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NEW YORK, SATURDAY, MAY 9, 1891.

Contents.

(Illustrated articles are marked with an asterisk.)

TABLE OF CONTENTS OF

SCIENTIFIC AMERICAN SUPPLEMENT

No. 801.

For the Week Ending May 9, 1891.

Price 10 cents. For sale by all newsdealers.

OUR URBAN POPULATION.

Mr. Robert P. Porter, Superintendent of the Census, has lately issued a bulletin relating to urban population, prepared under the direction of Mr. William C. Hunt.

In the published records of former censuses, urban population has been defined as that element living in cities, or other closely aggregated bodies of population, containing 8,000 inhabitants or more. This definition of the urban element, although a somewhat arbitrary one, is used in the present discussion of the results of the Eleventh Census in order that they may be compared directly with those of earlier censuses. The proportion of urban population has increased gradually during the past century from 3·35 up to 29·12 per cent, or from one-thirtieth up to nearly one-third of the total population. The increase has been quite regular from the beginning up to 1880, while from 1880 to 1890 it has made a leap from 22·57 up to 29·12 per cent, thus illustrating in a forcible manner the accelerated tendency of our population toward urban life. The number of cities having a population of more than 8,000 increased from six in 1790 to 286 in 1880, whence it has leaped to 443 in 1890.

In 1880 there was but one city, New York, which had a population in excess of a million. In 1890 there were three, New York, Chicago, and Philadelphia.

In 1870 there were but fourteen cities containing more than 100,000 inhabitants. In 1880 this number had increased to twenty, and in 1890 to twenty-eight.

The rate of growth of some of the cities is surprising. From the 443 cities having over 8,000, we select those that have increased by more than 75 per cent, and they number more than 100. It will be seen that Spokane Falls "takes the cake."

