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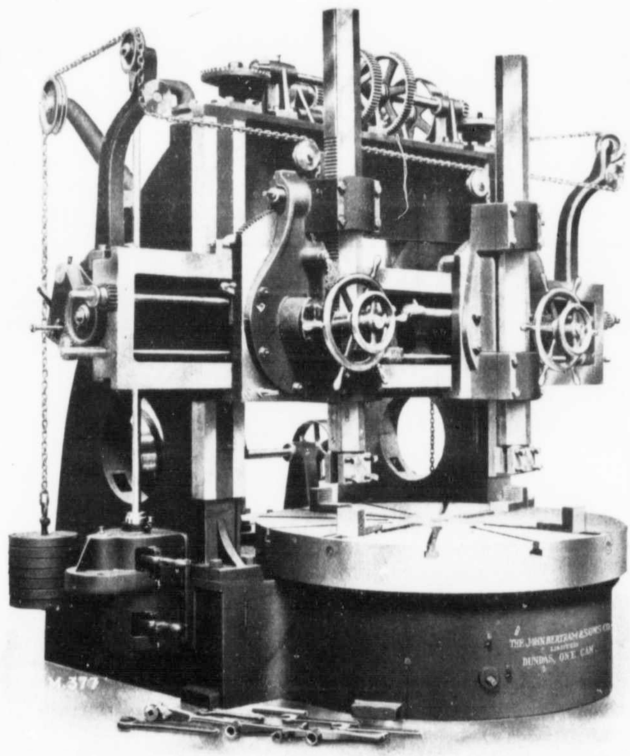

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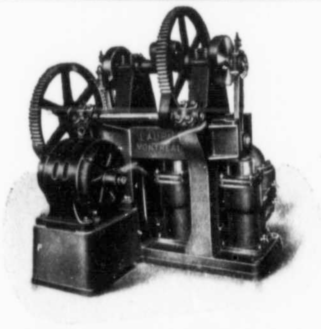

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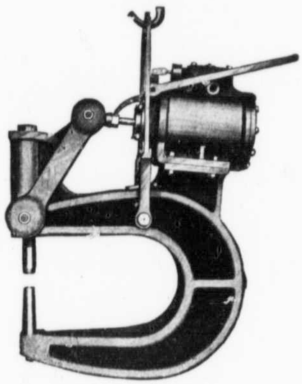

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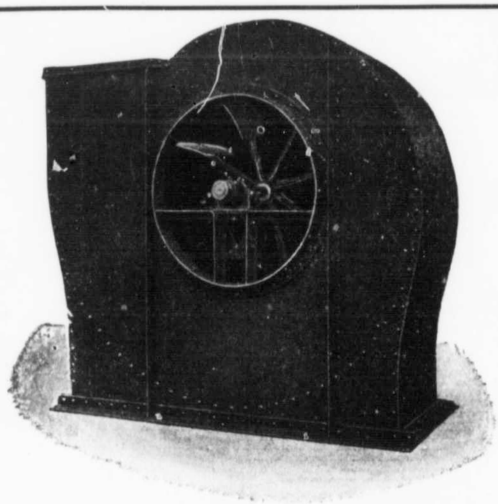

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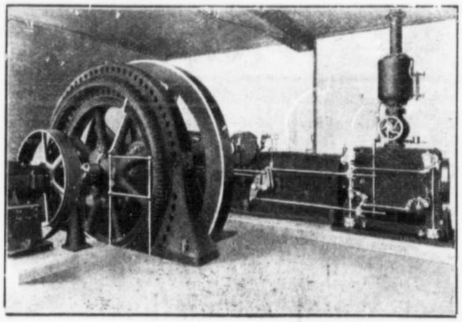

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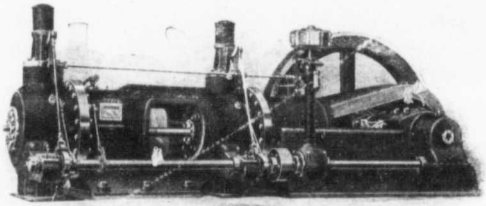

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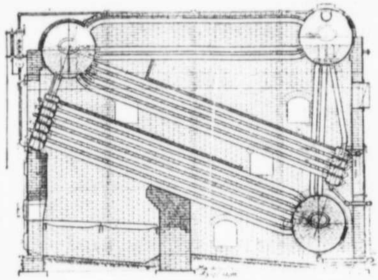

