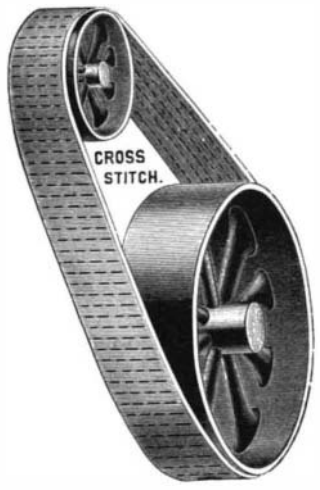
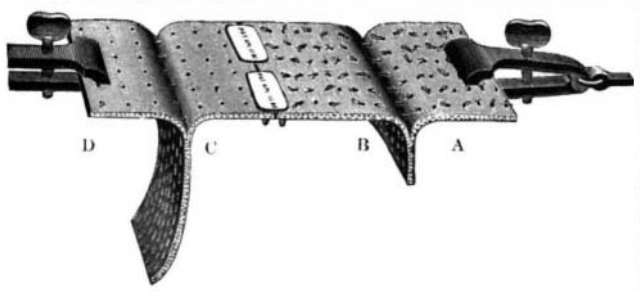
IMPROVEMENTS IN RUBBER BELTS.

Every year advances have been made in the manufacture of rubber belting, with the object of making a belt that will better stand the enormous strains and hard work to which belting is now put. When belts were first put on the market the different plies of which they were made up were held together by the strength of the rubber which is kneaded into the meshes of the duck, but that failed to serve the purpose, so that recently the best belts have been sewed through and through, thus holding the various plies together very solidly. It has been found, however, that these sewed belts are far from perfect. A recent improvement in this direction is called the "cross-stitch" belt, on account of the method of its manufacture, and it is the subject of several patents. The old style sewed belt is sewed with an ordinary sewing machine, one thread at a time; consequently, the threads on both sides run longitudinally, the length of the belt. In the "cross-stitch" belt all the threads are sewed at once. The threads on side run longitudinally, while on the other side they are tied together by threads running transversely, as is shown in the accompanying cut.



CROSS STITCHED RUBBER BELTS.

All who have had experience with sewing machines of any kind know the difficulty of getting an even tension on the thread at all times, and in the old style of belt it is practically impossible to have all the threads



TESTING STRENGTH OF RUBBER BELTS.

of the same tension. The result is that a portion of the threads take all the strain of the entire belt, for the tighter the tension on any particular thread, the tighter the thread and the more strain on that thread. On the "cross-stitch" belt all of the longitudinal threads are tied together by the under transverse thread, so that if one thread happens to have a tighter tension than the others, the under thread equalizes it with the others, so that the entire number of threads have identically the same tension.

By the very nature of its construction, also, the threads running across the "cross-stitch" belt are in a perfectly straight line, because all the needles are fixed to a single steel bar. This results in making the "cross-stitch" the strongest sewed belt possible, as can be seen by examining carefully the above cut, and making the test yourself.

Take any sewed belt, separate the plies as in the cut A B; separate the plies in the "cross-stitch" belt C D; clamp the two ends B C together, attach clamps to the ends A D, then apply power to A and D to pull them apart. This experiment will illustrate how strongly the threads hold, and that the "cross stitch" will rip open the other belt. The reason of this is that in the "cross stitch" the transverse threads are in a perfectly straight line of necessity, and in the other belt the chances are that only a portion of the threads would be in the same straight line at right angles to the line of the belt, because each line of threads is sewed separately.

Another objection to the old style sewed belt is that when the belt runs over a small pulley, the strain on the outside threads of the belt is very great, and they either break or weaken the belt by cutting into the duck. The thicker the belt, the more danger in this respect. In the "cross stitch" the transverse threads run on the outside, and this difficulty is overcome. They have these belts now in operation which have not had to be taken up once after being put on. For any further information regarding them, address the manufacturers, Boston Woven Hose and Rubber Company, No. 275 Devonshire Street, Boston.

California Trees.

A. H. Taylor, representing the Interior Department at Washington, visited Tulare recently for the purpose of arranging for a section of sequoia, to go to the World's Fair. The *Pacific Lumberman* says the Tulare Board of Trade decided to undertake to procure a fine tree, and, if the cost is not too great, the government will exhibit it in the government building at Chicago, and afterward put it on permanent exhibition at the Smithsonian Institution at Washington. The section of the tree will be at least twenty feet high, and thirty feet through.

