

PECULIAR BOILER EXPLOSION.

The West Side Street Railway Company, of Elmira, N. Y., sustained a severe loss caused by the explosion of one of their boilers. There were four men in the building at the time of the explosion. The fireman was killed instantly. The engineer was seriously injured, but the other two men escaped with a few bruises.

The buildings were of substantial brick construction. They consisted of a main building, which contained the engine and boiler room, a car house adjoining it on the north and another car house situated fifty feet to the south.

The station was equipped with three Payne & Sons' tubular boilers, each five feet in diameter by sixteen feet long, containing seventy-two four inch tubes. The boilers were numbered one, two, and three in order from the engine room. Each boiler weighed about four tons.

Boiler No. 1, which exploded, was nearest the en-

Comparative Timidity of Boys and Girls.

Boys report 221 fears on the average and girls as many as 355—a fact which seems to show that they are more timid than boys. There is an increase in the number of fears up to the age of 15 in boys and 18 in girls, but this may be due to the fuller descriptions given by older children and youths. Some of the fears recorded, such as fear of high places, of disease, loss of direction, fear of the end of the world, and of being shut in, are of much psychological interest. President Hall adopts the standpoint that the conscious ego or "I" in a person is but a feeble and inadequate manifestation of the soul, a "flickering taper in a vast factory of machinery and operatives, each doing its work in unobserved silence." Instinct is much older than intelligence, and some of these fears are, in his opinion, inherited from "swimming ancestors," like the gill slits under the skin of our necks. Prof. J. McKeen Cattell, the eminent American psychologist, does not agree with this view; though he admits that

it should be decorated in a color very different from the shade chosen if the light comes from only an unbroken expanse of sky.

Red brings out in a room whatever hint of green lurks in the composition of the other colors employed.

Green needs sunlight to develop the yellow in it and make it seem cheerful.

If olive or red brown be used in conjunction with mahogany furniture, the effect is very different from what it would be if blue were used. Blue would develop the tawny orange lurking in the mahogany.

If a ceiling is to be made higher, leave it light, that it may appear to recede. Deepening the color used on the ceiling would make it lower—an effect desirable if the room is small and the ceiling very high. Various tones of yellow are substitutes for sunlight.—The Upholsterer.

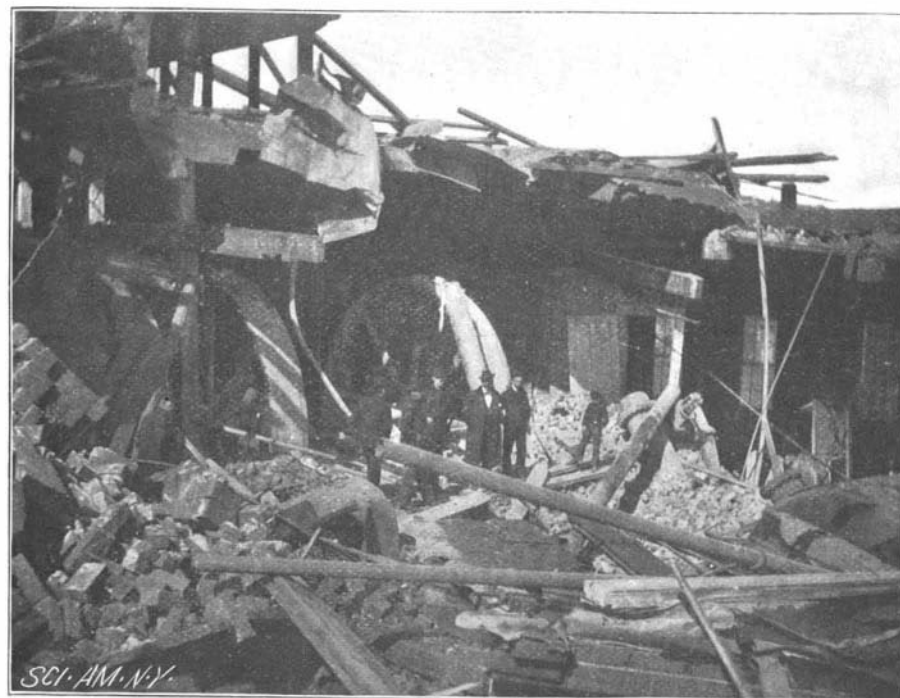
ACCORDING to the British Medical Journal, M. Julien Dumas has announced his intention to interrogate the



PATH CUT THROUGH BUILDING—PART OF BOILER 180 FEET DISTANT IN FIELD.



ONE-HALF OF BOILER IN FIELD 180 FEET DISTANT.



BOILER EXPLOSION—VIEW LOOKING INTO ENGINE ROOM.