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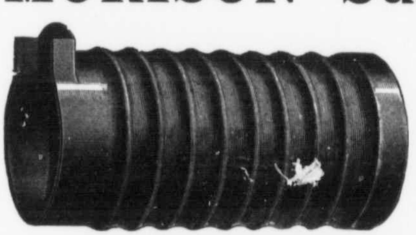

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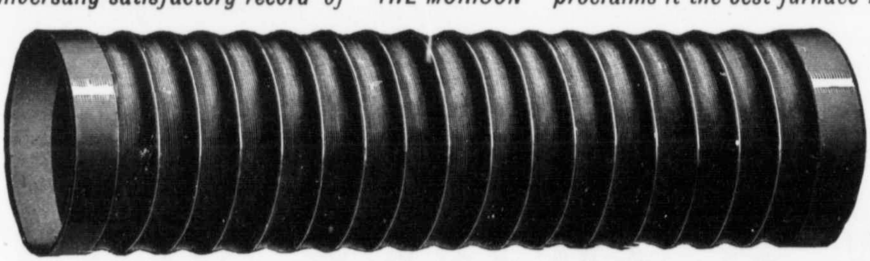

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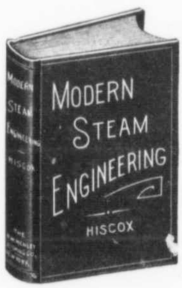

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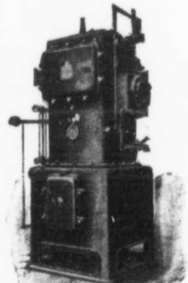

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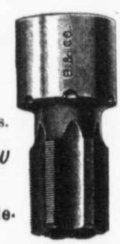

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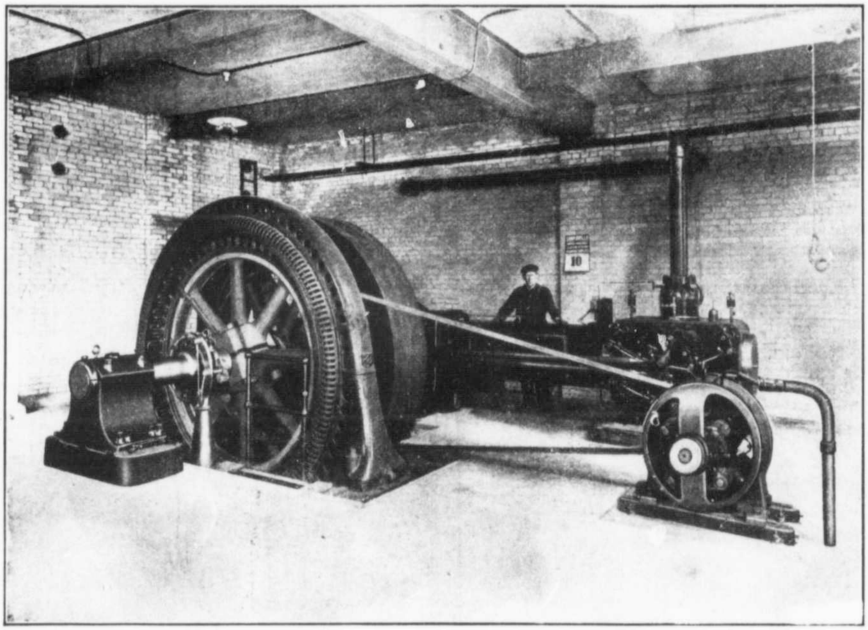

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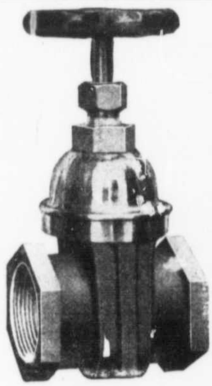

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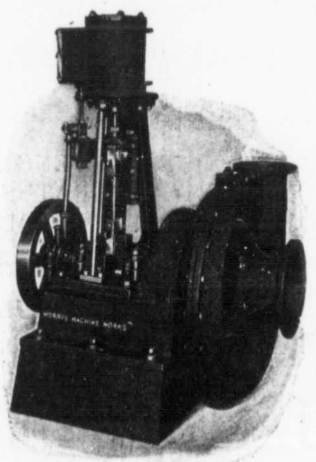