	1890.	1880.	Increase per cent.
Alameda, Cal	11,165	5,708	95·60
Alpena, Mich	11,283	6,153	83·37
Amesbury, Mass	9,798	3,355	192·04
Amsterdam, N. Y	17,336	9,466	83·14
Anderson, Ind	10,741	4,126	160·32
Anniston, Ala	9,876	942	948·41
Arkansas City, Kans	8,347	1,012	724 80
Asheville, N. C	10,235	2,616	291·25
Ashland, Wis	9,956		
Ashtabula, Ohio	8,338	4,445	87·58
Atlanta, Ga	65,533	37,409	75·18
Atlantic City, N. J	13,055	5,477	138·36
Battle Creek, Mich	13,197	7,063	86·85
Bayonne, N. J	19,033	9,372	103·08
Beatrice, Neb	13,836	2,447	465·43
Beaver Falls, Pa	9,735	5,104	90·73
Binghamton, N. Y	35,005	17,317	102·14
Birmingham, Ala	26,178	3,086	748·28
Bridgeport, Conn	48,866	27,643	76·78
Brockton, Mass	27,294	13,608	100·57
Brunswick, Ga	8,459	2,891	192·60
Butler, Pa	8,734	3,163	176·13
Butte, Mont	10,723	3,363	218·85
Canton, Ohio	26,189	12,258	113·65
Cedar Rapids, Iowa	18,020	10,104	78·35
Chattanooga, Tenn	29,100	12,892	125·72
Chicago, Ill	1,099,850	503,185	118·58
Chippewa Falls, Wis	8,670	3,982	117·73
Cheyenne, Wyo	11,690	3,456	238·25
Colorado Springs, Colo	11,140	4,226	163·61
Corning, N. Y	8,550	4,802	78·05
Dallas, Tex	38,067	10,358	267·51
Decatur, Ill	16,841	9,547	76·40
Denison, Tex	10,958	3,975	175·67
Denver, Colo	106,713	35,629	199·51
Des Moines, Iowa	50,093	22,408	123·55
Detroit, Mich	205,876	116,340	76·96
Duluth, Minn	33,115	3,483	850·76
East Liverpool, Ohio	10,956	5,568	96·77
East Portland, Ore	10,532	2,934	258·96
Elgin, Ill	17,823	8,787	102·83
El Paso, Tex	10,338	736	1,304·62
Evansville, Ind	50,756	29,280	73·35
Everett, Mass	11,068	4,159	166·12
Findlay, Ohio	18,553	4,633	300·45
Fitchburg, Mass	22,037	12,429	77·30
Fort Scott, Kans	11,946	5,372	122·38
Fort Smith, Ark	11,311	3,099	264·99
Fort Worth, Tex	23,076	6,663	246·33
Fresno, Cal	10,818	1,112	872·84
Gloversville, N. Y.	13,864	7,133	94·36
Grand Rapids, Mich	60,278	32,016	88·27
Hastings, Neb	13,584	2,817	382·22
Hazelton, Pa	11,872	6,935	71·19
Helena, Mont	13,834	3,624	281·73
Hot Springs, Ark	8,086	3,554	127·52
Huntington, W. Va	10,108	3,174	218·46
Hutchinson, Kans	8,682	1,540	463·77
Iron Mountain, Mich	8,599	....	....
Ishpeming, Mich	11,197	6,039	85·41
Jackson, Tenn	10,039	5,377	86·70
Jacksonville, Fla	17,201	7,650	124·85
Johnstown, Pa	21,805	8,380	160·20
Joliet, Ill	23,264	11,657	99·57
Kansas City, Kans	38,316	3,200	1,097·38
Kansas City, Mo	132,716	55,785	137·91
Kearney, Neb	8,074	1,782	353·09
Key West, Fla	18,080	9,890	82·81
Knoxville, Tenn	22,535	9,693	132·49
Kokomo, Ind	8,261	4,042	104·38
La Crosse, Wis	25,090	14,505	72·97
Laredo, Tex	11,319	3,521	221·47
Lima, Ohio	15,987	7,567	111·27
Lincoln, Neb	55,154	13,003	324·16
Little Rock, Ark	25,874	13,138	96·94
Long Island City, N. Y	30,506	17,129	78·10
Los Angeles, Cal	50,395	11,183	350·64
McKeesport, Pa	20,741	8,212	152·57
Macon, Ga	22,746	12,749	78·41
Malden, Mass	23,031	12,017	91·65
Manistee, Mich	12,812	6,930	84·88
Marinette, Wis	11,523	2,750	319·02
Marion, Ind	8,769	3,182	175·58
Marion, Ohio	8,327	3,899	113·57
Marquette, Mich	9 093	4,690	93·88
Melrose, Mass	8,519	4,560	86·82
Memphis, Tenn	64,495	33,592	92·00
Menominee, Mich	10,630	3,288	223·30
Meridian, Miss	10,624	4,008	165·07
Milwaukee, Wis	204,468	115,587	76·90
Minneapolis, Minn	164,738	46,887	251·35
Mount Carmel, Pa	8,251	2,378	247·10
Mount Vernon, N. Y	10,677	4,586	132·82
Muncie, Ind	11,345	5,219	117·38
Muskegon, Mich	22,702	11,262	101·58
Nanticoke, Pa	10,044	3,884	158·60
Nashville, Tenn	76,168	43,350	75·70
Nebraska City, Neb	11,494	4,183	174·78
Ogden, Utah	14,889	6,069	145·33
Omaha, Neb	140,452	30,518	360 23
Paris, Texas	8,254	3,980	107·39
Passaic, N. J	13,028	6,532	99·45
Perth Amboy, N. J	9,512	4,808	97·84
Pine Bluff, Ark	9,952	3,203	210·71
Plattsmouth, Neb	8,392	4,175	101·01
Portland, Ore	46,385	17,577	163·90
Pottstown, Pa	13,285	5,305	150·42
Pueblo, Colo	24,558	3,217	663·38
Rockford, Ill	23,584	13,129	79·63
St. Paul, Minn	133,156	41,473	221·07
Salt Lake City, Utah	44,843	20,768	115·92
San Antonio, Tex	37,673	20,550	83·32
San Diego, Cal	16,159	2,637	512·78
Seattle, Wash	42,837	3,533	1,112·48
Shamokin, Pa	14,403	8,184	75·99
Sheboygan, Wis	16,359	7,314	123·67
Sioux City, Iowa	37,806	7,366	413·25
Sioux Falls, South Dakota	10,177	2,164	370·29
South Bethlehem, Pa	10,302	4,925	109·18
Spokane Falls, Wash	19,922	350	5,592 00
Springfield, Mo	21,850	6,522	235·02
Steelton, Pa	9,250	2,447	278·01
Streator, Ill	11,414	5,157	121·33
Tacoma, Wash	36,006	1,098	3,179·23
Topeka, Kans	31,007	15,452	100 67
Trenton, N. J	57,458	29,910	92·10
Union, N. J	10,643	5,849	81·96
Waco, Texas	14,445	7,295	98·01
Wausau, Wis	9,253	4,277	116·34
West Bay City, Mich	12,981	6,397	102·92
Wichita, Kans	23,853	4,911	385·71
Winona, Minn	18,208	10,208	78·37
Winston, N. C.	8,018	2,854	180·94
Youngstown, Ohio	33,220	15,435	115·23

EXPERIMENTS FOR THE ARTIFICIAL PRODUCTION OF RAIN.

