LUMBER PRICES.

LUMBER.

CAR OR CARGO LOTS.

1¼ and thicker clear picks, Am. Ins..	$30 00@	32 00
1¼ and thicker, three uppers, Am Ins.		37 00
1¼ and thicker, pickings, Am ins.....		27 00
1 x 10 and 12 dressing and better......	18 00	20 00
1 x 10 and 12 mill run..................	13 00	14 00
1 x 10 and 12 dressing..................	14 00	16 00
1 x 10 and 12 common....	12 00	13 00
1 x 10 and 12 spruce culls.............	10 00	11 00
1 x 10 and 12 maple culls...		9 00
1 inch clear and picks..	28 00	30 00
1 inch dressing and better..	18 00	20 00
1 inch siding, mill run.......	14 00	16 00
1 inch siding, common	11 00	12 00
1 inch siding, ship culls.........	$10 00	$11 00
1 inch siding, mill culls................	8 00	9 00
Cull scantling	8 00	9 00
1¼ and thicker cutting up plank......	22 00	25 00
1 inch strips, 4 in. to 8 in. mill run....	14 00	15 00
1 inch strips, common.................	11 00	12 00
1¼ inch flooring......................	14 00	15 00
1½ inch flooring.............	14 00	16 00
XXX shingles, sawn................ .	2 30 @	2 35
XX shingles, sawn..................	1 30	1 35
Eastlake galvanized steel shingles, 24 W. G., per square..................		6 00
Eastlake galvanized steel shingles, 26 W. G., per square..................		50
Eastlake painted steel shingles, per sq.		4 00
Round pointed galvanized steel shingles, per sq...................		6 00
Round pointed painted steel shingles,		4 25
Round pointed, unpainted, Terne tin shingles.............		4 00
Manitoba galvanized, steel siding, per square.........................		5 00
Manitoba painted steel siding, per sq.		3 50
Painted sheet steel pressed brick......		3 50
Painted crimped steel sheeting........		3 40

Price of Copper shingles according to weight.

YARD QUOTATIONS.

Mill cull boards and scantling........		10 00
Shipping cull boards, promiscuous widths.........................		13 00
Shipping cull boards, stocks........		14 00
Hemlock cantling and joist up to 16 ft.	11 00	12 00
" " " 18 "	12 00	13 00
" " " 20 "	13 00	14 00
Scantling and joist, up to 16 ft.......		14 00
" " 18 ft.......		15 00
" " 20 ft.......		17 00
" " 22 ft.......		19 00
" " 24 ft.......		21 00
" " 26 ft.......		23 00
" " 28 ft.......		25 00
" " 30 ft.......		27 00
" " 32 ft.......		27 00
" " 34 ft.......		29 50
" " 36 ft.......		31 00
" " 38 ft.......		33 00
" " 40 to 44 ft..		36 00
Cutting up planks, 1¼ and thicker, dry	25 00	26 00
" " board,	18 00	22 00
Cedar for block paving, per cord......		5 00
Cedar for Kerbing, 4 x 14, per M....		14 00

B. M.

1¼ inch flooring, dressed, F. M.....	28 00	31 00
1½ inch flooring rough, B. M.......	18 00	22 00
1¼ " dressed, F. M.....	25 00	28 00
" undressed, B. M...	18 00	19 00
" dressed............	18 00	22 00
" undressed	12 00	15 00
Beaded sheeting, dressed	22 00	35 00
Clapboarding, dressed..................		12 00
XXX sawn shingles, per M, 16 in....	2 65	2 75
Sawn lath..............................	2 00	2 20
Red oak................................	30 00	40 00
White..................................	35 00	45 00
Basswood, No. 1 and 2	18 00	20 00
Cherry, No. 1 and 2..................	70 00	70 20
White ash, No. 1 and 2...	25 00	25 00
Black ash, No. 1 and 2...............	20 00	30 00
Dressing stocks......................	16 00	22 00
Picks, American inspection..........		40 00
Three uppers, American inspection....		50 00

MONTREAL PRICES.

Lumber, Etc.

Ash, 1 to 4 in., M.....................	$13 00@	18 00
Birch, 1 to 4 inch, M...	15 00	25 00
Basswood............................	12 00	20 00
Walnut, per M........................	50 00	100 00
Butternut, per M.....................	22 00	40 00
Cedar, flat..........................	00 04	00 06
Cherry, per M.......................	60 00	80 00
Elm, Soft, 1st......................	15 00	17 00
Elm, Rock...........................	25 00	30 00
Maple, hard, M......................	20 00	25 00
Maple, Soft..........................	16 00	18 00
Oak, M...............................	40 00	95 00
Pine, select, M......................	35 00	40 00
Pine, 2nd quality, M......	20 00	25 00
Shipping Culls.......................	13 00	16 00
Mill Culls............................	8 00	10 00
Lath, M..............................	1 50	1 90
Spruce, 1 to 2 inch, M	10 00	12 00
Spruce Culls.........................	4 50	6 00
Shingles, 1st quality................	2 00	3 00
" 2nd "	1 25	1 50

Cement, etc.

Portland Cement, per barrel..........	$ 2 70@	3 00
Roman " "	2 70	3 00
Fire Bricks, per M..................	20 00	30 00

NEW YORK PRICES.

WHITE PINE.

Uppers..	$45 00@	62 00
Selects.....	41 00	53 00
Fine common..........	36 00	48 00
Cutting up	23 00	30 00
Common	28 00	45 00
Norway.............	24 50	26 50
Pickets.............................	14 00	23 00
Shippers, according to quality, for different ports..........................	17 50	52 00
Coffin boards.......................	21 00	23 00
Box.................................	15 50	17 00
Ceiling.............................	24 00	42 00
Shelving................	25 00	32 00
Moulding......	34 00	37 00
Bevel siding...	16 00	23 00
Bridge timber.......................	38 00	50 00

EASTERN SPRUCE.

9 to 12 in...........................	16 50	17 00
8 to 12 in...........................	16 00	16 50
6 to 12 in...........................	15 00	16 00
6 to 9 in............................	14 50	15 00
Special lengths.....................	16 50	18 00
Lath................................	2 15	2 20
Piling, per lienal feet........	05	60

SHINGLES.

Pine, 16 in., extra..... ....$	3 10	3 25
18 in., extra......................	4 35	4 50
18 in., clear butts.................	3 15	3 25
16 and 18 inch, stocks...........	4 50	5 30
Cedar..........	8 75	19 00
Cypress..................	6 00	16 00
Redwood, per bunch.. . .	1 25	1 50
Various widths..................		1 00

HEMLOCK.

Timber..........................	13 50	14 00
Joists...........................	12 00	12 50
Board...........................	13 00	13 50
Lath...................... ..		2 00

DRESSED LUMBER, CAR LOAD LOTS.

No. 1 flooring, ⅞ in.............	23 00	24 00
No. 1 ceiling, ⅝ in.............	25 00	26 00
No. 1 ceiling, ⅜ in..............	18 00	19 00
Timber..............	14 00	15 00

ALBANY, N. Y. PRICES.

SHINGLES AND LATH.

Shngles, shaved pine.............		6 50
2nd quality.................		5 00
Sawed, extra.........	4 80	4 90
Sawed, clear butts...............	3 00	3 75
Cedar, xxx.......................	3 50	4 30
Shingles, cedar mixed...........	2 60	3 00
Hemlock.................		2 25
Lath, pine........................	2 25	2 30
Spruce......................	2 00	2 20
Hemlock.................	1 75	2 00

HEMLOCK.

Boards, 10 inch, each............		13½
Joist, 4x6........		33
Joist, 2½x4.......................		13
Wall strips, 2x4..................		10

PINE.

2½ in. and up, good............	58 00	60 00
4ths.......	53 00	55 00
Selects.........................	48 00	50 00
Pickings....................	43 00	45 00
1¼ to 2 in., good...............	50 00	55 00
4ths........................	45 00	52 00
Selects......	40 00	45 00
1 inch, good.........	50 00	55 00
4ths........................	45 00	48 00
Selects.......................	40 00	43 00
Pickings.......................	35 00	38 00
Cutting up, 1 to 2 in..............	30 00	35 00
Bracket plank....	32 00	36 00
Shelving Boards, 12 inch and up..	28 00	32 00
Dressing boards, narrow.........	20 00	22 00
Shipping boards.................	16 00	18 00
Box boards......................	13 00	15 00
10 inch boards and better..... ..	30 00	34 00
Common	16 00	22 00
12 in. boards dressing and better..	32 00	36 00
Common....	16 00	22 00
1¼ in. siding selected 13 ft.......	43 00	45 00
Common...................	16 00	21 00
1½ in. siding, selected....	43 00	46 00
Common...................	16 00	21 00
Norway, selected.....	24 00	26 00
Common................. .	12 00	16 00
10 in. p. k. 12 ft. dressing and better, each.................	45	50
Culls........................	23	25
10 inch boards, 13 ft. dress and better, each..	28	33
Culls........................	17	22

BUFFALO AND TONAWANDA PRICES.

NORWAY PINE—ROUGH.

No. 1, 1 and 1¼ in..	20 00	22 00
No. 2, 1 and 1¼ in..............	15 00	15 50
No. 3, 1 and 1¼ in.....	11 50	12 00
Stocks No. 1, 1 and 1¼ in.......		22 00
No. 2, 1 and 1¼ in..........		17 00

WHITE PINE—ROUGH.

Uppers, 1 and 1¼ in............	42 00	44 00
1½ and 2 in........	43 00	45 00
2½, 3 and 4 in...............	52 00	55 00
Selects, 1 inch............. ..	36 00	37 00
1¼, 1½ and 2 inch.....	34 00	35 00
2½, 3 and 4 inch..	44 00	46 00
Cuts, No. 1, 1 inch..............	28 00	30 00
1¼, 1½ and 2 inch..........	31 00	33 00
2½, 3 and 4 inch............	37 00	40 00
No. 2, 1 inch....	17 00	18 00
1¼, 1½ and 2 inch..........	23 00	24 00
Moulding, 1 inch.................	31 00	33 00

Electrical Mechanical and Milling News

Vol. XV.—No. IV. **TORONTO AND MONTREAL, CANADA, DECEMBER, 1890.** Price, 10 Cents; $1.00 Per Year

ELECTRICAL,

Mechanical and Milling News,

PUBLISHED ON THE FIRST OF EACH MONTH BY

CHAS. H. MORTIMER,

Office, 14 King Street West,

TORONTO, - - CANADA.

Temple Building, Montreal.

ADVERTISEMENTS.

Advertising rates sent promptly on application. Orders for advertising should reach this office not later than the 25th day of the month immediately preceding our date of issue.

Changes in advertisements will be made whenever desired, without cost to the advertiser, but to insure proper compliance with the instructions of the advertiser, requests for change should reach this office as early as the 22nd day of the month.

SUBSCRIPTIONS.

The ELECTRICAL, MECHANICAL AND MILLING NEWS will be mailed to subscribers in the Dominion, or the United States, post free, for $1.00 per annum, 50 cents for six months. The price of subscription may be remitted by currency, in registered letter, or postal order payable to C. H. Mortimer. Please do not send cheques on local banks unless 25 cents is added for cost of discount. Money sent in unregistered letters must be at senders' risk. The sending of the paper may be considered as evidence that we received the money.

Subscriptions from all foreign countries embraced in the General Postal Union will be accepted at $1.25 per annum.

Subscribers may have the mailing address changed as often as desired. *When ordering change, always give the old as well as the new address.*

The Publisher should be notified of the failure of subscribers to receive their papers promptly and regularly.

EDITOR'S ANNOUNCEMENTS.

Correspondence is invited upon all topics pertinent to the electrical, mechanical and milling interests.

OUR otherwise excellent contemporary, the Baltimore Journal of Commerce, is evidently a trifle off on the "Sabbath observance" question, and the same appears to be true of many of its readers. In a recent talk about itself, it remarks that "it is published in time to reach a very large share of its subscribers on Saturday night, and they, with one accord, acknowledge that it makes splendid Sunday reading."

THE announcement is made that the next meeting of the National Electric Light Association of the United States is to be held at Providence, R. I., on February 17th, 18th and 19th. If our American friends will permit a suggestion from this side the line, it is that the name of the Association should be changed to "The National Electrical Association." Its present title does not correctly indicate its character, inasmuch as there are found in its membership men engaged in helping forward not alone the progress of electric lighting, but also the many other and scarcely less important applications of electricity. Another suggestion is, that there are important duties awaiting performance at the hands of the "Canadian Electrical Association," which we hope shortly to see enter upon its existence.

THERE is no doubt that for extended areas the alternate current system of incandescent lighting is the most suitable and economical. The current can be transmitted over considerable distances at a small loss. The objection to its use in contradistinction to the direct current system has heretofore been that it was considered inadvisable to couple alternating dynamos in multiple, and consequently separate trunk wires have been run for each dynamo. It is becoming the practice now, however, to couple these dynamos in multiple, and means have been devised for synchronizing the alternations of current, or keeping them perfectly in step as it were, so that it becomes possible to feed the current from each dynamo into a general network or reservoir of mains from which the transformers draw their supply as needed. This is a considerable step in advance in alternate current lighting, and one which will increase its possibilities in a marked degree, besides reducing very largely the cost of construction and maintenance and avoiding considerable complication in the apparatus of the station. With the system of operation demonstrated to be a complete success, we may look for the alternating current to give its older rival closer work to hold its own as a favorite in the eyes of central station managers.

BRADSTREETS, the New York financial journal, in an article calculated to show that Canada is making but slow progress compared with the United States, puts in as evidence the statement that while the population of the Dominion since Confederation has increased only about 40 per cent., the gross debt has increased by about 250 per cent., and the annual expenditure by about 300 per cent. The inference drawn from these figures can not be considered a fair one. The bulk of our public debt has been incurred in the construction of public works and in assisting railroad enterprises, which in the natural order of things precede population. These undertakings, some of them of gigantic character, as for example the Canadian Pacific railway and our system of canals, will not have to be repeated, while they rank among the nation's valuable assets. The expenditure up to the present has naturally been out of proportion to the population, but having rendered every part of the country accessible by rail and water and provided the necessary transportation facilities, we may reasonably expect that each year hereafter will tend to restore the equilibrium.

ONE of the direct results of the adoption of electricity as a power transmitting agent in the operation of street railways will be the development of the class of dynamos having slow running armatures. Multipolar machines are coming into favor very rapidly as generators of electricity. The moderate speed at which they require to be driven offers many advantages. On shipboard, for instance, where space is limited, the engine can be connected directly on to the dynamo shaft, doing away with belting entirely, and even in isolated installations on land, the lower speed of the dynamo is a desirable ultimatum. But it is when used as a motor for railroad cars that an armature with a motion slow enough to couple direct to the driving axle without the intervention of gearing finds its most appropriate place. Gear wheels, even when cut by machinery on the most approved scientific principle, are at best a clumsy and noisy contrivance. They may work well when quite new, but unfortunately they do not remain many days in a perfect condition, and the least wear from the true shape of the teeth is the cause of endless trouble. Much ingenuity has been expended on various methods of meeting this trouble. The adoption of pinions made of compressed rawhide has done much to obviate the disagreeable noise of steel gears, but its use is a continual source of expense to the railroad operators. The production of a direct acting motor, if it has a fair amount of electrical efficiency, while not being too heavy for the purpose, will do much towards increasing the comfort, economy and popularity of the electric street railroad.

STATISTICS recently published leave no room to doubt that a considerable market exists in the West Indies for many natural and manufactured articles such as Canada can produce to advantage. It must be remembered, however, that in bidding for West Indian trade we shall be brought into direct competition with American products of a similar character, and in certain lines with British products also. Furthermore, the period during which these countries have preceded us has given them a hold upon the market of the West Indies which it will be difficult for us to break. Three things are especially necessary in order to our success—first, a spirit of enterprise; second, rapid and first-class steamship communication; third, willingness to purchase West Indian products to the largest possible extent. The first of these requirements, we are able from personal knowledge to say, has not thus far been manifested. While a great many exhibits are being sent from Canada to the Jamaica Exhibition, it is due to the fact that the Government pays all the expense connected therewith, rather than to any individual spirit of enterprise. An apathy that is not creditable to Canadian business men appears to prevail. If the Government or somebody else will undertake the trouble and expense of proving beyond a doubt that a profitable trade can be done in the West Indies, then our business men will be quite willing to do the trading and pocket the profits, but they apparently are not prepared to make personal effort or assume any risks. It was with great difficulty we are informed that several leading Toronto firms could be induced to give $50 apiece to enable a native of the West Indies to proceed to that country with samples of their goods. The experience of every business man should teach him that it is not in such a spirit that victories are won in the world's fields of commerce. With regard to transportation facilities, it is a well-known fact that up to the present time the Canadian steamers have not given satisfactory service. They are supposed to make the round trip between Halifax and the West India Islands once a month, but we have been informed that their regularity cannot be depended upon, and the knowledge of this fact may have had something to do with the apathy in Canadian business circles concerning the West India trade. On the third point, viz., the willingness of Canadians to purchase as largely as possible West Indian goods, it is of course too early to speak. It will, however, be the wish of every patriotic Canadian that the present visit of the Canadian Minister of Finance to the West Indies may result in opening a mutually profitable trade between the two countries. The Dominion Government is certainly deserving of commendation for the enterprise which it is manifesting in this direction.

AFTER all that has been claimed for the progress made in electrical matters in the United States as against the older countries of Europe, it has been reserved for the people of England to produce the first practical and actual electric railroad. By this we do not mean a mere tramway or a few street cars, but a railroad with all the adjuncts and paraphernalia that the name implies—locomotives, passenger cars, signal system and elaborate and ornamental station buildings. It is known as the City and South London Electric Railway, and was formally opened for traffic by the Prince of Wales on the fourth of November last. The road is an underground one tunnelled 60 feet below the streets, with a slight fall below the River Thames a little to the west of London Bridge. This depth has been adopted to avoid the network of sewers, gas and water mains, etc., and is reached at each of the six stations along the route by immense and powerful hydraulic elevators, each capable of holding 150 persons at one time. The main works of the company are situated at Stockwell, where a few acres have been utilized for the erection of the engine sheds and the electrical plant. The cars and engines are drawn to the surface there up an inclined plane by means of cables. As an instance of the fact that the work is on a scale far removed from comparison with any mere tramway work, we may mention that the signal box at the western terminus contains no less than 23 levers intended to work the signals and switches on the various lines, and that the motive power comprises fourteen electric locomotives of the highest finish and efficiency, each of over 100 horse power and capable of drawing a train of 30 tons at a speed of 25 miles an hour. The outcome of this bold experiment in electrical railroad engineering will be watched with the intensest interest by the electrical fraternity. Its success will open up an immense field in suburban railroad work, and though the factories turning out this class of apparatus are now taxed to their utmost to supply the demand for purely street railroad work, there will be an impetus given to their development that must have a marked effect in the industrial world for many years to come. There are many reasons why a locomotive driven by electricity can be used to greater advantage than its rival propelled by steam. First there is the saving in weight to be carried. The weight of tender with water and coal to be hauled by a steam locomotive is a considerable matter, while the weight of the engine itself is greatly in excess of that of the electric motor developing a similar amount of power. In the cost of operating also there will be increased economy. For instance, a fireman will not be required for each train; with central power one man can do the work of five on the road, while the cost of fuel will be materially decreased. The locomotive boiler is the most wasteful steam producer in existence, using up from six to eight pounds of coal per horse power. On the other hand a triple expansion condensing engine driving generators in a central station will do the same work on from one and a half to two. Owing to the intense heat in a locomotive fire-box, which is simply a cupola on wheels, the cost of repairs must be many times the amount required for boilers operated under more economical conditions. The absence of smoke and cinders, while not amounting to much in dollars and cents, will go a long way towards the attainment of the ideal railroad journey as far as regards comfort and convenience. The confidence and enterprise of this British undertaking deserve success, and we are proud that it has been left to the capitalists and electricians of the mother country to make this radical and pronounced advancement in electrical railroad work.