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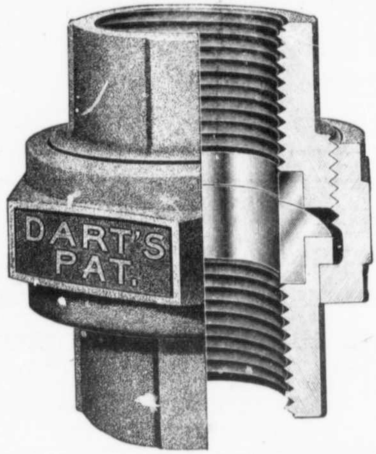

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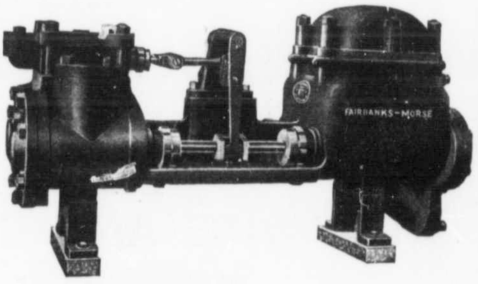

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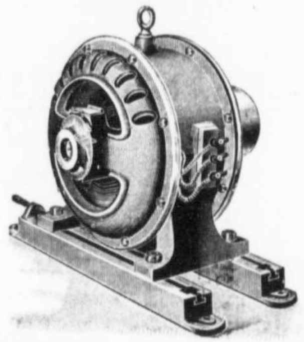

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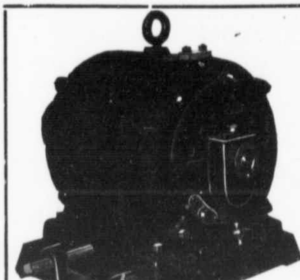

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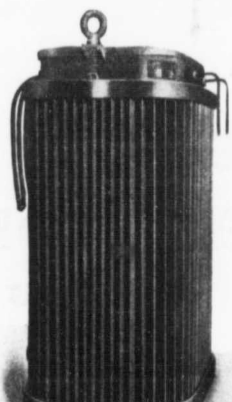

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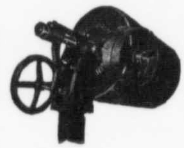

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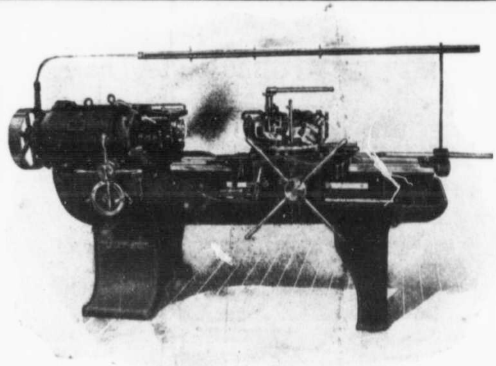

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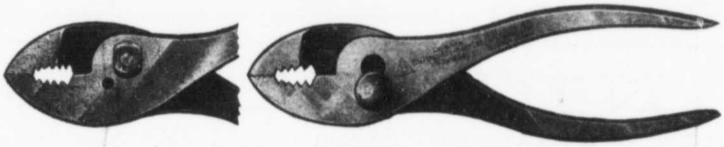

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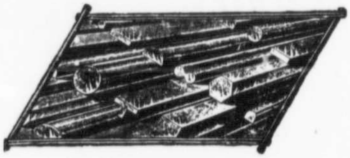

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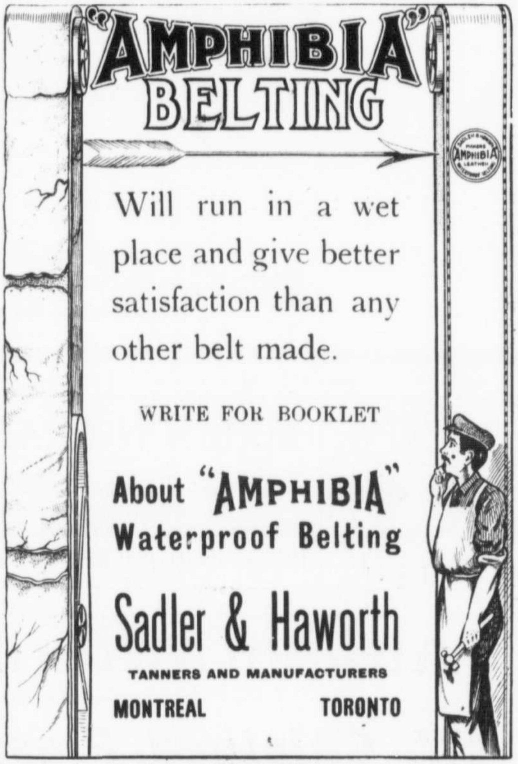