Among the government appropriations is $9,000 to be expended in making experiments on the artificial production of rain. We learn that the first experiment will be made in Western Kansas next June under the direction of Col. Dyrenfurth, of Washington.

Balloons filled with hydrogen and oxygen gas will be sent up and exploded by a steel wire attached to the balloons and connected with an electrical apparatus on the ground. Senator Farwell favors this idea because the concussion will be greater, and the greater the concussion, the more copious will be the fall. The balloons will also be aided in their work by the explosion of dynamite on the ground.

Drought is the curse of the Western farmer. In the State of Kansas, the western part especially, the eastern part of Colorado, the Southwest Territories, Texas, the two Dakotas, Nebraska, Minnesota, and, indeed, in nearly all the country west of the Mississippi River the dry seasons are frequent and dangerous to the welfare of the crops. The removal of this great bugbear of the farmer would be a boon that is beyond expression in words.

Those who are interested in the matter will find in the SCIENTIFIC AMERICAN of December 20, 1890, accounts of various examples of rain supposed to have been artificially produced.

PHOTO-ENGRAVINGS FOR NEWSPAPERS.

At the recent annual meeting of the Camera Club, London, Mr. H. Sutton read a paper about a new method of producing photo-blocks for newspaper work. He said the process was the result of the labor of years. He had been working at the problem since 1881, and only on the previous Monday had he obtained results sufficiently advanced to be worth bringing before the Camera Club. He had effected the direct conversion of photographs into blocks without intermediate conversion into fatty ink or bitumen images, followed by skilled etching to get type-high blocks. A process of this kind ought to give great impetus to the graphic arts. He simply electrotyped a relief image produced in the gelatine bromide film of an ordinary negative; the electrotype is then at once passed on to the printer. A gelatine bromide negative is developed with alkaline pyrogallol or quinol, then fixed in strong hyposulphite of soda, and washed with care, so that it shall not absorb too much water. If it be now placed horizontally on a metal plate, and gradually heated to 212° Fah. by the flame of a Bunsen's burner, the shadows of the image will be seen to run all over the plate. If, however, before development the negative had also been impressed under a crossed-line screen, so that the line screen and the picture would develop together, each little dot of the screen image would hold a certain amount of reduced silver, bearing some definite proportion to the action of light and development, and be surrounded by a fine line containing no silver where the opacity of the screen had prevented action. The reduced silver produces a certain amount of insolubility of the gelatine with which it is in contact, and the adjacent soluble gelatine, when heated as already described, runs beneath the insoluble gelatine by capillary action, thus producing dots and an image in relief. This capillary action is proportional in some way to the amount of reduced silver, and during the heating the two effects of relief and graduation are produced at the same time. The electrotype is taken direct from the glass negative in relief.

A New Departure in Jet Propulsion.

To the Editor of the Scientific American:

I have been an experimenter with water jet propulsion for the past few years, and the conclusion I have ultimately arrived at is that the jet is sure to drive screw and paddle wheel out of the market.

It has been the general opinion that the loss from the jet was caused by friction in the pipes. This may be true to a certain extent with outlets of such small dimensions as Dr. Walter M. Jackson has adopted, and who, in my opinion, has gone to extremes both as regards size of jet and velocity of discharge.

I have discovered that the real loss in all jet propellers has been that, as the direction of the jet has been always in a straight line in an opposite direction to the vessel's way, the jet cannot find a fulcrum close to the discharge to act against except the peripheral part of said jet. Such a jet, as the vessel is moving onward, will always discharge its water against water having already acquired a great velocity in the same direction, and will meet with very little resistance, and the greater the velocity of such a jet, the greater will be the slip.

I have been in Europe for the past four years, and have come in contact with almost all the eminent engineers and naval architects, and have closely followed the trials of the jet lifeboat Duke of Northumberland.

A little over a year ago the idea suddenly occurred to me to use two or more jets, the nozzles pointing in an opposite direction to the vessel's way, and to make such jets revolve around a common axis in circular paths like the tips of a screw propeller. The object was not to allow the jet time to give the velocity to the water acted upon, and so to find a solid fulcrum for the entire area of the jet close to the discharge.

I gradually perfected my apparatus and made some trials, which not only proved the theory entirely correct, but also showed that this mode of propulsion was far more efficient, more economical, and safer than any other known mode.

I am well aware of the fact that in order to bring it to that state of perfection necessary to give it a commercial value, many a trial will have to be made yet, but I am fully satisfied that the invention will do what I claim for it.

