THE WORLD'S COLUMBIAN EXPOSITION—EXHIBIT OF OTIS C. WHITE, WORCESTER, MASS.

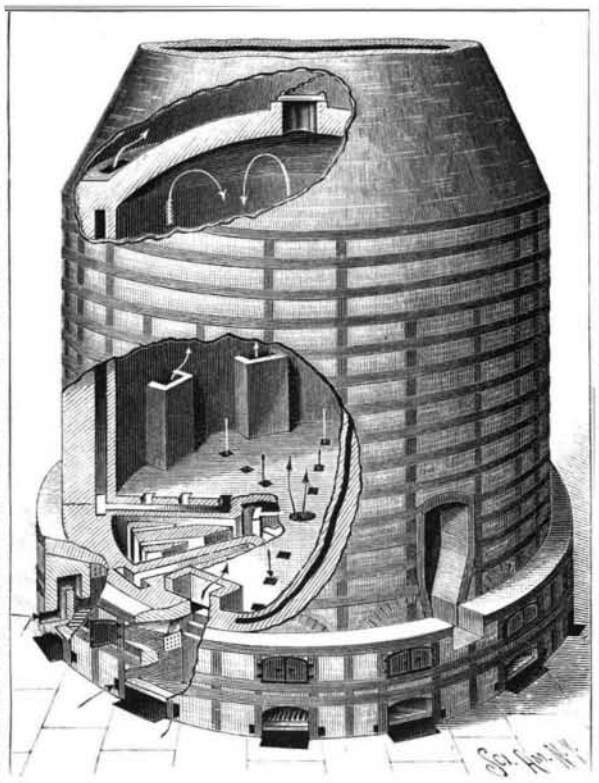
There are few if any single exhibits at the World's Columbian Exposition that seek recognition in more departments than that of adjustable extension movement in ball and socket and cone joints made by Otis C. White & Company, Worcester, Mass. The accompanying illustration shows this exhibit, which occupies a commanding position in the gallery in the Manufactures and Liberal Arts building. Although situated in this building, this exhibit comes in for consideration and award in the departments of machinery and electricity as well as liberal arts and manufactures. The various joints invented by Mr. White can be so combined as to be perfectly adapted to almost any line of work where joints are used, from the delicate adjustments required in scientific work to such coarser uses as the holding of the heaviest vises at an angle. A great variety of applications is included in the exhibit: forms used by surgeons, microscopists, biologists and photographers, as well as by artisans of every sort. The joints have as their bases a divided ball and socket joint, which is most ingenious and novel, and has of course been carefully protected by patents in various countries. A most valuable feature is that either a firm unyielding grip can be arranged for, or more or less elasticity can be introduced and controlled, so as to allow motion under any desired amount of pressure. This elastic quality has made feasible the novel series of adjustable holders for electric lights, which have attracted the attention of practical men to the exhibit. The illustration shows in the doorway one form of these holders, which has a ball and socket joint at the base, a sliding swivel joint at the elbows, and a wrist joint just back of the lamp. The swivel joint allows both rotation and extension to full length of each arm; and while all these adjustments can be easily made by the hand, the position is afterward retained, without any attention to screws or fastenings of any sort. The lamp can be moved, therefore, to any point within the radius of the arms, and there it will steadily remain, as long as it is wanted. This invention for the first time makes it possible to carry the incandescent lamp exactly to the work. A further and most important merit of these joints will appear on close scrutiny. The parts are all so devised that they can be made in quantities easily and cheaply, and can be put together by ordinary skill, so that the complete holder can be sold at a price which is surprisingly low.

Up to the present time the owners have been so busy in perfecting the joints and the processes of manufacture that no effort has been made to introduce the holders; but they have been sought by manufacturers, and are now in daily use in many large shops and factories. As soon as the inevitable corporation is completed, there will be little delay in supplying the largest and most varied demand.