STREET CAR THROUGH WHICH PART OF BOILER PASSED.

gine room. It burst in the middle, one end, with the tubes, being blown through two brick walls and two vestibule street cars, and finally landing in a field one hundred feet away. The other end of the boiler was blown to the top of the south wall. The power of the explosion was terrific. Boiler No. 2 was lifted from its foundation, landing on top of boiler No. 3. The roof of the boiler room was completely blown off. Bricks were scattered in all directions for about one hundred feet.

The cause of the explosion is unknown. The boilers had been inspected by the representatives of the Hartford Insurance Company but a few days before, when the tubes were found to be unburned and in perfect condition.

ACCORDING to the experiments of MM. Seguy and Quenisset, the X rays cause dangerous palpitations of the heart. The experiments were made on medical students and upon themselves, and MM. Seguy and Quenisset describe the palpitations as violent and unendurable unless the rays were intercepted by a metallic plate.

children have certain instinctive fears, he thinks that most of them are learned, not inherited, a view which agrees with recent observations on young birds.

Use Color Judiciously.

There are colors that are refreshing and broadening, others that absorb light and give a boxed-up appearance to a room, others that make a room with a bleak northern exposure, or with no exposure at all, appear bright and cheerful; some that make a room appear warm, some that make it cold.

The thermometer seems to fall six degrees when you walk into a blue room. Yellow is an advancing color; therefore a room fitted up in yellow will appear smaller than it is.

On the other hand, blue of a certain shade introduced generously into a room will give an idea of space. Red makes no difference in regard to size. Green makes very little.

If a bright, sunny room gets its light from a space obtruded upon by russet colored or yellow painted houses, or else looks out upon a stretch of green grass,

French government on the abuse of the Bertillon system of measurement. M. Dumas asserts that the calculations made by M. Bertillon are far from correct. He has had in his possession measurements taken of the same person at an interval of ten years. There were not two alike. M. Dumas expressed his desire to visit the anthropometric service. The minister of the interior and the police prefect asked him to name his day. M. Bertillon, with great courtesy, explained his system. He sent for a woman who had refused to give her name. She then said her name was Garcias, her birthplace Bordeaux. Measurements were taken. M. Dumas, being initiated, found without assistance the photograph of this woman, whose real name was Tosas, and her birthplace was not Bordeaux. Much astonished, he warmly praised anthropometry. He carried away with him four or five books on the subject. In one of them he found three photographs typical of the criminals most often met with. One of these was of the woman measured that morning, kept on the premises, according to M. Dumas, to illustrate the system.

The Increasing Demand for Wood Pulp.

While most branches of business have been languishing, the wood pulp manufacturers have had an unprecedented year of success, and, if the consumption of white paper is any indication of the true literary tendencies of the age, we have reason to congratulate ourselves upon the growth and spread of general education. The fact that our extensive New England forests of spruce have become important agents in spreading the knowledge of letters among all classes is noteworthy in this age, when school children are taught to plant trees each Arbor Day, and it might be a valuable lesson for instruction in the schools to show how dependent we have become upon the trees for the books and periodicals that we buy so cheaply to-day. There has never been a cheaper or better material discovered and utilized for making paper than spruce wood, and the large increase in the number of periodicals in the land is chiefly due to this process of converting forest growths into clean, white, cheap paper.

As a matter of fact, the book and newspaper business can be judged better by counting the number of spruce trees cut down every year than by accepting the circulation figures of wily publishers. The amount of white paper a publishing company consumes is a more trustworthy indicator of circulation than figures sworn to before a notary. If we are to judge the year's output of printed matter in this way, we are safe in saying that the army of general readers is largely on the increase. According to the figures published by the Paper Trade Journal, "the daily capacity of the book and news mills of the United States shows an increase of 14 per cent over last year, and shows the phenomenal increase of 352 per cent during the past fifteen years." As the mills do not produce more than enough to meet the demand, it may be concluded that our literature, such as it is, must be vastly increasing in quantity, if not in quality.

But this increase in the production of white paper cannot be wholly credited to the activity of American presses, for many of the London papers are now printed on the paper made from the spruce trees of New England and Canada. Our export trade in wood pulp and white paper is an infant yet, but it has such a healthy, vigorous appearance that it is safe to predict an important life for it. Great Britain imports annually nearly 300,000 tons of wood pulp for her printing presses, valued at nearly \$5,000,000, and the United States are just beginning to realize that our natural resources will enable us to supply a good percentage of the raw material. In 1895 we sent wood pulp to Great Britain in small quantities, valued in the aggregate at less than \$250,000, but in 1896 the export trade in this line had enormously increased. American made white paper has been exported to London more liberally than the raw wood pulp.

