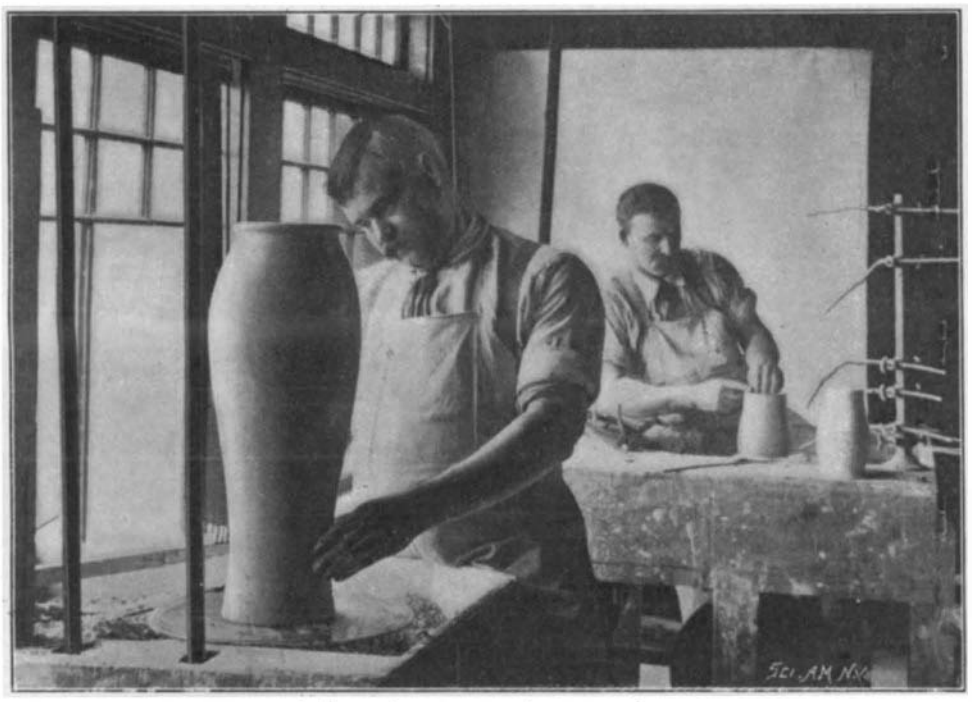
his satisfaction, to a turner, who employs a lathe operated by hand power to carefully trim off the surfaces. The casting method is employed only in the case of certain pieces, such as jars and pitchers which are of standard form, and which must be produced in considerable quantities. Even in this part of the work a method of ancient origin is utilized. The liquid clay is poured into a hollow mold and allowed to stand until the plaster has absorbed the superabundant moisture from the parts in contact. A thin shell of uniform thickness is thus formed and adheres to the mold when the more liquid portion is poured off. When the shell has remained in the mold a short time, it may be removed with safety.

After a piece of ware has been shaped by the potter, or cast in the mold, it is, while still wet, painted with the mixture known as "slip," and then follows a light firing. The pottery specimen, which at this stage is known as "biscuit," has a soft, dull surface. The ware is then subjected to successive firings, and these may radically change its appearance. The workers know that, as a result of this fiery baptism, dull blue may change to gray, and certain shades of green may emerge as pink; but there is always the chance that a wholly unanticipated transformation will take place as the result of some peculiar combination of the metals in glaze and clay effected during the firing. Following the application of the decoration, the piece is dipped in white glaze and sent to the kiln. The firing is, of course, a sort of crucial test, for a running of the colors or a defect in the glaze may play havoc with a specimen which is the potter's especial pride; moreover, there is the danger of breakage always to be considered. From the mixing of the clay to the withdrawal of the completed piece of ware from the kiln, a Rookwood specimen passes through the hands of twenty-one operatives.

