

insure the contact of the fuse with the vessel. The system of firing shown in Fig. 6 is that generally adopted with the torpedoes to be used with the launches which are being at present built for foreign countries. The launches may be divided into two classes, namely, those intended for river service, and those meant for ocean purposes. Fig. 7 represents a river launch similar to those constructed by Messrs. Yarrow and Hedley, of Poplar. The one shown is 45 feet long and 7 feet 6 inches beam, calculated to have a speed of 14 knots, built either of iron or steel, the plating being $\frac{1}{4}$ inch at the keel, and $\frac{3}{8}$ inch at the gunwale.

The draft is 3 feet 6 inches, and the freeboard 2 feet. There is a steel turtle-back shield, *g*, forward, $\frac{1}{4}$ inch full thick, to afford protection to the men and steering wheel, and throw off the water which might come on board from the explosion of the torpedo. The engines and boilers are also provided with steel sliding covers. The boilers are locomotive, with a total heating surface of 140 feet, the barrel plates being of $\frac{1}{4}$ inch. Lowmoor iron throughout, with $\frac{3}{8}$ inches butt straps inside and out, double riveted; and the engines are non-condensing direct-acting, of 55 horse power, working up to 140 pounds pressure. The diameter of cylinders is $6\frac{1}{2}$ inches and length of stroke $7\frac{1}{2}$ inches. The frames are made of 1 inch angle irons with $\frac{1}{4}$ inch reverse iron.

The spar, *c*, for the torpedo is shipped amidships, and can be run out over a roller. A pocket, *a*, suggested by Captain Davidson, is provided to allow the spar to have a greater depression than in the old plan of running it out over a roller on the top of the stem. Two stanchions, *f*, provided with pinholes, allow of the spar being depressed through an angle of 35° , a noiseless exhaust chamber, *k*, preventing the approach of the boat being heard. In this chamber the condensing is effected against a portion of the skin of the boat, the plates there being increased in thickness. It is surprising what a small effective surface is required to condense the steam in cases where the object is simply to condense it in order to avoid the noise, or to get the fresh water back into the boiler, and not with the object of obtaining a vacuum.

Fireless Locomotives.

It will be interesting to know that fireless locomotives are in constant and successful operation on a city and suburban railway in New Orleans, namely, the New Orleans and Carrollton Railway, under the able management of General G. T. Beauregard, who is a skillful engineer, and yet who is alive to, and keeps pace with the improvements of the age. This success has been achieved, too, under the most adverse and unpromising circumstances. The road under other running arrangements had become nearly valueless, its stock having gone down to 7 cents; but it is now a paying and valuable road. The road is about six miles in length. From the center to the outskirts of the city it is operated by mule power; there the mule is taken from the car, and the little fireless locomotive is attached, which is accomplished in less time than would be occupied in attaching another mule. The train is then off like a rocket, the driver still on the platform of the car working the engine, managing the brakes, and making change, as usual; there is no other person on the train to attend these duties. The car is started and stopped quicker than when drawn by the mule. The railway (double track) is in the middle of a very wide street, and is a little raised, so that it cannot be crossed by carriages except at the street crossings; thus, being somewhat isolated, high speed is admissible. The locomotive is simply a cylinder of boiler iron, perhaps 3 feet in diameter and 10 feet long, mounted on four wheels, and partly filled with water. The engine—a double vertical—is attached to the end of the cylinder next the car, being within reach of the driver. The cylinder is then filled with steam at a proper pressure, from a stationary boiler at Carrollton, when the locomotive is ready, and it will run to the city and back without care or expense. There is no fire, no ashes, no pump, no danger, and less noise than from the hoofs of horses. The expense of this means of propulsion, General Beauregard assured me, is less than by mules. The cost of the locomotives is \$1,250 each, which includes the builder's profit.—*New York Times*.

Responsibility for Employees' Injuries.

It has been established that failing to make reasonable provision for the safety of employees is a negligence employers are liable for; but judges and juries have failed to uniformly determine just what is a "reasonable provision." The nearest approach to the settlement of this matter we find in the court news of a recent number of the *Boston Herald*, in a case in the Supreme Court, of *M. F. Avilla vs. N. C. Nash et al.*

"The action was brought to recover damages for personal injuries resulting from the fall of an elevator in the defendants' refinery. At the trial there was evidence that the defendants had given directions to their foreman to forbid workmen riding on the elevator. The court ruled as a matter of law that, if the defendants had so directed the foreman, then, even in case he had not informed the plaintiff, the action could not be maintained against the defendants, for the accident was the result of the carelessness or negligence of a fellow workman, the foreman. The jury returned a verdict for the defendants, and the plaintiffs excepted. The full bench have now sent down a rescript sustaining the exceptions, and have ordered a new trial."

The point turns upon the fact as to whether Messrs. Nash had cautioned their foreman and directed him to forbid the workmen using the elevator.

