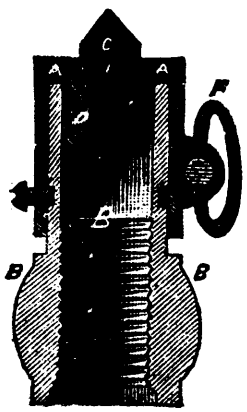
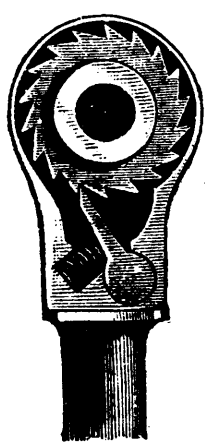
LATHROP'S SELF-FEEDING RATCHET DRILL.

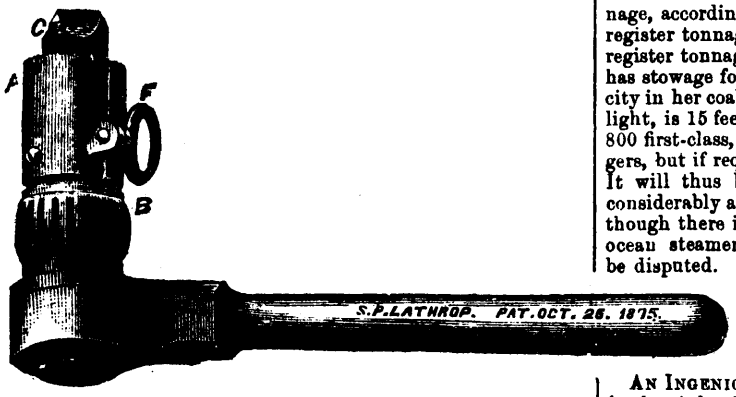
S. P. Lathrop, of Newark, N. J., is the inventor and manufacturer of a self-feeding ratchet drill which is claimed to be equally adapted to light and heavy work, being capable of instant adjustment to any required cut. The tool is simple in construction, and its operation will be readily understood from an inspection of the figures. The inner or feed-sleeve B, Figs. 1 and 3, screws upon the drill spindle, and is provided with a friction or outer sleeve, A, in the head of which is secured a steel chisel-shaped pin, C. The lower end of C is pointed and rests upon a hardened steel bearing, D, fixed in the head of the inner sleeve B. This sleeve, with its bearing D, revolves upon



Self-Feeding Ratchet Drill.
FIG. 1.



Lathrop's Self-Feeding Ratchet Drill.—Fig. 2.



Lathrop's Self-Feeding Ratchet Drill.—Fig. 3.

the point of the pin C, and within the friction sleeve A. The head of the pin C being chisel-shaped prevents the pin and the outer sleeve A from revolving. If the friction screw F is unscrewed, B is free to rotate upon the bearing of the pin C; but by tightening F the friction on the inner sleeve B may be increased causing the sleeve to remain stationary, and, consequently, causing the screw on the drill spindle to feed the drill until the friction on the drill becomes greater than that on the sleeve B. When this occurs B again rotates within the outer sleeve, and continues to do so until the drill has finished cutting the chip, when the operation is again repeated. The feed may, of course, be readily adjusted by tightening or loosening the friction screw F.

WELDING TUBES AND TIRES.—Herr Krupp, of Essen, has recently patented, in Germany, a method of welding tubes and tires, which is based upon an excellent idea. He draws the tube over one of a pair of ordinary rolls, and then heats the whole length of the portions to be welded by a special contrivance, which is a portable fire-box, into which air is so blown that the heat is directed against the weld. After the necessary heat is attained the rolls are set in motion and the place to be welded is repeatedly drawn through them.

GIANT STEAMSHIPS.

For some years it has seemed as if the limit of size in ocean steamships was to be fixed at about 5,000 tons. It was clear that the *Great Eastern* was a gigantic failure, a costly elephant on the hands of her owners. She could not be run as an ordinary passenger or freight steamer, and found only temporary employment in the work of laying submarine cables. Whether she can be utilized as a transport for cattle to European markets, as recently proposed remains to be proved; but it is certain that such a ship would not be *built* for that purpose—or indeed for any other at the present time. She may, therefore, be left out of the account, except as a warning that there *is* a limit of size, at least so far as economy of construction and working is concerned.

Steamships of 5,000 tons have been running for some ten years or more, but their number has increased very slowly, and until within a year or two there has been no disposition to build larger vessels. Then came the *Gallia* of the Cunard line and the *Arizona* of the Guion line, the former being 5,200 and the latter 5,300 tons. The *Orient*, for an East Indian line, soon followed, with a measurement of 5,386 tons. The success of these great ships, especially in regard to speed, coupled with the ambition of companies to outdo their rivals, appears to have given a new impulse to this branch of naval architecture, and two ships are now building which are to be much bigger than the biggest of their predecessors. One of these is a Cunarder, and is to be of 7,500 tons and 10,000 horse-power, her dimensions being 500 feet in length, 50 feet in breadth, 41 in depth. No sooner had the Cunard Company announced their intention to build a vessel second in point of size only to the *Great Eastern* than the Indian Company determined to have a steamship of even larger dimensions. The vessel is to be built at Barrow, and is to be of about 8,000 tons, but her exact dimensions have not been published as yet.

It may be interesting to compare these ships with the *Great Eastern*. The length of the latter on the water-line is 680 feet, extreme breadth 82 feet, 6 inches, and depth 58 feet. Her tonnage, according to builder's measurement, is 22,627 tons; her register tonnage, including engine space, is 18,914 tons; and her register tonnage excluding engine space, is 13,343 tons. She has stowage for cargo to the extent of 6,000 tons, and the capacity in her coal bunkers is 10,000 tons. Her draft of water when light, is 15 feet, and loaded 30 feet. She has accommodation for 800 first-class, 2,000 second-class, and 1,200 third-class passengers, but if required for troops alone she could carry 10,000 men. It will thus be seen that the *Great Eastern* is in point of size considerably ahead of anything yet ventured by ship-owners, and though there is an evident desire to increase the size of the great ocean steamers her position as the largest afloat is not likely to be disputed.

AN INGENIOUS METHOD of measuring the quantity of moisture in the air has been devised by Herr Rudorff, who lately announced it to the German Chemical Society. It consists in admitting to a measured volume of air (say 1,000 c. c. m.), contained in a suitable glass chamber, a small quantity of sulphuric acid from a graduated tube with stop-cock. The acid absorbs all the aqueous vapor contained in the air, thereby disturbing, however, the pressure in the chamber. This diminution of pressure is shown by means of a manometer connected with the vessel. Sulphuric acid is then admitted in drops until the original pressure is restored. The absorbed aqueous vapor is thus replaced by an equal volume of sulphuric acid, and by calculating the percentage of vapor that the air has carried can be readily ascertained. The method is said to give very accurate results, and the operation makes a good lecture experiment.

HEAVY LOCOMOTIVES.—The tendency at this time seems to be to increase the weight and draft of railroad locomotives, and to decrease the weight of cars in proportion to the load which they are designed to carry. The Pennsylvania Railroad Company are now building at their shops in Altoona a new fast passenger engine, to run between Philadelphia and New York. It will have drivers five feet eight inches in diameter. If it works satisfactorily nine more of them will be immediately constructed for the same road. They are also building 60 locomotives of the Modoc pattern, recently described in these columns—the heaviest ever built. The engineers do not like these heavy engines, but the company appears well satisfied with their pulling capacity.