THERE is still apparent among some mechanical engineers a feeling that the electric motor is an intruder. This can only be accounted for upon the theory that its merits are neither understood nor appreciated. The advocates of manilla rope transmission should bear in mind the fact that those most directly interested in that system recommend the electric motor in conjunction with it. The most thorough dissemination of power by whatever means is to the interest of engineers in every branch of the industrial field.

THE trouble and loss which millers are at present experiencing by reason of their inability to secure from the Grand Trunk Railway the cars necessary to transport the grain which they have purchased, emphasizes the necessity for a Railway Commission or other means for exercising Governmental control in the public interest over the operations of the railway companies. The business community should not be left at the mercy of the two giant railway corporations. The G.T.R. and C.P.R. have been allowed to absorb the various local roads built largely by public subscription, and thereby to deprive us of the healthy competition which it was designed should exist. The G.T.R. and C.P.R. have undertaken to do the carrying trade of the country, and it is only reasonable that they should be compelled to do it in a satisfactory manner. It is the duty of the Government to see that the fortunes of private individuals shall not be jeopardized by the failure of the railroads to meet the demand for transportation facilities. The last few weeks has been a time of great anxiety to grain buyers, many of whom would have been utterly ruined had the terms of their contracts been strictly enforced. The Boards of Trade of the country should urge Parliament at its approaching session to make the railways amenable to regulations such as will render impossible the continuance of the injustice from which shippers are now suffering.

IT should be scarcely necessary at this late day to have to correct misapprehensions as to what electric power really means. We often hear the remark that the days of steam engines are numbered, and before long steamers will be crossing the Atlantic in fabulously short spaces of time driven by electricity. This may be, but it will be when some other means of producing electricity are discovered than what we now know anything about. Electricity is not perpetual motion. We must expend some kind of power to produce it. The cheapest way to produce it, if we except water power, that we have knowledge of at present, is by using the very steam power that our enthusiasts are so sanguine of superseding; and not only that, but we must lose in the very act of converting our steam power into electricity and reconverting it, a considerable percentage of the total. It is therefore evident that as a basis of electric power we must have the most economical and efficient transformer of energy. While in certain locations water power may hold its position, it is certain that there are no more hearty admirers of the steam engine than can be found in the ranks of the electrical engineers. In the entire range of mechanical devices there is nothing which so nearly approaches the highest work of nature, the human being, as does the modern locomotive. So also in the quiet and perfect manner in which it performs its duty, there is an appearance of dignity in the operation of the stationary engine which fascinates even the engineer who is most familiar with its construction and work. The development of the steam engine is a most instructive study, and the constant trend of improvement in the direction of economy is unremittent. Triple expansion engines no longer excite curiosity, and they are being followed with the quadruple expansion. So long as steam is the main factor in electrical power transmission will the efforts of engineers be devoted to attaining as great a degree of perfection as finite matters will allow.

THE rapidity with which motors for power transmission are likely to be introduced will be to a large extent governed by their cost. The questions of reliability, safety and convenience are all important, but dollars and cents are the most conspicuous consideration, and this point should by no means be overlooked by the manufacturer of motors. The evolution of a perfect machine of this character is necessarily a slow process. Its original design and construction is in the hands of the inventor and a few practical mechanics. When it is placed in actual service the modifications begin. It is strengthened in one part and lightened in another. Its construction is gradually simplified. The arrangement of the parts is changed in order to facilitate examination and possible adjustment. Nothing but the lapse of time and the exigencies of actual service will develop all the faults and suggest all the improvements which may be made. When practical perfection is eventually attained, special machinery may be devised which will bring the cost of production down to the lowest point, greatly enlarging the sales, even if the profit on each motor is reduced. This is the natural course through which any line of manufacturing must pass in order to attain the highest degree of perfection. So long as competition tends towards the production of a better article at less money, it is beneficial, provided it is done at a reasonable profit. When, however, an effort is made to reduce cost by introducing an insufficient quantity of material, or that of an inferior quality, the result is more likely to show loss rather than gain. The high speed at which dynamos and motors are run, and their susceptibility to damage if not properly balanced and fitted, has led up to first-class workmanship, therefore it seems reasonable to suppose that in this particular branch of the electrical business there need be but little apprehension of retrogression.

THE legislative blow which Mr. McKinley aimed at the head of Canada, and which was designed to bring our people to their knees to supplicate from Uncle Sam the privilege of continuing in existence, has failed of its object. Canadians still maintain a perpendicular attitude, and are developing a strength of back-bone which is daily lessening the possibility of coercing them into a line of action which their judgment refuses to sanction. The possibilities for trade with Great Britain, as set forth in the speech of the Hon. John Carling, Dominion Minister of Agriculture, in Toronto, the other day, must have come in the light of a revelation to many Canadians. He said: "The Dominion trade with Britain was only beginning to develop. This year out of 335,000 head of cattle imported by Britain, Canada would supply about $115,000, and would no doubt greatly increase the quantity next year. Canada only supplied Britain with 2,000 lbs. of the 100,000,000 lbs. of mutton that country imported, 2,000 bushels of the 189,000,000 bushels of oats imported, 41,000 bushels of the 41,000,000 bushels of barley imported, and only 60,000 lbs. of the 633,000,000 lbs. of wool imported. Canada only sends 7,000 lbs. of bacon to Britain, whilst the United States sends 334,000 lbs., and in summer the Canadian bacon brought the best price. Last year Britain imported millions of dollars' worth of poultry, but Canada only supplied $1,500 worth. If Canadian vessels were not fast enough, they must get faster ones with all appliances for cold storage. In the West Indies, Britain, and Australia, Canada would find better markets than those closed by McKinley." Here we find a market which, unlike the "market of 60,000,000" of which we have heard so much, is no mere myth of the imagination, but a solid reality, and towards securing it our energies should be directed. We are pleased to know that by the publication of information regarding the possibilities of trade with Britain, the Dominion Government is encouraging and assisting such a policy. Meanwhile, we feel like sympathizing with Mr. McKinley, whose Bill has rebounded in such a way as to make him wonder what struck him.

ANNOUNCEMENT.

READERS of the ELECTRICAL, MECHANICAL AND MILLING NEWS are advised that a change in the character of the journal has been decided upon, the present number being the last which will appear in the present form. The publisher's entire interest in the milling department has been sold to Mr. A. G. Mortimer, publisher of the Canada Lumberman, by whom it will be continued as a separate publication under the title of the Canadian Miller and Grain Trade Review. Mr. Mortimer, as many of our readers will remember, was connected with the DOMINION MECHANICAL AND MILLING NEWS at the period of its inception in 1883, as travelling correspondent, in which capacity he visited a large number of mills throughout the Dominion. The knowledge of the industry and its requirements thus gained, will no doubt qualify him to publish a journal that shall worthily represent the interests of the milling and grain trades.

The Canadian Miller and Grain Trade Review will be sent to all millers who are at present subscribers to the ELECTRICAL, MECHANICAL AND MILLING NEWS. Those whose subscriptions are in arrears will kindly remit the amount owing to the new publisher.

It is not without a feeling of regret that the present publisher parts from this portion of his constituency, and he would take advantage of the opportunity to thank all who by their subscriptions and advertisements have given him support. It is his hope that a continuance of this support will be accorded the new publication, which, being devoted entirely to one line, will without doubt prove much more satisfactory to millers than the old.

With the commencement of the new year will begin the publication of a new series of this journal, under the title, CANADIAN ELECTRICAL NEWS AND STEAM ENGINEERING JOURNAL. The electrical industry is one of no small importance in Canada to-day, and is growing at a rate which leaves no room to doubt that it will assume gigantic proportions in the future. It will be the object of the ELECTRICAL NEWS to make known as widely as possible the methods by which electricity may be made to serve the interests of mankind, and especially to assist those who may be placed in charge of electrical apparatus without having had the opportunity to acquire a full knowledge of the principles governing its operation.

Steam engines of the highest efficiency are needed to supply the initial motive power for the generation of electricity, and the stationary engineer will hereafter require the knowledge which will enable him to operate both steam and electric plants. It is in view of this that the journal in its new form will deal also with the principles and practice of steam engineering. It will endeavor to bring about at the earliest possible date the organization of a Canadian Electrical Association, and will further to the utmost of its ability the interests of the existing Association of Stationary Engineers.

Without indulging in promises which time might frustrate, this much may be said, that no effort will be spared to furnish to those interested in electricity and and steam engineering a live Canadian publication.

The subscription price will be $1.50 per year.

The character of the paper having been outlined, its value as an advertising medium for manufacturers and dealers in electric apparatus of all kinds, engine builders, belting manufacturers, steam users' supplies, etc., will be at once apparent.

We invite the cordial co-operation of all who desire the success of the undertaking.

THE CANADIAN MILLER AND GRAIN TRADE REVIEW.

In connection with the announcement as above, regarding the transfer of the good-will and interest in the milling department of the ELECTRICAL, MECHAN-

ICAL AND MILLING NEWS, a few words by way of introduction will be necessary. It is with a feeling of old acquaintanceship that we again make our bow to the millers of the Dominion. The kindly introduction tendered us by our predecessor who after the present issue of this journal steps aside from the particular line of journalism incumbent upon the editor of a millers' publication—makes it unnecessary for us at this juncture to more than briefly outline our future course.

We have long recognized the fact that there was a field in this country for the publication of a journal *exclusively* devoted to the flour milling and grain interests. Such a journal THE CANADIAN MILLER AND GRAIN TRADE REVIEW is intended to be. We do not undertake the enormous duties of catering to the wants of the milling constituency without feeling that our experience of the past in this particular line will serve us in good stead, and materially aid us in our future efforts to make THE CANADIAN MILLER a credit to the influential branch of the commerce of our country which it will aspire to represent.

Many new features will at once be made, and we respectfully ask for and expect the hearty co-operation of all millers in our efforts to produce a journal, the interests of which will be the individual interests of every man engaged in the milling and grain trades.

THE CANADIAN MILLER will be published promptly on the 15th day of each month, and the subscription price will be one dollar per year. The initial number under the new name and management will be issued from the office of publication, Canada Life Assurance Building, King street west, Toronto, on the 15th of January next, and we freely invite contributions for same from all who desire to extend a helping hand in supplying news or other matter for publication.

In conclusion we cordially invite the trade in general, and old readers of the ELECTRICAL, MECHANICAL AND MILLING NEWS in particular, to favor us with a call when in the city, and by so doing demonstrate their good wishes for the permanent success of THE CANADIAN MILLER.

A. G. MORTIMER.

THE CENTRAL STATION AS AN INVESTMENT.

IT is evident that the electric lighting business has taken a firm hold as an industry of the world, and that the supply of current for motive purposes will be in increasing demand. Even in this country, the requirements of the public have outgrown the power of private firms to deal with, so that it has been imperative to form large corporations with immense capital to grapple with the task. Central stations have been erected and fitted in many parts of London, from whence the demand for the electric current can be met. Districts have been assigned to the supply companies, and the town mapped out in a similar manner to what existed formerly with the various gas companies, before these latter were consolidated into two huge corporations. The question now arises, Will these stations pay? According to Mr. B. E. Sunny (who read a paper before the Chicago Electric Club meeting on Oct. 20th last), that will depend on good engineering, as the whole secret of dividend-paying enterprises is in their ability to run reliably, every day and every year, without subjecting the machinery to excessive and abnormal demands, and in the avoidance of rebuilding, or abandoning original investments. The plant up to the point of normal and safe output should be fully employed, as well by day as by night; it is the duty of the management, therefore, to endeavor to utilize the machinery during the day in driving motors or charging accumulators, or in any other way that will bring grist to the mill; further, the price at which the electric current can be produced, and that at which it can be sold, leave a margin of profit that ought to be satisfactory.

Now, commercially, the business may be considered a success, from the fact that it is ever increasing. How then does its record read from the investor's standpoint? Can it be reckoned on the same footing with gas-works, water-works, or railways as a dividend producer? Most decidedly it can, and perhaps no people recognize the future of electric lighting more than the gas companies themselves. The American Gas Directory states that the gas companies are operating 32,000 arc lights and 140,000 incandescents. In one year these companies have increased their ownership in electric lights nearly 50 per cent., thus showing their belief in the earning power and permanency of the electric light. Hitherto, the ratio of expansion of business has been put much too low; in consequence, stations have been built on far too small a scale, necessitating, after perhaps only a couple of years, an entire reconstruction of premises and plant to meet the ever-growing demand for electric lighting. Cheap and scratch plants will never pay a dividend in the long run. To be profitable, an installation should be furnished with standard types of engines, dynamos, and apparatus that are not likely to become old-fashioned for many years to come.

By not, at the outset, building a station on a plot of sufficient area, as patrons increase the plant has to be added to until the place is crammed in every corner with a perfect chaos of machinery, and presents what Mr. Sunny concisely calls an exhibition of engineering gymnastics. This kind of station is a financial success, working always at its maximum output, until the demand exceeds the supply, and it becomes necessary to rebuild. The rebuilding means, in many cases, selling off the old machinery at an enormous sacrifice, and the complete loss of all investment in foundations, etc. To prevent such loss in the future, would it not be better to rebuild the majority of central stations on such a scale as will meet the anticipated requirements of electric supply at the end of 20 or 30 years?—London Electrical Review.

MILLING, FLOUR & GRAIN

The People's Mills at Guelph, Ont., have recently undergone improvements. Their capacity has been increased to 700 barrels per day.

The death is announced at the advanced age of 90 years, of Mr. Anson Pearl, who for many years was engaged in the milling business at St. Thomas, Ont., prior to 1840.

The Canadian Pacific road estimates that it will this year move about 12,000,000 bushels of wheat from the country west of Winnipeg, as compared with 7,000,000 bushels moved last year.

Mr. W. A. Matthewson succeeds Mr. McGaw as travelling agent of the Keewatin Milling Co. His duty is to look after grain buyers and elevators. Mr. McGaw will look after the interests of the company in Winnipeg in future.

The Osprey Farmers' Milling Company has been incorporated with a capital stock of $8,000. The names of the charter members are: Thomas Scott, McIntyre; James Feaversham; Thomas Hawton, Robroy; James Buckingham, Maxwell, and Francis Whewell, Ladybank.

Grain shipments from Halifax this winter are expected to be the heaviest that have yet passed through the elevators. Usually shipments do not begin till January or February, but this year the first steamer will load early in December, and it is expected the elevators will run to the fullest capacity.

A Washington despatch, dated Nov. 21st, says: "The Treasury Department has denied an application made on behalf of citizens of Trout River, N. Y., for permission to take grain from the United States to Canada to be ground and then returned to the United States free of duty, on the ground that there is no authority of law for the granting of such a privilege."

The storage facilities at Port Arthur now aggregate nearly seven millions of bushels, of which over six millions are on the line of the C. P. R. If the surplus for export reaches twelve millions there can be no blockade, as there is storage for over half of it, which, with the proportion always leaving and that held by farmers, leaves the C. P. R., which will haul out nine-tenths of it, an easy task.

The management of the Bank of Toronto has forwarded to the family of the late Mr. W. R. Wadsworth, miller, of Weston, who was for many years a director of that institution, an illuminated address which reads as follows: "The members of this board having learned of the sudden decease of their late highly esteemed colleague, W. R. Wadsworth, desire to record their high appreciation of the valuable services rendered by him to this bank, with which he has been identified since its inception, at the first as one of the charter members and for the past ten years as a director. His unfailing courtesy, his practical good sense and his knowledge of the business of the country, rendered him at all times a valuable coadjutor, and the board cannot but look upon his decease as a loss to the institution and to the community."

The Council of the National Association of British and Irish Millers are making strenuous efforts to improve the character of seed wheat, being alive to the fact that farmers generally sell their best wheat and keep the poorer for seed. The fact that wheat containing more gluten and less starch—of good nutritive value in other words—cannot be grown from indifferent seed, needs no demonstration, and an earnest appeal is made to all concerned to improve the situation by selecting the seed. What a field our own affords, says the Baltimore Journal of Commerce, for some such agency. The Government, through the Agricultural Department, is the proper channel by which this reform may be reached. With a careful selection of seed and more thorough and systematic methods of farming, the yield of wheat in the United States would be 30 bushels to the acre instead of 12 as now, and the aggregate production 1,000,000,000 bushels.

A suit of much interest to millers was settled at Osgoode Hall on Wednesday last, after the trial had begun. McLaughlin & Moore, the Toronto millers, had brought an action against the Lincoln Paper Mills Co., for infringement of trade mark. This trade mark consists of an oval shaped scroll with mitred edges, and is used by the milling firm on their paper sacks. The Lincoln Paper Co. disputed the right of the plaintiffs to said trade mark, and had been printing it for other millers and dealers, changing only the wording on the design, and hence the action at law. By the settlement the Paper Co. submit to an injunction restraining them from printing the design in future, and compelling them to withdraw and destroy all the sacks complained of. They also sell and deliver to the plaintiffs all the electros, etc., used in the printing. Each party paying their own costs.

Messrs. Johnson & Barclay's oatmeal mill and elevator at Portage la Prairie, Man., was totally destroyed by fire on the night of October 30th. Nine thousand bushels of oats had been stored in the elevator a few days before the occurrence. The loss is placed at $10,000, but it is scarcely probable that this amount will cover it. The bookkeeper was working in his office at about eight o'clock, when he heard the roar of flames in the partition along side of him, and on investigation found that the place was on fire. He at once took possession of the books and gave the alarm. It is thought that a spark worked its way through the brick partition to the wooden outside. Mr. Johnston, the senior member of the firm, came from Owen Sound, and started business at the Portage in 1883, taking as a partner four years ago P. Barclay, of Birtle. Both men are industrious and hard-working, and much sympathy is felt for them. They intend to build at once a flour mill and oatmeal mill. A public subscription is in circulation for their benefit.

It is a very great pity that shippers of Indian wheat, and those interested in the extension of its use amongst British and Irish millers do not take some steps towards ridding the wheat before it is shipped of the superfluity of "dirt" with which it is mixed. The advanced miller does not object to the ordinary impurities in the wheat, but the simple unalloyed "dirt" is becoming a greater nuisance than ever, and unless something is done towards checking the evil, Indian wheat, instead of growing in favor with our millers, will become "a thing to avoid," whatever may be its price. The dirt or mud in Indian wheat has qualities peculiar to itself; it is not like the dirt in other wheats; in the course of transit in fact, it becomes reduced to an almost impalpable powder, the result being that when it is moved in bulk it creates clouds of smokelike dust of a peculiarly obnoxious character, which no aspiration seems able to remove. Quite recently we were in a large mill where Kurrachee wheats, in bulk, were being discharged from barges by means of elevators; directly the wheat was agitated by the movement of the elevator-cups, clouds of dust arose, obscuring everything, and although the wheat was passed through warehouse separators, with their powerful fans exhausting the dust, when the wheat reached the store the dust was almost as great as before. In this particular case the matter has become a public nuisance; and the miller, who would, if the wheat were suitable, be able to use 2,000 to 3,000 qrs. per week, cannot now touch it.—Millers' Gazette.

TRADE NOTES

Messrs. Robin & Sadler have manufactured for the Royal Electric Co.'s eastern station, Montreal, a 3-ply belt, 112 feet long and 32 inches wide.

