pointed wheel causes the central exchange light to flicker, and it cannot be mistaken for anything else, because the operator is able to hear the mechanism of the box. The sound is very positive and distinct, and cannot be misunderstood.

Provision is made for breaking the circuit through the alarm apparatus, after the alarm has been sent in, so that there is no interference with the use of the telephone. The thermostats are so constructed that the moment they are subjected to 125 deg. of heat they collapse and close the circuit, thus sending in the signal.

It makes no difference whether the telephone line happens to be busy or the receiver has been carelessly left off the hook, the alarm takes precedence, automatically cutting out everything else until it has gone in and automatically placing the telephone in use again. When the operator at the central exchange receives a signal, she notifies a special operator in charge of the fire calls, who in turn sends the alarm to fire headquarters, being able from her list of subscribers to tell the exact location of the fire. In the meantime the first operator rings the 'phone bell in the office or building from which the alarm came, thus notifying the person who had sent the alarm that it had been received and the fire department is on the way; or in the event of an alarm's having come from a distant part of the building, a man sitting in his office might be thus warned by the telephone operator that there was a fire in his building, which he had not discovered.

Mr. Denio's patented thermostat and push button circuit is such that it could almost entirely be destroyed and still the alarm will go in just the same.

THE TURRET AND BARBETTE OF A BATTLESHIP.

If called upon to name the most important element in a battleship, we would unhesitatingly name the battery, and, more specifically, the 12-inch gun. If this estimate be correct, particular interest attaches to the means of mounting, protecting, and operating the 12-inch gun; and we think that the drawing on the front page of the present issue will be found to answer very fully any questions that may be asked upon this subject. The illustration is a vertical, sectional view, carried down through the structure of the ship, in the plane of the keel. It includes enough of the ship, in the fore-and-aft direction, to take in the ammunition and handling rooms, and to show the methods of storing the shot, shell, and powder, far down below the waterline, and the means by which it is brought up from its safe retreat until it is level with the breech of the gun.

Commencing then at the bottom of the section, we have, first, the outside skin or plating of the ship; then about four feet above that the inside plating, or inner bottom, as it is called. These outer and inner shells extend across the full width of the bottom of the ship and up the sides of it, until they reach a point about 5 feet below the waterline, where the inner shell terminates, the outer shell being continued up to the upper deck, some 20 feet above the waterline. At the point where the inner shell terminates there is formed an offset or ledge, known as the armor shelf, upon which the heavy waterline armor, a foot or so in thickness, finds a footing. The space between the outer and inner bottoms is divided longitudinally by the frames of the ship, which extend across the bottom and up the sides to the main deck; and this double bottom is further subdivided by a series of longitudinal girders, which extend parallel with the keel throughout the length of the ship, and thus serve to divide the space into a large number of separate cells, the whole system thus divided being known as the cellular bottom. Upon the inner bottom, or floor of the ship, in that portion shown in our drawing, and between that and the first deck above, is a magazine in which is stored the ammunition, or part of it rather, for the rapid-fire guns of 6-inch caliber, which are mounted upon the gun deck and main deck. The ammunition is stacked neatly in racks, arranged as shown in our illustration. At the after end of the magazine is seen the foot of an electrically-operated ammunition hoist, which consists practically of an endless chain belt, provided with racks in which the ammunition is placed and carried to the guns. On the deck above this ammunition room, and arranged centrally below the barbette, is located the handling room, into which open, by water-tight doors, the magazines that contain the powder charges and projectiles for the 12-inch guns. The powder, done up in bags, and the projectiles, are picked up from the rack by an overhead trolley, run out into the handling room, and lowered into the cages of the ammunition hoist. Two decks higher up we come to the steel protective deck, which is from 2½ to 3 inches in thickness, and extends from side to side, and throughout the whole length of the ship at the level of the waterline. This deck serves to prevent the passage of fragments of bursting shell down to the magazines, engines, boilers, steering gear, and other vital elements of the ship.