The great proportion of the clays used at the Rookwood pottery are found in the Ohio Valley, notably at Buena Vista, Ohio, and Hanging Rock, Ohio, and the predominant shades are red, brown and yellow. Of late the institution has also made use of mixtures from more southerly fields, including a white or cream colored clay from Chattanooga, Tenn., and a clay from Virginia, which, when combined with artificially tinted bodies, gives the wonderful sea-green tint found in much of the Rookwood ware of more recent manufacture.

It would be an error to infer that Rookwood is limited to a warm yellow or red tone, for even dark pieces have often been relieved with deep rich greens and blues, and there has been latterly developed an important series of light arrangements in pale blue, translucent greens, and even some fiery single-color reds. In all of these, however, are found the mellow tone and brilliant glaze characteristic of the ware. The Rookwood products might be divided into three general classes: the cameo, or shell-tinted ware; the dull-finished ware, characterized by the same dainty pink shading into white, but apparently unglazed; and, finally, the richly glazed ware. The distinguishing characteristics of these respective classes are found in the tinting and the blending of colors—effects made possible by the heavy, transparent, colored glazes. Of the various bodies employed, one might be described as genuine earthenware. The principal body in use combines the properties of stoneware and semi-porcelain, a valuable quality, since the object of the artisan is to approach as near as may be to the point of perfect vitrification without endangering the underglaze colors. A piece of Rookwood "biscuit," if well fired, possesses a vitreous ring, infinitely superior to that of earthenware, and will to all intents and purposes hold water, although absorbing the liquid to some extent.

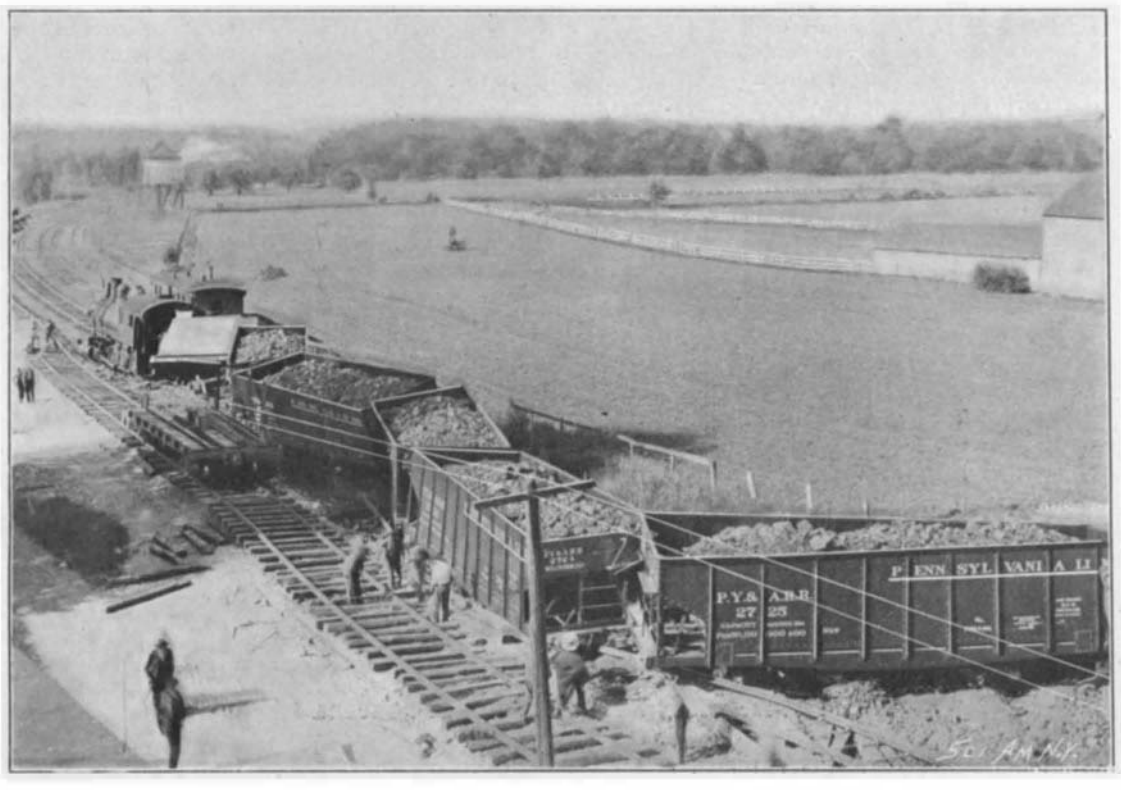
The men and women who have directed the destinies of the Rookwood institution have endeavored in every way possible to cultivate individual artistic feeling on the part of the employés. No mechanical means has been employed in the production of designs, printing patterns being barred absolutely, and no two pieces of ware are alike. All the artists of the Rookwood corps, with the exception of a Japanese, are natives of this country, and most of them have received their art education in Cincinnati. In pursuit of the policy of liberality heretofore mentioned, the conductors of the pottery have at various times sent their decorators to Europe and Japan, and the Rookwood artists are also permitted to initiate every piece of work turned out. Fully equal to the opportunities afforded the artists are those presented to the practical potters for the preparation of improved clay for the body, for beautifying the forms, and studying the glazes.



