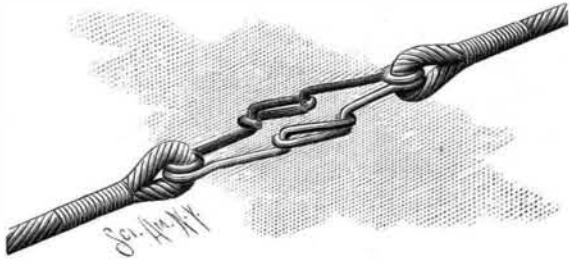


**AN IMPROVED BELL CORD COUPLING.**

A simple, inexpensive, and durable bell cord coupling, intended to avoid the liability of breaking glass in the cars where it is employed, and one which can be quickly and easily coupled and uncoupled, is illustrated herewith, and has been patented by Mr. Thomas H. Sheldon, of Fair Play, Col. It consists of a single length of light spring wire coiled to form a loop, through which the bell cord is passed, with hooks at

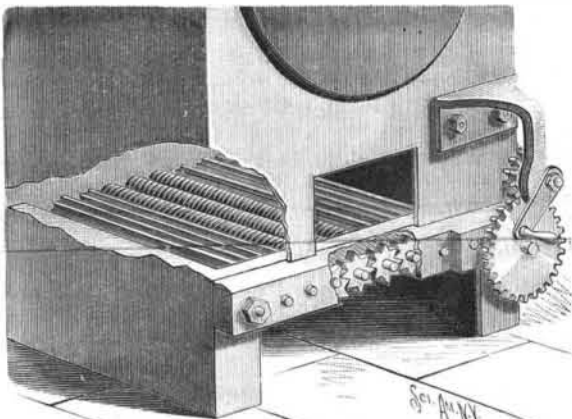


SHELDON'S BELL CORD COUPLING.

its free ends, shoulders being formed between the loop and the hooks. The wire sections are intended to be so light that there will be no danger of their breaking the glass, while their cost will be very low.

**AN IMPROVED FURNACE GRATE.**

An improved grate for the furnaces of steamboat, locomotive, and stationary boilers is represented herewith, and has been patented by Mr. Jerome De Pereira, of No. 41 First Avenue, New York City. The grate bars are journaled in the front and back walls of the furnace, the side bars being fluted longitudinally, and the central bars fluted circumferentially, gudgeons extending from both sets of bars through the front wall of the furnace. Upon the gudgeons are pinions which mesh with each other and form a train of gearing for revolving all of the grate bars from a single crank shaft. The fuel is fed upon the circum-

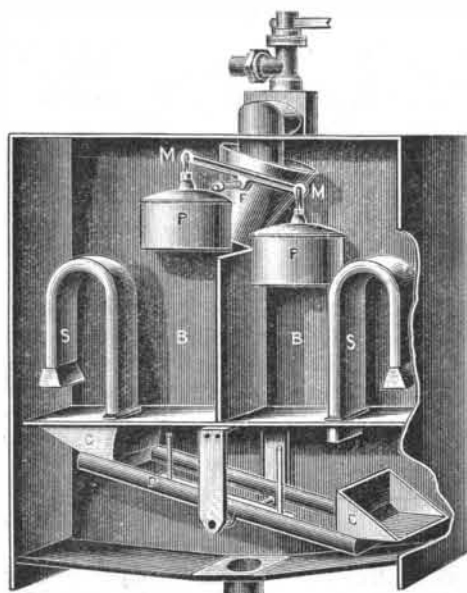


DE PEREIRA'S FURNACE GRATE.

ferentially fluted bars in the center of the furnace, whence it is gradually shifted upon the side bars, the comparatively small proportion of ashes forming in the center easily passing down through the bars, while all the small or fine fuel is retained. At the sides of the furnace, where there will be presumably less fine fuel and more ashes and clinkers, the latter are readily discharged into the ash pit, the crushing action of the longitudinally fluted grate bars readily breaking up the clinkers.

**THE SIPHON WATER METER.**

The siphon water meter aims at combining the accuracy of the positive action type of instrument with the cheapness of the inferential class. The liquid is delivered into a chamber of known capacity, which it fills up to a certain level. Immediately this level is reached, the supply is cut off from that chamber and



THE SIPHON WATER METER.

directed into a second, while at the same instant the first chamber commences to discharge its contents, the act of delivering tilting a beam which is connected to the counting apparatus. Thus the index tells the number of times the chambers have been filled and emptied, or the number of gallons which have passed through the meter.