Mr. Taylor will take a tree, thirty feet long and thirty feet through. His plan is to have it cut into slabs, three feet thick, for transportation. Two sections of the full diameter of the tree will be cut, and polished so as to show the grain completely. The outside of the tree, in these three-foot slab sections, will be taken to Chicago, put together, and formed into a complete, though hollow, tree. The polished ends will be the floor and ceiling.

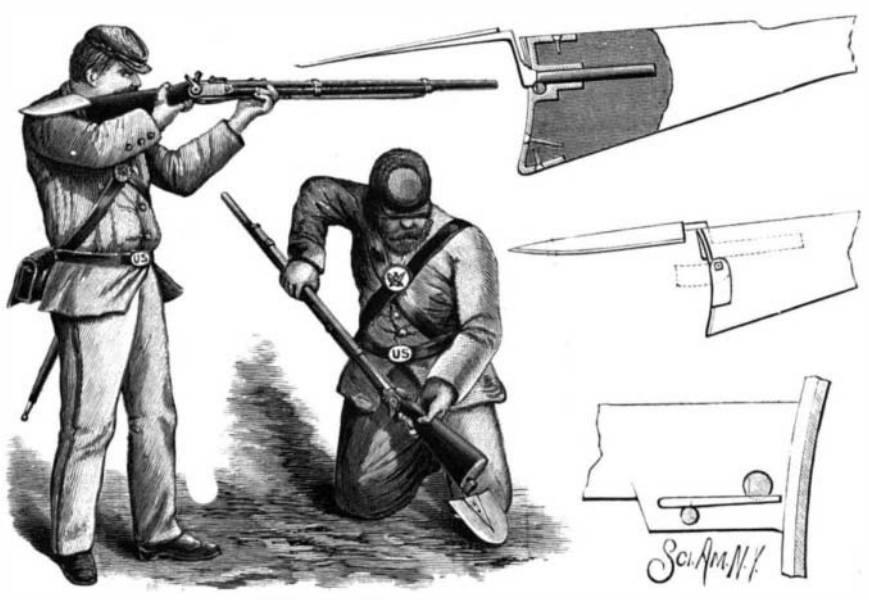
Inside, will be pictures of other trees and California scenery. It will be twenty feet, or over, across in the inside.

Colors in Tempering Iron.

Investigation as to the cause of the production of colors in tempering iron satisfactorily shows it to be due to the formation of thin films of oxide on the surface of the metal when it is heated in the presence of air. It also appears from recent researches that the oxide so produced is practically transparent, first, because the sequence of colors is what would be expected in films of a transparent substance when the thickness of the films gradually increases; also because of observations on the reflected light, the color of which varies somewhat at different angles; but chiefly because it is found that on increasing the temperature a little above the point necessary to produce a dark blue, the color gradually disappears, and the surface, though covered with more oxide, becomes almost colorless again. The colors being the result of oxidation, it is probable that the nature of the surface to be heated, its freedom from any soiling, and the length of time during which it is heated must exert a considerable influence on the shade produced.

AN INTRENCHING TOOL FOR SOLDIERS.

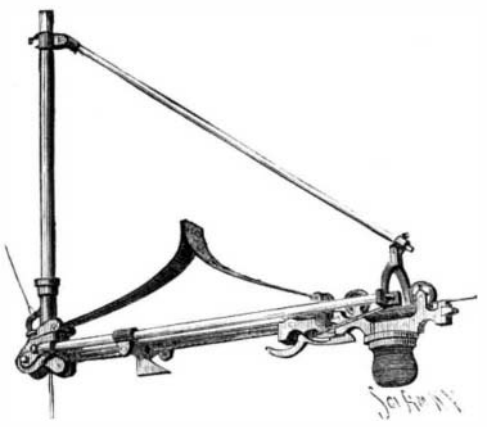
A tool adapted for use on the butt of a rifle or carbine in throwing up earthworks, digging rifle pits, etc., and which may also be used as a spade independently of the gun, is shown in the accompanying illustration, and has been patented by Mr. William H. Hamner, of Fort Assinaboine, Montana. The tool has a shovel blade, from which extends, at a slightly different inclination, a threaded part adapted to be screwed into a hollow handle, in which may be carried a screw driver, shell extractors, etc., the outer end of the handle being closed by a cap. To conveniently attach the tool to the rifle the handle is passed through a sleeve projecting inwardly into the wooden portion of the butt from the heel or base plate, as shown in the sectional views. To prevent the turning of the handle in the sleeve, there is a bolt in a transverse recess directly below the handle. To lock the bolt a spring is secured on one side of the sleeve to engage with its free end two shoulders formed at the inner end of the bolt. When the tool is fastened to the butt of a gun the back of the blade extends about in line with the top of the butt, and the soldier is not hindered from using the piece in case of emergency, the top of the blade then resting on the shoulder. In place of the handle shown, a telescopic handle may be used, and when this is extended the tool forms a regular shovel without the gun. When the tool is not to be used in connection with the gun, it may be carried in a loop on the soldier's belt.