It is interesting and instructive to note the growth of an industry that dates back only a quarter of a century, especially when that industry becomes such a paramount factor in our civilization that it actually revolutionizes our educational systems. When our Pilgrim Fathers landed in New England they did not look with favor upon the extensive forests of trees, which served as the hiding place for wild animals and equally savage red men, and their one thought was to cut down as many of these giant trees as they could. In the light of the clearings they hoped to find some measure of relief from the attacks and ambushes of their natural foes. Had their choice been granted them, they would have leveled at one stroke half the oaks, spruces and pines of their new country. It seemed like an endless, hopeless job to hew a space in the primeval forests large enough to accommodate the Pilgrims and their successors.

But of all the trees found in the woods, the spruces appeared to have the least value, and little mention is made of them in early colonial times. The oaks and hickories, and even the tall white pines, were utilized for house building and for making ships with which to carry on the trade of the colonies, and later to fight the mother country with. In time good old white oaks and hackmatacks assumed a value little realized by the first settlers, and lumbermen searched through the great forests for choice specimens of both. Our shipbuilding industry was then rapidly increasing, and it was necessary to secure the strongest and toughest woods for the frames and knees. How well the builders understood their business is testified to in the decaying old hulks of to-day, where the old white oak beams and hackmatack knees have successfully resisted the weather and elements for nearly two centuries.

The hemlock and pine trees grew into general demand and importance when the oak, ash and hickories became relatively scarce, but the spruce trees were passed by as nearly worthless. They were cut down for fire wood, and for some cheap building purposes, but the texture of the wood was considered very unsatisfactory for any important uses. Vast stretches of spruce forests covered the hillsides and valleys of New England, New York and Canada, and in their dense shades lurked the wolves, panthers, bears, and other wild animals. Here and there on the outskirts of the

woods a settlement would be established, but no systematic inroads were made into the spruce forests, simply because there was little commercial value attached to the trees.

This is the only reason why to-day we find vast forests of primeval spruces, with trees two and three hundred years old, left undisturbed, and where nature appears in her wildest and most solitary moods. There are regions in New England and Canada covered with dense growths of spruce where probably no human being has ever penetrated. The bear, the fox, the mink, and the panther live here in undisturbed peace. These woods to-day, instead of being apparently worthless, are more valuable than any other forests. Even in the "Pine Tree State," the spruces are worth far more than the pines. Here are millions of dollars' worth of marketable lumber that must in time be converted into white paper.

About thirty years ago the first wood pulp mill was established in the spruce woods of Maine. One of the most important of these pioneer mills was erected in Brunswick, in 1870, by the Androscoggin Pulp Company. The mills were small and unprovided with the modern machinery for chewing and macerating the wood into a pulp, and during the following ten years their growth was slow and far from phenomenal. But in 1880 the value of wood pulp began to be understood, and the industry really dates from that period. The census figures of that year reported in Maine seven pulp mills, with capital invested of \$440,000, and an annual product of \$300,000, and twelve paper mills, with a capital of \$2,000,000 and a product somewhat in excess of that sum. In 1890 the report gave eleven pulp mills, with capital invested \$2,695,611, and the value of product, \$1,518,611. But to-day there are over \$13,000,000 invested in pulp and paper mills in the State of Maine, giving employment directly or indirectly to over 5,000 men.

But Maine has not monopolized the industry, although it was first nursed in its woods. New York State stands first in the production of wood pulp for books and newspapers, having a daily capacity of 1,800,000 pounds, with Wisconsin second with 670,000 pounds; Maine, 665,000 pounds; Massachusetts, 614,000 pounds; Pennsylvania, 403,000 pounds; and New Hampshire, Michigan, Ohio, and Vermont following in order. To supply the mills with raw material it is estimated that 1,000,000,000 feet of spruce logs are required for the white paper used in the publishing business.

In making the best white paper spruce wood has invariably been employed, but in Europe attempts have been made to utilize the pine for this purpose. Both the pine and the poplar are more easily worked into ground pulp than spruce, but the woods lack the strength needed for large newspaper sheets. In Europe the pulp made from pine has proved of value for making the small sheets of books and pamphlets, and even magazines, but in this country, where spruce is abundant, it has received little attention. There is another difficulty in disposing of the pitch and resin in pine, which makes this wood less valuable to the wood pulp manufacturers. In the first experiments in this country poplar seemed to prove the most successful wood, and it was eagerly sought after, but it was soon discovered to be inferior to ordinary spruce. Efforts have repeatedly been made to use the hard woods for pulp, but the paper made from this pulp has the feeling of linen, and is not considered so good as the spruce pulp. Hemlock cannot be used as a substitute for spruce, for the reason that its fiber is more brashy and has less strength than spruce.