The emptying of each chamber is effected by a siphon. The water gradually rises in the short leg until it reaches the bend, and when it has attained this level it commences to flow down the long leg, and thus starts the exhausting action. If, however, the chamber is fed drop by drop, or by a mere trickle, there is a possibility that with a siphon of ordinary construction the feed may all leak away without the siphon coming into operation. To prevent this the bottom of the long leg is sealed by a small bucket at the end of a tumbling beam. Should the water leak over the bend, it will be caught at the bottom of the long leg until sufficient has accumulated to tilt the beam, when it will escape, at the same time putting the siphon into action.

The details are clearly shown in the annexed engraving. B B are the two measuring chambers, which are filled and emptied between the levels marked by the mouths and bends of the siphons, S S. These are of flattened section, as it is found that with this form the exhausting action is more certain. In a compartment below the chamber is the tumbling beam, D, carrying a bucket, C, at each end. This beam is maintained in an inclined position by the weight of water in its interior until the siphon above its elevated end begins to discharge, when the bucket at that end fills and tilts the beam, bringing the opposite bucket into position. This beam is connected with an upper beam, K, which moves with it. This latter beam works the counting mechanism, and also carries a chute or funnel, F, which directs the incoming water first into one chamber and then into the others. In large meters there are two plungers, P P, connected to the upper beam. The descent of one of these into the chamber which has just filled its bucket and is tilting the beam, D, insures the certain action of the siphon by raising the level of the water over the bend.

This meter was shown at the late Manchester exhibition by the makers, Messrs. W. & B. Cowan, of Smith Square Works, Westminster, and also of Manchester and Edinburgh.

It is well made, wonderfully simple, and will, no doubt, work for a long time without attention. As compared with a piston meter, it is claimed to be equally accurate and less expensive both for first cost and maintenance.—*Engineer.*

**Pyrofuscine.**

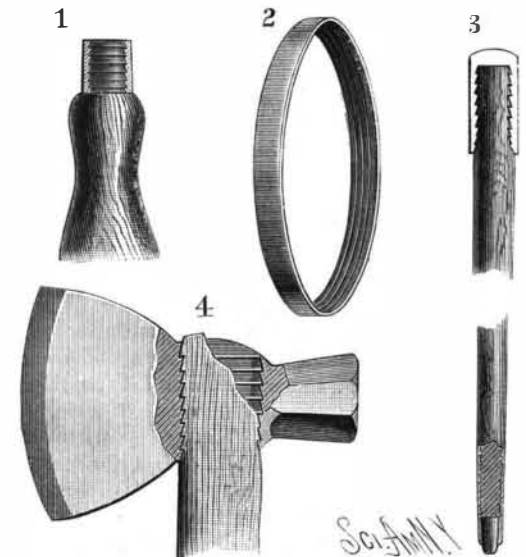
Can coal be a residual of an industrial process? The question may be asked in respect of the Reinsch patent tanning process, the employment of which is reported to be spreading in Germany. In this system a compound known as pyrofuscine, which contains carbon, hydrogen, and oxygen, and appears to belong to the class of humic bodies, is extracted from coal by treatment with boiling alkaline solutions. In practice, the coal, finely powdered, is digested with boiling caustic soda, and when the liquor is neutralized with hydrochloric or nitric acid, the new tannic agent is disengaged from the solution. It can be obtained in greater or less proportion from most coals and lignites, but not from anthracite. It possesses great chemical stability; and, unlike other known humic bodies, it resists chemical reagents and light. Its weak or concentrated solutions, although exposed to the air for a long time, remain unaltered. The alkaline solutions of pyrofuscine are strongly antiseptic, which property is utilized in tanning hides.