HAMNER'S INTRENCHING TOOL.

AN IMPROVED CASH CARRIER.

The illustration represents a new device for the conveyance of cash from the sales counter to the cashier's desk, recently patented by Mr. Joseph Starr, of New London, Ct. In the design of this machine all superfluous attachments have been omitted, and it is reduced to the practical and useful. With this machine the car is propelled along the wire by the use of a steel bow spring, which, as will be readily understood, is superior to rubber bands and cord combinations, for

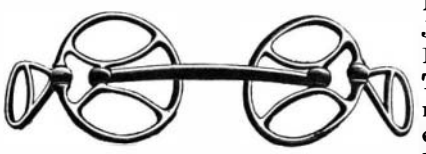


THE NEW STARR SPRING CASH CARRIER.

rubber soon loses its force, and the cord combinations are essentially the same as a hand push carrier, for the same calculation must be used to regulate the speed of the cash car. In the Starr carrier there is nothing to do but pull the cord, the spring does the rest; and by the use of the adjustable tripper the force and distance of the throw can be regulated to a nicety. Not only will this machine throw the car along the *level wire*, but will throw *up* grade also, which makes it very convenient for those who desire to have their cash desk elevated. To this propelling machine a basket is also adapted for carrying parcels. These machines are manufactured by the Starr Cash and Package Car Co., of New London, Ct.

AN IMPROVED BRIDLE BIT.

The accompanying illustration represents a bridle bit of novel construction which has been patented by Mr. Bernt M. Johnson, of Racine, Wis. The cheek rings are pivoted to the bit bar, which is a single one, and the rings may be used to produce pressure when required on the sides of the lower jaw of the animal, at the option of the driver, as there are pivoted to them independent rein pieces to control the action of the rings and bit generally. When the animal is not a vicious one, the free ends of the rein pieces are united by the ends of the reins with the inner portions of the cheek rings, so that the pull is at right angles to the bit bar, and the rein pieces do not protrude from the faces of the cheek rings; but inusing the improvement with a vicious horse, the ends of the reins are attached only to the back or free ends of the rein pieces, the pull upon the reins then pressing the inner portions of the cheek rings in against the jaws of the animal.



JOHNSON'S BRIDLE BIT.

Fuel for the World's Fair.

When bids for furnishing fuel for the World's Fair were opened March 19, the Standard Oil Company was found to have the lowest bid, on the basis of three barrels of fuel oil being equal to a ton of coal. The Standard Oil Company offered to furnish oil at the rate of 70 cents for a barrel of 42 gallons during 1892, and 72½ cents a barrel during 1893. Most of the fuel, of course, will be used in 1893. Various estimates have been furnished of the amount of coal necessary to keep the wheels going around. The lowest estimate was 75,000 tons. On that basis the big oil trust would deliver 225,000 barrels of oil at Jackson Park. The bids for coal were as follows: Weaver, Getz & Co.—Shawnee coal, No. 1 at $2.44 per ton; No. 2 at $2.38. Roods & Ramsey Company—Little Mud Creek lump at $2.60. New Pittsburg Coal and Coke Company, $3.08. Silver Creek and Morris Coal Company, $3.95. Officials of the fair have not decided yet whether to use coal or oil for fuel. The Standard Oil Company have produced statistics to show that oil is cheaper, more convenient, and cleaner. They agree to deliver the oil as wanted, and to relieve the Exposition Company of the necessity of furnishing large warehouses, as would be necessary in case coal were used.

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