feet long by 16 feet in diameter, working to a pressure of 70 lbs. per square inch, and supplied by Messrs. Lees, Anderson & Co, Clyde street, Anderston: the pair of fine engines by which the machinery is driven have also been supplied by the same firm, and are diagonal compound high pressure, both high and low pressure cylinders working on the same crank pin. The high pressure cylinder is 16 inches in diameter, that of the low pressure cylinder being 24 inches, and length of stroke 30 inches. In the former there is an expansion valve so arranged as to cut off the stroke at any point, from 5 inches to 20 inches, and which can be varied at will while the engines are working at full speed. They are regulated by Scott's Moncrieff patent governor. There will also be a small engine for the hoisting machinery in the grain store, and working separately. The architect of the building is Mr. W. Spence; while Mr. W. Young, flour mill engineer, has constructed and superintended the erection of all the varied and complicated mechanism of store and mill, with the exception of the engines, boilers, and millstones. Mr. Young's new cooler has been adopted here for the first time.

Scientific American.

MUNN & CO., Editors and Proprietors.

PUBLISHED WEEKLY AT

NO. 37 PARK ROW, NEW YORK.

O. D. MUNN. A. E. BEACH.

TERMS.

One copy, one year	$3 00
One copy, six months	1 50
CLUB RATES { Ten copies, one year, each $2 50	25 00
CLUB RATES { Over ten copies, same rate, each	2 50

VOLUME XXXI, No 9 [NEW SERIES.] *Twenty-ninth Year.*

NEW YORK, SATURDAY, AUGUST 29, 1874.

Contents:

(Illustrated articles are marked with an asterisk.)

THE LIGHT OF COMING DAYS.

The light of other days—practical, not poetic—was the tallow dip, and, further back, a bunch of moss in a dish of grease. The advance from this primitive illuminator to the gas jet covers a most important stage in the progress of domestic economy. To make the illuminating material distribute itself was a capital stroke of policy. By most people it is regarded as the final stroke in the conflict with the shades of night. But it falls very far short of it.

Before we can truly say that our streets and houses are lighted scientifically, another and more important advance must be made. We must get rid of the offensive and poisonous products, the heat and flickering, the sharp contrasts of light and shade, the needless expense and frequent fires, and the thousand other disadvantages attending the distribution and local combustion of our illuminating material, by distributing instead pure light.

The problem is simple and easily solved. What we want in our rooms is a clean, white light, like diffused daylight. The popular mistake lies in supposing that the light must necessarily be generated where it is used. The remoteness of our natural illuminators ought to teach us the absurdity of such a position.

Every tyro in optics knows that light is the most tractable of material effects. It is obedient to the last degree. You can send it where you will, to any distance, through the crookedest channels, through the darkest passages, and it will emerge undimmed, ready to be absorbed or dispersed as the operator may wish.

It is well known also that there are many ways of producing a brilliant light, much more easily and economically than by carbon combustion in small and scattered flames. Yet, curiously, this familiar knowledge does not appear to have ever been put to practical use in producing a simple, wholesome, agreeable, scientific illumination for public and private buildings. To our children, the old fashioned candle snuffers are unknown, or known only as relics of an antiquated system of domestic economy. It is possible that, to their children, gas pipes may be equally obsolete as articles of household use, light tubes furnished with reflectors and terminal radiators taking their place.

The working of the predicted system can be sketched in few words. Given, say, a large hotel to be furnished with artificial light: Instead of having a network of gas pipes leading to the different rooms and to different burners in each room, according to the present method, the light for the entire building would be generated in one place, say in the main ventilating shaft for the utilizing of the surplus heat. The distribution of the light would be effected by means of reflectors, each throwing into its appropriate tube a bundle of rays (made parallel by a lens) sufficiently intense to flood the room to which they were directed with a pure white radiance, which could be turned on or off or graduated by simply pressing a knob or turning a key. In size, the light tubes need be no greater than ordinary gas pipes. Indeed they might be much smaller, since all the light required for the largest room might be transmitted to the reflector as an extremely slender beam. The terminal lenses would close the tube against smoke and dust, which would dim the reflectors at the angles; and by keeping the enclosed air pure and dry, the absorption of light would be inappreciable.

The advantages of this mode of illumination are many and obvious. There would be no poisoning of the atmosphere by local combustion; no scattered flames to occasion fires; no circulation of combustible material to encourage fire, should it happen to break out; children and careless servants would have nothing to handle that could possibly do damage; there would be no misplaced heat; no smoke or odor to sicken or annoy; no cross lights or flickerings to hurt the eyes. Besides, the lighting of a house would help to purify its atmosphere, instead of vitiating it as now, if the source of light were placed, as we have suggested, in the ventilating shaft; and, very likely, the economy of the light would be such that means for the instantaneous illumination of the entire house could be maintained at all hours of the night without costing more than our present imperfect and partial lighting does.

For churches, theaters, and other places of public resort, this method of lighting is specially available and inviting. The source of light might be in an absolutely fireproof vault or chamber, or in a separate building, so that the danger of accidental fires, with their attendant evils, would be reduced to the minimum. Similar advantages would attend its application to shipping. For mines, especially coal mines, it is unapproachable for simplicity and safety. Smoky torches and treacherous "safety lamps" might be entirely abolished, and the deepest pits flooded with white light, without flame or shadow of a risk of explosion.

A CHANCE FOR INVENTORS.

While there is reason to doubt the possibility of devising an electric motor capable of doing heavy work as economically as the steam engine, there can be no question that, for light service, a satisfactory electric engine is one of the most widely felt needs of the age.