Any existing screw vessel can be altered without any alteration to the hull whatever, no matter whether single or twin screw vessel.

My invention is fully protected ; this, however, is the first communication I have made to a scientific paper.

Yours, very respectfully,
ALEXANDER VOGELSANG.

Brooklyn, New York, April 25, 1891.

THE SCREW PROPELLER.

The screw propeller, so called from the configuration of its blade surfaces, does really not exercise the functions of a screw, but is an immersed waterwheel with angular floats or vanes of varying obliquity.

The slip of the screw propeller should not be calculated from the pitch of its blade angles, but from the mean velocity of rotation. The velocity of rotation is the real velocity imparted to the water in an opposite direction to the vessel's way. A screw, however, when in rotation and moving onward, constantly acts upon new bodies of water, and the suddenness with which the accelerated water comes in contact with undisturbed water will not permit it to maintain the imparted velocity any great distance.

Blades of great width at the periphery will keep up the acceleration of water for a longer period than narrow ones, hence the latter being more efficient. The pitches of the blades should be such that they can easily follow up the speed imparted by the velocity of rotation ; if made too fine, the speed of the vessel will become greater than the pitch, and what has heretofore been termed "negative slip" will be the result. The speed of the vessel will also be materially reduced, as the backs of the blades press against the water toward which they are advancing. The pitch also regulates the quantity of water acted upon, as well as the direction of the water imparted ; but it is wrong to say that a coarse pitch accelerates the water more than a fine pitch. Rather the contrary might often be the case.

The value of an increasing pitch blade is not to be found in the gradual acceleration of the water, but in the gradual increase of the volume of water acted upon. Such parts of the blade surface where the rotary speed is less than the speed of the vessel will have no propulsive effect whatever. When a screw is set in rotation with the vessel moored to the wharf or dock, every particle of blade surface will come into full action, and the engines will not be able to attain the same number of revolutions as with the vessel in motion. The less the resistance from currents, head winds, and sea a vessel encounters, the smaller the effective propelling blade area becomes, and the less will be the power required for a given number of revolutions.

ALEXANDER VOGELSANG.

Natural Gas in Kentucky.

BY H. C. HOVEY.

In Meade County, Kentucky, near the town of Brandenburg, and located about 25 miles southwest of the city of Louisville, is a limited area of subterranean gas, differing remarkably from all other known fields. Extra-limital borings prove the area to be only about seven miles long and five miles wide. Geologically it is unique. While the Ohio and Indiana gas belt is wholly in the Trenton formation, that of Kentucky lies in the black Devonian shales, from which coal oil was distilled before the discovery of oil wells. The shales are overlaid by heavy limestones. There are three terraces between the Kentucky hills and the Ohio River. The lower terrace begins at the top of the Keokuk subcarboniferous limestone, where the depth of gas wells is 400 feet. On the upper terrace they cut through 156 feet of the Saint Louis limestone. The dip is from northeast to southwest, and about 20 feet to the mile. The depth of the wells varies accordingly. The shale is peculiarly compact, and almost as solid as cannel coal, being slatelike in appearance. It is highly fossiliferous, being full of the remains of algæ and marine shells, among which were noticed in great abundance the *Leptæna sericea* and the *Discina nitida*.

About thirty years ago parties bored here for oil; but obtaining merely gas and salt water, they closed the wells. Five years later Mr. Moorman opened one of these wells and operated it for the manufacture of salt; and the flow of both gas and water continues to this day in undiminished quantity. Other wells in the region have also been worked successfully for salt—a matter not now treated. The fact is that the entire shale is heavily charged with gas; but the trouble, in many places, is in a poor delivery. The gas seems to be available only where the texture of the shale is more openly stratified at the joints, thus allowing an escape. Although the rock is everywhere highly bituminous, no free oil is found except in very small quantities, barely enough to give the water an oily odor, and occasionally to tinge its surface with prismatic colors from the thin oily films.

As already remarked, the gas and salt water come out together, and the problem has been to separate them. The method by which this is accomplished is original and well worth describing. A 2 inch tube is run down in a working barrel, joined to a perforated anchor let into a pocket from 60 to 80 feet below the gas vein. This perforated tubing rests on the bottom. The water is pumped up through the central tube by means of suction rods, while the gas is delivered with unimpaired pressure between the tubing and the casing of the well. Six wells are grouped to an engine, centrally located as to the set operated, and connected with all of them by jointed surface rods, making a "spider." It takes only 25 pounds of steam pressure to keep the pumps going, unless a well happens to be "drowned," when more pressure must be put on temporarily. The engine in use is only 12 h. p., with a 15 h. p. boiler.