THE H. K. Porter & Company, of Pittsburg, Pa., builders of light locomotives, have received an award for all of the locomotives shown by them at the World's Fair, including both the "Logger," exhibited in connection with the Forestry department, and the other four motors and locomotives exhibited in the Transportation building. These interesting exhibits were fully described in the SCIENTIFIC AMERICAN of October 7.

LAWTON'S IMPROVED POTTERY KILN.

The economical use of fuel in the larger class of furnaces, such as those used for glass or pottery, is one of the most important problems of the day. In the cut we illustrate the Lawton pottery kiln, in which a partially regenerative or recuperative effect is obtained, with accompanying economy of fuel. The kiln is of the cupola shape, with furnaces distributed around its base which are of improved form. The air for the final combustion of the smoke and gaseous products passes through flues on each side of the furnaces and enters the fire chamber highly heated. This insures economy of fuel and also perfect combustion, little or no smoke being produced even with bituminous coal. The products of combustion from the furnaces are distributed by flues beneath the floor of the kiln. One portion goes to a central orifice, recognizable in the cut by arrows issuing from it, and another portion to a number of flues rising within the kiln and lying against its inner wall and opening into its interior. The kiln has a dome-shaped roof. Against this the currents of the gaseous products of combustion strike and are deflected toward the floor. The kiln is surrounded by an annular chamber connected to the interior by a number of flues under the floor leading to holes or apertures. In the cut these holes are shown of square shape. The deflected gases pass out through the apertures and flues leading from them and fill the annular space as they escape to the chimney. Thus the thin wall which serves as lining to the kiln is kept hot by what would otherwise be the waste heat of the furnace.



LAWTON'S IMPROVED POTTERY KILN.

In the center of the inner dome one or more crown holes are provided, which are opened when the kiln is being burned off. This facilitates cooling. A short movable pipe may also be placed over the central floor aperture to accelerate the starting of the fire and to regulate the inner currents. In use the chamber is filled with pottery and the fire started as usual. Owing to the heating of the air supply, the furnace is filled with so pure an atmosphere that the most delicate ware is unimpaired in color. The construction favors even distribution of heat also, and attains its results by a comparatively simple construction requiring no deep excavation. The air, which is gradually heated and introduced through the ports in arch and ends of the furnace, provides a very perfect combustion, and by means of this construction the dangerous gases which often do so much mischief are destroyed, and also the smoke, even when bituminous coal is used.

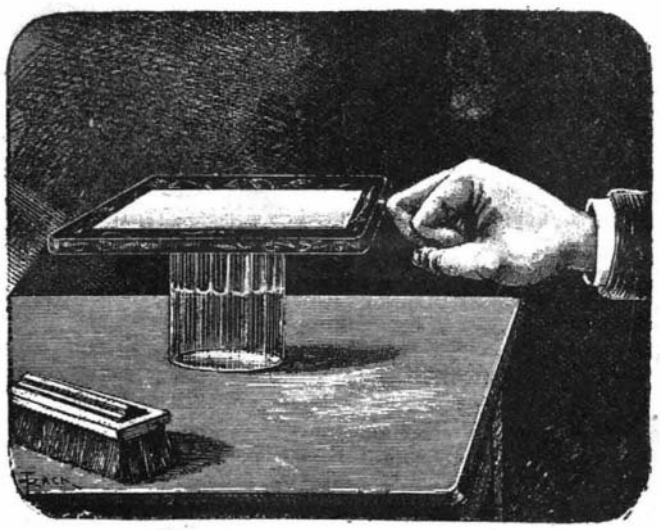
Full particulars may be obtained from the inventor, Mr. Lewis Lawton, Trenton, N. J.

THE WORLD'S COLUMBIAN EXPOSITION—EXHIBIT OF OTIS C. WHITE, WORCESTER, MASS.

A SIMPLE ELECTRICAL MACHINE.

That yellow amber, when rubbed, acquires the property of attracting light objects was known as long as forty centuries ago. This first experiment in electricity was destined for a splendid future, but a distant one, since it is from yesterday only that date the truly serious applications of this science.