THROWING AND TURNING VASES.

AN ACCIDENT TO A TRAIN OF STEEL CARS.

We present an interesting engraving showing what a small effect a railroad accident has on a distinctively American product—the steel mineral car. The accident occurred on the Youngstown and Ashtabula branch of the Pennsylvania Railroad. Heavy shipments of coal and ore are sent over this road, and, until recently, the old-style wooden car was used on the branch, but finally heavier locomotives and pressed steel cars were provided. Although the road was ballasted to withstand the additional strain, the rails were not replaced by heavy ones, and an accident like the one shown in the engraving is not a rare occurrence. An open switch was, however, the cause of the accident in this instance. A heavily loaded train of thirty or more coal-laden steel cars was passing through the little hamlet of Austinburg, sixteen miles from Ashtabula, and was making good time in order to pass over a heavy grade just north of the village, when an open switch caused the locomotive and five of the pressed steel cars, each of 100,000 pounds carrying capacity, to leave the track. Strange to say, the cars proper were not injured, although the running gear, brake mechanism, etc., was damaged. The main track and the siding were both badly torn up, and an auxiliary track was laid to allow local traffic to pass, but the next morning a train of empty gondolas, in attempting to pass, left fourteen of its number by the wayside, as the auxiliary track was not of sufficient stability to hold them, even at low speed. The steel cars could not be moved until they had been unloaded. Out of nearly thirty thousand pressed steel cars, there has never been one which has been wrecked beyond repair.



ACCIDENT TO A TRAIN OF STEEL CARS AT AUSTINBURG, OHIO.

Recent Developments in Wireless Telegraphy.

At the recent meeting of the International Electric Congress at Paris, some interesting developments regarding wireless telegraphy were explained. In connection with the possibility of being able to communicate over great distances, M. Willot, of Paris, contended that it was impossible to telegraph satisfactorily over distances exceeding 28 miles, owing to the adverse influence offered by the curvature of the earth.

This contention, however, is disproved by the results of the experiments carried out by Marconi himself, who has been successful in transmitting messages on several occasions over far greater distances than the limit mentioned by M. Willot. Marconi is of opinion that the Hertzian waves follow smoothly round as the earth curves. For instance, the curvature of the earth between his station at Poole, in Dorsetshire, and the station at the Needles, in the Isle of Wight, a distance of about 25 miles, amounts to at least a dip of 500 feet, and yet the messages have not been influenced in the slightest degree. From this result it is apparent that the ether waves follow the curvature of the earth, otherwise the messages transmitted from Poole would travel many hundreds of feet above the station at the Needles.