Thus far forty wells have been drilled in by different companies. It is found safe to drill wells within 300 feet of each other. The largest well put out in 24 hours 2,000,000 feet of gas. Three wells drilled within 600 feet did not interfere in the least with the flow of this first one. The original rock pressure is 94 pounds, and the working pressure about 45 pounds. The gas is brought to Louisville by an 8 inch line of pipes, and, as I was informed by Major Wm. J. Davis (connected with the State survey, and who has kindly verified my statements in this communication), the flow is characterized by extraordinary persistency; in this respect resembling the gas of Fredonia, N. Y. The company, as Major Davis tells me, are now supplying 700 customers in private residences, and are actually selling a million and a half cubic feet daily ; being the product of eight wells averaging daily at the wells about 350,000 cubic feet, and piped 35 miles. Every well is said to be equally productive. By using air compressors the supply delivered in Louisville is increased about 50 per cent; and when the number of 8 inch mains is increased to four, as is contemplated, the sales will daily reach about 12,000,000 cubic feet.

The Kentucky Rock Gas Company now controls this gas territory, and has the exclusive rights for supplying Louisville, where it sells the gas delivered at 25 cents per thousand, both for fuel and illumination.

THE cost of a high-class eight-wheel passenger locomotive is about $8,500.

Practicability of the Flying Machine.

The annual meeting of the National Academy of Sciences began at Washington on the 21st of April in the National Museum. A number of interesting scientific papers were read. That of Professor S. P. Langley, of the Smithsonian Institution, on "Flying Machines," attracted the greatest attetion. Professor Langley gave the results of a series of experiments he began about five years ago to ascertain the possibilities of aerial navigation. He said that he set up on the grounds of the Allegheny Observatory a whirling machine with a diameter of sixty feet, and driven by a steam engine of ten or twelve horse power. He first sought to ascertain whether or not it required more power to move laterally than to stand still in the air. For this purpose he had suspended a flat brass plate from the arm of the whirling machine by a spring. When the machine was put in motion and the plate encountered an artificial wind going forty miles an hour, the spring instead of elongating actually shortened, showing that the weight or power required to suspend the plate was less when in motion than when it was standing still. His next series of experiments, Professor Langley said, demonstrated that it took a second or two more for a brass plane to fall four feet while in motion than when it was dropped from the hand without motion, the plane when in motion laterally sinking slowly as if the air had become dense like cream. From his experiments he reached the conclusion that the amount of power required for artificial flight was perfectly attainable by steam engines we now possess. To him the amazing thing demonstrated by the experiments was that the faster you go the less it costs in power, and that a one-horse power will transmit a much heavier weight at a rapid speed than at a slow one.

In summing up Professor Langley said that he did not say that man could traverse the air, but under certain conditions and with our existing means, so far as the power is concerned, the thing was possible. The difficulties would be in getting started, in coming down to the ground again, and in guiding one's self through the air. Nature had supplied an instructive intelligence in a bird to balance and guide itself. He did not question that man would ultimately acquire it. He thought all aerial navigation would pass out of the sphere of charlatanism and into the hands of engineers in a short time, possibly months instead of years. He believed we would see something notable come from it.

Other papers were read by A. S. Packard on "Further Studies on the Brain of Limulus Polyphemus;" by F. H. Bigelow on "The Solar Corona;" by Dr. Washington Matthews on "A Report on the Human Bones of the Hemingway Collection in the United States Army Medical Museum;" by A. A. Michelson on "Application of Interference Methods to Spectroscopic Measurements;" and by H. S. Pritchett on "The Corona from Photographs of the Eclipse of January 1, 1889."

The Watson gold medal, awarded for astronomical work, was conferred on Dr. Arthur Anwers, of Oberlin.

Making and Tempering Spiral Springs.

When the steel spiral spring of an instrument gets broken, it is much more satisfactory to make one than to send the instrument off, and be without it for a week or more.

To make them use the best spring steel wire; select a smooth iron rod the size of the spring to be made; carefully draw the temper from the wire; fasten the rod and one end of the wire in a bench vise. Now wind the wire evenly and closely around the rod, until you get the length of the wire required for the spring. Take the rod out of the vise; fasten one end of the spring to the rod; taking hold of the other end, draw it along the rod until the spirals are the correct distance apart. To give the amount of spring wanted, fasten it firmly to the rod, then make the spring and rod red hot, and quickly plunge them into cold water. After drying, rub them all over carefully with oil, and move them about in the flame of a lamp until the oil takes fire, which will give the spring the proper temper. I know there are some who make springs direct from tempered wire; but they are much more durable if shaped and *then* tempered.—*Dr. Wm. H. Steele, in Items of Interest.*

Photoelectricity.