The attention of readers of this journal is directed to the advertisment on front cover of Messrs. John Gillies & Co., of Carleton Place, Ont., relating to the Marsh steam pump, of which they are sole manufacturers for Canada. They have secured all the patterns, templates and tools direct from the Battle Creek, Michigan, Mfg. Co., who manufacture the Marsh pump in the United States, and are therefore in a position to furnish exact duplicates. A description of the pump is given on another page of this paper. Any further particulars may be obtained by addressing the manufacturers as above.

Recent sales of Wheelock engines have been made to the following firms and corporations:—Lamb, Mason & Co., Ottawa; Kincardine Electric Light Co; Dr. Robertson, Milton; W. H. Comstock, Brockville; J. & P. McDougall, Maxville, English Portland Cement Co., Montreal, Que.; British American Starch Co., Brantford; A. D. Hermeston, Belmore; T. Waterhouse, Palmerston; Taylor Bros., Don Paper Mills, Toronto; Strathroy Electric Light Co.; Scott & Cross, Toronto; Berlin Piano Co., Berlin; Auston Mfg. Co., West Toronto Junction; W. H. Fowler, St. John, N.B.; Consumers' Gas Co., Toronto; Geo. E. Tucket & Son, Hamilton; Portage la Prairie Electric Light Co.

The Royal Electric Co. have completed and started up the first of last week the electric light plant in Richmond, Que., having completed for that purpose a line five miles long to a water power and moved their dynamos from the Richmond station, where they have been running all summer, to this water power, the present capacity of the plant being 350 lights run from an alternating dynamo, and 15 arc lights run from one of their Thomson-Houston dynamos. They have increased the St. John, (N.B.) Gas Light Company's plant by 30 arc lamps, installed a 650 light alternating plant complete for the Chatham, Ont., Gas Company, and are now building a new 1,500 light alternating dynamo for the Quebec and Levis Electric Light Co., and a 1,200 light alternating dynamo for the Halifax, N. S., Illuminating and Motor Co.

The Royal Electric Co. have shipped a 50 light arc dynamo with 50 arc lamps and a 650 light alternating incandescent plant complete with all the wire and supplies, to the Corporation of New Westminster, B.C. They have installed a 100 light incandescent plant (replacing Craig dynamo) in Joseph Paquette's mill, Montreal, and have sold Hunt Bros., of London, two 40 light arc dynamos, complete with lamps, the Peterboro' Light & Power Company a 650 light alternating incandescent plant, the Ingersoll Rock Drill Co., of Montreal, a 50 light incandescent plant. The Company are starting up the plant at Three Rivers, Que., with 2,000 incandescent lights and 80 arc lamps. For this latter plant they have erected all the steam plant, consisting of boilers and compound condensing engines, with condensors supplied by Messrs. Leonard & Sons, London, Ont. The plant is running in connection with the waterworks and is owned by the Corporation of Three Rivers.

CANADIAN ASSOCIATION OF STATIONARY ENGINEERS.

THE FOURTH ANNUAL DINNER AN OCCASION OF MUCH PLEASURE AND PROFIT.

THE Canadian Association of Stationary Engineers, or to speak more correctly, the Toronto branch of that organization, met at the Richardson House, Toronto, on the evening of the 5th of November to celebrate their fourth annual dinner. They were joined at table by visiting members of the Hamilton, Stratford and Brantford branches of the Association, making a total attendance of about sixty.

Mr. A. E. Edkins, President of the Toronto Society, presided, and gracefully discharged the duties of the position. The *menu*, as on former occasions, was of such excellent character as to occupy the undivided attention of the company for upwards of an hour, when the removal of the cloth was followed by a series of toasts, the first of which being "The Queen," was responded to by the entire assemblage singing heartily the National Anthem, and giving three British cheers for Her Majesty.

Mr. John Lewis responded for "Canada," expressing the pride he felt for his native land. He also touched upon the proposition which had been made to unite the Canadian Association of Stationary Engineers with the National Association of the United States. He warmly opposed the carrying out of such an arrangement, and advised the members of the Canadian Society to work out their destiny as a distinctly Canadian organization.

Mr. Grant supplemented Mr. Lewis' remarks by singing in a very pleasing and patriotic style, "Dear Canada."

The toast, "Our Educational Interests," was coupled with the name of Prof. Galbraith, of the Toronto School of Practical Science, who, in his response, expressed regret that the pressure of his duties prevented him from rendering to the Association as much help as he could wish to do. This Association and that of the Marine engineers had done much towards pushing forward the equipment of the School of Practical Science, and now the fruits of these efforts was beginning to appear in the new buildings lately erected. Notwithstanding that by their erection the accommodation for students had been increased four fold, he predicted that it would all be used up within two or three years. The desire for technical instruction was growing at a very rapid rate. Ten years ago, there were only seven students attending the institution, whose yearly fees aggregated $700; at present the yearly fees aggregate $3,000, the increase being due solely to additional members, as the yearly fees remain at the same amount. The expense of attending the Toronto School of Science was less than in the case of similar institutions elsewhere. In future also students would be given much more for their money, as there were now three courses, viz., Civil Engineering, Mechanical Engineering and Architecture. No attempt had yet been made to impart practical instruction, as in the American Schools of Technology, where the student is led from the simplest work to that requiring the greatest skill. It was proposed to do another kind of work, however, not done anywhere at present, viz., in the line of experimental research. They were now having constructed by the Polson Company an experimental engine of 50 h.p. to work under varying conditions, by means of which everything could be measured in the most accurate way. The amount of coal, water and condensing water would be measured. A number of students could be employed at the same time in taking measurements of the engine's various operations. There would be arrangements for getting at chimney drafts, temperature of fires, etc., thus enabling the student to acquire in a short time what many engineers of the present day had given much time to gain. Students would be able to see the relation of cause and effect, and consequently would be less liable to make mistakes in practice. Machines for testing the strength of iron rods, boiler plates, etc., to the extent of 50 tons were also under construction, and would, he hoped, be in operation shortly. All students would be required to put in one year at practical work in shops. He saw no possibility of being able to undertake evening classes, owing to the inadequacy of the present staff for such a purpose, but perhaps it might be possible, say once a month, to set apart three or four hours for engine trials in which members of the Association might take part. It would probably be found necessary to add another year to the course, but he hoped they would be able to give them the benefit indicated next year.

One of the members enquired whether it would be possible for engineers to obtain records of such observations.

Prof. Galbraith replied that complete records would of course be kept, and would be open to inspection by all engineers.

Mr. St. John, Government Inspector of Steam Boilers, whose name was also coupled with the toast, expressed the pleasure he felt at hearing of the progress being made at the School of Practical Science. He suggested that an unused appropriation made by the Dominion Government for appliances for testing boiler plates at the Toronto inspection department, might possibly now be secured and applied towards the purchase of testing machines for the School of Practical Science. There were a great many men who, having their living to earn, were unable to take advantage of the facilities which the school affords, and who don't take advantage of the means at hand for self education. He had been much impressed by the progress made by some in this direction. He instanced the case of one man who five years ago could not read or write, but who applied himself to the task of self-education with such success, that in six months he was able to write well and read fluently. This man lately came up for examination for a higher grade certificate and could work decimal fractions easily. There was great benefit to be derived from being associated, hearing papers read and experiences compared. He would like to encourage them to go on and obtain all the information possible. Books were now so plentiful and formulas so clearly explained, that any one with a common school education could master them.

Mr. Frazer, Secretary of the Boiler Inspection and Insurance Company, referred to the fact that Canada now exports to all countries, and that with increased production comes keener competition, necessitating the use of better machinery, and a greater degree of skill in its operation. Technical education was necessary to the attainment of such skill.

Mr. Mayne, on rising to respond to "Our Manufacturing Interest," said he would confine his remarks to the branch of manufacturing in which he was engaged, viz., boiler making. Canada, and indeed all the world, was greatly indebted to manufacturers. The prosperity of every village, town and city was dependent to a large extent upon them. Without manufactures they amounted to nothing. France had 50,000 stationary engines; Germany, 60,000; Austria, 12,000. The motive power of the United States and Canada amounted to 8,000,000 horse power; of England, 7,000,000 h. p.; of Germany, 4,600,000 h. p.; of France, 3,000,000 h. p.; of Austria, 1,600,000 h. p. These figures did not include marine and locomotive power. There were 105,000 locomotives generating 3,000,000 h. p., which, added to the stationary engine power, brings the total up to 46,000,000 h. p. Four-fifths of these engines had been made within the last twenty-five years. The steam power of the world represents the power of double the present population of the world. People were heard to complain that manual labor was being done away with, but how could we do the work of the world without manufactures? Some of our manufacturers could now be found investing $100,000 in machinery plants who a few years ago would have looked upon a few hundred as a large investment. Regarding self-education, he had often found specifications drawn up by members of this Associotion, that could not have been better executed by a consulting engineer. He advised his hearers not to be afraid to impart information to others, as they would gain, rather than lose by so doing. At present there were only a few men possessed of both theoretical and practical knowledge, but by and by they would be much more plentiful.

Mr. Smith Watts, representing the Amalgamated Society of Engineers, responded to the toast, "Our Sister Societies." He stated that the membership of the organization to which he belonged amounted to 68,000, and the expenditures for sick benefits, etc., reach $1,000,000 per year. The same field was open to this young Association, and the influence exerted by it might be proportionately great. However good an engine might be, it was comparatively useless without a good man to operate it. The advance in education among stationary engineers was truly astonishing. The reputation of engine builders was to a large extent dependent upon the ability of the engineers.

Mr. Smith, Secretary of the Maine Engineers' Association, responded on behalf of that body, expressing best wishes for the progress of the C. A. S. E.

Mr. A. M. Wickens, ex-President of the Association, and closely identified with its formation, gave a *resume* of its history and development, and was pleased at the growth of brotherly feeling among its members.

Mr. Sutton made a characteristic speech, well calculated to awaken the enthusiasm of every member.

Messrs. Tweed and Glencoe favored the company with songs, after which came the toasts to "The Press," "The Ladies" and "Our Host and Hostess."

The company separated shortly after midnight, having enjoyed a delightful evening, carrying with them the conviction that the Canadian Association of Stationary Engineers is founded upon correct principles and is fulfilling a useful mission.

SLUICES FOR RIVERS.

AT a recent meeting of the mechanical section of the British Association, Mr. F. G. M. Stoney read a paper on "The Construction of Sluices for Rivers, etc." He said:—In Indian irrigation many attempts have been made to work, or render more workable, sluices for the supply of water to canals, and while some experimenters confined their attention to overcoming great resistance with greater power, others have more properly sought to devise means for eliminating resistance to motion in sluices, rather than overcoming that resistance. This latter is the true direction to work in, and has eventually conduced to the best results. Several forms of the throttle valve have been tried on irrigation sluices, and have not succeeded. The ordinary sliding doors are subject to an amount of friction which precludes their useful application to such large openings as are now generally required. The most successful sluice for almost any situation is the sluice on free rollers. In this case there is not any sliding friction. The sluice door with its load of water presses on free rollers, the motion being similar to that of drawbridges on free rollers, and to that of observatory cupolas mounted in a like manner. There is, however, one marked difference as to the planes of motion. The ordinary application of free rollers was on horizontal planes; in the sluices it is on vertical planes, which was one of the primary difficulties in the way. Sluices on free rollers are now constructed to any required size, and so as to be easily workable under great pressure by one man without hydraulic power. They have proved very reliable during years of test, and the wear and tear is hardly noticeable, chiefly because of the absence of resistance. These sluices can be usefully applied to the purpose of increasing water power without increased risk of flooding the country; on the contrary, they have proved most successful in preventing floods. They can also be applied to the main stream of navigable rivers, as in the plan now sanctioned by Parliament for Richmond, in which three sluice gates, each 70 feet clear span, are used to hold up water to half tide, and at that period or level of water the gates are quickly raised some 23 feet above Trinity high-water mark, to allow of barges and steamers sailing under.

PUBLICATIONS.

The first of a series of commercial bulletins designed to show the possibilities for Canadian trade with Great Britain and other countries, has just been issued from the Department of Finance, Ottawa. This bulletin is given up entirely to the egg and poultry trade, and contains figures and other information of the greatest value to every one interested.

The holiday Northwestern Miller for 1891 is billed to appear shortly. It would be difficult to conceive of more handsome publications than have been the Miller's holiday numbers of the past three or four years, yet the publishers promise that the one forthcoming will outshine them all, and in view of the past who will feel disposed to doubt it. *Vive le* holiday number.

Since the meeting of the General Conference in Montreal last September, the Methodist Book and Publishing House makes another stride forward in its popular periodicals. A new paper for young people, with the progressive name "Onward," an eight-page, well-illustrated weekly, is issued at the low price of 60 cents a year, singly—over 5 copies, 50 cents a year. It is edited by the Rev. Dr. Withrow, whose management of the Methodist Magazine and Sunday-school periodicals of the Methodist Church has been so successful.

AN ELECTRIC POWER HAMMER.

CHARLES J. Van Depoele, who has been prominently identified with the development of electrical traction for street railway purposes, has devised an electric power hammer which represents a radically new application of electro-magnetic principles. In general design the hammer is quite similar to the steam hammer, with its vertical cylinder mounted upon an arched frame, and the rising and falling piston by which the hammer-head is carried. The novelty of the apparatus lies in the substitution of electro-magnetic power for steam by a slight and very simple modification of the mechanism. The piston is of magnetic material, and the cylinder is composed of a series of coils through each of which an electric current may be passed separately. The apparatus is virtually an immense electro-magnet, the cylinder being the coil and the piston answering to the core. The passage of an electric current through the coils forming the upper part of the cylinder raise the piston into the magnetic field thus created. By cutting off the current and simultaneously transferring it to the lower coils of the cylinder the piston is released and its descent is accelerated by the magnetic attraction created below. As a magnetic field can be created in any of the series of coils, the blow may readily be shortened or lengthened as desired. The current is controlled by levers and connections identical with those used on an ordinary steam-hammer. The absence of the steam-pipe is the only feature distinguishing the machine from the common steam-hammer.

THE PROPER DIMENSIONS OF CHIMNEYS.

THE size of a chimney is modified to some extent by its form and proportions and the character of its interior. A chimney, round inside, with a straight uniform flue, is the most efficient. If it tapers at the top the area for calculation must be at the top, and a square flue is equivalent to a circular one of a diameter equal to its side. Friction, says the Boston Journal of Commerce, lessens the effectiveness of a chimney and is usually considered as equivalent to reducing the section two inches all around. The effective area, this is called, and is the one to be considered. It is always best to have a chimney as well as a boiler plenty large for the work it is to do. There are two methods of estimating the size of the chimney: one is by the area of grate, and the other by the amount of coal to be burned; but they are, in a measure, identical. A good Corliss engine will run on a consumption of three pounds of coal per horse power per hour, with a fairly efficient boiler. An allowance is made for contingencies and a consumption of five pounds of coal per horse power is taken as the basis for the chimney. The horse power must be the largest amount the boiler will be called upon to provide for.

Having the horse power it is necessary to fix upon another proportion in accordance with whether it is desired to make the chimney a very high one or not. The height is usually determined upon arbitrarily; that is, it is often regulated by the height of surrounding objects above which it must be carried. It is not desirable to have it less than 60 feet high, and as the draft increases only as the square of the height, it is not desirable from the extra cost to have it very high. Not over 160 feet is recommended by the best engineers, even for powers up to 2000.

Having the horse power and height, to find the effective area of the chimney, multiply the horse power by .3 . Divide the product by the square root of the height, the quotient giving effective area in feet.

If the effective area is settled upon, to find the height, square the horse power, multiply by .03, and divide product by effective area. The effective area will be the area of a shaft 4 inches less than the actual diameter.

To find the diameter of the chimney, multiply the square root of the effective area by 13.54 and to the product add 4. This gives the diameter in inches.

To find the length of the side of a square chimney, multiply the square root of the effective area by 12 and to the product add 4, giving length of side in inches.

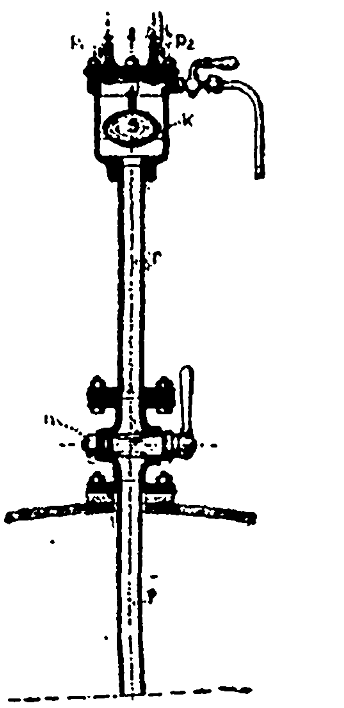
Another rule to find the proper area for a chimney is to multiply the grate area in square feet by 120 and divide product by the square root of the height, giving the area in square inches.

SELECTING LUBRICANTS.

THE time is not very remote, remarks an exchange, when any substance almost was considered suitable for lubricating machinery. So long as grease in some form was obtained it was deemed sufficient, and the selection of a particular lubricant for particular work was seldom, if ever, thought of. "We have changed all that," as the proverb of our French friends says. It is an indespensable factor in the profitable working of machinery that everything shall be done to utilize the full power of the mechanism, and to minimize the wear and tear of it. Competition is so keen, and profits are so small, that the most diligent attention is given to proper lubrication, as being one means of preventing loss of power and wear of plant, or at least of minimizing them. The care required is in the selection of the description of lubricant. The oil which is best adapted to contribute to the smooth and easy revolution of a heavy shaft in its journal boxes would not do for a light and swiftly-running spindle. In the first case the oil must possess cohesion among its own particles, and so much adhesion to the surface of the metal of the journal and of that of the box, as to constitute a perfect and resistant cushion, by which at all points of the revolution these opposing surfaces shall be prevented touching each other. In the latter case the consistence of the spindle oil must be much less; a great deal of viscosity might, indeed, impair its usefulness for its special purpose. These qualities of the lubricant are entirely physical. They may be ascertained by friction tests with the viscometer and dynamometer. It is important that the conditions under which they are tested should be as similar as they can be made to those under which the lubricant will be employed. There is another feature to be regarded. The oil must be free from corroding action on the bearings. It is quite possible that an oil may be all that is needed in the reduction of friction, and yet not be suitable for use. The corroding action varies considerably, and is not alike in any two oils; and, on the other hand, oils which have no corrosive effect on one metal have an injurious effect on another. A difficulty is often met with when the friction between different metallic surfaces is found to be less than between surfaces of the same material. In this case a lubricant is desirable that will reduce to a minimum the friction between both, and the corrosion of both; but it is very difficult to secure. Mixtures of mineral oils with vegetable oils are preferred as lubricants, because the effect of the former is to diminish, but not altogether to destroy the corrosive property of the other oils. It must also be remembered that pure mineral oil has a decided corrosive action on lead, equal to that of cotton seed, and greater than that of olive oil, to which it is sometimes added to prevent action on bearings made of an alloy into which lead enters. Lead is most easily affected by whale, lard and sperm oil, Iron is least affected by seal, even less than it is by mineral oil. Tallow oil is the most corrosive for iron, and olive oil ranks next. It is useful to remember that mineral oil has no effect on copper; of the other oils, sperm affects it the least and tallow the most. So great is the action of lard, seal and tallow, that they should never be used on copper. Tin is least affected by olive oil, and most by cotton seed oil. It will thus be seen that the corrosive action of lubricants should always be considered.

AN APPARATUS FOR INDICATING AN EXCESS OF WATER IN BOILERS.

A RECENT number of *Glaser's Annalen* has a description of an apparatus for showing an excess of water in boilers, the invention of Richard Schwarzkopff, of Berlin. It consists of a tube *r*, the open lower end



HIGH WATER INDICATOR FOR BOILERS.

of which lies in the boiler on a level with the highest permissible water mark; this tube can be closed by the cock *h*. The upper end of the tube carries a head *k* in which a float *s* is placed. This is provided with an upright rod, so arranged that any upward motion will press together two strips of spring brass lying directly above it.

