MODERN MILLWRIGHTING.

PROFESSOR Kick says: "We have already remarked that the tendency of modern millwrighting is to construct mills so as to reduce human labor to a minimum. And much can be done in this direction by means of cup elevators, grain and flour worms and spouts. The screen-house, or wheat-cleaning department, may be completely automatic, with the exception of the necessary watchman. But so far as regards the mill proper there is much more to be done; for in high grinding, be the process but half carried out, the co-operation of hand labor for the grading of the products is necessary, and for this reason, that from the different wheats, middlings varying in quantity and quality are obtained by the different breaks, and that for the grading and further distribution of those products, the co-operation of human and intelligent labor is to a certain extent indispensable, unless good and inferior materials are to be mingled with the result of injuring the quality of the product. A complete automatic plant can be recommended only where the quality of the products is of less account than their quantity and cheapness. The same remark applies to mills in which rolls are exclusively used for the process of reduction. Such mills will require more power for the grinding of fine middlings (dunst) than plants in which millstones or dismembrators are also brought into use, and the bran will be less thoroughly cleaned. Where country customers do not object to brammy flour, and where power is cheap, the miller may, from a commercial point, get along well enough with a pure roller plant; but if these conditions are not altogether fulfilled, as will happen in the great majority of cases, then such plants are to be rejected, however much they may be admired and praised."

THE WINNIPEG LIGHTING PLANT.

THE Winnipeg, Man., *Sun*, gives an extended description of the new plant of the Electric and Gas Light Company, from which we glean that the two systems of lighting have until recently been operated from separate points, but have now been consolidated, the electric light machinery having been moved to the gas works, and now both works are carried on under the same roof. An extensive addition, 80 x 80 feet, has been erected to the south of the old building, and is now utilized for the electric machinery. A moonlight season was selected for the change of the plant, and the work was done in time to be in readiness for lighting the city in accordance with the contract between the council and the company. That evening, on the first starting of the machinery in the new premises, several prominent ladies and gentlemen visited the works to witness the proceedings; and Mrs. W. Bathgate, wife of the general manager of the Electric and Gas Light Company, then turned on the steam to start the machinery in motion. The machinery of the Electric Light Company is of the most modern and improved pattern, and all arrangements are very complete. A large portion of the east side of the new addition is taken up by the large steel boilers, of which two of sixty horse power each are already in position, and the foundations are being built for two more, which will give them a total boiler capacity of 250 horse power. In the northwestern portion of the building are located the two very fine engines, considered the most powerful in the province, of 200 horse power. The steam enters a high pressure cylinder, and after doing its work there, is discharged into a low pressure cylinder. In an ordinary high pressure cylinder, the steam after doing its work in the cylinder is exhausted into the air against atmospheric pressure, which is 14.7 pounds per square inch; but in the case of these engines an air pump creates a vacuum in the condenser and low pressure cylinder, thereby destroying the resistance of the atmosphere, and consequently saving a considerable quantity of power; then the steam, entering the low pressure cylinder, does the same amount of work as in the high pressure, indicating a saving of nearly 50 per cent. But ten per cent. of this saving is utilized in driving the air and circulating pump, leaving a net saving of about forty per cent. against the old style engine. The engines have cylinders of 14 x 36 and 24 x 36 respectively, and set in motion a mammoth driving wheel forty-four feet in circumference and of great breadth. From this belting is attached to a pulley (of six feet diameter) on the line shaft, and which are pulleys belted back and front to the several dynamo machines. Underneath the engine house are the water pump, the condensed water basin and water pump. There are at present five dynamo machines in operation, and preparations are being made for putting in two more. The dynamos now used are four ten-arc lights of the Western pattern, and one forty-light of the Thomson-Houston, to supply the extra lights contracted for by the city council in the new agreement, and a 1,000 sixteen-candle light incandescent dynamo, to furnish incandescent lights throughout the city. The former will be ready shortly, while the latter, it is expected, will be in operation in July, as there is very little to be done other than to place the machinery and string the wires. Superintendent Stewart said the company intended going extensively into providing incandescent lights, as there were many inquiries for the light for stores and private residences. He expects to be running these lights to their full capacity in the early fall, and if the demand requires it, a second machine will be put in, of the same capacity as the one now being provided for. The incandescent light will be principally used in the outlying districts of the city, where gas pipes are not laid, and where the residents are desirous of having a better light for their houses than the murky coal oil lamp.

RAPID INTRODUCTION OF THE ELECTRIC MOTOR.

VERY quietly and with astonishing rapidity has the electric motor made its way into the hearts of power users, says the *Electrical Review*. It is really astonishing, even to the electrical enthusiast, how great has been the headway made by this modern servant of man. It has displaced steam engines in many instances in almost every branch of industrial manufacture; it even has been substituted for water power to the extent of using the latter for electrical generator, the leads for distribution and the indefatigable motor for local service, since greater economy is generally obtainable in this manner. It is fast relieving the horse in traction work, and bids fair even to do the uncomplaining mule out of his job. In all parts of the country the electric motor's busy hum can be heard. It is probably safe to say that there is not a town large enough to support a lighting plant that has not also advanced enough to adopt the motor to a greater or less extent. And we predict that the time is not far distant when the electric motor, as the immediate source of applied power, will be a greater factor in the field of usefulness than the steam engine, and the latter will be relegated to the driving of electric generators.