It is hardly proper to surmise what the results of a new trial will be, but the decision already secured by Messrs. Nash will have an important bearing to all manufacturers,

and the case as above cited should be placed in the hands of all superintendents and foremen, that they may be fully apprised of the responsibility they assume in not enforcing a strict compliance with orders for the security of life and limb.

Correspondence.

Hard Rubber Thermometers.

To the Editor of the *Scientific American*:

In 1852, I noticed the electric properties of hard rubber or vulcanite; and in 1853, I made arrangements with the owners of the patent for the manufacture of insulators for telegraph wire from this substance. The first orders for them were received from California; and as transportation was very expensive on the Isthmus route, they were made very light, weighing but half an ounce each. On arrival they were heated to about 300° Fah., by which they were expanded; and while in this condition, they were placed upon iron pins, to which they were held firmly by contraction.

My attention having been thus called to the dilatibility of hard rubber, several thermometers were made from it. One was made by riveting it to a thin strip of steel, about a foot in length, and one fourth of an inch in width. The bottom of this was held fast, while the top was free to move, and so to indicate the temperature on a graduated arc. This one, now in use, has a range from zero to 90° Fah., and is as sensitive as the common mercurial thermometer. It is well adapted for the ordinary range of the atmosphere, but is not suitable for indicating high degrees of heat, as the rubber softens at about 200° Fah. One of them was made by perforating a thin strip of steel, at intervals of an inch, and placing upon it a strip of rubber compound when in a plastic state. This was coiled, with an intermediate strip of metal, which forced the rubber through the holes. It was then vulcanized in the usual manner; and when cold, the intermediate strip was withdrawn, leaving an open space between the coils. This saved the trouble of riveting, and gave to the rubber an unbroken and smooth surface. The coil is held fast at the center, and the outer end is left free to move. Another thermometer was made of glass and hard rubber, the latter in the form of an arc, being riveted at both of its ends to a glass plate, which formed the chord.

Instruments of this kind are much better than mercurial thermometers for making electric connection with alarm bells to indicate excess of heat.

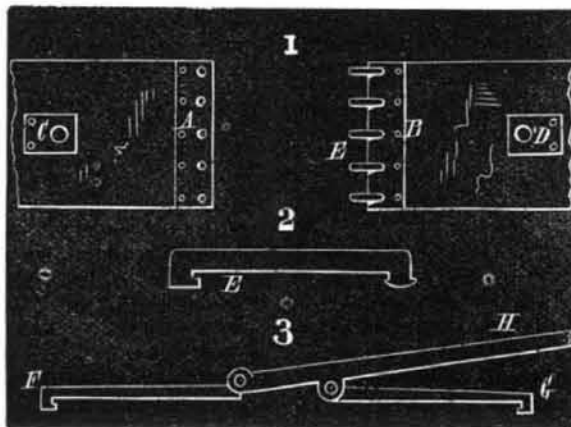
Boston, Mass.

J. M. B.

Coupling Machine Belts.

To the Editor of the *Scientific American*:

Seeing a query in your issue of March 13 about putting together belts which have to be frequently uncoupled, I send you an illustration of a 6-inch belt, which I have been running for over a year, reversing it from one to four times a week.



In Fig. 1, A, B, C, and D are pieces of No. 16 sheet iron, riveted to the ends of the belt; E E are hooks, shown in the natural size in Fig. 2, riveted to B. After the belt is laid over the pulleys, the hooks, F and G, of the lever, shown in Fig. 3, are placed in the holes at C and D. Now the two ends of the belt are drawn together by the lever, H; and the hooks, E, are put in their places at A. Then the lever is taken out, leaving the joint finished.

By this method, two men can set and couple a belt in the least possible time, obtaining an effectual joint, which will never allow the belt to run out of true or to reverse.

W. KAPP.

HOUSEHOLD HINTS.—I.

"The melancholy days have come, the saddest of the year," ejaculates paterfamilias as he lugs the stove down into the cellar. There has been for the last twenty-four hours a reeking atmosphere of soap and soda and step ladders and moist scrub women pervading the house. Rest, there has been none for him indoors, and so he has made a virtue of necessity and has worked manfully at taking down the stoves, wrapping them, we hope, in old carpet, and fastening the legs and pipe together so that they cannot escape and hide themselves in ingeniously inaccessible places, as he vehemently affirmed they did, when he found them in the garret and under the coal and in the chicken house last fall. Materfamilias, we trust, has fully perused the recipes we have been publishing for the last six months, and the knowledge thus gained has been practically applied in cleaning the paint and the windows, destroying vermin, and putting the house in "apple pie" order generally. At last it is all over, the rooms are "painfully clean," and the bright sun-

light pouring into the open windows is revealing the thread-bare spots in the carpets, and the cracks and knocks on the furniture only too plainly. A high court of inquiry has been held, and the superannuated veterans which have done long and faithful service on the floors, or have survived many a year's hard usage about the rooms, are at last condemned. Then the heads of the family, who, like sensible people, have waited for the high prices peculiar to Mayday to subside, prepare to sally forth on visits to carpet and furniture stores, and paterfamilias figures up his check book or draws his winter's savings from the savings' bank ready to withstand the coming financial strain.

