

A ROPE OF WATER.

Berthelot's Test That Showed Its Tensile Strength.

THE COHESION OF MATTER.

Perfect Planes of Metal or Glass When Brought into Contact Will Adhere to One Another as Though They Were Glued Together.

It is well known that liquids are among the least compressible of substances; this in spite of the fact that they have the property of conforming to any shape of vessel or of yielding to any forces, no matter how small, which tend to change only their shape. Thus, to squeeze water into nine-tenths of its volume under ordinary conditions would require a pressure of no less than 3,000 atmospheres, or 45,000 pounds, to the square inch. This property of being almost incompressible is best illustrated perhaps by an experiment tried centuries ago, wherein an attempt was made to compress water by filling a leaden shell with it and then, after closing, hammering and squeezing the shell. The only effect of the tremendous pressures produced in this way was to cause the water to penetrate the minute pores of the lead and exude in drops like perspiration on the outer surface of the shell. The same effect was found for a silver shell.

But, while it is a familiar fact that liquids will resist an enormous force of compression, the companion fact that they are also capable of withstanding tension is not so generally known. At first sight this statement may appear ridiculous. When water may be so readily dipped from a pail or poured from one vessel to another, how can it be capable of withstanding tension? If, however, we prevent change of form we find that pure water is capable of bearing fifty atmospheres of tension, or 750 pounds to the square inch. If it was possible, then, to utilize this property by making a "rope" of water we should find it capable of sustaining a good fraction of the weight that could be borne by an ordinary rope of the same size. But it must be admitted that the task of making a rope out of such material would be rather difficult, to say the least, notwithstanding the fact that it possesses this desirable property of tensile strength. Because of its inability to resist a deforming force it would have to be inclosed in a tube; but, while it would here be in condition to withstand compression, as from a piston in the tube, any attempt at "stretching" the liquid in this way would simply result in pulling away the piston from the water surface.

However, this tensile strength was actually found by Berthelot in the following way: A strong glass tube sealed at one end and drawn out very fine at the other was filled nearly full of water and then closed. The tube was then cautiously heated until the water had expanded and completely filled it. It was then slowly and carefully cooled back to its original temperature, when it was found that the water had not contracted, but still filled the tube.

It is almost a universal law that a small extension in volume of a body requires the same magnitude of force to produce it as to cause a similar amount of compression, the forces, however, being tension in one case and compression in the other. With this law in mind it is readily seen that the water that now fills the tube must be under tension, since previously at the same temperature it did not quite fill the tube—that is, it has actually been stretched or expanded beyond its normal volume for this temperature, and from our knowledge of the forces that would be required to produce the corresponding compression we can figure out what this tension must be.

The ultimate particles or molecules of matter we believe to be held together by powerful forces, known variously as cohesion or adhesion, but being in any case forces of attraction, and these forces tend to prevent any expansion of the matter, be it solid or liquid. It might be thought that these forces would cause two bodies in contact to adhere to each other, but particles have to be so near together to be acted upon by them that it is difficult to bring bodies into such close contact that an appreciable area of one is within this distance of the other.

However, two clean pieces of lead can readily be pressed so closely together that they will adhere, and a set of copper cubes was once made with such true faces that when a dozen of them were piled one on top of the other the series adhered together so well that the whole could be lifted from the top one. But the best example is furnished by pieces of optical glass whose surfaces have been worked so plane that when pressed together they will as readily break at some other spot as at this plane.

Perhaps it is unfortunate that these useful forces, which hold all matter together and keep it from collapsing into impalpable dust, are confined in their action to such a limited range. If this were not so, a break of any sort could be fixed by merely bringing together the broken ends. Glue of any kind would be unnecessary.

But even this state of affairs would have its drawbacks. A book laid on a table would have to be pried off with a wedge, and the same instrument would be required to open it. Everything would stick to everything else, and the pleasure of walking would be lost in the tedious process of prying first one foot and then the other from the viscid grip of the sidewalk or the floor.—Boston Post.

MUST CARRY GOOD WATCHES

Railroad Men Are Compelled to Use Accurate Timepieces.

It may be news to many that the watch of the railroad man is as necessary in modern railroading as the air brake. Without accurate time-keeping there would probably be more accidents than if there were no air brakes. The train dispatcher starts a train at a certain time; he halts it at certain stations at certain times; he side tracks it for a period of varying length; the watch of the conductor on the side-tracked train must agree with the watch of the conductor on the express to which he had to give way; each station master along the road checks the time of every train that stops or dies past.

In order that there may be agreement among all these railroad men there must obviously be not only timepieces, but accurate timepieces. There must also be some means of inspecting the timepieces to see if they are accurate and if they agree with some standard. The railroad man is therefore compelled to buy not simply an ordinary watch of reasonable value, but a particularly good watch, a timepiece which is adjusted to heat, cold and at least three positions. These three positions are pendant up, as carried in the pocket; dial up and dial down. Such an instrument will not vary more than thirty seconds a week, which is a good deal more accurate than many scientific instruments of precision used in laboratories. Even human proneness to error is considered in this matter of choosing a good railroad watch, for a lever set watch because there is just the chance that the stem of the pendant set may not be pushed back after setting through an oversight.

On one great line about 5,000 watches, worth on an average of \$25 apiece (a low average), are used. If we take into consideration the number of watches that are used on other roads throughout the country it is evident that the value must run up into hundreds of thousands of dollars.

In order that the watch may be kept up to a regular standard it must be inspected regularly. There is not only a general time inspector on most railroads, but a staff of local inspectors who are placed along the road at convenient points and to whom the men may resort when they wish to compare their time with the standard time at that place. Once every two weeks the railroad man submits his watch to such an inspector, usually a jeweler or watchmaker by profession.

The inspector gives his expert opinion on the condition of the timepiece. If it needs cleaning he says so and does it; if it is fast or slow he regulates it, and not until it is running with sufficient accuracy is it allowed to escape from his care. A watch's record is kept as if it were a thief. So far as repairing goes, the railroad man is under no compulsion. He need not hand over his watch to any particular watchmaker or inspector for repair, but he can give it to any watchmaker in whom he has confidence. It must, however, be submitted to the inspector before it can be used in actual service.

That no favoritism is shown in the matter of watches is evident in the fact that no less than eight different manufacturers supply railroad watches.—Scientific American.

Making the Chances Even.

In days when tavern brawls in England were frequent and swords were out on the slightest provocation common fairness demanded that the blades of chance combatants should be of equal length. In a sudden affray there would be no thought of measuring swords, so the authorities took the matter into their own hands at the gates of the city of London, where every gallant was liable to be challenged, and if the public official found any blade beyond thirty-six inches the smith stood by to snap off the steel to the required length. In Queen Elizabeth's reign this was the common practice.

Notice to Creditors.

NOTICE IS HEREBY GIVEN that the undersigned has been appointed by the County Court of the State of Oregon, for Morrow County, executor of the estate of D. C. Ely, deceased; all persons having claims against said estate are hereby notified to present the same duly verified according to law, to the undersigned executor at Morgan, Oregon, or at the Law Office of F. H. Robinson, in Ione, Oregon, within six months from the date of the first publication of this notice, which date is August 17th, 1911.

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