We shall now endeavor to show how the fundamental experiments of electricity may be performed with as reduced a material as possible. A sheet of paper will suffice us in the first place for a few interesting experiments. Heat a piece of ordinary paper in front of a brisk fire or over a lamp chimney until it begins to redden. Afterward rub it smartly with the hand or, better, with a brush, and it will then be capable of attracting small, light objects, such as fragments of thin paper and the web of feathers. If the sheet of paper be brought near a wall, table or any stationary object whatever it will be strongly attracted. Finally, if one places it above his head his hair will be attracted, while at the same time he will experience a sensation comparable to a slight tickling.



A SIMPLE ELECTRICAL MACHINE.

But more remarkable results still are reached upon improving the apparatus. Take a glass, expose it to the fire so that it shall be perfectly dry, and place it upon a table. Afterward take a tray, perfectly dry, and place it upon the glass in such a way that it shall preserve its equilibrium. Finally, take a sheet of paper slightly smaller than the tray, heat it and rub it rapidly with a brush and it will become quickly electrified. Then place it upon the tray.

An electrical machine will thus have been constructed without any expense. If the finger be brought near the tray, a spark will appear. This spark will be so much the brighter and the series of sparks will be so much the longer in proportion as the glass and tray are drier.

If, while the sparks are being drawn from the tray, the room in which the experiment is performed be darkened, these sparks will appear extremely brilliant.
—*Science Illustré.*

Remedy for Color Blindness.

According to the *Med. Record*, Dr. A. E. Wright states it to be a fact that total color blindness is very rare; also, that yellow-blue color blindness is very rare. The common form is the green-red blindness. It so happens that in the establishment of signals, green and red lights form the most commonly used colors, hence, from three to five per cent of men capable of doing work as pilots or engineers are kept out of such employments, often with results that are almost cruel. Most color-blind men can readily distinguish yellows and blues, and the doctor proposes that the red lights should have a distinctly yellowish tinge and the green lights a distinctly bluish tinge. In this way the difference between signals could be readily made out by almost all the color blind.

Torpedo Boats for Men-of-War.

Considerable interest is being taken in the new torpedo boats which are now being constructed, two at the New York navy yard for the Maine and two others at the Norfolk navy yard for the Texas. The boats are built as light as possible, so that they can be easily hoisted on board the large vessels. The torpedo boats will be operated entirely from the men-of-war as regards supplies, only a ton of coal at most being carried. The general dimensions of the boats are as follows:

	Maine. Ft.	In.	Texas. Ft.	In.
Length over all	61	8	50	0
Length on load water line	58	6	48	1½
Beam at water line	9	0⅜	9	0⅜
Freeboard	2	5	2	3¼
Mean draught	2	2	2	1½
Extreme draught	3	3	3	4

The Maine's boats will have a displacement of 14·8 tons each and the Texas' 12·15 tons each.

The two boats for the Maine will each be fitted with a bow tube for discharging an 18 inch Whitehead torpedo and the two boats for the Texas will each be fitted with a deck training tube for a torpedo of the same size. Each boat will carry a 1-pounder rapid-fire gun. The engines are single vertical quadruple expansion, working at a pressure of 250 pounds. The torpedo boats will be driven at a high rate of speed. It is expected that the torpedo boats for the Maine will make 18 knots and those for the Texas 17 knots per hour. The Whitehead torpedoes weigh 875 pounds, with tube and launching gear a little over half a ton, so that a great deal of attention has been given to the question of stability. This weight being considerably above the water line, the other weights, such as the engine, boiler, fuel, etc., are so arranged that the center of gravity is as low as possible.