Upon the protective deck is erected a great cylindrical structure, known as the barbette, whose walls, 8 to 12 inches in thickness, consist of solid plates of face-hardened Krupp steel. This barbette is practically a circular steel fort; and it is thick enough, and the steel walls are hard enough, to break up and keep out the heaviest projectiles of the enemy, except when they are fired at close ranges. At about two-thirds of the height of the barbette is a heavy, circular track upon which runs a massive turntable. The framing of this turntable extends to a level slightly higher than the top edge of the barbette, and upon it is carried the massive structure of the rotating turret, which is formed, like the barbette, of thick steel armor, bolted to suitable plate steel framing. In plan the turret is elliptical. Its front face, which slopes at an angle of 40 degrees, is pierced with two ports, through which project two 12-inch guns. The mounting of these guns is carried also upon the turntable, and revolves with the turret.

From the breech of the two guns a steel runway, or elevator track, extends down through the barbette to the floor of the handling room below, where its footing turns upon a step bearing located in the vertical axis of the barbette. This elevator revolves with the turret, and consequently ammunition can be carried up to the guns, no matter in what direction they are trained, whether ahead or on either beam. When the ammunition car in the handling room has been loaded an electric motor runs the car up to the breech of the gun, where the projectile and the charge are pushed from the car into the gun by means of an electrically-operated rammer, which will be noticed in our engraving at the rear of the turret, with one of the gun detachment operating the controller. All the movements connected with the loading and elevating of the gun, and the traversing of the turret, are performed by means of electric motors, and in our latest ships the various operations are under such perfect control that a 12-inch gun may be laid with as much ease and accuracy as a 6-inch rapid-firer. The circular projection seen at the forward part of the turret upon the roof is the sighting hood, from which the officer in command of the turret controls the sighting of the guns.

To Get More Heat From a Radiator.

There are a good many rooms where the radiator is either too small or the steam pressure is too low to maintain a comfortable temperature in severe weather. If the tenant is enjoying the many advantages afforded by central station electric lighting service, the matter can easily be remedied. Take the fan that kept you cool all summer and set it where it can blow against a large part of the radiator's surface. Turn it on at low speed, or at high if necessary, and your cold room will soon be thoroughly warmed. The philosophy of the thing is that steam at a low pressure carries much less latent heat than steam at a high pressure, and therefore warms the radiator so poorly that only a slight draft of air rises around the pipes, and condensation is slow. With the fan in operation there is a forced draft against the radiator that conducts a great deal more heat away from the iron, cooling it so that much more condensation of steam occurs inside it. The heat thus snatched from the reluctant radiator is held in the circulating atmosphere of the room, which is soon changed from cold to warm at a trifling cost for electric energy.—Electric City.

Death of Ernest Kempton Adams.

In the death of Ernest Kempton Adams, the profession of electrical engineering has lost one of its most promising members. Although only a very young man, Mr. Adams had been associated with the development of the stupendous Niagara enterprise. Despite his years, he left behind him no less than two hundred and forty-one inventions in diverse branches of physics. His electrical work embraced the designing of almost every type of electrical machinery, including generators, motors, transformers, measuring instruments, contact devices, and switches. Everyone of these embodied some practical improvement. Clock movements, acoustic instruments, physical apparatus, and even psychological instruments were designed by Mr. Adams, all of them affording evidence of most wonderful ingenuity. In purely physical work Mr. Adams's most noted achievement was an electrical repetition of Foucault's famous pendulum experiments. Akin to this is his atmospheric temperature clock, based on the high expansion coefficient of wood alcohol as a means of continuous operation. Mr. Adams had the reputation of being one of the finest draftsmen in his profession. Indeed, instructors in the Department of Electrical Engineering in Columbia University, the institution at which he took his degree, still point with admiration to some dynamo and motor drawings of his which are considered excellent achievements of their kind. In memory of his work, the Ernest Kempton Adams fund for physical research has been donated to Columbia University, for the purpose of promoting research in physical sciences.