Prof. G. M. Minchin, at a meeting of the Physical Society, January 16, read a paper on the electromotive force developed by light falling on sensitive plates which were immersed in suitable liquids. The blue end of the spectrum was found to be the most effective. Currents have a photographic effect on the plates, and this action is strictly confined to the parts through which the current has passed. Comparatively strong currents were obtained from plates coated with eosine and gelatine. A Hertz oscillator restored the sensitive state in a cell placed at a distance of 81 feet. An arrangement of 50 cells in series with an electrometer was exhibited, by means of which light falling on the cells could generate sufficient e. m. f. to ring a bell or light an electric lamp.—*Nature.*

A Contrast in Inventions.

That we are the most inventive people in the world, says the New York *Tribune*, is a well known fact. Indeed, the idea has peen put forward (in this country) that we are the most remarkable people on the face of the earth in all respects, and this is probably so, the very fact that other nations do not always recognize it being of itself sufficient to show their great inferiority. But it is not to the purpose to enlarge on this in the present instance, our aim being simply to describe a certain small but wonderful invention just reported from the State of Minnesota. It is interesting to note in passing the marked difference in the character of the inventions in Iowa and Minnesota. Lying close together as the two States do, we would expect, the writer adds, to find their inventive talent running in generally parallel lines, but such is not the case. The inventive genius of Iowa seems to be turned almost wholly to apparatus to circumvent the liquor prohibition law. Thus we have the Dissolving Liquor Store and the Flying Dutchman Saloon, already mentioned in the *Tribune's* columns, the walking stick which holds a pint, the pocket bible which holds a quart, the amateur camera which holds a quart and a half, the opera glass which holds two drinks, and the raised and glorified silk hat which holds two quarts, a pair of glasses, a silver spoon, a lemon, a quarter of a pound of sugar, and a dozen cloves. In Minnesota, where no prohibitory law exists, we find invention turned to the arts of peace, and scarcely a day passes that the household, the office, or the factory is not enriched by a new idea of some bright Minnesota man. We gather the particulars of the latest invention in that quarter from the columns of the *Republican*, an enterprising weekly published at Lake City.

The new article in question is the Ne Plus Ultra Rocking Chair, the invention of Mr. A. R. Watson, and is now on exhibition at Crane Brothers' mammoth jewelry store. Mr. Watson's idea is that the rocking chair should stand for comfort; but the ordinary rocking chair, though surpassing every other invention of man for its comfortable features, does not embody everything in that line. It has been Mr. Watson's pleasant privilege to supply some of these missing adjuncts. Chief of these is the temperature regulator. Underneath the chair is a small bellows. This is operated by the rocking of the chair, and is connected with a brass tube which extends up the back of the chair and slightly above it, where it curves down and ends directly over the occupant's head. When sitting in this chair and rocking, a gentle but invigorating breeze is diffused over the entire person from the tube. It is especially agreeable to bald-headed men, and an air shower bath of this nature must be very pleasant for any one on a warm day. But the ingenious Mr. Watson is determined that his chair shall have all seasons for its own, and next fall he will add an attachment under the bellows consisting of a kerosene or gas heater, which will so warm the current of air that the fortunate owner of one of these chairs will find it as useful in winter as in summer. A little scent bag concealed in the bellows perfumes the air delightfully, whether it is hot or cold. The air current in the summer will be found excellent for discouraging the attentions of flies and mosquitoes, and that the bald-headed man may take his afternoon nap in it undisturbed, Mr. Watson has concealed a spring and the necessary mechanism under the bellows, so that it may be wound up like a clock and run two hours, rocking the chair, and, of course, working the bellows. A music box in the back, which plays the national airs, completes the improvements to date, though so long as Mr. Watson is spared his mental faculties, no man can tell when others may follow.