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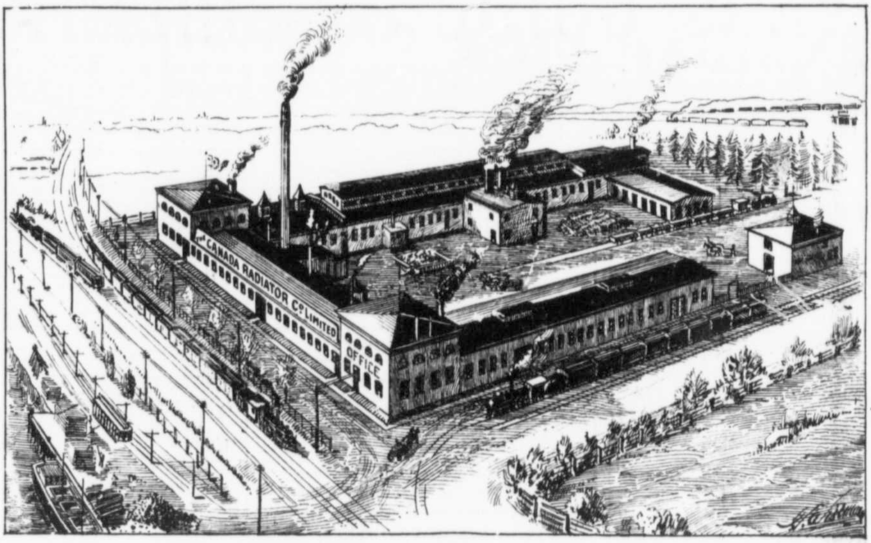

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These buildings are built of solid brick walls 12 inches thick, on a stone foundation 24 inches thick, this foundation itself is built on rock. The Foundry is 26 feet high, all other buildings are 17 feet high. The roof is a gravel one, the foundry roof being supported with steel trusses from wall to wall.

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This Department has been started to bring together those who have to sell specialties for the factory, mill or foundry and these buyers who are "in the market" for such lines. Readers of this paper will find this department one of the most useful features of the paper. Mention the paper when you make enquiries of advertisers.

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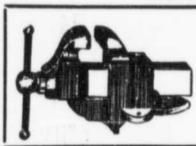

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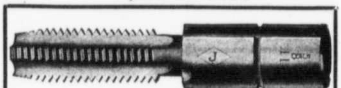

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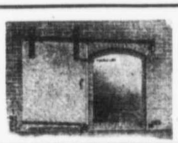

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Needs no attention after work is flat in vise.
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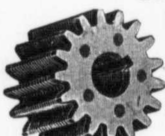

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CANADA'S MANUFACTURERS
1909 - Industrial Blue Book - 1909
BUYER'S GUIDE
Published on Subscription only
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Manufacturers of Engine Sized Superfine Papers, White and Tinted Book Papers, Blue and Cream Laid and Wove Foolscaps, Account, Envelope and Lithographic Papers, etc.

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ON THE OUTSIDE OF

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Not only protects it from the **FIRE** in a neighboring building but **REDUCES YOUR INSURANCE** rate from **40%** to **70%**

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"Acorn Quality" Corrugated Sheets

Don't tie up unnecessary capital in expensive buildings. Write us and we'll tell you how to build at small cost, thus leaving the bulk of your capital to develop your business.

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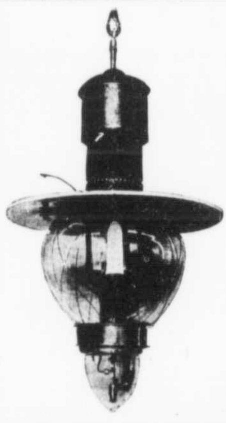
PRESTON, ONT.

Montreal Toronto



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Duplicate Orders for

'THE EMPIRE LIGHT'

Are the rule rather than the exception!

HAVE YOU HAD A TRIAL INSTALLATION MADE YET?

The Empire Light Co.

Burns Vaporized Coal Oil

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The Popularity of the Kahn System is Increasing Daily. There is a Reason . . . .

