Testing Boilers.

A writer in the Cincinnati *Artisan* adds his testimony as to the inefficiency of the hydraulic test in examining steam boilers as follows: This test is only valuable in bringing to notice defects which would escape ordinary inspection. It is not to be assumed that it in any way assures good workmanship or material, or good design, or proper proportions; it simply shows that the boiler being tested is able to withstand this pressure without leaking joints or distorting the shell to an injurious degree.

Bad workmanship may often be detected at a glance by an experienced person. The material must be judged by the tensile strength and ductility of the sample tested; the design and proportions to be judged on constructive grounds, and have little or nothing in common with the hydraulic test.

The great majority of buyers of steam boilers have but little knowledge on the subject of tests, and too often conclude that if they have a certified copy of a record showing that a particular boiler withstood a test of say 150 pounds, it is a good and safe boiler at 75 to 100 pounds steam pressure. If the boiler is a new one and by a reputable maker, that may be true; if it has been in use and put upon the market as a second hand boiler, it may be anything but safe at half the pressure named. By the hydraulic test, the braces in a boiler may be broken, joints strained so as to make them leak, bolts or pins may be sheared off or so distorted as to be of little or no service in resisting pressure when steam is on.

The practice of inspecting boilers by sounding with a hand hammer is in many repects to be commended. It requires some practical experience in order to detect blisters and the wasting of plates, by sound alone. The hammer is especially applicable to the thorough inspection of old boilers.

It frequently happens in making a test that a blow of the hand hammer will either distort it or be driven entirely through the plate; and it is just here that the superiority of this method of testing, over or in connection with the hydraulic test, becomes fully apparent. The writer once knew a locomotive which had been run into the repair shops for some slight repairs, and afterward was subjected to the usual hydraulic test and was found to be tight; it was then run into the round house for service, but before it was fired it was accidentally discovered by a boy's "fooling" around the fire box with a hand hammer that the plates which were originally five-sixteenths inch thick had been reduced in some places by corrosion to a thickness scarcely more than one-sixteenth inch. This incident is introduced by way of a digression simply to show the value of the hammer test and the insufficiency of a hydraulic test in the case of boilers which have been for some time in service.

The location of stays, joints, and boiler fittings all modify, and are apt to mislead the inspector if he depends upon sound alone. There is a certain spring of the hammer, and a clear ring indicative of sound plates, which are wanting in plates much corroded or blistered. The presence of scale on the inside of the boiler has a modifying action on the sound of the plate. When a supposed defect is discovered, a hole should be drilled through the sheet, by which its thickness may be determined as well as its condition.

The literature of boiler explosions is by no means scanty, and varies anywhere from sound practical experience to the most visionary idealism; but those who have most to do with steam boilers, and whose business it is to trace results to causes, are singularly unanimous in the opinion that almost without exception boiler explosions may be traced directly back to the causes—overpressure and neglect.

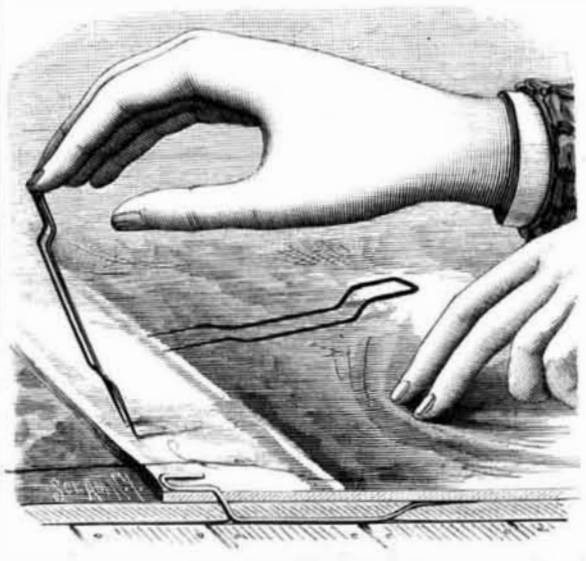
A Spring Motor.

