Md., U. S., produced samples of paper from southern canes and white pine shavings, and stated that they could make by their process, from reeds or wood, as the main staple, paper worth from 6*d.* to 8*d.* per lb., at a cost not exceeding 3*d.* per lb. In 1854, patents were granted in Great Britain for modes of making paper from the stalks of the hop-plant, from Brazilian grass, and from twitch or couch grass. Also, in 1854, specimens of paper made of straw were exhibited at the World's Fair in New York, which for whiteness, strength, and beauty of finish, appeared to be nearly equal to rag paper. Its patentees and manufacturers, Messrs. Cooper & Mellier, stated that they had succeeded in making a better article from straw than any of the 150 inventors who had patented, previously, similar processes in England and France alone. In the same year an inferior quality of straw paper, costing about 4½*d.* per lb., was used in printing a Philadelphia daily paper, the *Ledger*, which had then a circulation of from 20,000 to 30,000 a day. In 1854, George W. Beardslee, of Albany, U. S., produced a strong, soft, and beautiful paper from basswood. In the same year, Alexander Brown patented in this country a mode of making paper from the bracken, or fern plants of Scotland. Also, about the same time, Mr. C. Hill manufactured paper in England from the stems and roots of horseradish, the rush and flag, and the vegetable remains of manures. In 1854, Herr von Parmewitz, inventor of a process of making wool from pine trees, presented to the King of Prussia specimens of paper made of the same material. Both of M. Parmewitz's inventions are in successful operation at the present time. Paper was also made at this time from the red pine, at Giersdorf, which was said to be so white and good as to be fit for writing and drawing, and needed no sizing because of its resinous quality. In 1856, extraordinary efforts were made to procure new materials for paper, and to effect their conversion into a pulp which could compete with pulp from rags. The *Times* in that year offered a reward of £1,000 for the discovery of a new and readily available material. Mr. Watts patented a mode of producing paper from wood shavings and bran, which he expected would take this premium, but was not successful. About the same time, Messrs. Watt & Burgess, of London, made elaborate experiments for the conversion of woody fibre into pulp, and it was asserted that paper made of this material would cost only £24 a ton, which if made of rags would cost £40. In the same year, very clean and firm paper was manufactured from the common garden hollyhock by J. N. Nevin, of Scotland; and from undressed flax by James N. Kellogg, of Louisville, Kentucky, U. S. In 1855, a mill was erected by Geo. W. Beardslee, at Little Falls, N.Y., for the purpose of making paper from basswood and other ligneous substances. Another mill was erected in the same year at Waterville, Maine, U.S., by Charles H. Hall, for manufacturing paper from the barks of trees, and good wrapping paper was produced at a moderate cost. In 1856, paper made by Henry Lowe, of Baltimore County, Maryland, U. S., was used in printing the *Baltimore County Advocate*. Mr. Low's mill was employed exclusively in the manufacture of wrapping paper. Also, in 1856, Edward Grantless, a marble cutter, of Glasgow obtained a patent for a mode of making paper of *stone*. In the same year, wrapping paper was made at a mill near Hagarstown, Maryland, U. S., from the refuse leather scrapings of curriers shops. About the same time, paper was made from similar materials by Lasare Ochs, of Belgium. In this year also, the *Overland Mail*, published at Hong Kong, was printed on stout and heavy paper, of fine texture, made from the shavings of bamboo. In the same year, pasteboard was produced from beetroots, by an English manufacturer. Also, at the same time, a beautiful white paper was made by Dr. Terry, of Detroit, U. S., from a species of moss very common on Isle Royal and other localities in the region of Lake Superior.

In this review of the attempts made to obtain paper from other materials than rags, we have mentioned only a few of the most important facts. Many thousands of inventors and manufacturers, many years of incesant labour, and millions of pounds sterling, have been expended in experiments upon wood, straw, and similar substances; but the problem of obtaining good paper, at a moderate cost, from raw vegetable fibre, is yet only partially solved. Neither straw, nor wood, nor any similar material, has superseded linen and cotton rags. The raw fibre papyrus was used for thirteen centuries; the reign of rags has now lasted twelve and a half centuries; and it appears probable that the time for returning again to some cheap vegetable fibre is fast approaching. Whoever shall first succeed in solving the problem, by introducing into common use, among paper manufacturers, the raw fibre of any vegetable, will deserve a large reward, and a high rank among the benefactors of mankind.—*Technologist.*

## ARTIFICIAL ILLUMINATION.

Dr. Frankland recently delivered a lecture on "*Artificial Illumination*," at the Royal Institution of Great Britain. He commenced by stating that it was ten years since he delivered a lecture on the same subject at the Royal Institution. In the interval very little improvement had taken place in the means of producing artificial light; but recently a new illuminating agent had been introduced, and the magneto-electric light had received an important application. The lecturer exhibited and described the electric light; and went on to speak of Dr. Faraday's discovery of the magneto-electric spark, and its application to lighthouse illumination. Professor Holmes' machine, he said, had been in operation at the South Foreland lighthouse for twelve months without breaking or failure. The electric light, however, was of no use for domestic purposes; its cost was too great, and it was only available where light of the greatest intensity was required. Some improvements, in the form of mechanical contrivances for keeping the carbon poles at proper distances, have been introduced, as instanced in the clock-work arrangement in Duboso's lamp; and the electric light had received a modification in the substitution by Mr. Way of mercury for the carbon poles. The light emitted from the mercury poles Dr. Frankland showed to be far inferior to that emitted from the carbon points. He stated that it only amounted to one twentieth; but the battery used was not the best adapted to procure a good light, as it required quantity rather than intensity.