IT HAS BEEN PROVEN ECONOMICAL
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IT HAS BEEN TESTED BY EXPLOSION

Our Literature Tells the Story, Learn to Know
THE TRUSSED BAR; THE CUP BAR;
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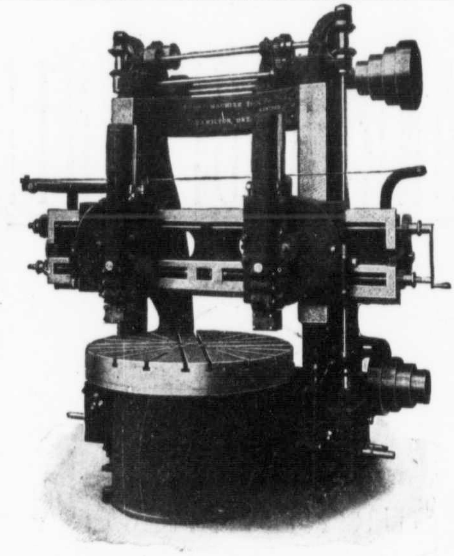

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HIGH GRADE MACHINE TOOLS

LONDON MACHINE TOOL CO.

Limited

HAMILTON, - CANADA

Amatite

TRADE B MARK ROOFING

PAINTING a roof is work. Buying the paint is expense. Both are needless if your roof is Amatite.

When you finish laying Amatite, take away your ladder, pick up your hammer and knife, go away and leave the roof to take care of itself. A few years later you may go back and look at it if you care to, but it won't be necessary, and there won't be anything to do.

This is due to the fact that Amatite has a *real mineral surface*—a surface that is too strong to need protection—too durable to require painting.

If you buy one of the smooth surface roofings you will have to paint it every two or three years to keep it from leaking. In fact, such roofs depend on the paint almost entirely for their waterproofing qualities.

Amatite on the other hand depends for its waterproofing upon double layers of Coal Tar Pitch,—the greatest known enemy to water.

Amatite comes in rolls of 110 square feet ready to lay. No special tools are required, and anyone can lay it properly,

A sample of Amatite will be forwarded free on request. Send for it and see how much better it is than the kind which requires painting to keep tight

THE PATERSON MANUFACTURING CO., Limited

TORONTO MONTREAL WINNIPEG ST. JOHN, N.B. HALIFAX, N.S.

"It holds, where others fail"

WE WANT YOU TO TRY

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PAT. IN CANADA 1907

SHEET AND SPIRAL PACKING

Long Fibre Asbestos and Rubber Perfectly Combined

Manufactured in Canada solely by

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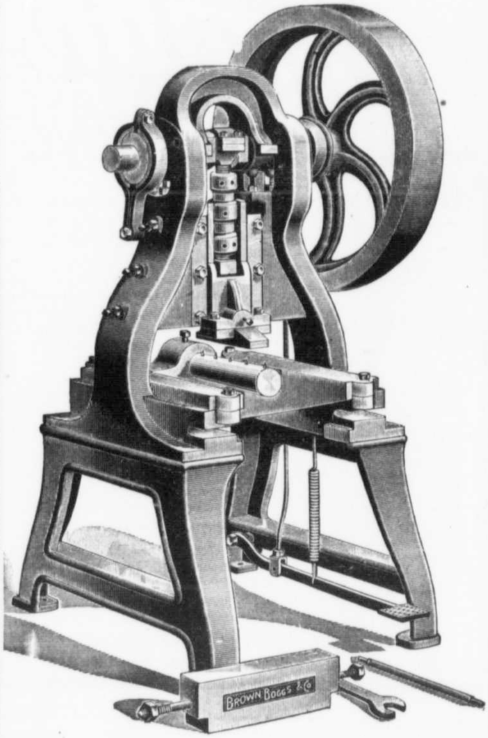

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OUR LARGELY INCREASED FACILITIES will enable us to serve the trade more promptly than ever before.

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THE WHITMAN & BARNES MFG. CO.

CANADIAN FACTORY AND SALES OFFICE:

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Industrial Training in Fitchburg

A Co-operative Plan of Industrial Training Which is Being Inaugurated by the Fitchburg Iron Workers' Association and the City Authorities Whereby a High School Training and a Shop Training is Given at Same Time.

In the Nov. 20 issue of The Canadian Manufacturer is given a complete description of the co-operative engineering courses of the University of Cincinnati, whereby students put in alternate weeks in the university and in the shops in the city. It is a six year course, and the work in the shops is laid out as carefully as it is in the university. The scheme was devised more than two years ago by the Dean of the College of Engineering, who placed it before the Cincinnati branch of the National Metal Trades' Association. The manufacturers thought well of the scheme and have done their share towards making it a success. Reference to the article will show the details of this co-operative engineering course, and the remarkable success it has met.