All that is lacking to meet this want is a suitable battery; in other words, a simple, compact, portable, and, if possible, dry apparatus, capable of generating a steady current of electricity for a considerable period without renewal, capable of standing unused without material waste, yet able to give out its full power on the instant when required, capable of being easily and cheaply kept in working order, free from fumes, and not liable to leak or spill its contents under ordinary circumstances.

The applications which await such a battery are practically innumerable.

Even with the fuming, slopping, troublesome batteries already in use, enough has been accomplished with electric motors to demonstrate the superiority of electricity for light work. Everything that steam can do in such cases it can do; and there are many occasions, domestic and otherwise, where steam power cannot be conveniently employed, where a small electric engine might do the required work quickly, neatly, without heat or risk of explosion, and without calling for special engineering skill or knowledge, the common lack of which must ever act as a bar to the general employment of steam for household service. And though the power obtained may be, in itself, many times more expensive than an equivalent amount of steam power, the advantages attending the use of electricity are so pronounced, the possible saving of time and trouble so great, that, with a generator such as we have described, there would be no hesitation in giving it the preference in thousands of cases where a little power is wanted for continuous work, or where there is occasional need of a small but instant effect.

Take, for example, that almost universal household necessity, the sewing machine. How immensely would its usefulness be increased by an acceptable means of running it: a motor which would require no winding up, which would not easily get out of order, which would be always safe, always ready, and perfectly under control! A man who should devise a battery to meet this demand alone would be sure of a fortune.

But this is only one of a countless number of uses to which such a battery might be put.

In almost every civilized home, there is water to pump, washing machines to operate, wood to saw, coal to lift, and a multitude of other labors, all of which might be done advantageously by simple electric motors, provided the requisite battery were forthcoming. Besides, there is light to furnish, doors and windows to guard against burglars, errands to run, and accidental fires to report. It is not impossible that the common dwelling house of the future will rival Houdan's in the diversity and completeness of its electrical appliances; yet, without entering the region of speculation or looking beyond the simple daily needs of ordinary households, there is a present call for the services of this fleetest, neatest, and most tractable of servants, sufficient to ensure wealth and renown to whoever shall capture and harness him satisfactorily.

For light manufacturing purposes, the call is equally urgent. In every workshop where steam is not used, there are presses, saws, lathes, drills, and numberless other present or possible machines, to which electro-motors might be profitably applied. For amateur workmen, nothing could be more desirable or more likely to meet with immediate acceptance. Then what an admirable contrivance it would be for driving light wagons or propelling pleasure boats! There would be no fuel to carry, no fire to watch, no possible explosion to fear: there would be no stabling or grooming to pay for, and no food to buy for the hours of idleness. Mr. Bergh ought to offer a premium for the invention, simply for the sake of the animals he loves.

Where the range of application is so great, it is needless to multiply examples. Our purpose is to suggest, not to demonstrate, the multitudinous uses to which a satisfactory electro motor may be put, and to call the attention of inventors to the certain reward that will come to whoever shall overcome the last remaining obstacle.

A CITY BUILT BY ONE MAN.

History affords numerous instances of the foundation of cities by single individuals, and the beautification and enlargement of portions of the same through the munificence of others; but nowhere, as we believe, is it recorded that any one man from his private fortune has ever attempted the actual construction of a complete town. All the more remarkable, therefore, is the enterprise which for some five years past has been quietly pursued by Mr. A. T. Stewart, a gentleman of whose immense wealth no accurate information has ever been made public. The high rates of taxation and the consequent exorbitant rents incident to ownership and occupation of dwellings in New York city have been the means of virtually banishing a large number of persons doing business therein, whose moderate incomes forbid the necessary expenditure, to the adjacent suburban districts. Hence arose a great demand for cheap homes; and as a result, village after village has sprung into existence in Long Island, New Jersey, and in fact at every point within a radius of forty miles of the metropolis.

Mr. Stewart, in view of this constant exodus of the city population, conceived the unique idea of building a model suburban city, where comfortable homes, provided with all modern improvements, could be obtained for a moderate outlay. Accordingly, he purchased a plot of land, ten thousand acres in extent and embracing that portion of Long Island known as Hempstead Plains. This is in a compact tract of about ten miles in length by one mile in width, and nearly a perfect parallelogram in shape. Surveying and staking out the new city followed close upon the acquisition of the ground, and the first work taken in hand was the making of streets and avenues, with pavements, sewers, culverts and conduits, for blocks of buildings yet to be erected. Simultaneous with laying the foundations of the houses, was the commencement of gas and water works, and of a railroad connecting the city with New York. Unlike the usual course adopted in projecting new towns in the vicinity of the metropolis, no lots were advertised; nor has any attempt been made to dispose of the property, as it is the intention to treat the city as a single house, finishing it first, and selling it subsequently. The New York *Sun* aptly describes the enterprise as a new city springing up, with no Mayor or Council, no assessments for street improvements, no taxes for water and gas, no entangling alliances or issuing of bonds to secure railroad transportation, no scrambling or grumbling to secure immigrants.

An admirably kept hotel, situated in the middle of a fine garden plot, together with some forty houses, are thus far complete. The latter are located in lots of 200x200 feet and provided with outhouses and handsomely laid out grounds. They rent for from $250 to $800 per year on three year leases, and contain every convenience found in the best city dwellings. Work upon this remarkable town, to which the name of Garden City has been given, is rapidly progressing, and we understand that the advantages offered are meeting with a wide popular appreciation.

GERMAN RAILWAYS.—It appears that, in consequence of the increased cost of railway working in Germany, as well as in other parts of the world, the rate of interest realized, on the capital expended on first establishment account, declined last year to 4·4 per cent. In 1869, the corresponding return stood at 6·4 per cent. An augmentation of 16 per cent in goods rates is required in order to secure an average interest of 5½ per cent on the capital expended.