An exhibition of a spring car motor was given at a recent date at the works of the United States Spring Car Motor Construction Company, Twelfth Street and Montgomery Avenue. As a practical illustration of the operation of the motor a large platform car, containing a number of invited guests and representatives of the press, was propelled on a track the length of the shop. The engine, if such it may be called, was of the size which is intended to be used on elevated railways. As constructed the motor combines with a stationary shaft a series of drums, carrying springs, and arranged so that they can be brought into use singly or in pairs. Each spring or section has sufficient capacity to run the car, and thus as one spring is used another is applied. There is a series of clutches by which the drums to which the springs are attached are connected with a master wheel, which transmits through a train of wheels the power of the springs to the axles of the truck wheels. The motor will be so constructed that it may be placed on a truck of the width of the cars at present in use, and will be nine feet long, with four traction wheels. It is proposed to do away with the two front wheels and platform, so that the front of the car may rest on a spring to the truck. There will be an engine at each end of the road, which, it is calculated, will wind up the springs in at least two minutes' time.

While the mere construction of such a working motor involved nothing new, the real problem involved consisted of the rolling of a piece of steel 300 feet long, 6 inches wide, and a quarter of an inch thick. Another element was the coiling of this strip of steel preliminary to tempering. To temper it straight was to expose the grain to unnecessary strain when wound in a close coil. To overcome this was the most difficult part of the work. At the exhibition the inventor gave an illustration of the method which has been employed by the company. The strip of steel is slowly passed through a retort heated by the admixture of gas and air at the point of ignition in proportions to produce intense heat. When the strip has been brought to almost a white heat, it is passed between two rollers of the coiling machine. It is then subjected to a powerful blast of compressed air and sprays of water, so that six inches from the machine the steel is cold enough for the hand to be placed on it. After this operation the spring is complete and ready to be placed on the shaft. The use of the springs is said to be beyond estimate. They may be employed to operate passenger elevators, the springs being wound by a hand crank. It is understood that the French Government has applied for them for running small yachts for harbor service. Among the advantages claimed for this motor are its cheapness in first cost and in operating expenses. It is estimated that an engine of twenty-five horse power will be required at the station to wind the springs. If there be one at each end of the line, the cost for fuel, engineer, and interest will not exceed $100 per week. This will answer for fifty or any additional number of cars. The company claims that by using twelve springs, each 150 feet in length, an ordinary street car can be driven about twenty miles.—*Phil. Inquirer.*

CARPET FASTENER.

The engraving shows a cheap and simple device by which druggets, mats, and other carpet covers may be readily fastened down. The fastener is of a staple-like form, having the separated ends sharpened, and made in one piece of



ALLEN'S CARPET FASTENER.

suitably-shaped wire. The parallel sides are bent as shown in the sectional drawing, the length of these bent portions nearest the points being less than the others, thereby placing the head part at a higher elevation. When the fastener is to be applied it is held nearly upright, the points being down and with its opposite raised end portions in front. The pointed ends are pushed through to the floor, when the upper part is lowered backward, and the fastener pressed forward and inward until the second bend is within a certain distance of the carpet. The thumb is then placed upon the head and a finger upon the drugget a little beyond the ends, when the ends are brought up through the carpet but not through the drugget, while the depressed sections of the sides rest upon the floor and the head section bears upon the drugget to hold it in place.

This invention has been patented by Mr. Charles E. Allen, whose address is Winsted, Conn.

Free Sulphuric Acid in Sulphate of Alumina.

Sulphate of alumina is taking the place of alum for many purposes. In paper making it is very essential that this salt should be free from acid, since the latter destroys ultramarine and injures the sizing by causing transparent spots. Oscar Miller has reported the results of his experiments in the Berlin *Berichte*, which show that methyl orange is the safest and best test for the free acid. With pure sulphate of alumina it produces only an orange color, but is very sensitive to *free* acid, with which it produces a rose color, or pink. Ethyl orange is more sensitive to free acid, but, in fact, too much so, as it turns pink with a neutral sulphate. Tropæoline is not sensitive enough. By extracting the acid with alcohol, and evaporating, the solution may be titrated with methyl orange.

The Electric Light in Theaters.

The Edison installation at Niblo's Garden consists of one K dynamo, 55 volts electro-motive force, capable of supplying current for 500 eight candle power B lamps. At each performance of "Excelsior," the Edison lights are in use as follows: 1st act, last scene, the electric torch held by the character "Light;" 2d act, last scene, the Brooklyn Bridge; 3d act, 1st scene, the discovery of the electric spark in Volta's laboratory. In the last scene the ballet dancers are provided with wands, each having an Edison lamp on the end, and festoons of lamps are lowered from the flies above. At a given signal the entire number of lamps—400—are lighted instantaneously, producing a magical effect of great brilliancy. To instantly light such an immense number of lamps at their proper candle power is a very severe test on the regulating capacity of the engine and the dynamo.