Co-Operative Trade Education.

The same idea is contained in the plan of industrial education laid before the authorities of Fitchburg, Mass., by the Fitchburg Iron Workers' Association recently, except that instead of the shop training being combined with a university course in engineering, it is combined with the regular high school course. The students work in pairs and alternate weeks in the shops and in school, as in the co-operative engineering course at Cincinnati.

A scheme somewhat similar to this was inaugurated some years ago in Niagara Falls, Ont., by the Standard Bearings, Limited, who made arrangements with the High School Board of that city to take a limited number of students from the High School and give them a practical training during the summer vacation—In this way it was hoped to sort out the boys who had a natural inclination for the mechanical trades. As far as it was carried out this plan showed good results. Of course to make a really good showing the scheme should have been a little more comprehensive. A variety of industrial enterprises should have been interested in the plan.

The plans for this industrial school at Fitchburg were laid before the city authorities and the School Board at a banquet given by the Fichburg Iron Workers' Association recently. These plans provided for an industrial school to be incorporated in the present high school system. These plans were readily taken up by the City Government and have been put into operation. The idea is somewhat unique and bids fair to become an essential factor in industrial education in towns and cities of limited size throughout the country.

The plan is in the form of an apprenticeship system whereby boys, having passed the first year in the high school, take up during the next three years a mechanical course, studying one week in the school and the following week working in the shops. A special instructor has been employed and special text books provided. The boys are taken in pairs by the manufacturing companies. The boy who has studied in school a week on Saturday morning at 11 o'clock goes to the shop, and learns on what particular job his partner has been working and how it is handled, so that he can come in the following Monday morning and begin work where the other boy left off. Thus he follows the shop course without necessitating instruction on the part of the shop foreman.

Mr. Hunter, the man in charge of this work, has had more applications than could be taken care of the first year.

Details of School Curriculum.

The school course is as follows:

Fitchburg High School.

CO-OPERATIVE INDUSTRIAL COURSE.

FIRST YEAR, ALL SCHOOL WORK.

Subject	Periods per Week.
English	4
Shop mathematics	5
Mechanics	5
Freehand and mechanical drawing	5
Current events	2

SECOND YEAR, SCHOOL AND SHOP WORK.

Subject	Periods per Week.
English	4
Shop mathematics	5
Chemistry	4
Electricity and heat	4
Freehand and mechanical drawing	8

THIRD YEAR, SCHOOL AND SHOP WORK.

Subject	Periods per Week.
English	4
Shop mathematics	4
Commercial geography, business methods and conditions	4
Advanced chemistry or industrial chemistry	5
Freehand and mechanical drawing	8

FOURTH YEAR, SCHOOL AND SHOP WORK.

Subject	Periods per Week.
English	4
Civics and American history	5
Applied mathematics	5
Mechanical and freehand drawing	8
Discussion of current mathematical appliances	2

Work in the Shop.

The shop work consists of instruction in the operation of lathes, planers, drilling machines, bench and floor work and other machine work, according to the ability of the apprentice and pertaining to the particular branch of manufacture in the shop where he is employed. The rules and conditions of this system are:

Rules and Conditions.

Rules and conditions under which special apprentices taking the four-year co-operative industrial course at the high school of Fitchburg are receiving for instruction at the works of

....

First. The applicant for apprenticeship under this agreement must have met satisfactorily requirements for entrance to this course at the high school.

Second. The apprentice is to work for us continually well and faithfully, under such rules and regulations as may prevail at the works of the above company, for the term of approximately 4,950 hours, commencing with the acceptance of this agreement and in such capacity and on such work as specified below:

Lathe work, planer work, drilling, bench and floor work.

And such other machine work, according to the capacity of the apprentice, as pertains to our branch of manufacturing.

This arrangement of work to be binding unless changed by mutual agreement of all parties to this contract.

Third. The apprentice shall report to this employer for work every alternate week when the high school is in session, and on all working days when the high school is not in session, except during vacation periods provided below, and he shall be paid only for actual time at such work.

Fourth. The apprentice is to have a vacation, without pay, of two weeks each year during the school vacation.

Fifth. The employer reserves the right to suspend regular work, wholly or in part, at any time it may be deemed necessary, and agrees to provide under ordinary conditions other work at the regular rate of pay, for the apprentice during such period.