As long as the water in the boiler remains at a proper level, viz., below the end of the tube *r*, steam will escape from the small cock in the head of the apparatus, and the springs will remain apart. But as soon as the maximum water level is reached the tube *r* and head *k* are filled with water, the float is raised and the lower spring pressed against the upper. The contact of these pieces is improved by two slips of platinum brazed to the brass, one slip on each piece. These springs are connected by wires and binding-screws p_1 and p_2 with an electric bell.

In this way it is possible to give a signal to the engineer in the engine room, or at a more distant place, of the excess of water in his boilers.

In nearly all previous inventions for this purpose the float has been placed in the boiler itself, where it was coated by boiler scale and tossed about by the motion of the boiling water. Observations of the interior condition of a boiler in use show that this motion is much more violent than is generally supposed to be the case. Therefore it was only natural that the parts in the boiler were soon destroyed. The inventor of the apparatus under consideration claims that none of these evils are felt in his indicator, since the only motions the float can have are a very small rise and a corresponding fall. There is also no injurious deposit of scale on the float, whereby it would be weighted, since the water in the boiler is raised into the head *k* but few times, steam usually filling it. The apparatus can be removed by closing the cock *h* and removing the bolts from the flanges directly above. In use, the cock in the head is kept very slightly open, in order that the water may rise in the tube *r*, when it reaches its maximum level.

THE MANUFACTURE OF PEARL BARLEY.

THE art of making pot, or roll barley, as it is called in the southern parts of Germany and in Hungary, has, alike with all other industries, says the Millers' Review, had its fair share of attention and improvements as time went on. The demand for this article of food, well known in every household now, is steadily increasing. No doubt the improved method of its production was the cause for finding greater favor. In former days its manufacture was not productive of an adequate return of profits to the miller, for those old machines cut up the grain too much, and then, too, the waste was always more or less a loss, since the maker had not yet been taught to what good use it could be turned. It is quite different now, for to run a barley mill at the present day is equal to a speedy acquisition of wealth. It cannot be said, however, that every miller of the old school failed in making his trade pay. There are exceptions. The reason of failures was to be sought in lack of shrewdness in the selection of grain and the want of proper judgment in its manipulation as well as over-trust in mere machinery. This holds good to this day. Pearl barley is exported in great quantities, especially to Russia and the Danubian States.

The manufacture of pearl barley is of German origin, and from Germany it was introduced to other countries. Even to-day its manufacture on rational principles remains in comparatively few hands and is guarded by them as a great secret. Since, however, such secrecy is injurious to the common interest, I publish the results of my experience, acquired during long employment in a barley mill, for the use and profit of all those millers of this country who may find a better paying trade by adopting its manufacture. The process requisite for the production of pearl barley may be divided into six operations, viz.: Grading, cleaning, decorticating, separating the hull, cutting the grain into a greater or less number of pieces according to the size of the kernels, polishing the kernels, grading the prepared barley, and removal of the flour made during the process.

The preparation of the barley for manufacturing is, at the beginning, the same as that of wheat. From the bins it is raised to a separator in order to remove dust, seeds, sticks, and other impurities. Then it is submitted to the best scouring machine obtainable. Right at these operations is where great precaution must be observed, as the perfect work here will tell on the product. Should the barley be of inferior quality, it will have to repass these machines.

This done, the husks are split in a cylindrical machine especially made for this purpose, and the shells and smaller grains are removed. The first two reels are clothed about alike, but the reel over which the barley must pass after final decortication is in four different numbers, which grade the barley kernels according to length. An assortment of this kind is most important, because graded barley is much easier cut and saves less waste. What has fallen through the first two reels is of inferior value and will have to pass through the same process again. It is cut, but not polished. The glaze is only put on the finer sorts. The good grain, cleaned by the last decortication, is taken to a scourer of four sizes of meshes and assorted in four grades. Every grade of barley is cut separately, but large grains of the first, second or third shelling may be brought under the polishers whole. All are now glazed. The glazing is suited to the different grades of fineness. Suppose an ordinary kind took six minutes for polishing, then the second best would take eleven to twelve minutes, and so on. The naming of the grades is not found alike in different mills, and the degree of fineness depends always on the demands of the customers. Usually from six to ten sizes are manufactured and sold under different names.

The waste in cutting and polishing is called the flour, which may be separated in several different sorts. After polishing, every number or kind of barley passes the dressing machine and an aspirator to take out the hulls, etc., etc. The treatment of the smaller grains is the same as that of rolled barley. They are generally glazed by a single passage and assorted in two sizes, which are dressed separately. The refuse of the husking is separated in first and second quality and sold for feed. The flour collected during the polishing can be used with rye flour for common bread, and it is in this product mainly where is shown how well the miller attended his cleaner. Poor grain cleaning makes a very dark flour only fit for feed, while thorough cleaning makes a very acceptable flour to be used for rye bread.

THE FLOUR MOTH.

THE following report on the flour moth (*Ephestia Kuhniella*) was submitted to the Provincial Board of Health by the Secretary, Dr. P. H. Bryce, at its last meeting:

To the Chairman and Members:

GENTLEMEN. During the months of September and October I undertook, at the request of Dr. Bryce, an inspection of the flour mills and retail flour and feed stores of the city, for the purpose of discovering the presence of the flour moth, which he had reason to believe had not been completely stamped out during the preceding summer. The mills were pretty thoroughly examined, but it was not possible to overtake all the retail stores, consequently only those were visited which he had reason to suspect might be infected.

The moth was found to have obtained a foothold in two of the mills in the city doing a large business.

In the first mill the moth seems to have been present in considerable numbers during the early part of the summer, but the proprietor claimed that he did not know it was such a serious pest. An examination of the premises showed the presence of the moth flying about the office and mill, but especially in a dark cellar in which part of machinery is placed. The larvae with their webs were found in almost every spot where an accumulation of dust had taken place, and also numbers of the cocoons. He was instructed as to the steps to be taken in order to rid himself of the pest, and he immediately began a process of cleaning and white-washing throughout the whole mill. The walls, etc., were swept down and the sweepings burnt, then the mill was whitewashed throughout and the cellar made lighter and airier by the opening of another window. He has promised to take still further steps, by burning sulphur and steaming, but as yet he has not done so. His mill was visited on Nov. 18th, and although much cleaner and better ventilated, still the moth had not disappeared entirely, and it was pointed out to him that if he did not take more vigorous steps he would have trouble in the spring.

The Macintosh mill was troubled considerably during the summer by the presence of moth, so much so that it was found necessary to abandon the cellar for grinding purposes. The moth is still present in the rooms on the first two floors. They claimed to have cleaned up carefully, whitewashed and burned sulphur, but as yet they have taken no steps to disinfect their bags.

A number of millers seem to have realized the necessity of protecting themselves, and some of them see that the bags that are returned to them are disinfected before being used again.

The retail stores are extremely favorable centres for the spread of the pest. Most of these dealers receive stock from several mills, and thus assist in passing the moth on in the egg stage from infected to uninfected mills. Some of them admitted having seen the moth during the summer, but as none of them kept a stock long on hand it is only in stores where dust is allowed to collect that the moth would likely remain any length of time. One wholesale dealer admitted having seen the moth in his store during the summer, but on examination in September failed to reveal its presence. The store is clean and light, and the cellar is not used at all. A gentleman on Yonge Street had seen the moth flying about during the summer, and a few were still found about the bags. There was more opportunity for the moth to breed in this store. Another supply man on Queen Street had also seen the moth flying about during the summer months, but said that they had completely disappeared. A careful search, however, disclosed a few still in various parts of the store. A number of other retail stores were examined, but no trace of the moth found. In the cases where the moth was found in the stores, the stores were dark or not well ventilated and there were accumulations of dust which might easily serve as breeding places. Had it been possible to overtake all the retail stores of the city, I have no doubt other centres might have been found, as several of the millers seemed aware of the presence of the moth in retail stores.

On account of the lack of interest which some millers have shewn in the subject, a second bulletin, which is here appended, has been sent out to millers and retail men in city and local health officers in the province. As a consequence of the sending of the second bulletin, a gentleman in a western town has sent in some oatmeal which he suspected contained the ephestia. An examination of it proved that the larvae were present. In this case the larvae had been developing in oatmeal still sticking to a bundle of oatmeal bags. The bags were burnt.

A few days ago a package of corn meal was sent in from the local health officer in Meaford, suspected to contain the ephestia. The larvae in it, however, turned out to be common meal worm.

Respectfully submitted,

J. J. MCKENZIE.

METHODS OF IMPROVEMENTS.

R. JAMES ABERNATHEY writes to the Millstone as follows: As a sort of text I clip the following from a private letter from an operative miller, received by me a few days since. "I have just helped to start this mill after having been re-programed to three breaks, a double set of 9 x 18 rolls on each break, and it is no exaggeration to say we have increased the capacity one-third, and also do better work." While a great calm has rested for a long time on the sea of controversy that for two or three years was kept rolling and heaving by the angry blasts of wind emanating from the great struggle among systems fighting for the supremacy, it is evident that quiet, but none the less effective work, has been going on, with the revolutionists fairly in the lead and making rapid strides in a forward direction.

The foregoing incident is only one in a great many, but serves at this moment to recall the scenes of the past and to teach a lesson for the future. The mill referred to was among the first in its section to be changed from buhrs to the gradual-reduction system, and was undoubtedly run by its owners for several years in quiet contentment, unaware of anything better in view; but now we are informed that the mill has been changed to a three-break short-system mill with better results and largely increased capacity. Whether or not results might have been still further improved and capacity further increased by the adoption of the two-break system, which, as is generally known, is a sort of pet hobby of mine, I do not know, nor do I care, so long as it has been demonstrated in this case, as in hundreds of others, that a system of breaks, less than half in number than was in general use a few years ago, does just as good, or better, work and more of it with the same amount of machinery. I am quite content, in this instance, at least, to drop all reference to individual hobbies, and again raise my voice, persuasively, of course, in behalf of a still further extension of the shorter and better system of milling. So long as I do not insist on two breaks as a system there will, I think, be no antagonism from any direction, as all parties interested in mill building operations are well satisfied to build or remodel on the three-break plan. In doing that they have yielded a great deal of ground and more than half way, which is as much as reasonable men ought to ask, and hence, from now forward, I shall call off the "dogs of war," and when I speak of, or in any way refer to the short system, I will mean the three-break, the two-break, or the one-break, or all three of them under one general head of *Short System*. All of them are successfully filling their respective missions, the two first in merchant milling and the last in small custom milling. To the milling fraternity everywhere I will say, there are your systems, take your choice. As to the two first it will be a matter of judgment or inclination. The one is a system of high milling; the other a system of low milling, with final results substantially the same. As to the the third, all must be governed by location, circumstances and conditions. The main point, however, is this. If one mill can, with the machinery already on on hand, be made to increase output and improve condition, why cannot another? Why cannot all?

The last interrogatory I will withdraw, as I think there are many mills that are as good, perhaps, as the skill of man can make them, and that do excellent work in all respects. It is extremely doubtful if it would be wisdom to take the time and trouble to change the system simply to improve results so long as there is a question of doubt as to whether the improvement will fully warrant the expense and time lost in making the change. If, however, the business of the mill demands increased capacity, then by all means make the change by shortening the method and utilizing the machinery for more work, and at the same time work for the improvement of the product.

But aside from all the various systems of roller mills in actual operation, doing good, bad and indifferent work, and requiring attention in proportion to the kind of work they are doing, there are still in the country a great many mills that have been neglected by their owners and no effort whatever made to improve them. As they were operated by the forefathers of the owners, so they are substantially operated to-day.

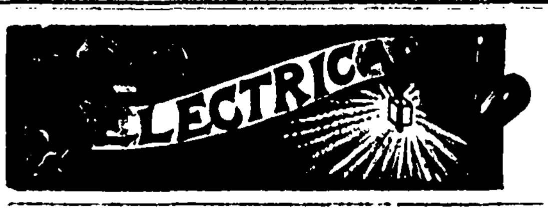
It is presumed that many might have improved their mills long ere this, only at first roller mill building was very expensive, and the business of the mills would not justify the great outlay. Then, too, system discussions may have later interfered with the improvement of mills, and still later the long era of general dullness in trade may also have aided in retarding trade, but at this time there seems to be no valid excuse for not improving. There are methods now that adapt themselves to the wants and requirements of all, and all can be suited. For two or three years past a general dullness in trade and a lack of business in many sections may have acted as a legitimate hindrance to many that would have otherwise done something, but that has now passed, or is rapidly passing, and it requires no spirit of prophecy to foresee that we, as a great commercial people are entering upon one of those periods of great business activity similar to many already passed through. As other business is affected, so will the flour making trade, all will be active alike; if there should be any difference in degree of activity, it will be in favor of flour-making for some very good reasons. The past few years of general dullness has retarded the growth of the industry somewhat, while the flour-consuming population has increased very rapidly, thus throwing the flour-making facilities relatively behind. And again, as will be noticed by all observers, the quantity of flour that is exported has been increasing year by year, and it now looks as if by and by it will be all flour and no wheat that goes abroad, so that with the certainty of renewed activity a largely increased home market and a constantly expanding foreign market for our flour, there can certainly never be a time so auspicious and inviting as the present, nor one that will offer more encouragement to those awaiting a time to fit up their mill.

AUSTRALIAN WHEAT DETERIORATING.

SAYS the South Australian Chronicle: A matter of vital importance to the farming community, and indeed to the whole colony, has been recently brought under the notice of the Bureau of Agriculture by the Flour Millowners' Association. It appears that for past years there has been a gradual deterioration in the strength of South Australian flour, caused by the decreasing gluten-producing power of our wheat. Efforts have been made from time to time to establish a trade with Europe in South Australian flour, so as to more fully utilize the mill-power of the country, which is capable of doing twice the work that can now be found for it. The capital sunk in buildings and machinery in connection with flour milling in this colony is considerable, and it seems probable that the rapid development of wheat-growing in New South Wales will shortly enable that colony to supply its own breadstuff requirements, thus still further curtailing our inter-colonial exports of flour, and rendering it more than ever necessary that a trade with Europe should be established. The placing of flour on the London market means that it is brought into competition with the American product, which is much stronger in gluten than our own, and is consequently largely used for mixing purposes by English bakers. Our wheats, being exceptionally dry, are bought to mix with the damper wheats and are greatly in favor, the gluten being supplied by the wheats mixed with them; but our flour, although good in color, sells sparingly and mainly for pastry purposes. In Victoria the millers this year have also great trouble in maintaining the standard of gluten in their flour. That the staff of life should become weaker and weaker is a serious matter, and one which may well command the attention of our agricultural chemists and scientific farmers. Is it the effect of the exhaustion of soils, brought about by the repeated cropping without manuring, or is it the outcome of repeatedly sowing the same kind of seed year after year? Experiments with different kinds of manures might lead to satisfactory results, but the element of expense is, of course, an important consideration. There is in the caves of Narracoorte a large quantity of very valuable guano, estimated at upwards of 3,000 tons, and it sells very slowly in South Australia, the bulk of the quantity taken out going to Victoria. The dryness and delicacy of South Australian wheat will always command for it high prices in the world's markets, and if we would utilize our mill-power and increase or even maintain the present export of flour, we must endeavor to strengthen the gluten producing quality of our wheat. A large manufacture of flour would give employment to a number of hands and cheapen the price of bran and pollard to the manifest benefit of the stock-owners. The Bureau of Agriculture will be doing a great service to the country if it can suggest some practical remedy for the deterioration complained of, and the Government would do well to remit the duty on wheat imported from other countries for seed purposes.

PERSONAL.

Mr. James Jones, of the well-known firm of James Jones & Son, mill furnishers, Thorold, Ont., is at present in England negotiating for the sale of the European patents for the Climax Break. We are pleased to learn that he has every prospect of selling these patents at a satisfactory figure.



The Vankleek, Ont., Electric Light Company has been incorporated.

The Rat Portage Electric Light Company has just commenced operations.

The Central Presbyterian is the first Hamilton church to adopt electricity for lighting.

The town of Regina, in the Northwest, will be lighted with electricity, work on the system having been started.

The management of the Kingston street railway have decided to adopt electricity as the motive power next year.

Mr. Campbell, manager of the Kingston electric light plant, has gone to Woodstock for the period of three months.

The mayor of Vancouver, B. C., proposes that the city should become owner of the electric light and tramway plant, at an estimated cost of $250,000.

Mr. W. Farwell, of Sherbrooke, Que., in company with J. W. Simmonds, Portland, Me., has secured incorporation for the Roberts Storage Battery Co., with a capital of $1,500,000, in the latter city.

The Kamloops, B. C., Electric Illuminating Company will soon be in a position to supply that town with light. A thirty-five horse power engine and the necessary generating apparatus will go into operation at once.

There is said to be a possibility of Brockville having an electric street railway next season. A company of local capitalists now hold a charter, and it is understood to be their intention to utilize the plant of the incandescent light works for supplying the motive power.

To secure uniformity in regard to rating a circular has been issued to customs collectors throughout the Dominion placing bells, annunciators and pushes and other articles wholly adapted to telegraph and other electric and galvanized apparatus and not suitable for other purposes under section 544 of the tariff, dutiable at 25 per cent.

The County Council of York has granted permission to the Metropolitan Electric Railway Co. of Toronto to adopt a different rail and to make other changes, the heavy cars necessary for the use of electricity having proved too much for the present track and rail. The company will also be permitted to extend their line to Richmond Hill.

Application is being made to the Quebec Legislature to incorporate "The Ries Electric Traction and Brake Company of Canada," for the purpose of utilizing and developing the application of electricity to motive power, working, manufacturing and dealing in electrical apparatus and machinery for such purposes, and for producing light and for other purposes.

The Sherbrooke, Que., R. C. seminary and college, the cathedral and bishop's palace, have adopted the electric light. Contracts have been closed with Mr. Albert J. Corriveau, of Montreal, for the plants. It is the intention of the college authorities to put up an electrical laboratory in connection with their plant, and have all the necessary electrical apparatus for the study of electricity by their scholars.

The economy of small electric motors for industrial purposes is shown in a shoe factory in Brockton, Mass., where for the last year and a half a 25 horse power motor has been running the machinery. This is being replaced with three motors of 15, 10 and 5 horse power respectively, and a saving of 6 horse power is looked for from the change. The electric power company that furnishes the current agrees to charge less for the current for the three small motors than it did for the one large one.

The Royal Electric Company write as follows: "We notice in the September issue of your ELECTRICAL, MECHANICAL AND MILLING NEWS an item among the electrical notes from Vancouver, B.C., in which you state that the old Thomson-Houston plant at the corner of Abbot and Hastings streets, Vancouver, would not be used any longer. This is an error which we would thank you to have corrected in your next issue. The old plant referred to, which was displaced and discarded, was the Edison Company's plant installed several years ago, and now replaced by the Westinghouse Electric Company's plant. As this is a reflection on our system, we will be pleased if you will correct the same."