The Watch Manufacture in England.

The London *Times*, in a recent article on this subject, shows that there has been no real growth in watch making in England for the past hundred years. The methods of manufacture and the total production are now substantially the same as they were about a hundred years ago, and the great increase in the trade has been met by French, Swiss, and American manufacturers. The making of watches in France on a large scale is a comparatively modern industry. In 1850 the production at Besancon, the center of the French watch trade, only amounted to some 50,000 watches annually, whereas about ten times as many are now made there yearly. In Switzerland the annual production is now estimated to equal 3,500,000 watches, or an increase amounting to about a million watches a year within the past five years. But in estimating the extent of the English watch trade it is stated that, for 1880, the latest date for which complete returns had been published, the total number of watches made bearing the stamp of Goldsmiths' Hall was only 206,000, an output which is equaled by that of one American firm. The English watches are usually high-priced, and they meet a certain demand, largely from those who think they do not own a first-class timepiece unless it has cost a good deal of money, but the entire increase in the trade in England has been filled by watches of foreign manufacture.

The causes that retard the development of English watch making, as stated by the *Times*, are "defective organization and defective appliances. The method of manufacture and the tools employed are not substantially different from the method and the tools of 100 years ago. It is a natural consequence that the trade has shown no elasticity, and that in latter years it has found little custom at home. English watches are not made in sufficient quantities to justify the production on a large scale of any one particular type; the trade is for the most part in the hands of 'small men,' who make certain sizes in dozens and half dozens. In the Swiss and American factories a particular type, if it be considered worth making, is made by thousands; everything is organized for production on a large scale. Confining the contrast to English and American methods, the principal point upon which it is necessary to insist is that in America the twelve or fourteen trades which constitute watchmaking are aggregated under one roof and form one compact organization. By the older method still pursued in England, and until recently almost the rule in Switzerland, the different parts are transported from one workshop to another, in different quarters of the town, and even from one part of the country to another. Under the new method the *maximum* of efficiency and individual responsibility is obtained by the minute subdivision of every process; the loss of time in the transfer from one department to another is so minimized as to be practically non-existent."

Creosoted Wood Hard to Burn.

An establishment for creosoting piles and plank was recently burned in New York, when it was demonstrated that creosoting afforded considerable protection against fire. A correspondent says: "The building was of pine and spruce in their natural state, except the sills, which were made of creosoted pine. The latter were set on posts and raised about a foot above the ground, so that the flames had a chance to get under them; they were charred, yet retain their form and a certain amount of strength, whereas not a piece of the untreated lumber could be found. Scattered over the premises were numerous creosoted piles and several thousand feet of plank all charred, but the pieces mostly retained their original form and a certain degree of usefulness. Where the flames could reach the comparatively uninjected heart wood, they ate into it, leaving a charred creosoted shell. In all the above charred pieces the fire went out of itself; creosoted wood burns with a dense black smoke, which probably has a smothering effect."

Quinine from Gas Tar.

The last contribution of modern chemistry to science is the production of quinine from gas tar. Professor Fischer, of Munich, has succeeded in obtaining from distilled coal a white crystalline powder, which, as far as regards its action on the human system, cannot be distinguished from quinine except that it assimilates even more readily with the stomach. Its efficacy in reducing fever heat is said to be remarkable, even rendering the use of ice unnecessary. The importance of such a discovery as this consists not so much in the actual fact achieved as in the stimulus given to scientific research by the opening up of a new channel of investigation. The romance of gas tar is evidently far from being exhausted. In addition to the sweetest scents, the most brilliant dyes, the most powerful disinfectants, and even prussic acid are some of the numerous and wonderful products of its decomposition.

New Apparatus for Demonstrating Foucault's Current.

Prof. A. Von Waltenhofen has devised a simple apparatus for the above purpose, consisting of an electro-magnet which is fastened in a vertical position, and between the poles of which a copper pendulum oscillates. The copper plate has the form of a segment of a large flat ring, is eight inches long, 2 inches wide, and one-half inch thick, and is suspended by a sort of trapeze arrangement, so that it may pass exactly between the poles. The pendulum is set swinging, but as soon as the current is connected it goes very slowly, as if moving through a thick liquid, or stops entirely.—*Instrumentenkunde.*