Sixth. Should the conduct or work of the apprentice not be satisfactory to employer, he may be dismissed at any time without previous notice. The first two months of the apprentice's shop work are considered a trial time.

Seventh. Lost time shall be made up before the expiration of each year, at the rate of wages paid during said year, and no year of service shall commence till after all lost time by the apprentice in the preceeding year shall have been fully made up.

Eighth. The apprentice must purchase from time to time such tools as may be required for doing rapid and accurate work.

Ninth. The said term of approximately 4,950 hours (three-year shop term) shall be divided into three periods as stated below, and the compensation shall be as follows, payable on regular pay days to each apprentice:

For the first period of approximately 1,650 hours, 10 cents per hour.

For the second period of approximately 1,650 hours, 11 cents per hour.

For the third period of approximately 1,650 hours, 12½ cents per hour.

Tenth. The above wage scale shall begin the first day of July preceeding the apprentice's entrance upon the first year of shop work of the high-school industrial course. The satisfactory fulfilment of the conditions of this contract leads to a diploma, to be conferred upon the apprentice by the school board of Fitchburg upon his graduation which diploma shall bear the signature of an officer of the company with which he served his apprenticeship.

Features of this System.

There are many towns and cities throughout Canada in which the manufacturers and the high school authorities might co-operate in an educational scheme such as this.

The Grand Trunk Railway have a very efficient apprenticeship course in their different shops. The boys taking this apprenticeship training are usually boys without a high school education. The apprenticeship scheme includes class two nights every week during fall and winter months, at which the boys are taught arithmetic, elementary algebra, elementary mechanics and mechanical drawing. The instructors conducting these classes very often have considerable trouble with many of the apprentices because of their lack of intelligence and lack of ambition. The continued demand is for a better class of boys—boys who will take an interest in their work and in their future—boys who will develope into good mechanics instead of second rate or poor ones.

This co-operation of the high school course with a shop training is likely to attract intelligent and ambitious boys—boys of a better class than usually drift into shop apprenticeship courses. It will tend to make the mechanical trades more attractive. And perhaps one of the best features of co-operative schemes is the chance it gives a boy of judging whether he is fitted for the mechanical trades. The boys' instructors in the school and those having charge of them in the shop, if they consult together, can tell whether to encourage or discourage the various boys in the pursuit of the mechanical trades.

The graduates of such a course will have a good high school education, which coupled with the practical training they would get, will enable them to make good mechanics of themselves, or if ambition and ability warrant it, good mechanical engineers. There could be no better preliminary training for a course in an engineering college.

To sum up, there is a demand for boys of a better calibre for the mechanical trades. This co-operative scheme will tend to satisfy the demand. Besides the many other obvious good points in this plan of education, this one is most important.

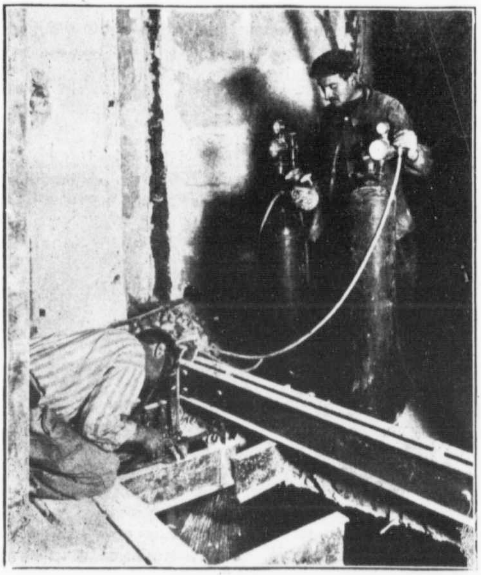
[In future issues of The Canadian Manufacturer will appear further articles on technical and industrial education of interest and value to manufacturers and others.—Editor.]

Cutting Metals With Oxygen

By Jacques Boyer.

