A Triangular Rule.

It is not an easy matter to lay out a straight line—or rather two parallel lines—on a shaft in the exact line of its center by an ordinary straight-edge or rule. There is no means of knowing that the rule is held exactly in line, and the marks for a keyway, for instance, may be parallel with each other but diagonal relative to the longitudinal center of the shaft. A simple straight-edge may be made by any machinist having access to a planer, that will insure exactness without extraordinary care. Take a piece of inch square bar steel ten inches long, anneal it, put it on the planer and plane two adjacent sides, and then plane away the two other adjacent sides, thus leaving it of triangular or L section, the sides perhaps three-sixteenths of an inch thick, or a quarter of an inch thick, beveled on the inside so that the edges will be thinned down to one-sixteenth of an inch.

If this method of producing an angular shell by the wasting of most of the block of steel appears unnecessary, a piece of plate steel three-eighths of an inch thick, two inches wide, and ten inches long may be bent to the angle, the corner being upset so as to get a perfectly square corner in finishing. It is evident that such a tool would be very convenient in laying out lines on shafts and other cylindrical bodies, and also on the inside of bored holes. Of course, two or three varying sizes of the tool would be desirable.

A modification of this tool may be made for leveling purposes, as the leveling of shafting, the testing of the parallelism of shaft and crank pin on steam engines, and for similar purposes. In this adaptation the tool is simply a block, say two and a half inches or three inches square, and six, seven, or ten inches long, with perfect planed sides and a V planed out of one side so deep as to have a bearing only on its edges or inside when placed on a shaft of any size from one and a half to six or more inches. With this tool, having an ordinary spirit level laid on its top, there is no difficulty in leveling, and no danger of having the spirit level mislead by not bearing exactly on the center of the shaft. This recessed V block need not be of steel; ordinary cast iron is good enough, only it must be planed and finished true on the V-recessed face and the opposite face—the top.

Water in Boilers.

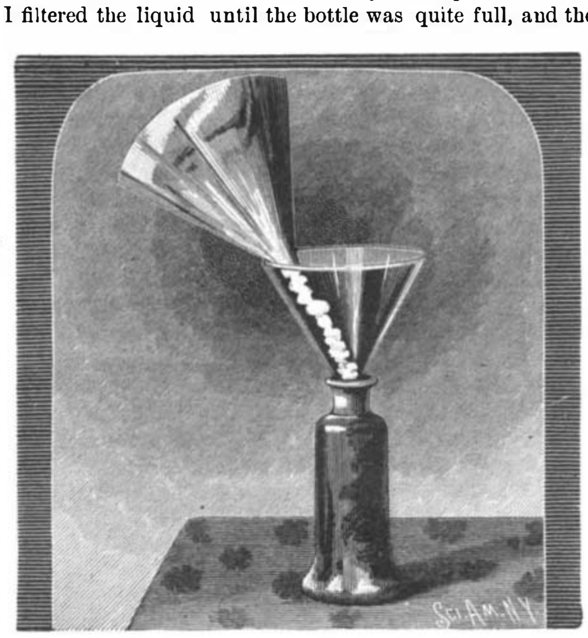
The danger of allowing water to assume the spheroidal condition in steam boilers is generally recognized; and M. Melsens has investigated the causes which conduce to this state. He has found that when the shell of a boiler is roughened with many points, water boils at the same temperature as that which in a perfectly smooth boiler will produce the spheroidal condition. The demonstration of this fact has been shown by the following arrangement: A dish representing the bottom of a boiler is divided into two equal parts, one of which is made perfectly smooth, while the other is covered with little pointed metallic cones, soldered to the plate. The dish is raised to a uniformly high temperature by a gas furnace, and then a quantity of water is poured simultaneously into both compartments, rising high enough to just cover the points of the cones. In the smooth compartment the water will pass into the spheroidal condition and not enter into ebullition; in the other, the ebullition will be lively so soon as the water covers the points of the cones. The same phenomenon occurs when the water has, by long boiling, been previously purged of its contained air. It remains to be proved whether this experimental fact can be utilized in the construction of boilers, in order to suppress or diminish the disasters arising from overheating.

What will Burst a Gun.

Some strangely twisted pieces of gun barrels exhibit, in a most interesting fashion, says the Philadelphia *Times*, the vagaries of overtasked gun barrels. The specimens are parts of some guns burst by Capt. Heath, of that city, during some protracted experiments with various weapons. Five of the barrels were burst because a ball was "stuck" near the muzzle in each case, two gave way because about four inches of snow was put in the muzzle, two were burst by reason of having some wet sand at the muzzle, and three were ruptured by mud at the muzzle. Sportsmen often scoop up a little mud or sand unconsciously, bang away at game, and are then astonished to find the gun with a ragged and shortened barrel.

ANOTHER CURIOUS CASE OF FREEZING.