In certain lines of work, however, the electric motor has a long way to go in the way of improvement before it can be used, if ever. For instance, in rolling mills and other establishments of a kindred nature, where the required power cannot be subdivided, and enormous strains are put upon the driving engines, as at present constructed, the electric motor has no place, and we doubt if it ever will have. But in all cases where the useful effect is wanted at many points and in moderate amount, the electric motor will have the best of the contest. Already it has made great strides in the propulsion of street cars, and there are for this purpose alone a great number of motors in daily operation. Certainly this new servant of man is proving to be a rich prize.

ECONOMY IN MILLING.

ONE of the remarkable things connected with the manufacture of flour says the *Millstone*, is that the business of manufacturing has never been placed upon that economical basis of operation which characterizes manufacturing of other lines of staple products. For instance, cotton and woolen mills, machinery, boilers and engines, machine tools and general mechanical supplies. The cotton and woolen manufacturers of New England, and some of the engine builders and other machinists of the country are making fair dividends out of the waste which now belongs to flour mills. Not that all of their operations are essentially wasteful, but the whole arrangement for the production of flour with respect to insurance, convenience of handling, cost of fuel, labor and all is conditioned on an extravagant basis. It is entirely possible by proper means and united action on the part of any respectable number of millers to reduce their insurance to one-third its present cost. This would mean, say, a reduction of 2 per cent. upon the value of the destructible property on which insurance is carried. There are few mills which we have in mind wherein a saving of 25 per cent. of the wages paid for roustabout labor could not be made by the application of power shovels, and cars and scales which would hold and weigh say, one-half, if not a whole car of wheat. By such means, and with an elevator which would carry the wheat to the scale without waiting for a lower hopper to discharge itself, or for weighing or other waste of time, the matter of handling wheat would be a small thing. Small reservoirs for holding flour which make it necessary to pack out as soon as made, is another source of expense. There are few mills which one goes into where they cannot see the opportunity for great improvements of many kinds in handling flour after it is packed. Again, this is true of all milling products received or discharged. Machinery which is out of the line or not well proportioned, requires a great deal of extra attention, and therefore extra help. A mill where provisions are not made for collecting dust or exhausts from the rolls and conveyors, requires extra help in the way of sweepers. Generally speaking, mills could be arranged to operate on their present capacity with a much less complicated scheme. The general design of the mill and the workmanship from a mechanical sense, and its general arrangement, has a great deal deal to do with expense of its operation by millers, machine men, oilers and sweepers. We have in mind one mill, which is not an exceptional instance, where the pay-roll was $50 a day, which was afterwards reduced 20 per cent. by a few very simple devices. The general category of labor-saving arrangements which we have suggested here was not undertaken. We say that the neglect of all of these things is extravagance, that it is waste; that in no line of manufacturing business are these things so generally disregarded. A great many mills are operating at a great loss of fuel through cheap steam plants. Oftentimes the difference between a second class and first-class engine could be made up in a six months' run.

We do not wish to institute any radical reforms along this line, but make the suggestion in order that millers may have them in mind, and come to them through the course of years as they find it convenient and agreeable to do so. It may be done by taking up one detail at a time, and thus, without great immediate outlay, improve the earning capacity of their milling property.

POINTS FOR ENGINEERS.

THE area of a chimney is generally made 0.16 of the area of the fire grate.

The average quantity of incombustible matter is 10½ per centum.

All grates should have an inclination of about one inch in every one foot of length, sloping downward from the fire door toward the bridge wall.

When air is admitted behind a bridge wall to aid in consuming the gases, it must be at a point where the temperature is not less than 800 Fah.

When wood is to be the fuel employed under a boiler, the grate area should be from 25 to 40 per cent. larger than if coal is to be used.

The aggregate amount of air opening through the grate should never be less than one quarter the total grate area, as a minimum, and may be increased with advantage.

Look well after the masonry of a boiler; stop all cracks in the walls with mortar or cement as soon as discovered. They impede the draught and cool the plates of the boiler, causing a waste of fuel.

The benefits derived from heating the feed-water are found not only in a saving of fuel but also in a diminution of the intermittent contraction and expansion, in purification of the water, and in steadiness in steaming.

The part of the bottom of an externally fired boiler acted upon most severely by the fire is just behind the bridge wall, and if a girth seam unavoidably comes at that point, the edge of the lap must not face towards the fire.

Plates of iron are tested cold by punching holes near the edges, and by bending them to angles of different degrees, corresponding to the thickness of the plates. They should bear these tests without showing any signs of cracks or laminations.

Remember that the efficiency and safety of a boiler depend as much upon the efficacy of the water circulation as they do upon the strength and disposal of the boiler, therefore crowding of tubes in a boiler should be avoided.

One very important cause of deterioration in boilers is due to the fact of their becoming too small to do the work without forcing, so that the pulsations of the engine cause a well marked succession of shocks on the boiler, which results in a weakening of the material. By placing one's hand on the head or shell of the boiler, the vibrations of the metal can be felt, similar to the rising and falling of a man's chest while breathing.

Whenever a hard patch is to be put on a boiler, it must have the same thickness as the sheet to which it is to be riveted, and should be of the same quality of material, and it should be so arranged that no pocket is formed for the collection of scale or sediment.

When a safety valve of more than five inches in diameter is required for a boiler, it is preferable, as well as much safer, to make use of two valves, each having an area of one-half the total valve. Valves having a diameter of more than five inches are apt to spring on their seats, are clumsy to handle, and more difficult to keep tight.—*Manufacturer and Builder.*