Captain Tissot does not utilize the ordinary Ruhmkorff induction coil in connection with his wireless telegraphy, but avails himself of a peculiar unipolar transformer invented by M. O. Rochefort. The apparatus comprises the primary coil, but the secondary coil is a single one, that only occupies one-half of the central space. By this means the tension is greater at one pole than at the other, and it is possible to carry on the work with higher electromotive forces.

In relation to the coherers, Captain Ferrié has been conducting several experiments with carbon-metal contacts, which he has found to be more sensitive than carbon-carbon contacts. He has also found them to be preferable to wire and an electrolyte contacts, and that there is a tendency for metal-metal contacts to stick, owing to the current flowing when the apparatus is at rest. He stated that the results of his experiments had convinced him that there is a layer of dielectric between the two points, which breaks down when the difference of potential becomes too high. When the coherers are placed in petroleum they act, but not when they are placed in a vacuum. Should the particles chance to be in very close proximity to one another, then a partial vacuum between them may be produced, through which a brush discharge might pass. It is due to this fact that Captain Ferrié attributes the curious current variations that result from the placing of a lamp carbon upon a cylinder of silver, without any intervention of Hertzian waves.

Another electrician, M. Budde, has devised a method by which vessels can communicate at sea. He places his transmitter in a cylindrical parabolic mirror, which revolves, and by this means radiates the Hertzian waves successively in all directions. The aerial wires are attached to the masts of the vessels. He completely insulates the transmitter and receiver upon each vessel from one another, so that no interference of one with the other may ensue, by means of a commutator which turns synchronously with the transmitter mirror. This apparatus has only been employed over short distances, but the results have been so successful that the method should be subjected to thorough tests over great distances.

Analyses of Egyptian Gold.

M. Berthelot has recently made a series of analyses of Egyptian gold, using the samples which he obtained from M. Maspero, the eminent Egyptologist, who is now director of the Museum of Antiquities in Egypt. M. Berthelot draws some interesting conclusions from these analyses, and has presented the subject to the Academy of Sciences. In the most ancient times, native gold found in alluvial deposits was used directly; it was usually combined with a certain percentage of silver. When this amount exceeded a few hundredths, it took the name of electrum, or asem, among the Egyptians. It is at a much more recent epoch that the silver was separated from the gold and the latter obtained in a pure state. In Lydia, where the first coins were made, this epoch may be fixed by the analysis of the coins preserved in the museums. It is the epoch of Crœsus; the coins of an anterior date are alloyed with silver. The process of separating gold from silver is described by Pliny; it is the cementation by the dry way of the metal in leaves, stratified with a mixture of chloride of sodium and sulphate of iron. The silver is eliminated in the state of double chloride, while the gold remains. This process has been employed throughout antiquity and during the Middle Ages up to the beginning of the sixteenth century, at which time the mints commenced to separate the metals by the wet process, by the methods still used at the present day, and whose description is given for the first time in manuscripts of the middle of the sixteenth century. M. Berthelot found it of interest to verify these inductions by the analysis of specimens of known date, taken from Egyptian tombs. The gold leaves which surround certain mummies seem to be especially adapted for this research; and several of these were obtained from M. Maspero. Their number is, however, too limited to permit of determining exactly the date at which the gold commenced to be completely purified from silver, but the analyses are of interest, in any case. The first was made with gold leaves of the sixth dynasty. Two analyses gave:

Gold	92·3	92·2
Silver	3·2	3·9
	95·5	96·1
Organic matter, etc.	4·5	3·9

Tin, lead, copper, etc., were entirely absent. The proportion of iron is almost negligible. For the second series, gold leaves of the twelfth dynasty were used. These gave:

Gold	90·5	90 0
Silver	4·5	....
	95·0	....
Organic matter, etc.	5·0	....

There is no considerable proportion of other metals. The third analysis was made with gold leaves of the Persian epoch, which gave 99·8 parts of gold. It is observed that the only pure gold is that of the Persian epoch, but as the interval between the two last analyses represents a period of ten centuries, an intermediate series would be useful for comparison.