For the past three months the Northern Railway Company of France has had in operation at Calais an electric light installation which possesses some peculiar features. At Calais three stations require lighting, namely, the town station, the harbor station, and the goods depot. The generating plant is situated close to the town station, but is several kilometres distant from the harbor station and goods depot. The plant consists of two 150 horse-power Chaligny engines, four 13 kilowatt (65 volts x 200 amperes) compound-wound dynamos, and four series-wound dynamos, having a maximum output of 27 amperes and 1,200 volts (32.4 kilowatts). At the harbor station there are two series-wound motors, which drive two low-tension dynamos through shafting. At the goods depot there is one series-wound motor, which drives two low-tension dynamos. The electric transmission of power is carried out on Brown of Oerlikon's principle; that is to say, a series-wound motor is driven by a series-wound generator at an almost constant speed, which is nearly, but not quite, equal to that of the generator. The electrical plant was constructed by the firm of Breguet, and at each lighting centre a battery of accumulators is provided as a stand-bye, and to supply current during the hours of light load. The efficiency of this arrangement is, of course, considerably lower than would be the case if the lighting were carried out on the alternate-current transformer system. The two motors at the harbor station have at ¾ load, an efficiency of 55 per cent., and at full load an efficiency of about 60 per cent. Taking the commercial efficiency of the generators to be 85 per cent., the commercial efficiency of the whole arrangement at ¾ load is about 44 per cent.—The Electrician.

The market value of platinum, says The Electrician, is at the present moment nearly equal to that of gold, their respective prices being £4 and £4 3s. Eighteen months ago platinum was to be had for about 30s. an ounce, and six months ago the price was under £3. Apart from the question of a possible "corner," and the ever increasing demand for platinum for electrical purposes, this 166 per cent. rise in price within eighteen months may be attributed in a large measure to the increased cost of production at the mines in the Ural Mountains, whence we draw our chief supply of this metal. The owners of these mines, owing to their large yield of gold, were able to sell platinum comparatively cheaply; the gold, however, is now becoming scarce, and hence the platinum, which is still plentiful, can no longer be sold at so low a figure. Platinum, besides being used for the leading in wires of glow lamps, is largely used for electrodes in electro-chemical work, and up to the present no satisfactory substitute has been found so far as these applications are concerned. The history of platinum is as interesting as its characteristics are remarkable. During the sixteenth century it was observed that the gold ore from the Darien mines included grains of a whitish metal. This discovery was not made known by the Spanish Government, because they found that it made an excellent material for adulterating gold. It was only about the middle of the last century that the metal began to find its way into Europe. The Ural Mountain deposits were discovered about 1823, and they have been worked by the Russian Government since about 1828. Platinum is generally found in small grains, but masses of considerable size have been discovered, thus in 1682 a specimen, which weighed 11,614 gr., from Condato, was placed in the Madrid Museum. Platinum was coined by Russia to the extent of half a million sterling between 1826 and 1864, when the coinage was discontinued. Almost all platinum contains iridium, which greatly increases its hardness and durability without impairing its power of resisting chemical agents. Liebig said that "without platinum crucibles, which share the infusibility of porcelain with the chemical inertness of gold ones, the composition of most metals could not have been ascertained, and chemistry could not have come to its present level." One of its most important uses is for large evaporating stills for the concentration of sulphuric acid. A still of this kind valued at nearly £4,000, exhibited at Vienna in 1873, was capable of concentrating 20,000 lbs. of sulphuric acid daily. This particular use for platinum has to a large extent been discontinued, and at one time the quantity of platinum thus set free caused a decline in its market value.

THE WONDERFUL ALLOYS OF ALUMINUM.

EVERYONE has heard of the bright and elastic blades of Damascus and of India that carry an edge so keen as to cut a silken robe like a razor, and yet have such a magnificent temper that they are neither broken nor dulled by being hurled by a strong arm against a granite wall, or by being used to cut a bar of iron in twain. Faraday's hint that this miracle was explained by the presence of small quantities of aluminum has been accepted. The great guns cast at St. Petersburg, by using one eight hundreth part of aluminum are not only free from bubbles and other common imperfections, but on being etched with acid they showed the wavy lines of the finest Damascus steel. Exquisitely delicate castings can be made by adding only one eight thousandth part of aluminum to wrought iron, by which also the melting point is instantly lowered 500 degrees. These are called by the trade "mitis castings." Aluminum may be alloyed with gold, silver, zinc, tin, and several other metals, in each case with remarkable results; but its alloy with copper, discovered by Dr. John Percy, F.R.S., is doubtless the most valuable of all yet produced, and it is of this that we shall chiefly speak.

In the church of St. Germain, Paris, there are twelve noble candlesticks, six feet high, and also an exquisite crucifix, which seemed to be made of the purest gold. They have stood there for 25 years without visible alteration; their lustre and color being as perfect as at first. The material, however, is not gold, but is aluminum bronze. I once saw a complete dinner set made of this beautiful alloy, which could not be told from choice gold, except by its lighter weight. In rising from two to seven per cent., the bronze changes from a rich red gold to a peculiar greenish gold hue. Every grade polishes well, is malleable cold or hot, yields easily to the graver, is more elastic than steel, and can be trusted to make very sharp castings.

Every one and one-fourth per cent. of aluminum added to the copper doubles its ductility, so that a wire of the alloy will stretch two-thirds of its length before breaking, and the tenacity of the higher grades is perfectly wonderful. The machine by which tenacity is tested is itself interesting. A pair of steel hands grasp the opposite ends of a short rod of known diameter, and then, steam being applied, they begin to pull, and meanwhile the number of pounds is indicated on a marked balance. As I had the pleasure of seeing the tests applied to various metals. The experiments were most exciting. Annealed copper gave way at a strength of 32,000 pounds to the square inch. Wrought iron held on till a strain of 50,000 pounds had been reached. Cast steel burst with a report like a small cannon at 63,000 pounds. Ten per cent. aluminum bronze stood firmly up to 85,000 pounds; while eleven per cent. stubbornly resisted till the enormous force of 120,000 forced its closely knit fibres apart, and I was assured that it even had endured a strain of 130,000 pounds before breaking. It is unquestionably the strongest metal known. Imagine a slender rod, one inch square, holding up a load of from 40 to 60 tons! One of the most exacting tests to which ten per cent. aluminum bronze has been subjected is in its use as a firing-pin in proving ordnance at the Springfield arsenal, in which service it resists 130,000 percussions, whereas steel pins are crushed in about 9,000 blows.

And now comes a most curious fact taken with the foregoing. By adding more aluminum the alloy becomes so brittle that at 20 per cent. it will break if simply dropped on the floor, and can be pulverized in a common mortar, like bismuth or antimony. The reader might infer, if not set right, that, in order to get a ten per cent. bronze, ten pounds of aluminum would be melted with 90 pounds of pure copper; and, of course, it could be done in that way. But a short cut has been invented of great ingenuity, by which the alloys of aluminum, and certain other metals, too, can be finished for about one-quarter the cost that would otherwise be incurred. This process was invented by the Cowles Brothers, of this city, assisted by Prof. C. F. Mayberry, and was first publicly described by them in 1885, though it has since gained wide celebrity.

Imagine a single oblong box of fire-clay lined with charcoal. On a bed of charcoal is placed a mixture of granulated copper and of granular corundum—an ore of aluminum obtained in Georgia. The furnace has a perforated cover, and is open at both ends to admit electrodes. These furnaces may be of any desired number or dimensions. The main smelting works are at Lockport, N. Y., and the electrical supply is from dynamos of from 125 to 150 horse-power, the largest in existence. The current of from 1,500 to 3,800 amperes is conveyed by copper cables as large as a man's arm to the huge carbon electrodes, which convert that enormous energy into the most intense heat known, the result being that the copper is melted and the corundum reduced so as to form an alloy there in the furnace, which may be cast into ingots, analyzed and recast till the exact per cent. sought is gained. And yet this mighty current whose strength at any given moment is accurately shown on a dial can be perfectly regulated by resistance box which enables the operator at will to decrease the flow from its greatest intensity down to zero, without breaking anything or causing any serious flashing of the dynamo. The practical result is that aluminum in alloys is reduced to 35 cents a pound; and this cheapness enables the bronze to be used for purposes that could not be thought of were it necessary first to extract the pure aluminum from the ores before making the alloys. The Cowles patent covers also the reduction of silicon, boron, sodium, magnesium, etc., the most refractory ores yielding to its potent and novel methods.

The Aluminum Brass and Bronze Company, which controls the exclusive rights, under the Cowles patents, is located at Bridgeport, Conn., in buildings just completed and covering an area of 65,000 feet. About 300 hands are now employed, and the number will be increased when the works are fully developed. The capacity of these works will be a million pounds per month. Although the shops are just opened, some work has been already done worth mentioning, the results being entirely satisfactory. The *chef d'œuvre* thus far is a propeller, nine feet in diameter, and weighing but 3,000 lbs., for the United States gunboat Petrel—a splendid specimen of what can be done in aluminum bronze. The company announce that they are ready to furnish pure aluminum castings, 16 grades of aluminum bronze, besides several grades of aluminum brass, aluminum silver and other alloys. They also make a specialty of silicon copper.

How remarkable it is that the addition of the metaloid base of so brittle a substance as glass to such a metal as copper should produce an alloy that, when drawn into wire, leads all other metals both for tension and torsion. When used for ordinary telegraph wires, for which it is admirably adapted by its high conductivity, the poles need not stand nearer than within 1,000 feet of each other. Wires of this material withstood perfectly the strain of the famous blizzard of March, 1889. Large orders for telegraph, telephone and trolley wires have been filled both from this country and from abroad. As an extraordinary instance of what can be done with this wonderful alloy, it may be cited that the telegraph wire stretched across the entrance to the Dartmouth Harbor, England, has a single span of 2,400 feet, or nearly half a mile. The wire used is No. 17 silicon copper, and weighs but 24 pounds. On the Dartmouth side it starts from a point 332 feet above high-water mark; it sags to 198 feet, and then rises to 207 feet on the Kingswear side of the harbor.

PURIFICATION.

By W. J. Bates.

A MILLER on being questioned by another as to the secret of making good flour, gave the laconic answer, "Purify, purify, purify." I do not think a better or more expressive answer could be given—certainly not in so few words, for in this process lies one of the secrets, if not indeed the secret of successful flour manufacture. We are all ready to admit its importance in theory, but still liable to underrate its value in practice.

Purification, as we understand the word, applies only to the one process of removing light impure material from that which is heavy and pure, but the term can be legitimately applied to any process in the mill where cleaning and separation are in progress. Thus we purify our wheat, using various processes to accomplish our object, because we know it is dirty and polluted with foreign matter. Our aim is purity in all things, and surely this is an attractive ideal. The separation of the husk, or "offals," from the pure flour of the wheat by sifting or dressing is only another form of this one universal process of purification.

Of course I am aware that each of the above processes has its distinct technical appellation; but the admission does not disprove the fact that they are each and all a part of the system we term milling, the essence of that term being purification, or the separation of the pure from the impure—in a word, the food of man from the food of beasts.

I am rather sorry that this excellent term, purification, is applied to only one process and appropriated to one machine. I am afraid, too, that the machine sometimes belies its name, for instead of being a purifier it becomes merely a sifter or grader. I fear also that many of our operatives have very hazy ideas of what constitutes purification. In men of only average intelligence and no proper training, it would be unwise to expect great niceties of discrimination. I say it, not reproachfully, but with regret, that the average operative miller is wofully deficient in discrimination and a poor judge generally of the work he is doing. In a trade like milling so much depends upon uniformity, and everything is so liable to variation, that it is absolutely necessary for men in charge to detect the slightest tendency to change either way and to detect it before any mischief ensues.

It is not a pleasant thing for the manager to find on coming into the mill in the morning that it has been run, he knows not how long, with short feed during the night. He detects at once what the men in charge have altogether failed to notice. (I fear I am wandering from my subject, so will proceed.)

Amongst all the devices—electricity included—which have been tried to accomplish the separation of pure from impure, none have succeeded without air currents. We shall admit that air is the best purifier, but in its application we sometimes differ. The original system of air currents acting upon falling material was an excellent one, and for many purposes has not been superseded. But, like the millstone, they have had to give way, in some parts of the process, to more perfect machines; but the principle still remains good, and may be improved.

Ingenuity has not exhausted itself in the purification of granular material by means of upward currents acting upon its descent; and probably when inventors have attained perfection with sieve purification, as they now promise to do, they will turn their attention to the somewhat discarded system called gravity purification. Even now it seems to be more generally adopted in combination with sieves for overtails, and other coarse stock, for which indeed it is admirably adapted.

We can scarcely discuss purification without bringing in the kindred operation of scalping, for one necessarily waits upon the other. So many changes have taken place in our mills and methods of late, and particularly in scalping, introducing theoretical improvements in results that we scarcely know where we are—for changes inevitably cause other changes. All, however, seem to agree that a gentler handling of impure products gives better flour, and there is possibly something in it; but experience teaches us to discount many of these statements and promises, sometimes regretfully.

With the style of scalper I am not now concerned; but the scalping, or clothing, I feel at liberty to speak about—the usual clothing is from about 18 upwards, and the tendency is to finer scalper covers, with the object of getting smaller and purer semolina, but this, I think, is a mistake, as it can be done only at the expense of either the bran, which is cut up, or, if the bran is not cut up, then the finish is bad. I do not pretend to know everything in milling, but it does seem a mistake to regulate the size of semolina by the break rolls and scalpers. The fact of its being done does not alter the result, or render the principle correct.

Our object is at all times to obtain the largest quantity of semolina possible and as little break flour as we can, for the reason that we can purify the one and make patent, while the other at best is an inferior product. If we set our rolls close enough to make semolina small enough to pass 24 wire, we must groove them fine to avoid tearing the bran, and then we inevitably make a large proportion of break flour—we cannot avoid it—especially if our feed is heavy. Besides, we get a heavy feed of small branny stuff on the last break, which makes it difficult to finish either that or the bran, and consequently, when finished, the latter feels harsh and gritty.

Now experience has convinced me that this style of working is wrong. We cannot effectually graduate the size of our semolina by one simple operation—another is needed, and this is a sizing, or grading roll. It is by far the best plan to scalp coarse, say 16 for first and second, and 18 or 20 for third; the latter breaks are thus relieved of a large part of the feed, and will make a much cleaner and more rapid finish. In fact, for short system milling it is essential.

This coarse product can be easily separated from the finer material by sieve or similar device, purified by aspiration, and then gently reduced with either a smooth or a finely grooved roll (a dull 6th break roll will do admirably). It can then be gently scalped in a suitable machine, the fine product thereof joining the original fine middlings, and the impure branny product to either the last break or a special roll, where a clean finish can be made. By this system the middlings will all be collected at one spot for further treatment, and will also be almost pure and of uniform size.

Having thus obtained a uniform, or almost uniform, grade of middlings, it becomes a question of how we shall prepare them for purification; for in the preparation, it appears to me, lies a greater difficulty than in the actual purification.

As I have before remarked, dressing, whether with reel or centrifugal, is really a form of purification, although often incomplete. If we dress and dust our middlings so that no particle of dust adheres to them, we find they are very easily purified. But if, on the other hand, we only partially dust them we not only experience a difficulty in their purification, but we also feel that in the operation there is considerable waste.

Now, this is where the doubt and uncertainty come in with me. I have not quite made up my mind whether I should dust violently and thoroughly, as with a centrifugal, or lightly, as with a sieve, thus leaving a portion of dust to be removed by the air of the purifier, although I certainly incline to the latter method. I know what the critical expert, and possibly most of my readers, will say, and that they will laugh at my foolish hesitation. Let them, however, remember that my hesitation is the result of thought and not of a hasty conclusion—and I think I have reason on my side. I look at it in this way. Middlings requiring purification must necessarily be contaminated with impurities. Those impurities, as we are aware, are of an unpalatable nature—light, flocculent, and adhesive. They are supposed not to dress out in the dusting process (and indeed some do not, being too large), but it is considered absolutely necessary to remove them before the middlings are ground, for fear they should then go through with the flour, and yet there is far less danger of this taking place at this than at the dusting stage; for then they are round and sharp, whereas after reduction they are softer and flat.

It will be argued that we cannot make patent flour without pure middlings, and we cannot purify dusty middlings. This is true, no doubt, but there is also something to be added to complete the truth, which is that in attempting to obtain perfectly dustless middlings we must of necessity make some very dirty flour. I defy anyone to dress hard material like coarse middlings or semolina thoroughly, so that no light dust adheres, without putting into the flour impurities which should certainly be extracted by air. If anyone doubt the truth of this I ask him to prove it by putting some coarse middlings or semolina into a reel or centrifugal clothed with 14 silk, and get a loaf baked with the product. It will be a dark and poor loaf, although the flour does not look amiss. How is this? Why, that dirty, impalpable, fluffy stuff which adheres so tenaciously to the semolina (and which corresponds exactly with the dust we get in our dust catchers) has been rubbed off and consequently forms a good portion of the product dusted out. If purification is to be of any practical value it must be in the extraction of those impurities which are as fine as the flour itself, and too fine to tail over in the ordinary rough dusting process; for it is obvious that coarse, branny material, which may certainly have a slightly impure appearance, can be easily separated by dressing. If it does not pass the silk when the middlings are violently dusted it surely will not after purification and reduction, and in any case this kind of impurity can do little harm.

It is customary to assume that anything having a floury appearance which may find its way to the dust catcher is just so much good flour wasted. I am not, however, quite sure of the correctness of this assumption. A great deal of that impure matter which we find it advantageous to extract, either by air or silk, is light in colour and floury in appearance. It is best, however, to prove its value before deciding as to its quality, and the best test of all is a loaf of bread from it. Its value can also be fairly gauged by weight and tenacity. If, for instance, on wetting it shows strong evidence of [illegible] then we may, I think, conclude that all is not quite right. If on the other hand—and this is easily determined—the product of dust catcher gets rotten and refuses to stick together, it may be safely concluded that, however white and floury in appearance, there is nothing wrong; the quantity of dust in dust catcher may appear to be excessive, but if it is free from good material (as determined by foregoing experiment) the excessive quantity is evidence rather of good work than otherwise, showing that the right machines are doing their work, for it is better there than in the flour. The more impurities we lift out with air the better it is for both the working of the succeeding machines and for the flour.

We all agree that good flour should be extracted before the middlings go to the purifier, but it should be done as carefully as possible, and without disturbing that adhering flocculent material; for it seems the nature of the stuff to stick to the rough surfaces of the semolina, while the heavier pure flour falls away by its own gravity in a suitable machine. I do not believe in making one part of our flour very dirty that the other may be made very clean. If we can make it all pure and clean so much the better. That should be our object. But let us not lose our common sense in the pursuit of our ideal.

Milling has passed through many phases, and we sometimes, nay often, I fear, have to reconsider and modify our prejudices and established beliefs to make them harmonize with its developments; but still we can, and indeed must, think for ourselves. There is no greater slave, no baser tool, than he who does a thing because another does it or tells him to do it. The man who has to lean thus upon another is not fit to be trusted, indeed, he cannot trust himself! Everything has to be done to suit the varying circumstances of the situation, and this is where individual thought rather than an established ritual is required and will succeed. There are, of course, broad principles which we must all follow, but it would be utter folly to attempt to make the details of one mill a model for another which may be doing a different trade altogether. As soon might we build a mill just suited for hard wheat and put it to work on soft wheat.

Just how to free the middlings from flour and not to overdo it by too great violence is a delicate and difficult matter. There seems to be no compromise between the violent centrifugal or reel on the one hand and the too gentle sieve of the rotary type on the other. Clearly some other kind of machine is needed for this function, and this necessity appears to me to be the inventor's opportunity. I certainly think the less we conglomerate our chop the better dusting we are likely to get. Thus, if each break is treated as far as possible separately a better result is obtained than if we mixed all together and then tried to separate or dust them. More particularly this applies to, say, second and fourth or fifth breaks—the one is almost dustless, the other almost all dust, and that being the case it is folly to spoil the possibility of good work.