The results of calculations for stability are as follows: At nominal condition, ready for service, with ammunition, torpedo, and crew of five men on board:

	Maine.	Texas.
Metacentric height (feet)	1·55	1·5
Angle of heel at maximum stability (degrees)	43	38
Righting moment at maximum stability (ft. lb.)	27,135	16,308
Angle of vanishing stability (degrees)	89	73

With thirty men on deck, in addition to weight at normal condition:

	Maine.	Texas.
Metacentric height (feet)	0·83	1
Angle of heel at maximum stability (degrees)	35	30
Righting moment at maximum stability (ft. lb.)	18,400	7,875
Angle of vanishing stability (degrees)	67½	52½

Cockpits, with considerable seating capacity, have been provided, so that the torpedo boats may be used as dispatch boats if necessary.

SCULPTURE AT THE WORLD'S FAIR.

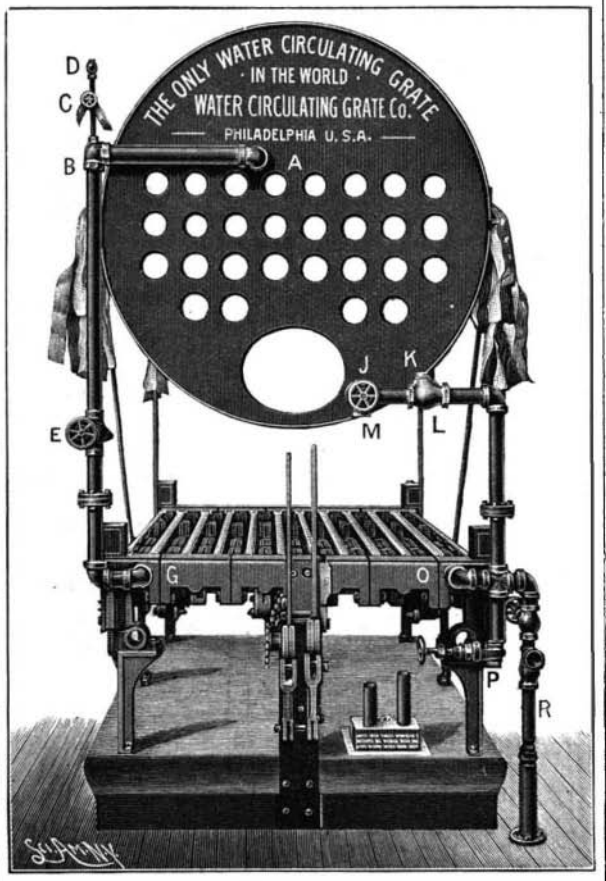
When the ephemeral glories of the Chicago World's Fair have passed away, the best of the statuary will remain a lasting memento of 1492–1892. One of the finest pieces of sculpture is illustrated on this page a group of horses drawing a chariot in which stands the triumphant Columbus with heralds on either side, surmounts the Peristyle; another is a group from the Agricultural building. Both are the work of Mr. Edward C. Potter and Mr. Daniel C. French, and are worthy of the subject and the occasion.—*Black and White* (*English*).

Launch of a Great Cargo Steamer.

The new White Star Liner Cevic recently launched is a very fine vessel, 500 feet long, 60 feet broad, and 38 feet deep, of a registered tonnage 8,315. Her total capacity of hold is 14 089 tons. She will be provided with accommodation for 800 head of cattle on upper decks, with permanent stalls for twenty horses in the center, besides having room in holds for a big cargo of other freight. The Cevic is built of steel throughout to Lloyd's highest class, and will be propelled by two screws with manganese bronze blades, driven by two complete sets of triple expansion engines. She will be lighted throughout by electricity. The scheme for ventilation on board will be as near completeness as possible. The Cevic has been built by Harland & Wolff for the White Star Line for carrying cargo and live stock between New York and Liverpool.

THE WORLD'S COLUMBIAN EXPOSITION—EXHIBIT OF THE WATER CIRCULATING GRATE COMPANY.

The exhibit of the Regan water circulating and shaking grate is located in the boiler house extension, Section D, Machinery Hall. This grate is designed for marine, stationary and locomotive boilers, and is adapted for all classes of fuel without change of bars.



