ship is bad by electric signals, a separate engine driving the dynamo machine supplying the lighting power. Each room has a separate ventilating pipe from a main fan, also a steam coil for cold weather.

In the race of August 10, between the steam yachts of the American Yacht Club Fleet, from Larchmont, N. Y., to New London, Conn., a distance of 90 miles, this remarkable boat made the distance in 4 hours 44¾ minutes. Allowing some of her competitors one hour's start, she was first in beating the Yosemite, her especial antagonist, by 26 minutes. This latter's blowing fan broke down about the middle of the contest, but it is doubtful if without the accident she could have caught up, the Atalanta having gradually drawn away from her from the start.

The day was stormy, with strong head winds. The Atalanta was well prepared for the contest. Her load line just touched the surface. All her boats were in on deck, and her numerous crew gathered way aft at the start, when they moved forward as soon as she gathered full headway. As her propeller took hold of the water, a small mountain of water and foam rose up, almost obscuring her rail, but gradually subsided as her full speed was gained.

When under full headway, a broad sheet of foam spread from her bows, falling away amidships only to rise again toward the stern. The Yosemite on the contrary seemed to gather but little at the bow, but the swell rose amidships, and then fell away again before reaching the stern. Her disturbance of the water's surface was much less marked than that of the Atalanta, which proved herself in this contest the fastest yacht in American waters.

Boring with Compressed Water.

When the French engineers first began the Mont Cenis Tunnel, says a Paris correspondent of the Boston *Herald*, the work was done in the old-fashioned way by means of hand drills and blasting. Later, machines were invented driven by compressed air, which did away with the hand drills, and by the aid of which the work was successfully completed. Similar but improved machines were employed in the piercing of the St. Gothard; but when Mr. Brandt undertook the piercing of the Arlberg, he proposed to the contractors to substitute compressed water for compressed air. He invented a special apparatus for the purpose, and the experiments made with it in the Westphalian mines were so satisfactory that his proposition was adopted on the western side, while the piercing of the eastern gallery was to be done by the same means as had been employed on the St. Gothard, known as the Ferroux machine. After a few months' experience it was demonstrated that the Brandt was in perforating power the equal, if not the superior, of the Ferroux machines, while it possessed an undoubted superiority for the ventilation of the gallery, and consequently for the health and comfort of the workmen. When I saw the Brandt machine at work, I was struck by the contrast between its smallness and the greatness of the task it had to accomplish. In appearance and size it resembles an old-fashioned 6 pound field piece. The drill has a diameter of 30 inches, and consists of a circular auger, which is held powerfully against the rock by means of a hydraulic pressure of from 100 to 120 atmospheres, while at the same time a rotary movement is imparted to it. The pressure against the face of the rock is the result of a column of compressed water contained in the cannon-like cylinder of the machine; inside of this cylinder is a fixed piston rod, a detail in which the Brandt machine differs from all other similar drills, in which it is the cylinder that is fixed and the piston rod that is movable.

The rotary movement is imparted to the drills by means of a cog wheel acting on the cylinder and moved by a transversal endless screw, driven by two little hydrometric engines placed on either side. The drill will make, according to the nature of the rock, from 5 to 12 revolutions per minute, and it can be driven to a depth of 39 inches. When it is withdrawn a dynamite cartridge is inserted, and the face of the gallery is blown down. By means of four of these machines, a gallery 16,390 feet long, with a heading of ten square yards, was driven into the western side of the Arlberg during the same space of time that six Ferroux machines were driving a similar gallery 17,900 feet into the eastern side of the mountain. The daily rate of progress varied greatly, according to the nature of the rock traversed.

Sometimes a stratum of exceptionally hard rock would be encountered, and sometimes the strata would be so friable that the roof and sides of the gallery had to be immediately protected with shoring. At the start the average daily progress did not exceed 6½ feet, but toward the end 26 feet were the minimum, and 37 feet the maximum, of a day's work. As high as 100 cubic yards of rock were sometimes removed during 24 hours, and an average of 500 cubic yards of masonry were built per day. About 2,000,000 pounds of dynamite were used in this blast, and most of it was manufactured on the spot, in large frame buildings erected for the purpose in isolated spots at either end of the tunnel. In the construction of the gallery the same system employed at the St. Gothard Tunnel was adopted. This system consists in the establishing of a principal gallery, and of a second gallery parallel to and above the principal one. The dimensions of the former were 8 feet high by 9 feet wide, which allowed six miners to work at the same time. The upper gallery, 7 feet high by 6½ feet wide, would only permit four men to work.

OIL is now extracted from the seeds of grapes in Italy. Young grapes yield most, and black kinds more than white.

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THE RETURN SCREW.