As to the correct method of feeding, clothing and working a purifier, we seem now to be as far off a settled plan as ever. Pure middlings, or at least clean-looking middlings, can be obtained in limited quantity with almost any purifier. We have only to use fairly fine silk, and cover it with a heavy feed, adjusting the wind so that no bubbles arise, when the heaviest and purest will find their way through; but, of course, a very large proportion will tail over, which will also be very impure. This style of purifying is very deceptive, for instead of being lifted out the impurities are only floated over, and will still do as much mischief as they would originally have done unless they get further treatment on other purifiers. It then becomes a question whether it is best to purify in this manner successfully, that is, by sifting out a portion on one purifier and sending the residue, or overtails, to another, clothed coarser, and so on, continuously, until all are properly finished, or to split up the middlings into different grades and sending each grade to a suitably clothed purifier, where a finish is made at one operation. Possibly cleaner-looking middlings can be obtained by the former method, but I think a better and more complete purification is effected by the latter. The feed is it finer, and the wind has consequently a more searching effect and carries away the impurities far more effectively than with the thicker feed, for then, if an extra force of wind is used, such as would operate well on the thin feed, it rushes through in certain places, causing waste, while the other portions of the sieve are practically inoperative. It is impossible to obtain all the middlings at the mill bright and pure: there is bound to be a portion of coarser material, having small portions of husk adhering, and the only way to really separate or purify it is by reduction, that is, to get white clean middlings; but although it has a branny appearance, it may nevertheless be quite pure as far as wind can do it, and if reduced for flour straight off the impurities would easily dress out.

It seems to me that the secret of purification is to search the middlings with a fairly strong air current, and using silk coarse enough to allow all the sharp middlings, whether sharp or not, to pass through; by this means we get a large quantity, in fact all the middlings purified, whereas by sifting and tailing over we get a limited quantity pure, and leave a larger portion to be either used impure or to be dealt with by other machines.

The recent improvements in English purifiers (I say English, because our friends across the water (America) seem to have no faith in these innovations, and for once, either through prejudice or ignorance, have allowed us to get a decided advantage over them; possibly they go on the principle that no good thing can come out of England) enables us to have complete control over the wind and middlings under operation, with the additional advantage that when once in the air current the impurities cannot possibly return to the sieve again; and when we consider how very inefficient the old styles were in this respect, we must certainly allow that great advances have been made. A more absolute separation of offals from pure middlings can now be effected than was ever dreamed of before.

The test of purity in middlings is their transparency. Whiteness is certainly no proof of purity, for if white clean-looking middlings, but impure, are re-purified, it is surprising what a change can be wrought in them, and what soft sticky stuff can be extracted. In this second operation they lose some of their whiteness and appear rather inclined to yellow, but they handle more lively and glisten, which is proof that their whiteness was in part due to foreign matter. The change which is effected in the appearance of the middlings by proper purification is conspicuous also in the flour, for instead of that soft, fluffy feel, the flour has now a lively appearance, due in some measure to freer dressing, owing to the removal of the soft impurities. This being the evident result of good purification, does it not more than prove that violent dusting is a mistake, and also that returning the product of dust catches back to any portion of the flour, however low grade it may be, is a mistaken economy? It would be far better to try to get a little more of that soft, fluffy stuff out of the flour into the dust catcher, that stuff which nearly all dust catchers catch so inefficiently, and which so offends our nostrils and tickles our throats, and when there (in the dust catcher, not our throats), to keep it there for another purpose than human food.

In our anxiety to get a high percentage of flour, and to prevent what we consider to be waste, we often, I fear, commit inconsistencies and damage our products, whereby we suffer a real loss, for we surely degrade the quality of our flour, and this inevitably leads to reduced prices and difficult sales. A great deal of white is required to effectually counteract the mischief which a very small amount of black causes.

Secondary purification.—This is a question, or matter, upon which there is considerable difference of opinion. I have already touched upon it in my remarks about scalping and re-purification. Some milling engineers aver (and many millers, without much thought, agree with them) that if the products are properly purified as they come from the scalpers, there is no need for a secondary treatment; and also, that in any case it must be wasteful, as the middlings are flattened by reduction, and carry flour with them which will be blown away with the air. This is possibly true, but it is equally true that however pure you may get your semolina—fine middlings would not, of course, stand purification after reduction—there is still matter adhering to the residue after reduction, which is certainly best out, and can be got out best by air. Besides, if the theory of re-purification being unnecessary was true, how is it that there is any residue at all after two or three reductions? If semolina could be perfectly purified so that after reduction there were no light impurities, why not simply make it into flour straight off without the trouble of dressing? There is a residue, however, and always will be, from the purest stock. It comes partly, no doubt, from that fine material which forms the walls, so to speak, of the starch cells; these cells being fractured, loosens this light fluffy stuff (is it cellulose?), and if the operation is not too severe the reduced middlings—the product of the semolina—are left in a state in which they can be well and profitably repurified; and the clearest proof of this is in the appearance, first, of the middlings themselves, and next, in the rubbish which has been lifted out, and which if left in to be handled in all the subsequent operations to which the middlings are subjected, would most certainly stand a fair chance of ultimately getting in the flour, which would not be improved in weight nor quality thereby. Flour with a woolly feel has generally an excess of this kind of colorless impurity.

The mischief generally is caused by too much dusting. The desire to get the products into a state fit for purification sometimes leads us into excess in this way, especially with low class stock; for as I said before, violent dusting makes more bad flour than good purification can overcome. Therefore in many cases it would be far better to reduce common middlings and tailings as quick as possible, and not to dress too close. The heavy pressure of the rollers enlarges the impurities, and a fairly heavy feed causes them to tail over into the offals. By gentle reduction of this class of stock some good middlings may be obtained, but I am convinced by experience that it causes more mischief to produce them fit for the purifier than they are worth after purification. It looks nice in a mill to see all the products going to the rolls clean and free from offals; but if we look at those reels and centrifugals upstairs which have helped in the process, and analyze the flours therefrom, or test by any simple test, we shall, I fear, feel inclined to qualify our admiration, and to mentally admit that it is possible to go too far after an ideal, indeed, to attain too great perfection.

This theoretically perfect system, of enormous length, formed the groundwork of an American book on milling published a few years ago. The author, no doubt, fully believed in what he there elaborated, but I fancy if he now had to re-write that work he would, as the result of experience, find it necessary to curtail his systems and to modify some of his then expressed opinions.

It is now generally admitted that too many operations, whereby the system is prolonged, is a mistake, but some in their zeal to remedy this defect have gone to the opposite extreme of having too few machines to do the work properly. Four breaks might do very well in a mill where three would be altogether insufficient, and the same remark applies to all the operations throughout the mill, particularly to the purifiers. For first-class work there must be a full complement of these essential machines, and it is a fact the more perfect work we do here and on the break rolls, the less smooth roller surface and the less silk surface we shall require, for the whole product grinds better and dresses better, besides, being purer, coarser silk can be used, consequently both flour and offals reach their respective sacks in a less roundabout way. If we can avoid too much of that mischievous dusting, we shall be nearer our ideal of perfect milling than we could possibly be with the most elaborate and complicated system in the world.

I know something of complication and elaboration, and the worry and trouble it causes, with the attendant incommensurate results. I therefore speak with the more confidence in its condemnation, and I do this on behalf of my fellow workers.—London Miller.

COMPRESSED AIR FOR POWER DISTRIBUTION.

WITHIN the limits of the city of Dresden the erection of steam boilers is prohibited, and with a view of developing small industries and also supplying electric light, the question of distribution of power has recently attracted considerable attention. Electric distribution naturally suggested itself, but the objections to high-tension currents led to a consideration of compressed air as a means of power distribution. Dr. R. Proell, well known in this country as the designer of the Proell governor, has worked out an elaborate scheme, and in a phamphlet published by himself and Messrs. O. L. Kummer & Co. of Dresden, gives very complete details, both in calculations and drawings, of a project for supplying 7,500 indicated horse power, and he expresses the opinion that a well-designed and carefully arranged installation of this kind, would compete in economy with an electric installation involving distribution by cables over long distances. A careful perusal of the pamphlet itself will probably enable the initiated to form a better opinion on this question, and we will confine ourselves to stating the general features of the scheme. Provision is made for the erection of ten triple expansion condensing engines, working with an initial pressure of 150 pounds and twenty-fold expansion of steam, each engine to indicate 750 horse-power. The cylinders are to be 18.9 inches, 30.7 inches, and 49.2 inches in diameter and 49.2 inches stroke, working at 60 revolutions per minute, which gives a piston speed of 490 feet per minute. The engines are arranged horizontally; the fly-wheel shaft has two cranks, to one of which are connected the intermediate and high-pressure pistons, tandem fashion, and to the other the low-pressure piston and air-pump, the latter placed vertically below the foundations. Coupled to the extended piston-rods, in each case, is an air compressor. The steam consumption is estimated at from 12.1 pounds to 12.5 pounds per indicated horse-power per hour. The air compressors have cylinders 27.5 in. in diameter and 42.2 inches stroke, same as the engines, and while the latter are, of course, controlled by the Proell valve gear of the latest pattern, the air compressors are fitted with mechanically controlled double-beat valves of the Riedler type. The cooling is effected by an external water jacket round the cylinder covers and valve chests, injection being objected to by the designer. The twenty compressor cylinders are calculated to produce 2,200,000 cubic feet of air of 120 pound pressure per day, crediting the compressors with a coefficient of efficiency of 90 per cent. Steam is to be generated by fifteen water-tube boilers of the "Durr" type, each having 2,200 square feet of heating surface, the fuel is to be lignite, fired into regenerators of the Schneider type, and with this arrangement the author expects to obtain an evaporation of five pounds of water per pound of lignite. An interesting automatic regulation is next described and illustrated, which has the object to adapt the air compression to the consumption. It consists of a pressure regulator operated upon by the air in the main, and altering the point of cut-off in the steam cylinder, thus either increasing or decreasing the speed of the engine until equilibrium is again established.

Probably the most novel features of the scheme consist in the motors, which it is intended to erect for the utilization of the compressed air. Heating the air during expansion and at the same time injecting a water spray, are the leading points. For medium powers of four horse-power and upwards, the author proposes to use the "Doerfel-Proell" engine, of which a considerable number are already in regular use with steam, giving very economical results at from 200 to 300 revolutions. This motor is combined with a coil boiler, in which latter the compressed air is heated before it enters the motor, and during the heating process a small amount of water enters the coil from an overhead reservoir, while the exhaust air is used for accelerating the draught, thus establishing a self-regulating arrangement. For small powers of from ¼ horse-power, a new compound single-acting engine has been designed, somewhat of the pattern of the numerous box engines, the two cylinders being arranged on one centre line vertically above each other, and the pistons attached to the same crank passing between the two. In these little motors a gas-burner is provided under the bottom of the low-pressure cylinder to heat the air as it expands in the latter. This heating is of considerable importance, and when completely carried out the author asserts that air motors can be worked as economically as any other method of power transmission, or producing steam-power on a moderate scale. In large engines, however, such as would be necessary to supply electric light for a district, the air-heating appliance would require considerable heating surface, and to obviate this, combined gas and air engines on the plan of Mr. Fischinger have been designed by the author, in which the heat of the gas explosion is immediately utilized to warm the compressed air used as motive power in the air cylinder. The two cylinders are arranged horizontally, tandem fashion, the air cylinder nearest the crankshaft. The compressed air enters the jacket of the gas cylinder, which latter is of the two cycle Benz type, cools this and enters the working cylinder ready heated. That all this has been most elaborately worked out in calculations will be expected by all who know Dr. Proell, and anyone sufficiently interested in this scheme will do well to study the pamphlet in question, which moreover contains detailed calculations on the capital to be expended as well as working expenses. —Engineering.

When the finishing or bran operations of the mill are reached, says the St. Louis Miller, neat adjustment becomes more necessary. Ability to determine correctness of adjustment by feeling is possessed by few grinders. Hence you will frequently see the careful competent grinder compare the products of the different ends of a roll, to aid his work in uniformity. Then, by selecting unfinished particles of bran at the end of operations and by tracing back by comparison find out exactly at what point, in grinding the material is getting by, untouched; rather than by feeling all along the line until the impropriety is reached. And, however the search be conducted, it should be followed persistently until all improperly worked particles of bran disappear from the finished bran. For, unless all particles of bran are uniformly finished the grain reduction work is not perfect.

SOME SOLDERING KINKS.

EVERY millwright should have some soldering tools, and he ought to know how to use them. If he has no tools, let him go and buy some at once. Any hardware dealer keeps them. Don't buy tools too small for the work they are to do. Coppers weighing one pound each are the smallest ever needed in a paper mill, and one 2-pound copper should be bought also.

Solder can be bought ready-made, but it is better to use a special grade of solder for each different kind of work. The solder bought ready-made ought to consist of two parts of lead and one of tin, and may be used for soldering lead pipe and all kinds soldering except the very heaviest, for which three parts of lead and one part of tin answers fully as well.

Some "tin whackers" use a fine solder made of 1 part lead and 2 parts tin; but more lead will do just as well, except for blow-pipe or gas soldering, when the larger amount of tin is an improvement. For general mill-work, I should make up a solder of, lead, 1 part; tin, 1½ parts, for fine work; and some coarser solder, 2 parts lead to 1 of tin for heavy work. When making solder, put some fine charcoal in the ladle with the lead and tin. This keeps the air from oxidizing the top of the hot metal, and very little "dross" is formed. The same plan works well when melting Babbitt metal or other alloys having a low melting point.

Having made the solder and bought "coppers," the first job is to tin them. Some coppers come already tinned. I didn't buy mine, so they surely were not tinned. I melted up some old copper in a crucible, and cast the bits in a molding sand. I tried to melt the copper in a white-hot fire of anthracite coal under a five-foot boiler, but the fire was not hot enough, so the job was finished in the blacksmith's forge. A fire big as a half-bushel basket was built up, the coal was well coked, and the crucible was buried therein. I had no further trouble in melting copper, beyond two hours steady work at the bellows.

Buy the coppers, by all means, if they are to be had, but if "out on a job," then make them, even if it is necessary to melt the copper in a thick, wrought-iron ladle.

For tinning soldering coppers, nothing is better than a soft-burned brick for a dish to contain the tin and the solder. With a cold-chisel dig a cavity in the top of the brick (the flat side) two or three inches long, and wide enough to receive the soldering tool. Melt some solder into the cavity thus formed, also throw in some pieces of sal-ammoniac and a few bits of rosin.

See that the copper bits are hot enough to melt solder; a greater heat will not tin as well as the low one. Rub the tool on the brick, melting the solder, sal-ammoniac and rosin.

The brick scours the copper bright, and the flux causes the solder to adhere very easily. One of the most horrible things ever attempted by an honest man, is to solder a dirty, greasy job with a dirty, untinned, soldering copper. Never try it. It is as foolish as to attempt making bond paper out of cedar bark and old papers.

See that the surfaces to be soldered are clean. If not, make them so by filing or scraping; then protect the surfaces from oxidation by an application of flux, or muriatic acid in which zinc has been dissolved. Have the soldering copper hot. Hold it two inches from your face and the right degree of heat will soon be learned. Have the copper cleaned, as well as hot; also it must be well thinned. When all these conditions exist, the melted solder will flow along the seam with the greatest ease, leaving a smooth, well-finished surface of solder behind it. No lumps, no open places, no smearing, and no burnt fingers caused by trying to solder before the tools and job were got ready.

If a man has a box of rosin and a bottle of "killed spirits of salt" (zinc dissolved in muriatic acid), he can do almost any job of soldering which may come along; but to do work in the best manner and the easiest, a flux should be provided for each metal to be soldered. The hydrochloric (muriatic) acid and zinc flux is worthless when rust is to be avoided, for in some cases the acid continues to act after the soldering is done, and in a few months may eat into the metal far enough to separate the solder from the work. In this case, of course, the joint becomes unsoldered and falls apart.

In soldering zinc, some men use muriatic acid, diluted with water, for a flux, and the rusting action is more than ever to be feared in this instance, but may be lessened by adding soda carbonate (washing soda) to the acid. There are few pieces that cannot be soldered without the use of an acid flux, and rosin will do nearly as well if a little oil be added, or if the soldering copper be dipped in acid and then into oil before applying it to the seam with rosin on it.

Sal-ammoniac is the proper flux for copper, and this agent also works well with tin, but it is not necessary, for resin is all that is needed. Lead is perfectly fluxed by tallow (the plumbers call it "touch"), but may be soldered with either of the other fluxes.

When hard soldering is to be done, borax is the proper flux, as for welding, where a cheaper material is often substituted, as when sand is used for iron, and lime for steel. Hard soldering, brazing and welding are all of the same nature as the welding operations, and with the electric soldering bit these operations are carried on as readily as soft soldering is done with a copper bit.

DOUBLE BELTING.

THE economical transmission of power has always been a subject of interest both to the manufacturer and user of machinery. The heavy cumbersome gearing that was formerly used in shops and factories for the purpose of transmitting the motive power to the different departments has given place to the more simple and economical method of transmission by belting and pulleys; consequently, the upright shaft, extending from the basement to the uppermost storey, with its pair of beveled gears connecting with the line shaft on each floor, has become a thing of the past in all new mills and many old ones. The modern practice of using lighter shafting and smaller pulleys and running the same at greater speed has had much to do with this change, and, while the first cost of construction is materially reduced, the economy in connecting the shafts in each department by belts running from one floor to another is not altogether in the first cost, but aside from the jar and noise of fast running gearing the saving in the motive power is a factor that must be taken into consideration. Since this practice has become almost universal, large and expensive belts have also become a matter for consideration and a question of importance.

Many different kinds and styles of belts have been introduced, and each has its own advocates. For heavy wide-driving belts, that run over large pulleys and are not exposed to oil or grease, probably there is nothing that has given better results than good rubber belting; but there are certain other conditions where rubber belting is impractical. For belts that run at high speed over small pulleys that require the use of a belt-shifter, and that are exposed to the action of oil and grease, there is nothing that answers as good a purpose as good oak-tanned leather.

While there is no question as to the durability of leather belting, with usual care under such conditions, when composed of good material and properly constructed, yet there is still a question upon which all the "voters do not agree." Much has been claimed by both the manufacturers and users of leather belting for double belts, made by cementing and riveting together two thicknesses of leather; and some have claimed that a double belt made in this manner will transmit nearly double the power with the same stress as a single one. That there is more tensile strength in a double belt, if made of equally as good stock, there is no question; but as the frictional power of any belt is in proportion to the surface in contact with the pulley, the tests which have been made with both kinds will not warrant that conclusion. In certain cases and under certain conditions, it is admitted that a double belt may transmit more power than a single one of the same width; but it is owing either to the extra stress put upon it, directly or indirectly, by its extra weight, especially where it runs horizontally, or nearly so, with the slack side running towards the top of the driven pulley. In this case, the sag caused by its extra weight causes it to embrace a greater arc upon the driven pulley and cover more of its surface, thereby increasing the frictional power.

Still, there are other objections to double belts, constructed in the usual manner, that more than offset these advantages.

One is, the stock used in double belts is usually thin and soft, and joined together by long laps, which renders it inferior to the stock used in single belts, which are usually cut from the back of the hide and joined by short laps.

