickly; I ascribe the whole mischief in the process to the actual consumption of the soft and more delicate particles of the gluten. Let us suppose that ten pounds in the hundred are thus consumed. Why, we have not only lost the ten pounds of hide, but we have failed to gain the five, or seven, or ten pounds of tannin which should have combined with it! I shall say but little of another process adopted by a great number of our large tanners within a few years, commonly called *sweating*, which accomplishes, by the process of that fermentation natural to all dead animal substances,



GOODALE & MARSH'S NEW STEAM EXCAVATOR.

this affinity has active existence. Every ounce of the hide, therefore, which fails of that degree of softness requisite for the incorporation or union of tannin is no better than lost; it can never form the necessary union with the tannin in order to make leather; but it must remain in a state which, in technical phrase, we call 'horn' or 'starved hide.' Some tanners have fancied that the opening power of the lime, in the next stage of the process of preparation, may perform what the pure water and the softening mill had left undone. We know that lime is a powerful solvent, and in part it possibly may remedy the defective work of the water and the mill, but not fully. If then, ten pounds of hide in a hundred should fail of the requisite degree of softness, in the harder or thicker parts the leather will fail proportionably, both in weight and quality. The operation of a strong solution of lime, on the soft and raw hide, is powerful, opening the pores, loosening the hair, consum-

all the beneficial purposes of the lime; and, I am inclined to believe, with less waste of the raw material. Several practical tanners, in whose judgment I have very great confidence, say, that the sweating process, in comparison with the liming, 'requires less labor saves a portion of the hides, which, in the process of incipient putrefaction, would be suddenly destroyed by lime, causes a greater gain in the weight of the leather; that it is more solid, finer texture, less pervious to water, and wears longer; but requires longer time in the tanning, and is very difficult for the shoemaker to

sew or stitch.' The process called *bating*, which immediately follows the liming, is intended to expunge the lime and restore the texture of the hide, as nearly as may be, to what it was before the liming process. It is, in its nature, that kind of fermentation which immediately precedes putrefaction, and the ultimate decomposition of all animal substances. This is perhaps the most delicate and critical operation in the whole range of the manufacture of leather, and requires in the operator the nicest perception, the most improved judgment, and constant watchfulness especially in variable weather. The next process is the *handling*. Here begins the actual tanning, in a solution of tannin, which, being a powerful anti-putrescent, instantly arrests the fermentation generated in the bate. I have good reason to believe that, in the *bating* process, a large portion of the substantive body of the hide may be 'run off,' without destroying its organic structure. I presume every reflecting tanner will support me in the