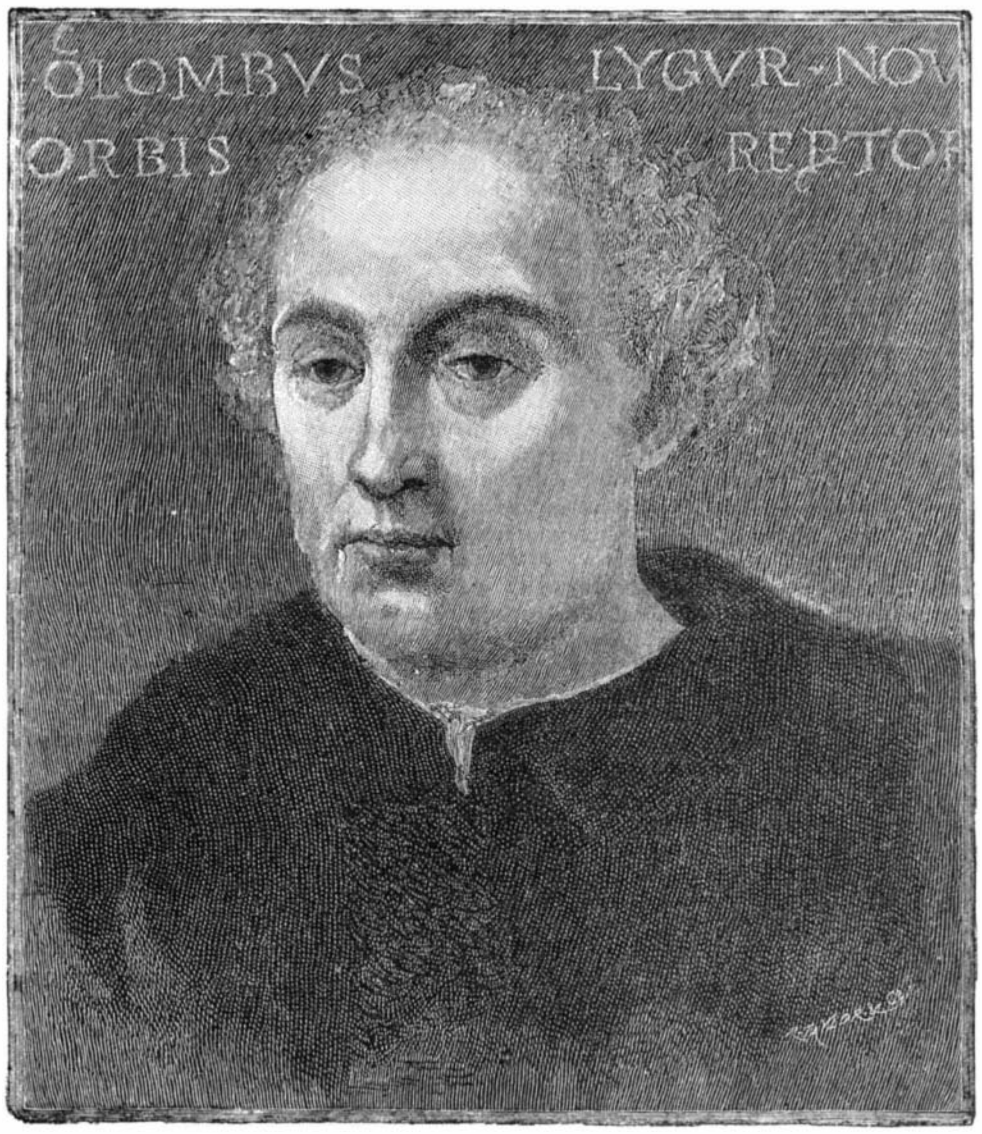
As we said, the contrast between the inventions of the two neighboring States of Iowa and Minnesota is truly striking. But how much more will those of Minnesota do for the cause of civilization? For instance, how much greater will be the influence for good of the Watson hot and cold air rocking chair than will be that of a hymn book which holds a quart—or even two quarts!

Copper Colorations of Vegetables.

At a meeting of the Paris Society of Pharmacy, December 3, 1890, a paper by M. Mestre was discussed, in which the author claimed that the copper colorations existing naturally or artificially in vegetables are perfectly harmless. He said that there was often less copper in colored conserves than in many unsuspected aliments, and the copper was found only in conditions of difficult solubility. In colored peas the average proportion of copper present was 7 cgm. to ½ kilogramme, but he had found as much as 21 cgm. The average quantity in beans was 56 mgm., the maximum quantity was 99 mgm. Bread, he stated, contains an average of 5 mgm. of copper per kilogramme, and wheat 5 to 10 mgm. Preparations of pork contained 51 mgm., and those of geese 35 cgm. Chocolate contained 36 mgm. The conclusions of the author were that people might use and abuse the privilege of employing colored vegetables without feeling toxic effects from the copper contained in them.

AN ORIGINAL PORTRAIT OF COLUMBUS.