Another and more serious objection, even if they were made from the same quality of stock, is in the unequal strain to which each part is subjected in passing around the pulleys, which has a tendency to tear them asunder. For example, when two pieces of leather of an even thickness and length are cemented together, and then strained around the surface of a pulley, they cannot remain so; the outside piece must either stretch or the inside one must contract, and in either case the tendency is to separate. To illustrate this, suppose two pulleys of 48 inches diameter to be connected by a double belt. As the half circumference of each pulley is constantly embraced by the belt, it amounts to really the same thing as it would provided the whole circumference of one pulley was embraced. The circumference of a pulley 48 inches in diameter is equal to 150,734 inches; if the same be surrounded by a single piece of leather five-sixteenths of an inch thick, it would require a piece 151,734 inches long to surround it, so that the ends will abut against each other, and it is plain to be seen that when so surrounded the extreme diameter of the pulley would be increased by twice the thickness of the leather, or five-eighths of an inch, and the circumference would likewise be increased in proportion to the diameter, so that instead of 150,734 inches the circumference would be increased to 152,076 inches. In order to surround this by another piece of the same thickness, so that the ends will also abut, it will by the same rules require a length equal to 153,069 inches, so that the difference in the length of the two pieces will be equal to 1,956 inches, which is so near that we might as well call it two inches. It is evident that if the two pieces were cut the same length and cemented or riveted together, when strained around the half circumference of each pulley, which would be the same as if it embraced the full circumference of one, that one piece must contract or the other stretch enough to make this difference in length. If the belt remained in one position after being so bent around the pulley, it would be quite different; but, as soon as it leaves the pulley, it becomes straightened out, and consequently both parts between the pulleys must resume their former relations and that portion thus straightened must again become of equal length. This constant unequal strain must have a tendency to break the cement and tear out the rivets in a short time, which is usually the case, and probably forty-nine double belts out of fifty, after running a few months, if carefully examined, will be found thus separated, and the result is that the rivet holes are strained and enlarged, if not most of them torn out altogether.

This, however, will depend much upon the length of the belt and the size of the pulleys, but in any case enough has been shown to prove that the principle is wrong.

Even with extra thick single belts, when the flesh side is run next to the pulleys, the grain side will frequently be found covered with fine cracks, especially so when run over pulleys of small diameter. The grain side being harder and not having the same elasticity, is more apt to crack from this unequal strain, and this is one of the strongest arguments in favor of running the grain side next to the pulley, the flesh side being tougher and possessing more elasticity will stand more stretching without cracking.

In cases where the width of the pulleys are not sufficient to give the required power with a single belt without straining it beyond its powers of endurance, and a double belt is required, it is much better and more economical to use two single belts, one running over the other. Belts run in this manner work well and give the same results and will last much longer. The stretching and breaking of one is entirely independent of the other, and there is no unequal strain upon either.

As a further proof that this theory is correct, if two belts are run in this manner, and a mark made upon them at any convenient point for observation, it will be found that while there is no slipping of one upon the other, yet at every revolution the position of the marks will change, and in a short time one will make a complete revolution around the other.

Old belts of considerable width when worn thin are frequently repaired by riveting a narrow strip upon each side. This plan is less objectionable for the reason that the new strips will readily stretch to the old one without the unequal strain that new belts doubled the whole width are subjected to.

Take, for instance, a belt sixteen inches wide that is worn thin. Now if a strip of new belt, say four inches wide, be riveted upon each side, it becomes practically as good as new, and, with proper care, will continue to do good service for a number of years; but in no case should glue or cement be used, for the reasons already given, and only rivets enough used to secure it in its position. The space between the rivets, which need not be less than from six to eight inches, will allow it to give sufficient between them to compensate for the strain, but if the strips are cemented and closely riveted the belt will be destroyed in a few weeks. The belting up of a new mill is an item in the bill of no small consideration, consequently it is of the utmost importance to the mill owner that all reasonable means should be adopted for their care and preservation.—The Tradesman.

The London Millers' Gazette informs us that in one of the best roller plants in that country, and one of the largest, where five breaks are used, the chief work is done on the first break, the result claimed being a larger amount, and better-shaped, semolina. A few years ago the miller who did not only lightly crack the wheat on the first break, and separate the so-called "crease-dirt," would have been considered exceedingly foolish.

THE DANGERS OF ELECTRICITY.

AT the recent meeting of the National Electric Association, Cape May, President Dr. Henry Morton, President of the Stevens Institute, gave an interesting paper on the dangers of electricity. Among other things he says:

The Employers' Liability Assurance Corporation, after collecting a mass of material from a great variety of sources, has formulated a series of rules for the protection of those employed in erecting and operating electric apparatus, involving the use of powerful and therefore dangerous currents. These rules have been examined and approved by several of the managers of prominent electric companies, and so far it would appear as if no accidents have resulted from the use of electric currents where these rules have been followed, and that most, if not all, the accidents which have occurred would have been prevented had these rules been followed and obeyed. As the author had something to do with the framing of these rules, his chief object in presenting the paper was to secure their criticism by those best able to perceive their imperfections, and such suggestions as may lead to their beneficial modification or extension. The rules are as follows:

1. Do not touch or handle any electric wire or apparatus of any sort while standing on the ground, or while in contact with any iron work, gas or water pipe or stone or brick work, unless your hands are covered with rubber gloves, and you are provided with such properly insulated tools as have been declared to be safe and in good order by the electrician or other competent officer of this company.

If it is at any time necessary to stand on the ground, or on any surface not insulated from the ground, while handling electric wires or apparatus, rubber boots or an insulated stool should be used.

In moving wires hanging on or lying over electric light wires, lamps or fixtures, use a dry hand line.

2. Never handle any electric wire or apparatus with both hands at once when this can be avoided, and if it is necessary to do so, be sure that no current is present, or that one or both hands is protected by rubber gloves or other efficient insulation.

3. When handling line wires, treat each and every wire as if it carried a dangerous current, and under no circumstances allow yourself to make contact between two or more wires at the same time.

4. Never open a circuit which has been in use without giving notice to the superintendent, or whoever is in charge, of your intention to do so, and at the same time request that the same line be opened at the main station, and kept open until you have given notice that your work on that line is complete.

5. In the dynamo room never go near the belts or dynamos, nor touch any apparatus unless you are fully informed or instructed how to do so.

Tools used by linemen should be provided with insulated handles of hard rubber or other equally good insulator. It is the duty of each lineman to look after his own tools and see that they are in good order, especially as to their insulation.

6. Lamp trimmers and others engaged in the care of lamps must see that the switch putting the lamp in circuit is turned off before they handle the lamp in any way.

7. In construction work, a space of at least 20 inches must be left between the holes for the pins on the cross arms, so that a lineman may get to the top of the pole and work without danger.

The same insurance association has collected the authentic records of a number of so-called "electric accidents" or accidents happening to the electric companies. I have now before me the abstracts of 91 such cases.

Dr. Morton concludes as follows: "Of course I do not mean to imply by this that these rules are perfect or complete, but only that they seem to be in the right direction, and to furnish a starting point from which further developments may proceed.

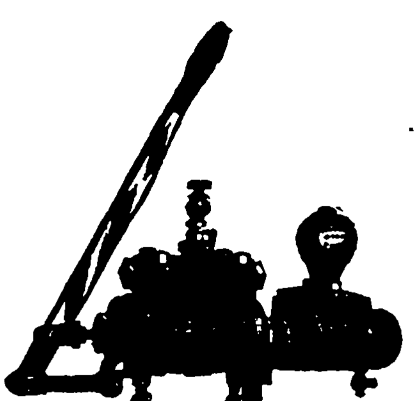
"No one having even an elementary knowledge of electricity as it existed ten years ago need or needs to be convinced of its power to do harm where all safe guards are removed, and the occasional declarations of its harmless character which have been uttered can only be accounted for by reference to that combative disposition which impels some minds always to take a view in opposition to any which may be expressed, and gives birth now and then to a book or phamphlet disproving the law of gravitation or the solar origin of light and heat. To say this is, however, far from agreeing with the other extremists who would banish electricity from our daily walks and occupations, or place it under restrictions which might render it harmless, but which certainly would render it relatively useless for the countless purposes in which its efficiency demands its full development.

"The true opinion is that which is supported by past experience, and which advocates the fullest development of power to which this agency can attain, combined with the use of all the means of protection by which human intelligence can protect itself while using to the utmost this potent and, therefore, dangerous weapon in our victorious contest with the inimicably destructive forces of nature."

THE MARSH STEAM PUMP.

THE steam valve is made of brass, and though nicely fitted, moves freely in the central bore of the steam chest. It has no mechanical connections with other moving parts of the pump, but it is actuated to admit, cut off, and release the steam by live steam currents, which alternate with the reciprocations of the steam piston. Each end of the valve is made to fit the enlarged bore of the steam chest, and it is due to these enlarged valve-heads, which present differential areas to the action of steam, and the perfect freedom of the valve to move without hindrance from other mechanical arrangements or parts, that the flow of steam into the pump is automatically regulated. The importance of this feature cannot be over-estimated, as the pump is automatically regulated, and can never run too fast to take suction, or should the water supply give out when the throttle valve is wide open, no injury can occur to the moving parts.

The steam valve does not require setting. It has no dead centre, and will always start when the steam is admitted. The steam piston, as shown, is double, and each head is provided with a metal packing ring, the interior space constituting a reservoir for live-steam pressure, supplied by the live-steam pipe through a drilled hole, shown by dotted lines. At each end of the steam cylinder are similar holes leading to each end of steam



MARSH STEAM PUMP.

chest, which, together with the centrally drilled hole, and the space between the piston heads, constitute positive means for tripping, or reversing the valve with live steam. Messrs. John Gillies & Co., Carleton Place, Ont., are the manufacturers for Canada.

THE McKINLEY BILL AND BRITISH MILLERS.

PROF. Wm. Jago thus discusses the effect of the recent tariff legislation on British flour manufacturing in the British Baker, Confectioner and Purveyor: "The millers of this country are more or less jubilant over the anticipated results of the McKinley act recently passed by the American government. As is well known the object of this Act is to prevent foreign goods being imported into America. One result, however, of establishing a cordon is that the same means which prevent ingress also prevent egress. Within wide limits the extent of a nation's export is measured by its imports. For this there are many reasons, among which may be cited the one simple and immediate one of means of transit. By former protective duties America has kindly given us practically the whole of her ocean-carrying trade. The result is, that whatever America wishes to export has to be fetched from her ports by foreign ships, most of whom carry the British flag. Now, what is the result of this? Whenever a shipowner is asked to carry a cargo one way, he immediately inquires of himself what freight he can get on the other. So many 'ocean tramps' are now lying in Liverpool docks and the Mersey harbor. If America says, 'I want to send a cargo of wheat or flour over to you, but will not take a cargo of anything you can bring from Europe with you,' then the freight must be enough to pay the ship's expenses both ways. On the other hand, India says: "Send us over a cargo of Manchester goods, and I will send you back some wheat;" the expenses of the whole voyage are borne conjointly by the outward and homeward cargo. The result is that relatively Indian wheat reaches us more cheaply. Further, there will be no actual transfer of specie from one country to another; in the international clearing-house the one transaction goes against another in the credit and debit account, and so, nationally, goods not money change hands. This is bound to be the case, for whenever a drain occurs on the actual cash resources of a country, *i. e.*, its stock of gold, money becomes dear, and at once restrictions are placed on its export. The result is that trade is forced into those channels where reciprocity exists. American wheat and flour are thus kept out of our markets. *This same end is also being attained in* another way. Protective duties increase the cost of all materials the farmer uses. His very clothing, his agricultural implements, and his labor become more expensive as a result of protection. The miller is in the same plight, the consequence is, that the cost of production of both wheat and flour is enhanced. Sales must be effected at higher prices, or else at less profits. This must affect the price of wheat, and more so that of flour, because the latter has to run the two gauntlets of millers' as well as the farmers' extra expenses. The natural result will be that the miller, such as he of Great Britain, who manufactures as a free man and not working in shackles, will be able to manufacture the more cheaply, and hence milling will gravitate nearer to us. For causes such as these millers look with welcome on Acts of the McKinley type."

POINTS ON MODERN MILLING.

THE system of gradual reduction, even when shortened down to the lowest practical limit, is often unwisely done. It is a prevalent impression that this system is so much more automatic than the old buhr method, that it will run itself, and that skill, further than that required by the mill furnisher, is unnecessary. This is only in part true of buhr dressing and regulating, as compared with the dressing and tramming of the roller machines. But the reverse is really true, for a modern mill is a far more complicated machine than the most elaborate buhr mill. Even the so-called short system is only shortened in the reductions at the head, the work of separation being lengthened more on the separating machines, or on the cloth at the tail of the mill in about the same ratio that the breaks have been shortened. The complications of modern milling have increased because all the breaks and all the separations have a certain bearing on every part of the process. That is to say, a mill that would be in perfect balance in cloth and roll surface on four breaks would be entirely overthrown as a complete system were the same mill to add another break—*the addition would require a complete* change in the clothing of every reel or purifier.

Many millers, having in mind the production of the largest quantity of middlings, because that is the leading idea of the modern process, will be found exceedingly careless of their quality. It is needless to add that a process having for its aim the production of the largest quantity of middlings, will entirely reverse the aim if the middlings should be impure, because the reduction of impure middlings into flour would be the same thing as the old process of reducing the entire berry into flour. A process depending on the production of middlings, is only successful because in this condition the material may be more readily separated from the impurity, than in a method of flouring where the reduction is so close that much impure matter cannot be separated. The purity of middlings is the purity of flour, and if the "short system" has led up to a belief that this is unessential, it is only because the first two breaks in this system only reduce the berry to sizable conditions and do it with two instead of four breaks. The short system does not pretend, unless the pretentions partake of the quackery rather common to many millwrights, to revolutionize the gradual reduction method. It only changes the position of the reductions and separations, and while reducing quickly at the head, is extra careful at the point where the reductions have a tendency to flour, and the modern *process depends upon the ability to prevent flouring* before the impurities are removed. The amount of straight flour of good quality made on the first breaks by the short system, is due to the special cleaning of the wheat in the first place, and the resistance of branny impurities to reduction far in excess of the starchy portions. But as the branny portions carry the strongest portion of the wheat, the conditions change when they are reduced to manageable size, at which point the process cannot be shortened, and where gentle treatment is necessary to clean the middlings from its bran, or scalp the bran off from the flouring portions, where the reductions need not be many, but where the separations must be increased.—The Millstone.

[illegible] OF A COMBINED ENGINE AND DYNAMO.

THE direct union of engine and dynamo on a single base is rather growing in frequency, says the Electrical World. The exigencies of ship lighting have created a demand for such machines, and as the average speed of dynamos has greatly fallen, owing to improved constuction, the direct coupled machine is coming into more and more prominence. Some interesting tests have recently been made in England with a direct coupled machine of the Edison-Hopkinson type, driven by a compound double-crank engine made by Willan & Robinson. The results of the test show an efficiency of engine and dynamo that is emphatically remarkable, and distinctly greater than any similar result which has heretofore been reported.

The particulars of the engine and dynamo are as follows: The engine is a double cylinder compound, with low pressure cylinder 14 inches in diameter and 16 inches stroke, working with 120 pounds of steam pressure. It is coupled to a dynamo constructed for an output of 475 amperes at 110 volts when driven at 430 revolutions per minute. The armature is of the bar construction, is plain shunt wound and is fitted with a commutator of hard drawn copper with mica insulation. Four brushes are carried on each rocker arm. Some details of the machine and its performances are as follows:

Resistance of Magnets	16 ohms.
Resistance of Armature	.0055 ohms.
I. H. P.	83.3
E. H. P.	72.2
Total efficiency	86.7 per cent.
Consumption of water per I. H. P. hour	21.6 pounds.
Consumption of water per E. H. P. hour	25 pounds.

As may be readily seen from these figures, the engine and dynamo were worked above their full normal output, which fact would tend to slightly increase the efficiency.

Another test made with a precisely similar combination, working at its normal load, gave the following results:

Resistance of Armature	.0058 ohms.
Resistance of Magnets	15.6 ohms.
I. H. P.	85.3
E. H. P.	70
Giving a total efficiency of	83.3 per cent.

In the first experiment the electrical losses were as follows: Loss in magnet coils, 756 watts, equal to 1.4 per cent.; loss in armature coil, 1,386 watts, equal to 2.6 per cent., so that the electrical efficiency of the machine due to ohmic resistance alone was 96 per cent. The remainder of the losses, a little over 8 h.p., is due to friction of engine and dynamo, hysteresis and the like. This is certainly an admirable showing, both for the engine and dynamo, for, not only must the latter be more than usually efficient, but the former must be singularly light running, to give so small an amount of friction. Messrs. Maher & Platt, builders of the dynamo have constructed a large number of similar combinations. Those referred to are part of a considerable order made for ordinary electric light service.

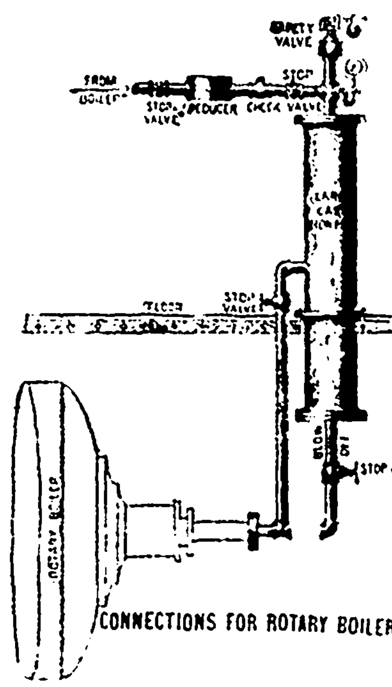
CONNECTIONS FOR ROTARY BOILERS.

WHEN rotary boilers, as used in paper mills, are supplied with steam direct from the steam generating boilers, a great deal of trouble is sometimes caused by the digesting liquor flowing back through the steam supply pipes into the boilers, and into the pipes supplying steam for other purposes, whereby much damage is done to stock in process of manufacture.

This flowing or working back, as explained by The Locomotive, is caused by fluctuations in the steam pressure at the boilers. For instance, steam is at 60 pounds per square inch on boilers and rotary; there comes a sudden demand elsewhere for steam, or the fires have to be cleaned, and the pressure falls with comparative suddenness to 40 pounds per square inch in the boilers; the great body of stock and liquor in the rotary is at a pressure of 60 pounds, and temperature due to this pressure; the radiation of heat from the shell of the rotary is not sufficient to reduce the steam pressure as fast as it falls in the boilers, and as a consequence the stored up heat generates steam which flows out of the rotary toward the boilers, and takes along a share of the liquor. Also, when the level of the liquor is above the centre of the main journal or steam inlet, as it is always supposed to be when working, the greater pressure of steam in the rotary will force the liquor back through the pipes to an extent depending on the difference of pressures, the length of time it is maintained, and the condition of the check valves in the steam pipe. It is the experience of manufacturers that a check valve will not wholly stop the flowing back of the liquor, and even two or three have been put in without curing the trouble.

Of course, if a separate boiler could be used to boil the rotaries, and no other connections were made to it, the flowing back of the liquor would do no especial harm in many cases. There have been cases, however, where the grease contained in the rags and stock under treatment, and which found its way back into the boilers, has caused burning of the plates of the shell. But it is rarely desirable, or even practicable, to devote a special boiler to the duty of boiling the rotaries, hence some other means must be adopted to prevent damage to stock from the above-described cause.