The curious and beautiful case of freezing which was illustrated in the SCIENTIFIC AMERICAN a few weeks ago has called forth a number of letters from our correspondents, and one gentleman, Mr. Koerner, of Wisconsin, has forwarded to us a photograph which we present in the accompanying engraving. In the letter which came with the photo he said: "The bottle contained a solution of photosulphate of iron. I filtered the liquid until the bottle was quite full, and the



STEM OF ICE AT FILTRATION.

next morning, to my suprise, I found it in the condition shown. The white line connecting the filter with the bottom of the funnel is a solid piece of ice and has the coarse shape of rock candy. Everything is solidly connected, though the ice does not rest on the side of the funnel, but in one solid stick running up and holding the filter in place." The filter of course is one of the ordinary paper filters commonly used in laboratories; this unexpected termination of Mr. Koerner's filtering operation affords a very pretty illustration of the wonderfully expansive power of ice.

OIL ON TROUBLED WATERS.

Thomas Stapleton's translation of Bede's "Historia Ecclesiastica" was published in 1565. Bede was born 672 A.D., and died 735 A.D. In one portion of his work he states that when a certain priest was sent into Kent to fetch King Edwine's daughter to be married to King Oswin, he so appointed his journey as to return with the lady by water. Upon beseeching the prayers of the bishops he was given a pot of oil, told that he would meet a tempest and contrary wind, and that he was then to cast the oil into the sea. All happened as the bishop had foretold, and "in this distresse the priest at the length remembering the bishop's wordes, toke the oyle pot, and did caste of the oyle into the sea, which being done . . . the sea calmed, the bright sonne appeared, the ship passed on with a most prosperous viage." Here it will be noted the oil not only calmed the sea, but changed the weather and brought out the sun.

Various other instances are reported in which the saving of ships was believed to be directly due to the diminished force of the waves caused by pouring oil in the sea.

On October 8, 1880, a three ton boat sailed from Montevideo for Naples, the voyage being undertaken, not in a foolhardy spirit, but to test the value of a little oil on rough water. The olive oil used was inclosed in small bottle-shaped bags each containing about half a gallon. When it became necessary to lie to in a gale, a large bag was attached to the bow of the boat and thrown overboard. This served as a floating anchor, or drag, and kept the boat's head to the wind. Two small bags were then thrown over, one fore and one aft. Each bag had a small hole through which the oil slowly escaped. Although the oil did not reduce the size of the waves, it was claimed to render them comparatively harmless by preventing them entirely from breaking.

On February 4 last, the ship Jan Mayen left Dundee for St. Johns. She met a heavy storm that smashed the binnacle, carried away the compasses and part of the bulwarks, and finally threw her on her beam ends. As a last resort to save his ship, the captain tried the oil experiment. Three bags were filled with oakum saturated with oil; one bag was hung over the weather bow, another amidships, and a third on the quarter. In a short time the sea ceased to break over the ship, which soon righted. The oil lasted until the next morning, when the sea had considerably calmed down.

On January 26, the ship Lauderdale, from Junin to Hamburg, was struck by a heavy sea and soon began to make water. The next morning the captain of the Medea lowered a boat to go to her assistance, but it was capsized and all on board lost. If the boat had got only a little nearer the Lauderdale she would have been in smooth water, as on board the latter vessel they were pouring oil into the sea through a pipe in the forecastle, and this had a wonderful effect on the water all around. In view of this statement, the fact that a boat should be lost when oil was actually running into the sea from the forecastle of the ship looks rather bad for the oil theory. During the following morning the crew of the disabled vessel left in their own boat and got on board the Medea. Three trips were made in the boat, which was supplied with a can containing about five gallons of oil, from which a stream about the thickness of a pencil was allowed to flow into the water, and the result was that the sea was calm and no water broke on board.

The accompanying engraving represents Folkstone Harbor, England, where a method of putting the oil upon the water when needed has been recently effected. From each side of the South-Eastern Railway Company's pier had been laid under water several hundred feet of lead pipe about one and one-quarter inches in diameter. The pipe is furnished with a series of upright branches eighteen inches high at intervals of about one hundred feet, each branch terminating in a valve and a brass rose like that of a watering pot. The lead pipe is connected at its shore end with a force pump placed on the pier. By means of the force pump oil is driven through the pipe and out of the small perforations in the roses under water. On January 29, 1884, the plan was tested, about one hundred gallons of oil being pumped through the pipes. Soon there was a wide stretch of rolling sea, only at the edges of which the waves broke, and in the center of which a life boat rode easily. Seal oil was used. A second experiment was made at the same time, consisting of firing shells filled with oil, which, when the shells burst, spread itself over the water. The shells were simply oil flasks, each being provided with a fuse so timed as to burst when required. Our engraving, which is from some English pictures taken on the spot, purports to represent the condition of the water both before and after the application of the oil. On one side we behold the sea lashing itself into a fury wherein no small boat could live. On the other side is seen the appearance of the same water after a little oil has been discharged thereon. All is calm and peaceful, and the boat is observed to be gliding, as it were, over a surface as smooth as a lake in a summer day. This is fully equal to the statement above made by Bishop Bede more than a thousand years ago, and so far as the oil virtue is concerned, one story is about as true as the other.

EXPERIMENT WITH OIL ON TROUBLED WATERS.