("I don't see nuthin' about Science in all that. What's it got to do with masheens?" interrupted the practical man who happened into our sanctum just in time to hear us read over the foregoing paragraph to ourselves. "Nothing, excellent and anti-theoretical friend," wereply, "nothing about 'masheens' is therein contained; but as to Science, it relates to the science of home, the science of making one's life something more than one "demnition grind" for existence, by—as you will perceive if you continue looking over our shoulder as we proceed with our writing—rendering that home more attractive, more cheerful, and so making for yourself and yours a sanctuary, at the doors of which the cares of labor may be laid aside." He said that it must have cost "an awful lot to polish that 'ere model with the file," from which we inferred that our previous remark was lost upon him, so we resumed our pen, oblivious to his further presence.)

We were about to observe that, before buying furniture and carpets—if we may venture to intrude upon the family discussion which is taking place previous to the exodus to the shops above mentioned—there are several facts well worth remembering, which may assist one in selecting goods, and besides tend to save money; and at the same time there are a few more hints which we have to offer which mainly relate to simple decoration, and which, we think, may result in making the rooms which are to be renovated look perhaps a little more tasteful and pretty. Let us suppose that a sitting room which also does duty for a parlor is to be newly furnished. The walls are now either plain white or else the old paper has been scraped off and new hangings are required. The first question is of a carpet. Some people believe that the English article is the best; so it is we think, as a general rule, so far as colors are concerned, but if durability is considered a first requisite, then the American goods, if of first quality, are fully equal to those of foreign make. A good carpet is thick, pliable, and well woven, and it is better economy to buy a good article like a real Brussels at the outset. Ingrains are now made to go with Venetian borders, but these do not wear equal to Brussels, and besides with the border costs nearly as much. In this city the best body Brussels costs from \$1.75 to \$2.50 per yard, and the lining (which consists of layers of stout brown paper with cotton batting between, and which saves carpets wonderfully, particularly if the floor be at all uneven), is easily made, or costs when bought 10 cents a yard. For those who can afford a little extra expense, it may be well either to mat the floor or else plane it very smooth, putty up all the cracks, and stain brown, finishing with a coat or two of shellac dissolved in alcohol. Then cover the middle with a large rug, leaving a yard of uncovered space around the walls. Handsome druggets can be bought very reasonably for this purpose; or two Turkish rugs (each about 4x6 feet, such as are sold for \$15 to \$18 a piece), placed side by side, would be large enough for a good-sized apartment, though costing more than the drugget. These can be easily taken up and shaken, or in summer can be removed altogether, leaving the cool matted or painted floor. Turkish rugs, besides, are like camel's hair shawls; they will accord with any color of furniture or wall, and are almost indestructible by wear.

To return to the carpet: supposing such to be the choice: we should advise the selection of that and the wall paper at the same time. It is a good plan to procure a roll of the intended hangings as a sample, and carry it to the carpet store for direct comparison. This will save many awkward contrasts of color. If a green carpet be decided upon, then a plain paper of a rose tint, or with that shade prevailing, accords handsomely; the same paper goes well with the unobtrusive gray-patterned carpets now very much in fashion. If the walls be tinted French gray, in kalsomine or paint, this shade will suit almost any colored carpet, especially red or crimson. Big-figured papers and huge medallion carpets are abominations only fit for hotels and steamboats. Bright tinted papers may go with a rich-toned carpet, or with one in which the colors are mingled; but we never should select hangings printed with impossible birds and animals, or a carpet covered with gaudy flowers, hideous designs in red and yellow which look like a petrified firework explosion, or incomprehensible and huge scroll work. A neat, small, quiet figure is by far the most genteel and appropriate, while it is much more economical, as none of the stuff is ever wasted in matching.

Before laying the carpet, if moths are suspected, it is well to rub the boards over with turpentine; sprinkling with very dilute carbolic acid, about a tablespoonful to a gallon of water, is also a good precaution. This last should be rubbed over the walls before the paper is put on.

Now comes the matter of furniture. Do not buy the so-called "cottage" stuff. It has no merit save that of cheapness, and our own experience in its use has left us with the firm conviction that glue was too expensive and it was stuck together with gum arabic. A hearty sneeze from a stout person is ordinarily sufficient to completely disorganize the chair he may be sitting on. Besides, it is usually of pine wood, for which bedbugs have an extraordinary predilection. Do not buy veneered furniture, especially if there be furnaces