The New Metallic Alloy Delta—Official Tests.

The associated copper foundries of Lyons and Macon have communicated to the Society of Mineral Industry the results of traction trials undertaken, under the direction of the navy, on the metal delta, says the Moniteur Industriel. The details of its properties are interesting. It is an alloy of copper, zinc and iron. It differs much from brass, both viewed from a mechanical standpoint and with reference to resistance to corrosion.

The tests of pieces designed for the "Casabianca," the "Jemmapes," and the "Valmy" indicate, for the cast metal, a range of elasticity varying from 15 to 18 kil. per square millimeter, and a rupture limit from 35 to 40 kil. with an elongation from 25 to 48 per cent. The diameter of the eprouvettes was 13·6 millimeters; the length was not stated. Heated, the limit of elasticity is not modified materially, at least at the temperature of 215° C. At the same temperature, the rupture charge sinks to 31 to 33 kil. The elongation rises 53 per cent. For most alloys the lengthening diminishes with the temperature.

Rolling extends the limit of elasticity to 30 to 34 kil. per square millimeter, and the rupture charge in the same ratio, which, on rolled pieces, varies from 52 to 75 kil., with an elongation from 20 to 26 per cent. The metal is easily forged at the deep red. At the cherry red, it burns and crumbles under the hammer. At the black, it becomes brittle and cracks. Between these limits, it is as malleable as lead. It is well adapted to stamping, allowing the formation of interchangeable pieces, of which the mechanical qualities are equal to those of the forged metal.

For mines, it presents advantages from its resistance to acid waters. Experiments at the collieries of Bonifacius in Westphalia bore on the comparison of this alloy with iron and steel. Rolled bars of each of these metals, kept for six and a half months in acid mine water, lost respectively 45 and 46 per cent of their weight for iron and steel and only 12 per cent for the alloy. With an addition of 7 or 8 per cent of sulphuric acid in the water, the alloy does not lose sensibly of its weight in ten days. In particular, it has been employed in mines for timber fastenings and signal cables. The wheels of steam rotary pumps, corroded rapidly by acid waters, have been advantageously replaced with the metal delta.

SIX NATIONS VILLAGE AT THE PAN-AMERICAN EXPOSITION.

BY EDWARD HALE BRUSH.

Indians of the Six Nations' league are now at work upon the grounds of the Pan-American Exposition,

PAN-AMERICAN EXPOSITION—A SENECA CHIEF.

making the bark houses in which they are to live during the Exposition.

It is the purpose of this exhibit to turn back the pages of history several hundred years and show the Indians who then inhabited New York State and the customs they followed. Corn will be ground in stone mortars four hundred to five hundred years old, and bread will be made in the crude way then practised by the Six Nations. For the time being the Indians will discard what civilization has brought them, and live as their ancestors lived, ready for the battle or the chase. The Six Nations Indian exhibit will be of especial value to students, as interpreters will be provided, so that they may talk with the Indians themselves, and ask such questions as they desire concerning the utility of articles on exhibition, or concerning Indian customs.

It is even now possible to see within thirty miles of the Pan-American grounds in Buffalo the ancient customs, dances and other ceremonies of the Iroquois practised much as they were three hundred years ago.

The dances are a strange admixture of the customs

PAN-AMERICAN EXPOSITION—GHOST DANCERS.

of the red man and the customs of the white man. The snake dance, for instance, is performed by red men who wear outing shirts in fast colors of the latest style, golf stockings and russet shoes, and by the Indian squaws who wear the bonnets of a Buffalo milliner.

In some of the dances the leading participants ordinarily dressed in many respects like their ancestors. In the "Feather Dance," Chief Maurice Green, a Seneca, recently wore a buckskin suit with a headdress of horns and feathers. But next to him danced a brave who wore a gauze shirt, which might have been purchased at a Buffalo department store, as a covering for the upper part of his body, knee breeches and long stockings, with bells at the knees, and a figured apron somewhat like that of a Mason. Most of the costumes were more or less fantastic, some typically Indian, others such as may be seen at an American masquerade ball.