Correspondence.

The New York Harbor Entrance.

To the Editor of the SCIENTIFIC AMERICAN:

In your article of January 7, 1905, on the "New York Harbor Entrance," the following point seems to be overlooked:

At the present time there are across the wide submerged flats between Coney Island and Sandy Hook several channels of moderate depth. The article shows that Rockaway Beach is traveling westward and Sandy Hook northward across this area, thus narrowing the entrance.

As the channels are created and maintained by the tidal flow, may we not look for a single, much deeper and better channel after the above narrowing has taken place? In other words, is not the approaching catastrophe, pointed out by Prof. Haupt, a blessing in disguise, but not wholly unrecognizable?

CASSIUS E. GILLETTE,
Major of Engineers, U. S. A.

San Francisco, Cal., January 21, 1905.

The Black Lily.

To the Editor of the SCIENTIFIC AMERICAN:

In the SCIENTIFIC AMERICAN of October 22, I find a description of a peculiar flower which you call "black lily," found in the Philippines by two teachers.

This flower "has not yet apparently been noticed by scientists," you write. It is, however, very well known by scientists, at least by German and Dutch scientists. In this country (Isle of Sumatra) you can find many of them.

The scientific name is *Amorphophallus campanuformis Blume.* It is not a member of the order Lilaceii, but of the Aroideæ, and no real flower, but a "spadix."

The plant is in all its peculiarities very well known to the Dutch of East India, but you must not forget that we are here some centuries, and you in the Philippines only a few years.

I suppose that a botanist can explain the matter to you, if you tell him that this member of Aroideæ is composed of many flowers together and seems to be only one. D. H. ARENDS, JR., Medical Officer.

Tebing Tinggi Palembang, Sumatra, Dutch East India, December 6, 1904.

What Farmers in the Wheat Belt Need.

To the Editor of the SCIENTIFIC AMERICAN:

There are two things especially needed by the farmers of the wheat belt, of whom I am one.

The first, and by far most important, is an automatic shocker attachment to our reaping machines; the second is a practical traction engine adapted to farm and road work in a country where the soil is loose and friable.

As to the engine first: It should combine greater traction power than the average threshing engine, with minimum weight and water consumption. It should be very simple in construction, and built for hard, rough work. Possibly such an engine is on the market, but I have seen nearly all the standard makes and they do not fill the bill from the standpoint of the farmer seeking an efficient farm and road motor.

The automatic shocker is an urgent necessity. It is the one remaining thing needed to insure our harvests being gathered. "Hobo" labor is costly and inefficient. The waste from poor shocking alone would annually amount on the average farm to the cost of such an appliance. It must, to be efficient, do the following things: (1) Hold, place, and discharge, standing and with heads well knit together, not less than seven or eight bundles. (2) Be absolutely under control of driver as to moment of discharge. (3) Not shell over-ripe grain. (4) Add not more than two-horse draft to the machine. (5) Be simple, strong, easily adjusted, and able to handle bundles made from lodged grain. (6) Able to increase or decrease bundles in shock according to size, and general condition.

In my opinion such a shocker can be better adjusted to the header than to the binder type of reaping machines. A shock-forming table behind a header would allow of a lateral discharge of the finished shock without materially increasing the width of the machine. That type of machine, 12-foot cut, could be handled by eight horses and one man, and would have a cutting capacity of about thirty acres daily.

HUGH J. HUGHES.

Hannaford, N. D., December 23, 1904.

The rotary cement kiln was invented by Frederick Ransome, of England, in 1885, but has been perfected and made a commercial success in the United States. In 1893 rotary kilns were used in the manufacture of 25.2 per cent of the Portland cement produced in the United States, and in 1900 this had increased to 81.5 per cent. The cement consumed in the United States during the year 1902, estimating one barrel of cement to one cubic yard of concrete, was sufficient to build a wall 1,000 miles long, 20 feet high, and 7 feet thick.