Singularly enough, the trees on which the paper manufacturers must chiefly depend for their supply are very slow growing. A spruce tree requires from 100 to 150 years to mature its growth, and the first fifty years of its growth do not yield a very large tree. During the second half century of its existence it develops size rapidly, and the third period is devoted more to the compacting and hardening of the texture. For ordinary paper purposes, the spruce trees that have reached an age varying between 100 and 150 years are just as good as those two and three hundred years old. In the primeval forests of Maine, New York and Canada we have many spruce trees ranging between 200 and 300 years, but many of the growths are in a state of decay. The large trees have made little progress in the last century, and less suitable timber can be obtained from such tracts of forest than from those where the average age is from one to one and a half centuries. The large trees decay as rapidly as the small ones advance, and the forests are consequently at a standstill. While there is danger of the pulp mills denuding the spruce forests too rapidly under the present demand for pulp, it would undoubtedly be a benefit if all the primeval forests could be thinned out without further delay.

The hemlock is rather slow growing, but it is much quicker than spruce, while the poplar is a more rapid growing tree than either. Pine, however, goes ahead of all the evergreen trees in this respect, and sapling pine land will produce a forest fit for box boards, averaging twelve inches in diameter, in thirty to forty years, while spruce would take twice that time for trees

of similar size. Even such hard woods as maple, birch and beech grow much faster than spruce or hemlock. For this reason pulp manufacturers have inquired anxiously into the source of their supply, and there is every reason to believe that a vast industry must depend upon the spruce trees for its very existence. Pine, hemlock and the hard woods are out of the question. They can never be made suitable substitutes for spruce for paper making, unless the chemist's art and skill invents some new process of changing their nature. An industry in which millions of dollars are invested will be affected by any reduction in the supply of spruce wood for the next century.

The spruce forests of New England and New York will supply sufficient material for all purposes for many years to come, and Canada and New Brunswick have untold stretches of spruce forests that are scarcely touched as yet; but in spite of all this, farsighted manufacturers are looking into the future and securing for themselves control of forests that will make them independent of any corner in the market of raw material. While the spruce forests are still selling at a small price, they are buying up immense tracts for future use. The woods are thus passing into the hands of capitalists who are able and willing to develop them. Lately an English syndicate attempted to control all the wood pulp manufactories in Canada, and should control of the spruce woods of Lower Canada pass into foreign hands, there would be all the more reason for American mill owners to plant and develop, and not destroy, their New England possessions.

The German pulp manufacturers have demonstrated what can be done with the spruce trees by judicious culture and development. On an area much smaller than that covered with spruce trees in New York State, they have long supplied all the raw material needed for their paper mills, and annually exported over half a million dollars' worth. The forests there are merely thinned out, the old trees being cut down as fast as they reach the proper age, and the results are so highly satisfactory that the mills are assured of a continuous supply of raw material as long as the present system of forestry is continued. A similar intelligent treatment of our spruce forests must be adopted in this country, and there is no doubt but they will receive it now that better equipped owners and managers have secured control of most of the valuable forests. G. E. W.

Distress in Spain.

The London Financial News says: "The misery which has made itself felt over Spain, and which has given rise in several instances to bread riots, is attested by the railway returns for the opening months of the year. The Norte, for example, up to January 28, showed a shortage in its receipts of 500,000 pesetas compared with the corresponding period of 1896; the Mediodia on the same date was 720,000 pesetas behind the corresponding record for last year, the Andaluces about 60,000 pesetas, the Zafra to Huelva line 55,000 pesetas, while the Bilbao-Portugal division of the Northern, which had receipts of 1,035,000 pesetas for the month of January, 1896, succeeded in showing this January a total of only 902,000 pesetas. As the outlook for the agricultural and commercial industries of the country for the coming season is far from hopeful, and the straits of the government for money must soon be extreme, the Spanish railways will in all likelihood reflect a dismal state of things at the end of the year. The fall of about 27 per cent in the value of the peseta is an additional burden which the companies have unfortunately to bear, and no alleviation of it is possible until peace and sound business conditions are restored. This is a consummation which the French holders of Spanish railway securities must be very anxious to see hastened; but neither the silver-coining policy of the Finance Minister nor the dilatory policy of the Cabinet in applying reforms, nor, still further, the renewed Carlist movement, give any assurance of it as yet."

Size of a Spider's Thread.

Leeuwenhoek, the first microscopist, wrote in 1685 as follows: "I have often compared the size of the thread spun by full grown spiders with a hair of my beard. I placed the thickest part of the hair before the microscope, and, from the most accurate judgment I could form, more than a hundred of such threads placed side by side could not equal the diameter of one such hair. If, then, we suppose such a hair to be of a round form, it follows that 10,000 threads spun by the full grown spider when taken together will not be equal in substance to the size of a single hair. To this, if we add that 400 young spiders, at the time when they begin to spin their webs, are not larger than one full grown one, and that each of these minute spiders possesses the same organs as the larger ones, it follows that the exceeding small threads spun by these little creatures must be still 400 times slenderer; and, consequently, that 4,000,000 of these minute spiders' threads cannot equal in substance the size of a single hair."—Microscope.