Machine belts tanned with pyrofuscine resist destroying agencies better than those prepared with tan and alum. Wetted and dried many times, exposed to the sun, and kept in dry or damp air, these hides perfectly preserve their strength, elasticity, and fiber. At the same time the process is a cheap one. It may be asked, however, what is the composition of the coal after the pyrofuscine has been extracted from it, and whether it or the tar from its carbonization shows any noteworthy alteration as a result of the alkaline lixiviation. Pyrofuscine may be experimentally made by boiling several times 4 or 5 lb. of coal in a solution containing 100 grammes of hydrate of sodium. The liquid will contain from 2 to 3 percent of pyrofuscine, and neutralized with an acid will yield from 25 to 30 grammes of the substance weighed in the moist state. If well washed in water, it is unchangeable by acids.—*Tour. Gas Lighting.*

NOT far from Hyde Park, Mass., there is a setter dog which has a peculiar way of making known its desire for food. When hungry, it will go to the coal hod and pick up a piece of coal and lay it at the feet of the mistress of the house, and if that does not bring the food, it will get another piece. On one occasion the dog's patience was taxed to the utmost on purpose, and it nearly emptied the coal hod.—*Wade's Fibre.*

**AN IMPROVED FERRULE.**

A ferrule which is designed to remain firmly attached to the article to which it is applied, even if the wood or other material should shrink, has been patented by Mr. Charles P. Hawley, of No. 510 West 153d Street, New York City, and is shown herewith, Fig. 1 showing it as applied to a tool handle, Fig. 2 as embodied in a barrel hoop, Fig. 3 as applied to the cap and ferrule of a cane, and Fig. 4 as used in the eye of an ax. The

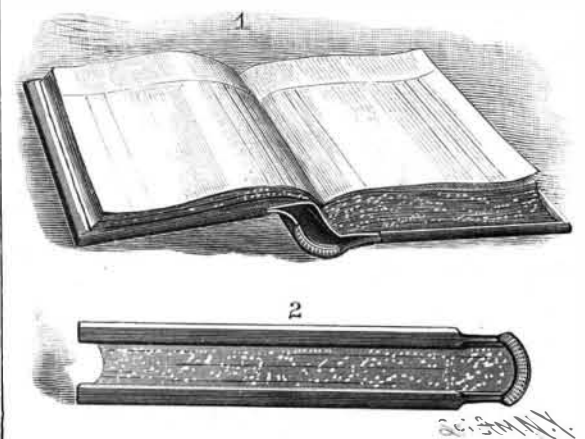


HAWLEY'S FERRULE.

invention consists in ridging or serrating the inner surface or bore of the ferrule, cap, band, or eye with a series of parallel notches, the notches being cut into the ferrule in a manner to form inclined faces and a corresponding series of shoulders, which range preferably at right angles to the bore of the ferrule. The forcing on of a ferrule, hoop, or eye, so formed, momentarily compresses the material, but allows of its subsequent expansion, when the fiber enters the notches and makes a firm hold, the ferrule differing from a screw-threaded one in that it is not liable to come off with the shrinkage of the material over which it is attached.

**AN IMPROVED METHOD OF BOOKBINDING.**

A binding for books which allows the leaves to be opened out flat at any part of the book, without strain upon the back or the threads or cords which hold the leaves, is illustrated herewith, and has been patented by Mr. George Huether, of No. 57 Cedar Street, New York City. The covers are formed in two parts or thicknesses of pasteboard or other material, the outer thicknesses of each cover being less in width than the inner, and connected to the spring back by flexible connections, the inner thickness of each cover being con-



HUETHER'S BINDING FOR BOOKS.

nected to the inner binding next to the back of the leaves. The spring back has flexible side pieces attached to the covers between the inner and outer thicknesses, these side pieces, when the book is open, permitting the inner edges of the inner thicknesses to lift slightly away from the spring back, so that the inner binding will have greater freedom, thus enabling all the leaves to be opened flat without strain upon the binding or leaves.

Two new turret ships are about to be laid down in Cronstadt for the Black Sea. They will besister ships, in almost all particulars alike. Their displacement will be 8,000 tons. For protection of center of ship and machinery, steel armor 20 inches thick will be used, decreasing to 10 inches toward the keel. The breastwork and turret armor will be 16 inches. They will be armed with four 12 inch guns in each turret, and will carry in addition four 9 inch guns, eight Gatlings and a torpedo apparatus. Against such vessels as these our proposed armorclad vessel would be a puny antagonist. Why the United States should build vessels with 12 inches of armor when other governments are not satisfied with less than 20 inches is a question worthy of attentive consideration.—*Army and Navy Register.*