THE WORLD'S COLUMBIAN EXPOSITION—EXHIBIT OF THE WATER CIRCULATING GRATE COMPANY.

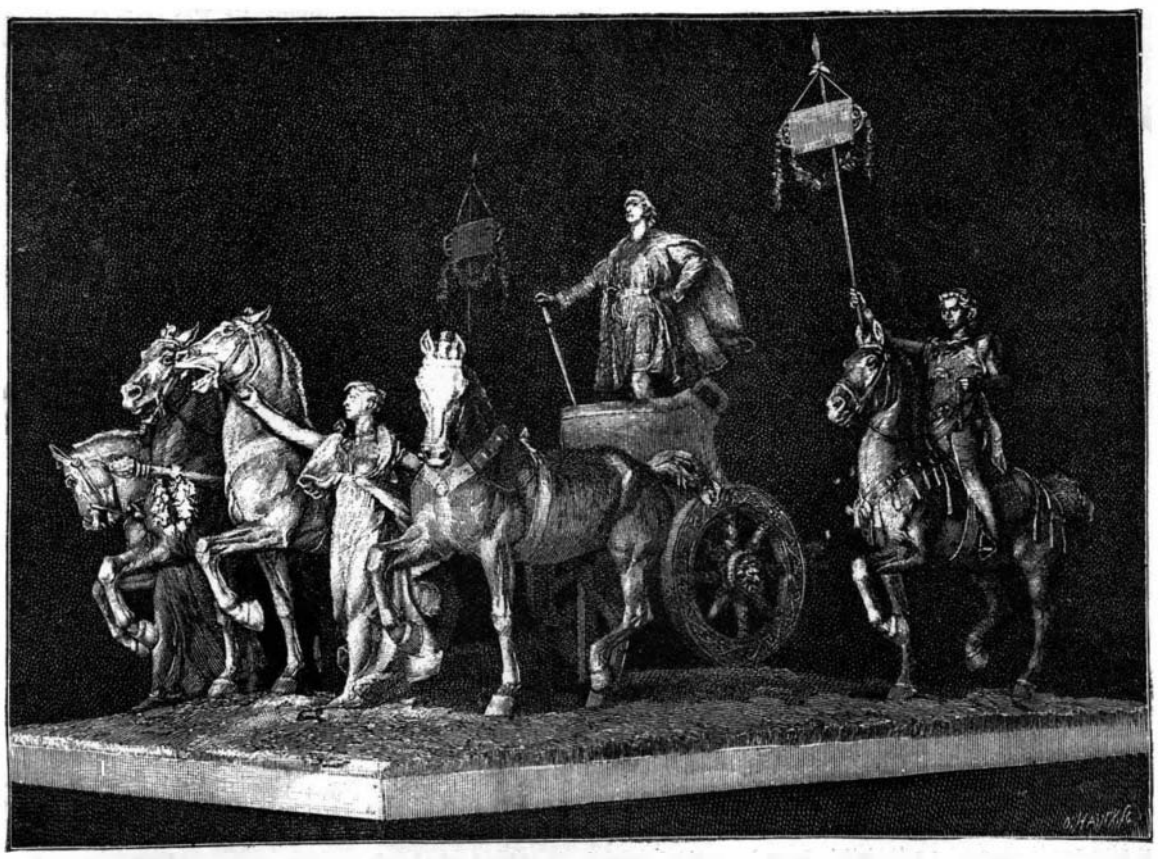
No artificial draught is required, and the circulation is designed to keep the boilers clean. The operation of the grate is as follows:

R is the feed pipe; O is where the water enters the grate from the feed; M is a valve to shut off blowing surface blow; L is a reversed check which closes when feeding, and supplies the grate with water; J and K are the connections which go through the boiler front and connect on to the bottom of the boiler; G is where the feed water comes out of the grate on its way to the boiler; E is a valve which is to be shut when blowing from the bottom; A is where the water is delivered into the boiler, through an inside pipe, nine feet in length; B, C and D is an air check which allows the air to escape from the grate when building a fresh fire; P is a blow-off from the top and bottom of boiler, including the grate. One lever shakes the front half and the other lever the back half of the grate. There are stops on these levers, allowing the fire to be shaken little or much, as desired. When starting to feed at R, the water goes up the pipe to L, the check shuts and prevents the water from going into the bottom of boiler at J, and backs down to O, and enters the grate, running through one bar and then another, coming out at G; it then passes up the pipe to A, and enters the boiler at the top under the water line, through an inside pipe which carries the water and delivers it at about the middle of the boiler. The moment feeding stops, the check, L, is opened from the pressure from boiler, and the water from bottom of boiler takes the place of the feed which is cut off. To blow the grate, open P and shut M; this gives a surface blow from the top of boiler, passing through the grate, keeping it clean of all sediment; as soon as the surface blow has been used enough, let P remain open and open M; now the blowing is at the top and bottom at the same time; the bottom one is sucking the mud from bottom of boiler; shut P, and circulation commences at once. *M and E always remain open unless blowing, as they are the two main lines of circulation from grate to boiler.*

This grate is made by the Water Circulating Grate Company No. 1028 Filbert St., Philadelphia, Pa. It has been patented in England, France, Germany, Austria, Spain, Belgium, and Italy, as well as in the United States.

Completion of the Mont Blanc Observatory.

The observatory on the top of Mont Blanc is at last completed. The work was facilitated by the use of windlasses, which drew the materials up the icy slopes. Some of the builders remained on the summit for twenty days, the August weather being very favorable. The construction of the observatory was begun over two years ago. The builders hoped to cut through the ice cap to solid rock, but this was found to be impossible, after they had gone down a distance of thirty or forty feet. So at last it was determined to let the building stand upon the ice and snow. The observatory was made in sections at Paris, under the immediate direction of Mr. Janssen. The pieces were transported to Rochers-Rouges on the backs of men, and were finally brought to the summit by the aid of windlasses. The building is thirty-eight feet high, but only one-third is above the snow. The upper story is used exclusively for observatory purposes, while the lower stories shelter attendants and parties of tourists. The observatory rests on ten heavy screws, so that the building can be easily leveled. The interior is lighted by small dormer windows with double panes of thick glass. All wood used in the construction is fireproofed, and all necessary precautions against fire have been taken. Anthracite coal will be burned. It is seldom that the cold exceeds thirty-two degrees below zero. The observatory will be occupied from May to November, and a great deal is expected from the self-registering instruments during the winter. If possible, it is intended to connect the instruments with Chamounix by electricity, but no steps toward this end have been taken yet. M. Janssen was carried to the top of Mont Blanc last year in a litter borne by thirteen porters. The new observatory will enable scientists to carry out important experiments and observations in physics, meteorology, spectrum analysis and vegetable and animal physiology.



SCULPTURE AT THE WORLD'S FAIR—STATUE OF COLUMBUS ON THE PERISTYLE.

Phosphorescent Minerals.

Mr. Jacksh, of Trieste, Moravia, as quoted by the *Popular Science Monthly*, names four sulphurets which become phosphorescent after a brief exposure to daylight—the sulphurets of calcium, strontium, barium and zinc. The last compound has been obtained in a luminous condition only recently by distillation in a vacuum. Prepared in the usual way, by precipitating soluble salts of zinc with sulphurets, it shows no signs of phosphorescence. Sulphuret of barium gives a yellowish orange glow, but only for a few minutes after each exposure to the light, and is of as little use as the sulphurets of strontium and of zinc, the greenish glow of which disappears after about two hours. For practical uses the sulphuret of calcium of commerce is the only phosphorescent of value. Pure, it gives a faint yellowish light, but treated at a red heat, with the addition of a small quantity of a salt of bismuth, it is transformed into a substance giving a violet light and retaining its luminous quality for nearly forty hours after an exposure of only a few seconds.