The old portrait of Christopher Columbus recently discovered at Como derives its value not only from the scarcity of authentic likenesses of the great navigator,



PORTRAIT OF COLUMBUS BY SEBASTIAN DEL PIOMBO RECENTLY DISCOVERED AT COMO.

but from its art history, as it was painted by Sebastian del Piombo.* It was formerly regarded as an heirloom in the family, now extinct, of the Giovios, and was in the possession of the writer Paul Giovio, who refers to it in his works, and had it engraved. On the failure of the male branch of the Giovio family, the portrait passed, two generations ago, to the De Orchi family, and is now in the possession of Dr. De Orchi, of Como.—*Illustrated London News.*

* Sebastiano del Piombo was born in Venice in 1485, and died at Rome in 1547. He was especially celebrated as a portrait painter, his likeness of Andrew Doria, in the Doria Palace, at Rome, being one of his best known works. He also acquired fame as a painter of the portraits of the Colonnas and of Popes Adrian V., Clement VII., and Paul III.

The Ship Railways of the Future.

In a paper lately read by John F. O'Rourke on the Chignecto ship railway, before the American Society of Civil Engineers, the author said:

"This will be the first application of rails to navigation, and Canada has secured the honor by guaranteeing for twenty years an annual sum equal to one two-thousandth the yearly receipts of the New York Custom House. As when built it will, most likely, be self-supporting, Canada may be said to have purchased the honor with a little accommodation.

"If ship railways will do all that is claimed for them, and it is morally certain that they will, a new era is about to open in transportation. A ship is not a fish, though that seems almost asserted in the stress that is laid on the popular statement that water is its natural element, and usage makes it difficult to think of a ship apart from water. It is lost sight of that a ship is a land-built structure of the strongest and stiffest design, fitted to withstand the tossing and buffeting of the highest seas and the wildest storms. Now pounded and overswept by a colliding wave, and the next moment bare of water almost to the keel, while all the time, perhaps, the rocking and plunging and the mighty wind is tearing the rigging and snapping the spars. Nevertheless, vessels that have lived through fifty years of such life are not uncommon.

"Lighthouses and breakwaters tell enough of the fury of the sea to ridicule any pretense of hydrostatic pressures around ships excepting in still water, or that naval constructors build ships dependent on the water pressure to keep the cargo from bursting out the sides, or that water is the natural element of ships in the caressing sense used by the good people who object to ship railways as snares of destruction.

"It therefore follows that a ship resting on blocks at short intervals, along the keel and bilges, is adequately supported, and that if borne on a suitable carriage over a smooth and rigid roadway, it will make the journey with as much ease as under the most favorable conditions afloat, or, generally speaking, that a ship is as well adapted to traveling by rail as by water.

"The Chignecto ship railway will soon be an accomplished fact. Others will quickly follow, and it takes no gift of prophecy to foresee the time when every isthmus will pass ships dry shod, if need be, and when inland cities will be open to navigation with rails, and the freight car and the ship will occupy adjoining sidings at the warehouse and factory. It is not beyond belief that a twentieth century siege may be conducted by war vessels on temporary roads, opposed by traveling fortresses on strategic railways that defend every approach."

Hydraulic Electric Lighting.

The Hartford, Conn., Electric Light Company has nearly completed a notable undertaking for utilizing the fine water power of the Farmington River, wherewith to operate their central station, from which is distributed current for both light and power throughout the city of Hartford.

Under contract with the Farmington River Power Company, which owns the dam, about 300 feet long, across the Farmington River, nearly ten miles from the city, the Electric Light Company has erected a station with a full equipment of dynamos, etc., and will hereafter furnish the current for all the city street lights and for power purposes from that station.

Six dynamos are now in operation, supplying 250 street lights. Four more are to be added, which will then generate enough electricity to supply the rest of the street lights, two hundred of which are yet supplied from dynamos operated by steam in the station on State Street. It is intended to add a large generator of 300 horse power for supplying electricity for power purposes.

The fall over the dam is 19½ feet, and the volume of water about two feet deep. The force is estimated to be equal to 1,000 h. p. The supply of water is considered to be unfailing, and far in excess of any possible future requirements of the lighting company. To convert this great power from the river, six Rodney Hunt horizontal water wheels are used, with a capacity of 800 h. p., and the power is conveyed to the dynamos by shafting and belts.

To convey the electric current to the city, 500 poles, varying from 40 to 70 feet high, have been erected, carrying eleven wires. The water power at the dam is very steady, and improvement in the city lights supplied from this source is already perceptible.

Parasitical Plants.

The author proves that a parasite growing on plants of the *Strychnos* genus contains neither strychnine nor brucine. The mistletoe growing upon the oak does not contain the blue tannin of the latter, but exclusively a green tannin. In like manner other parasites are shown not to absorb the peculiar principles of their hosts.—*A. Chatin.*