To many machinists the production of a return screw for changing a rotary into a reciprocating movement is a difficult job. It is something more, to be sure, than cutting a right and left hand screw separately or independently; for the starting and finishing points of the two threads must be the same, and yet there must be no abrupt corners at either end of the screw. To produce such a dual or returning screw, the work should be properly laid out before it is attempted to be completed at the lathe.

The return screw is a right and left hand thread cut on a short cylinder, each crossing the other, the terminals meeting at some initial point. In practice it is best to have the threads square, with slightly inclined sides. The object of the return screw is to convert a rotary motion into a back and forth movement of perfect regularity. This back and forward movement can best be obtained by means of a lever, by which the ultimate throw can be limited or extended. On a return screw of only six inches length, with four turns of one and a half inches pitch, the writer once produced a practically regular and even reciprocating movement of twenty inches. The lever is moved by a substitute for a half nut that runs in the scores of the thread. Unlike any half nut, it does not reach over two threads—it engages only with one. In fact, it is a crescent shaped piece of steel, with thinned points, having a pivot at the back of its convexity, so that it may turn freely in either direction.

In action the crescent runs along the channels of the right hand thread, as the screw revolves, until it reaches the end of the screw, when it turns sharply on its pivot and traverses the left hand channels to the other end; then reversing and keeping up the reciprocating movement indefinitely. The motion is equable, smooth, and without jar. In some situations this contrivance is better than a cam or an eccentric, or any other method of change of motion from rotary to reciprocatory.

In laying out this return screw, machinists sometimes make the mistake of using one single point for the end returns. This, although agreeable to theory, is not feasible in practice. The crescent shaped traveler cannot turn a sharp corner; its course conforms to the spiral lines of the thread. So the ends of the threads—the places of their union—should be curved similar to the spirals of the screw. Machinists sometimes content themselves with drilling a single hole as a starter for the screw cutting tool for one thread, and the end of the cut for the other thread. This is wrong, for it leaves a corner or angle of only the turn or diameter of the drill, the width of the thread. Two holes should be drilled at a little more than their diameter apart, and on the finishing they can be connected by means of a little chiseling. This will give a curve just sufficient to throw the guide on to the other thread. In beginning a cut on a return screw, it is well to mark the right hand thread, and then before cutting it to mark the left hand thread; the change of gears is a trifling trouble.

THE ANCIENT INTERIOR AFRICAN SEA.

The very precise accounts left us by classic authors regarding an interior sea in the Libyan region of Africa, have always attracted the attention of geographers. The ancients called it the Bay of Triton, and spoke of it as an arm of the sea in communication with the Mediterranean, and distinguished by an island named *Phla*, which the waters alternately covered and exposed. Herodotus and Scylax give these particulars, and Ptolemy at a later date describes a river which flowed into it. For a long time the geographic world failed to locate this sea, but from the studies of Dr. Shaw, of Rennell, Sir Granville-Temple, and MM. Tissot and Guerin, it was supposed that in the historic period the lakes had communicated with the Mediterranean and had formed the Bay of Triton. Commander Roudaire, basing his assumptions on this identification, believed that this Bay of Triton was dried at the commencement of the Christian era in consequence of the formation of an isthmus which separated it from the sea, and that it would suffice to dig a canal between the basin of the lake and the Gulf of Cabe to revive this ancient sea. But later examinations proved that this hypothesis was untenable, as the bed of the Djerid Lake was above the level of the Mediterranean, and M. Fuchs recognized in 1874 that the soil of Cabe was formed, not of beds of sand or recent alluvium, but of strata of sandstone, gypsum, and limestone, and was at least 46 meters above the level of the adjoining Mediterranean waters. But recent geographical discoveries show there is a new basin in Tunis, that of Lake Kelbiah, which embraces all the central portion of the Tunisian plateau and the plain of Kairouan.

A large stream descends from Tabessa and empties into the Gulf of Hammamet, where it debouches between Sousa and Erghéla. At some distance from the shore lies the great Lake Kelbiah, which the river traverses, reappearing beyond under the aspect of a canal of exit, by which Lake Kelbiah during floods empties its surplusage of waters into the sea. M. Rouire, in the *Cosmos les Mondes*, gives some notes of a recent visit he paid to this locality. He had previously studied this region, and had published his conclusions as to its being the site of the ancient Bay of Triton, which had almost been abandoned by scholars as a real geographical locality. His essay awoke a lively discussion, and he was accused of ignorance of the ancient authors and their descriptions. A renewed careful study of Herodotus, Scylax, Pomponius Mela, and Ptolemy assured him that the position of Lake Kelbiah corresponded with its surroundings to the descriptions of these authors.