The annexed cut, reproduced from The Locomotive, shows an arrangement that has been tried on rotaries in numerous instances, with success. The principle upon which the apparatus is based, is the use of a reduced pressure in the rotary, so that whatever the pressure in the boilers that in the rotary shall always be considerably less, and thus guard against the possibility of a backward flow of steam and liquor from it toward the steam boilers. The steam coming from the boiler passes through a reducing-valve of any approved make, by which its pressure is reduced to whatever may be considered necessary for the work to be done in the rotary. After being reduced in pressure the steam passes through a check-valve, and then through a stop-valve. It then enters the top of a large iron pipe, from the side of which a pipe leads off to the rotary. A steam gauge is attached to the large pipe, and likewise a safety-valve, weighted, say, to five pounds more than the reducing-valve is set at. This is to prevent the possibility of the full boiler pressure coming on the rotary, even if the reducing-valve should cease to operate. The stop-valve between the rotary and the large iron pipe should be first closed, when shutting the rotary off, for the following reasons: If the valve between the steam generators and the reducing-valve were shut first, the supply of steam would, of course, be cut off from all points beyond, and



CONNECTIONS FOR ROTARY BOILERS

the rotary and all the pipe between it and the valve which was shut would begin to cool off by radiation. But owing to the fact that the pipes have a much greater amount of radiating surface in proportion to the volume of steam which they will hold than the rotary has, they will cool off much quicker; and since they are in free communication with the large body of steam and hot water in the rotary, the pressure will be kept up by a flow from the rotary into the pipes. Or we might express the action thus: The steam being shut off, the pipes cool quickly, the steam condenses and forms a vacuum; the large body of steam in the rotary has not time to condense, hence the higher pressure in the rotary causes the liquor, and more or less stock, to "back up" into the pipes. The consequence is that the check-valve and safety-valve becomes clogged with stock and dirty liquor, and if, as would most likely be the case after the operation had been repeated a few times, the check-valve failed to close tightly, the reducing-valve and steam-gauge would be found in the same condition. Where no stop-valve has been used between reducer and rotary, rags have been found tightly forced into the nipple of the steam-gauge, being obliged to pass back through both check and reducing-valves in order to get there.

The use of the stop-valve between the rotary and the reducing apparatus and its connections prevents all this trouble. If care is taken to *shut this valve first* when the rotary is to be blown off, no steam, liquor or stock can get back beyond it to clog the safety-valve, check-valve, reducing-valve, or steam-gauge.

It will be understood that the large cast-iron pipe shown in the cut acts as a receptacle or trap for any liquor and stock that may be carried back, the blow-off at the bottom serving to remove all such material from the pipe.

USEFUL INFORMATION

A solution of india rubber in benzine has been used for years as a coating for steel, iron and lead, and has been found a simple means of keeping them from oxidizing. It can be easily applied with a brush, and as easily rubbed off. It should be made about the consistency of cream.

Delta metal is composed of copper and zinc with an admixture of iron. The copper and zinc alone, forms brass, and the iron when added makes delta metal, which can be forged like iron, is very strong and resists corrosion from alkalines or acids. How the name was derived is not known.

A new device has appeared to test the springs of an indicator, which become weaker by use. The drum is removed and a scale substituted, and known weights applied to an attachment to compress the spring in the indicator, the result being shown on the scale by the movement of the pencil. This is all well enough so far as it goes, but it does not go far enough to include the fact that a spring acts one way under steam and quite differently when not under steam. For instance: A spring gets stiffer as it grows warmer, up to a certain point, so that indicator makers have to allow about 1 pound in 40 for this fact, and a spring testing a trifle over 39 pounds to the inch with weights is marked 40 pounds.

The plan of extinguishing fire by electricity has been successfully introduced by Mr. H. Lufkin, and if it is perfected as promised will no doubt be a popular system among mill and shop owners. He proposes to modify the present system of automatic sprinklers by the use of a motor and pump and a complete system of sprinkler piping. On each floor, or in any number of places on the floor, are placed in convenient positions push buttons for the starting of the motor and pump and the opening of any valve required. The complete and instantaneous control of masses of water thus gained, and the ability to localize their flow, suggest possibilities of fire extinction which will materially increase its ease and certainty.

EFFECT OF COPPER UPON RUBBER.—In a paper read before the British Association, Sir William Thomson made interesting remarks relating to the decay of India rubber. Prof. Dewar observed, incidentally, that metallic copper when heated to the temperature of boiling water in contact with the rubber, exerted a destructive effect upon it. With a view of finding whether this was due to the copper *per se*, or to its power of conducting heat more rapidly to the rubber, I laid a sheet of rubber on a plate of glass, on it placed four clean disks, one of copper, one of platinum, one of zinc and one of silver; after a few days in an incubator at 150° Fah., the rubber under the copper had become quite hard, that under the platinum had become slightly affected and hardened at different parts, whilst the rubber under the zinc and silver were quite sound and elastic. This would infer that the pure metallic copper had exerted a greater oxidizing effect on the rubber, the platinum had exerted a slight effect, whilst the zinc and silver, respectively, had had no injurious influence on it. A still more curious result was this, that the rubber thus hardened by the copper contained no appreciable trace of copper, the copper therefore presumably sets up the oxidizing action in the rubber without itself permeating it.

According to a recent issue of the Bulletin de la Societe de Mulhouse, Mons. Rodolphe Boutcart has devised a simple method, by means of which, in the midst of a busy workshop full of machinery in motion, any special noise, even though of insignificant intensity, can be distinguished and its origin traced. In this way even the irregular action of a very small factor in a machine may be discovered. The apparatus, if indeed it may be designated by such a term, is simplicity itself. It consists of an ordinary india-rubber gas tube about a yard in length; the length may, however, be varied to suit the nature of the investigation. The tube is unprovided with ear-piece or bell. One end is applied to the ear of the observer, whilst the other is moved about in order to explore the seat of the irregularity. Since the free orifice of the tube is comparatively small and is applied as closely as possible to the vibrating surfaces, it practically receives only those sonorous vibrations which are emitted by this surface; other vibrations that may be in progress within the room will scarcely affect the ear drum of the observer, who will take care to close his other ear as far as possible. The "test" tube can be made and used by any one; there is nothing to *learn* about it. Those who have to do with machinery will find it especially useful for observing noises due to irregularities in the working of small parts of machines which may be either difficult or dangerous to approach in any other way.

A NEW JOINT MAKING MATERIAL.—A permanent and durable joint can be made between rough cast-iron surfaces by the use of mineral asbestos mixed with sufficient white lead to make a very stiff putty. This will resist any amount of heat, and is unaffected by steam or water. It has been employed for mending or closing cracks in cast-iron retorts used in the distillation of oil and gas from cannel coal. The heat being applied to the bottom of retorts and the temperature of the iron maintained at a bright red heat, after a time the bottom of the retort would give way, the larger portion of the cracks being downward towards the fire. The method employed was to prepare the mixture, place it on top of a brick, then put the brick on a bar of iron or shovel, and press the cement upwards to fill the crack in the iron, holding it for some time until it had penetrated the cavity and somewhat set. Of course, during this operation, the lid was removed from the retort, so that no pressure of gas or oil forced the cement outward until it had penetrated the cavity and somewhat set. For several reasons the use of asbestos is very excellent. It is well known that this substance cannot burn, and there is no danger of it being the cause of fire in the shops where it is used. The idea is being largely adopted by foundrymen generally.

THE OUTLOOK FOR FEED MILLING.

I. RIDDELL, writing to the Corn Miller, says: "A radical change has come over the prospect of the feed miller's business during the last few months which deserves careful consideration from those interested in that particular branch of the trade. During all of last winter the phenomenally low price for corn and oats, discouraged all efforts to sell other feed and prevented the grinding of them to a great extent, the argument being that it would not pay to do so at the prevailing low prices. While the truth of this reasoning is, to say the least, doubtful, there will be little use in controverting it at this time, for as these grains have nearly doubled in price since then, there is little doubt but that a great deal more of them will be ground this season than last, and it behooves every one who is interested in the business to prepare to handle it as cheaply and expeditiously as possible.

It will be a good idea "about this time," as the almanac says, to look over the whole equipment of the mill, which may have been allowed rather to run down during the last unfavorable year or two, and by a general overhauling get ready for the work which will probably soon begin to drop in, for especially where lively competion exists, the mill that is always ready to handle a grist is the one which gets the best share of the patronage. The greatest lack of many feed mills is a cleaner which will take out the pieces of cob which interferes with the working of the elevators and also with the feeding of the buhr, where that is used as the instrument of reduction, as it is in the majority of cases. In oats, also, there is often a considerable quantity of straw, caused by contrary winds in threshing, and not infrequently, a miscellaneous assortment of nails, clevices, horseshoes, etc., which have been hung up over or laid into the oat-bin and got mixed with the grain.

I remember once gathering two or three pounds of steel fence staples, with an assortment of spikes, from off a shaking screen while running a grist over it, and on various occasions have got a sample of almost everything found on a farm from chicken droppings to a bed sheet. As many of these qualities are the reverse of profitable to grind, to say nothing at present of the danger, the receiving hopper, unless it feeds directly down onto the revolving screen, which is the best way when the arrangement of the mill will allow, should have a moderately close screen of small iron rods put in just low enough to be convenient to watch while the grain is being "dumped," or else there is likely to be a great mortality among the elevator cups, as well as a large amount of language indulged in which is likely to be more forcible than polite.

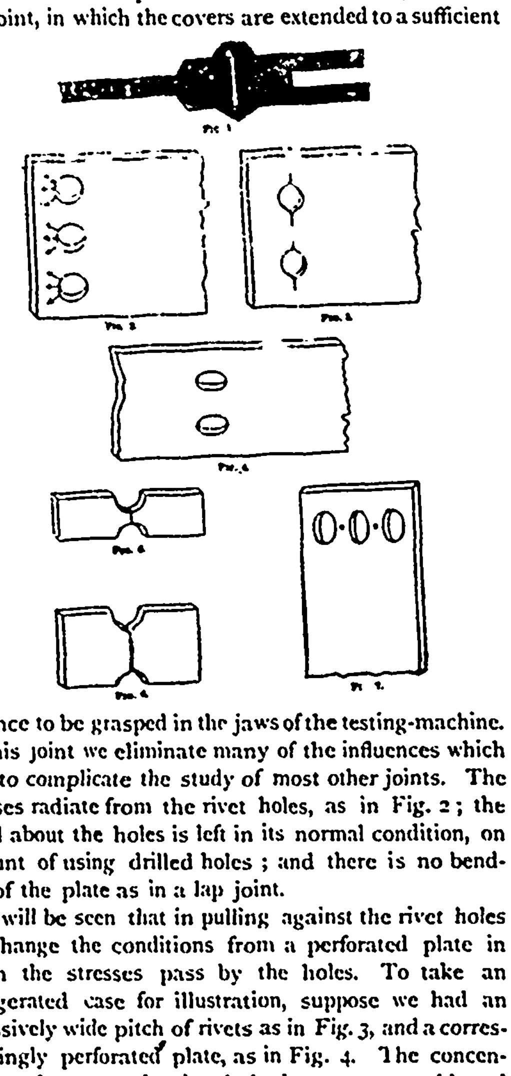
For a cheap cleaner for a feed-grinding mill a good sized revolving screen will do pretty good work, preferably one made of zinc or sheet iron, the proper size of holes in which will be about five-eighths of an inch. If there is not room enough for a screen, a simple shaker with a sieve say two feet wide by three feet long, with ½-inch holes, will handle a large amount of grain. It should have a wedge-shaped piece fastened to the delivery spout in such a way as to spread the stock over the whole width of the sieve, so as to prevent its piling up and carrying over. One reason for having the cleaner (especially if the sieve is used) where it may be easily inspected, is that in the winter time much of the corn that is brought in is shelled with hand shellers in open cribs where very likely the snow has driven in and perhaps partially melted, and so worked in among the corn with a good deal of the silk, etc. After such grists have stood in the mill a while the warmer atmosphere causes the snow to melt and makes the whole mass damp and sticky, and if it is then emptied into the dump hopper it will be found hard to elevate, and will most likely clog up the cleaner.

Next to the cleaning machinery, generally the most troublesome part of the feed side of the mill is the elevators. Leaving out of view for the present the many mistakes made in erecting elevators, especially in arranging them for easy delivery of their load, the condition of much of the grain the feed elevators have to carry, as noticed in previous paragraphs, still further increases the trouble with them, so that they should be seen to and put in complete repair before the rush for the season begins. 6975-22

While great claims are made for the various roller feed-grinding devices—and they will doubtless make the required reduction with less power than the buhr—the stubborn fact remains that none of them will make a feed as satisfactory to the farmers as the now despised buhr, and this for the same reason which has given the roll its preeminence as a wheat grinder, namely, its ability to granulate, for it is not *granular* feed which feeders as a general thing desire, as the finer and softer s the better they are satisfied.

STRENGTH IN SINGLE-RIVETED JOINTS.

IN the course of some recent correspondence between this office and Mr. James E. Howard, of the Watertown Arsenal, some points concerning the shape of test pieces of boiler plate, and the distribution of strains in single-riveted joints, were discussed. Tests made at the Arsenal are executed upon strips 10 inches long and 1½ inches wide, and of the thickness of the plate as rolled. Strips of these dimensions compare well with larger specimens, 5 or 8 inches wide, and 15 or 20 inches long. Substantially the same results are obtained, whether the specimens have enlarged ends or parallel sides. Inasmuch as strips of the dimensions given above (*i. e.*, 10" x 1½") appear to allow unrestricted flow of the metal, so far as form is concerned, it seems fair to consider that they represent the true qualities of the material, and that the indications that they give are entitled to confidence in designing riveted joints or other built-up forms. The strength per unit of area, along the net section in a riveted joint, depends upon a number of conditions which vary considerably in different joints, so that the tensile strength of the net section in some joints largely exceeds that of the strip, and in others falls far below it. The conditions in perforated test specimens are in some respects quite similar to those existing in a joint; but there is enough difference to cause them, in many cases, to give results appreciably different from those obtained from the joints themselves. The simplest form in which a joint can be studied seems to be that represented in Fig. 1, where an annealed steel plate with drilled holes is riveted between two other plates, using one line of rivets. This corresponds to one-half of a single-riveted butt-joint, in which the covers are extended to a sufficient



distance to be grasped in the jaws of the testing-machine. In this joint we eliminate many of the influences which tend to complicate the study of most other joints. The stresses radiate from the rivet holes, as in Fig. 2; the metal about the holes is left in its normal condition, on account of using drilled holes; and there is no bending of the plate as in a lap joint.

It will be seen that in pulling against the rivet holes we change the conditions from a perforated plate in which the stresses pass by the holes. To take an exaggerated case for illustration, suppose we had an excessively wide pitch of rivets as in Fig. 3, and a correspondingly perforated plate, as in Fig. 4. The concentration of stress at the rivet holes in one case would tend to cause fracture in detail, the metal first separating at the sides of the holes and then tearing across; whereas, in the perforated plate, the percentage of metal removed being small, the stress on the net section would remain substantially uniform. If the rivet holes are punched, and the pitch very close, the cold-hardening of the punching might impart increased strength to the entire net section; while in a wider pitch, the punching would be an element of weakness by destroying a part of the ductility of the plate at the points where this ductility is most needed. These same considerations apply to wide and narrow grooved specimens. See Figs. 5 and 6. The narrow one has the entire net section reinforced by the surrounding metal, while the wider specimen merely begins to tear out at the edges on account of the larger, and consequently more rigid section of metal on either side of the groove. Of course it will be understood that all these effects are exaggerated in the cuts. A riveted joint gives the best result when the net section is most reinforced by the solid section of the plate, or when the stress is substantially uniform over the net section extending from rivet hole to rivet hole.

When rivet holes are enlarged, the metal is stretched more at the sides of the holes than at the middle of the pitch, *i. e.*, at x x in Fig. 7, and a metal, which in the tensile strip shows a large stretch near the maximum *load with a small change in the load, seems particularly* well adapted to distribute the stress from the rivet hole to the middle of the net section. In case this is an important point, it will be readily seen what a variety of conditions we may have in different grades of metal. The foregoing are some of the considerations which make a simple joint appear complicated when it is examined closely. There are numerous other considerations of a similar nature, one of which is the effect of temperature on the strength of the metal. Tests have been made at Watertown at 200°, 250°, 300°, 350°, 400°, 500°, 600° and 700° Fah., the highest strength being found in the neighborhood of 500° Fah.—The Locomotive.

MACHINERY MFG.

Negotiations are in progress for the establishing at Kingston of spiral weld steel tube works.

The Kingston Board of Trade has expressed the opinion that improvements made by manufacturers in their works in the city should not be assessed.

Messrs. Waring & White are to erect an extensive foundry at St. John, N. B. Messrs. Pender & Co. will erect at the same place a large factory *for the manufacture of horse and wire nails.*

The Osborne Manufacturing Co. of Hamilton, have compromised with their creditors at 20 cents on the dollar. The liabilities, direct and indirect, are estimated at about $100,000, about $32,000 of which is to the trade.

The boiler in Hugh McDonald's sash factory at Belwood, Ont., exploded on Oct. 30th. The boiler-house was wrecked, and pieces of the boiler, boards, etc., were driven through the air in all directions. No one appears to have been hurt.

The police magistrate of Toronto recently fined Thos. Moore & Co. *for maintaining a nuisance in the shape of a gas engine* on their premises. An appeal has been taken from this decision, and upon the judgment of the Superior Court rests the fate of fifty-five gas engines in the city.

The Canadian Society of Stationary Engineers has appointed *A. M. Wickens, Toronto, Robt. Mackie, Hamilton, and Arthur* Ames, Brantford, a committee to confer with a committee of the National Association of Stationary Engineers of the United States on the subject of the amalgamation of the two societies.

The Winnipeg City Council has accepted the proposition of Messrs. Mann, Holt, Ross & Mackenzie for the construction of the Assiniboine water-power works. This is looked upon as an important step by Winnipegers. The work will commencenext year and the contract calls for completion by the end of 1892.

On Nov. 19th, one of the large boilers in Peters & Cain's saw mill at Midland, Ont., exploded, going up through the roof, and moving the other two boilers about 20 feet out of their places. Several men in the mill were knocked into the bay, and another upon whom portions of the boiler fell, was found with his head in the mud port hole. None were fatally injured, however.

To most new engineers, how to square a valve is a mystery and is generally supposed to be done by rolling the eccentric on the shaft. This is not so. Squaring the valve is setting it so it will cut off the steam at both ends of the cylinder exactly alike, so that the exhaust will sound alike. This may be so and yet not have the proper relation to the time of doing it. Thus it might let on steam when the crank was at the quarter, say six and 12 o'clock, when the dead centre was at nine and three o'clock, and yet be square. Now to square a valve exact, pay no attention to the opening of the port, only that it is alike at both ends. First. Turn the balance wheel so that the cross head slide is about ⅛-inch of the end of the stroke. Now with a fine scratch awl make a fine mark across the slide and guide, then before moving the balance wheel nail a strip of board or lath to some stationary object so as to be at the edge or rim of the wheel, then with a piece of chalk make a mark on the rim of the wheel, then turn the wheel past the centre so the cross head has arrived exactly at the same scratch mark, then mark the rim of the wheel with chalk, then measure just half the distance between the chalk marks and at this make another chalk mark; turn this so it will be at the edge of the board, then the crank will be on an absolute centre. A large variation on the rim of the wheel makes but very little at the centre of the stroke. Thus ⅛-inch on a 12-foot wheel would not vary the stroke the hundreth part of an inch. When this is done next ascertain the amount of opening of the valve, or the amount or extent of the throw of the valve from any given point and mark this. Turn your crank to the other end and proceed just the same in all the particulars, except use the same strip of board or lath for a marker. Measure the opening in the port and you will find that perhaps one end was open ¾-inch and the other end was open ⅝-inch. Divide this by shortening or lengthening the valve rod by whatever method there is provided for doing this. It may be a turnbuckle nut in the rod or perhaps you will have to set the nuts back or forward on the valve rod where it passes through the valve. *When you have set the valve so that it opens the port alike* at both ends the valve is squared and the exhaust will be alike at both ends. If your engine is high speed roll the eccentric so that the port is open 1-16-inch. When the centre mark on the balance wheel is at the strip nailed on the post at the rim of the wheel the *other end will be the same. for the engine is squared. You now* will have a squared valve and 1-16-inch lead that is as exact as if the work had been done by the most scientific engineer.—Tradesman.