The music to which the Indians dance is furnished by rattles formed of turtle shells filled with small stones and grains of corn. With these the Indian musicians beat upon the benches where they sit, and accompany the noise of the rattles by a wild monotone or sing song. It seems to be a point of honor, or an expression of loyalty to tribal custom and religion, for the pagan Indian to take part in these dances, and the aged chief, the gray-haired squaw, and the young mother with an infant in her arms join with the young buck and the Indian maiden in performing them. The pagan Indians predominate on this reservation, and it is the pagan Indians alone who preserve these customs, for it would be regarded as an evidence of backsliding from his faith for a Christian Indian to take any part in them.

At the Six Nations village on the Pan-American grounds next summer the dances and other ceremonies will be produced without the modern innovations.

Four mounds are being constructed on the grounds of the Exposition, near the Six Nations village, to represent the works of the ancient mound builders of North America. One mound will represent the mastodon in Wisconsin; another that designed to portray the serpent swallowing an egg; another the spread eagle mound, and still another, the burial mound. Usually these mounds were in form typical of some animal or object in nature. The burial mound, now completed, shows the burial pit and the cremation chamber and relics in them such as are generally found.

The Carthage of To-day.

A railway now runs to Carthage from Tunis. The summer palace of the Bey may be visited, but superficially. A walk through the courtyards is allowed, surrounded by thickly latticed windows, but one may not stand still within the precincts. Not on the direct road to Carthage, but easily reached during the same drive, is the museum at Bardo, opened in 1888 in the old harem adjoining the Bey's public palace, and full of most interesting results of recent North African excavating. Catalogues can hardly keep pace with discovery and additions, so that of many beautiful things a verbal description by the intelligent attendant comprises all available information. Especially rich in mosaics, the museum contains room after room filled with fine examples of wall and floor decoration, those found in Suza (Hadrumetum) being generally in a better state of preservation than the Carthage remains. The ancient inhabitants would seem to have pleased themselves by reproducing with their bits of colored stone many familiar scenes; and so "fishing," with men and boats and nets, a seashore banquet, quite elaborately worked out, the "chase," with dogs, hunters and flying game, appear. In 1897 a very large pavement design was discovered near Zajhrun, representing the signs of the zodiac in a circle, surrounded by the seven days of the week. In addition to the earlier mosaics, there are many exhibiting Christian designs. But mosaics by no means comprise the chief wealth of the museum. Hundreds of Punic lamps of earthenware are gathered, simple but showing graceful forms and decoration, weird masks with ingenious varieties of contortion in the features, tear vials and water jars, and fine bits of sculpture. Three statues have been recently excavated together at Carthage, perhaps the most beautiful at Bardo. The central figure in this exquisite group is thought to be a Ceres, and is more perfect than the others. A few fine relics in gold and silver are shown, and altogether the Musée Alaoui would be an enthralling spot for months of study.

Blacking Mites.

Frouessart relates in Soc. Biologique the discovery of an acarus inhabiting blacking. On opening an ordinary tin box, simply fastened by a band of paper pasted around the edge, the appearance of the contents was curious; and instead of the ordinary paste which we generally obtain in blacking, there was a friable mass resembling charcoal, on which was pasturing an innumerable host of whitish acari, grouped together like a flock of sheep.

Blacking paste is usually composed of molasses heated to 212°, of vegetable oil, superphosphate, gypsum, and carbon, the last three being the result of the action of vitriol on bone ash. Further, the mass may be sterilized with sublimate 1 to 20,000. The mixture contains at least three substances on which the acarus (Tyroglyphus siro) might feed—molasses, oil, and phosphate of lime. Experience has shown also that the proportion of mercuric salt is quite insufficient to prevent acari, or even molds.