The process of cutting metals by a stream of oxygen, patented by the German Oxhydric Co., has been employed with success in numerous establishments for several years. The operation is performed by means of a blowpipe with two nozzles, of which the first delivers an ignited jet of mixed oxygen and hydrogen, and the second a stream of pure oxygen. The pressure is regulated by a gage attached to the oxygen tank. The oxyhydrogen flame and the stream of oxygen strike the same part of the metal, which after being heated by the flame is rapidly cut, or rather burned, through by the oxygen, the temperature being raised to 1,300 or 1,400 deg. F. by the combustion of the metal. The cut is as smooth as a sheared cut and requires little or no finishing. The chemical composition and physical properties of the material are not affected beyond a distance of $\frac{1}{100}$ inch from the cut. The precision of the cut varies from $\frac{1}{25}$ inch in plates less than 2 inches thick to $\frac{1}{6}$ inch in the thickest objects, and the width of the cut varies from $\frac{1}{2}$ to $\frac{1}{8}$ of the thickness. Armor plates can be cut in one-twentieth of the time required for mechanical cutting, and the sharply localized heating probably causes less strain than punching and shearing develop. If oxygen costs two cents and hydrogen two-thirds of a cent per cubic foot, the cost of cutting an iron plate $\frac{4}{5}$ inch thick is about 7¼ cents per running foot—about half the cost of mechanical cutting.

Special machines are constructed for cutting various objects. The pipe-cutting machine is made in a number of sizes for pipes up to 4 feet in diameter. The nozzles are attached to a frame which is easily adjusted to the proper position on the pipe, and are guided by a small wheel that runs around the pipe. Another machine is designed for cutting flanges and lateral openings in pipes for branch connections. Then there is a machine which cuts oval, round, and square manholes in large pipes and boilers. In the plate-cutting machine used in very thick plates the nozzles are moved in a straight line by a long screw and a hand wheel. Finally, there is a "universal" machine which can be arranged to make curved and polygonal cuts of any pattern in addition to the simpler cuts effected by the other machines. A special form of this universal machine is exceedingly useful in taking apart machinery and steel building. It operates by cutting off the heads of the rivets, which are then easily driven out.



Cutting a Steel Beam with Oxygen.

The range of usefulness of the oxhydric process is very extensive. The process is regularly employed in many rolling mills, boiler shops, and machine shops, and it is used in steel foundries for the removal of runners and sinkheads on castings. It is also employed largely in cutting plates for the hulls and armor of vessels, in demolishing iron vessels and buildings, and in cutting up scrap.

The advantages of the process are well illustrated by the following examples, taken from actual practice. In the dust catcher of a blast furnace, made of ½ inch plates, seven openings for branch pipes, each 8 feet in diameter, and four holes over 2 feet in diameter, were cut by two men in 6 hours at a total cost, for labor, gas, etc., of $15.50. It would have taken two men at least two days to cut one of the large holes with hammer and chisel.

A brace plate for a locomotive base was cut out of a steel plate ⅜ inch thick in one hour. The aggregate length of cutting was 22 feet.

A sinkhead 3 inches thick and 16 inches long was removed from a steel casting in 4 minutes with 40 cents' worth of gas. A sinkhead 1½ inches thick and 10 inches long was cut from the flange of a valve case in three minutes. Three runners about two inches thick and with an aggregate length of 30 inches were cut neatly from the flanges of another valve case in 11 minutes at a cost of 57 cents. The removal of runners and sinkheads with planing and shaping machines is a very difficult, tedious, and expensive operation; and after it is completed, it is necessary to send the castings back from the machine shop to the foundry to be annealed. The oxhydric process is applied in the foundry to castings hot from the mould, which are annealed before they go to the machine shop for finishing.

The dome of a blast furnace was removed by cutting it into four parts with the oxhydric apparatus. The actual cutting was done in 70 minutes, and the furnace, with its new dome, resumed operations two days sooner than would have been possible with the methods usually employed. An old cruiser, containing 14-inch armor and guns 3 feet in external diameter, was reduced to scrap ready for the furnace in 2½ months. The old method would have required 18 months.

In cutting up scrap precision is not required, and consequently very rapid progress can be made. Four tons of scrap can be cut up in a day by apparatus controlled by one man. With the oxhydric process the work can be done at any place, thus saving transporation charges, and far more cheaply than by the old methods. The process has already been adopted, for cutting scrap, by nearly three hundred railroad machine shops, ship yards, and other establishments.

The oxyhydrogen nozzle of the oxhydric apparatus is cooled by water and other heat absorbed so effectually, that flame striking back is immediately cooled below the point of ignition, and consequently extinguished, so that all danger of explosion is eliminated. The cooling device also serves the purpose of mixing the gases intimately.—Scientific American.

The Oxygen Metal Cutting Outfit.

A lot of departments are always calling for more help when what they need is more method. And a lot of department heads are not delivering the goods, though they are capable, just because they are wasting time and energy doing hand-work when they are being paid for brain-work. It pays to take a look around once in a while just to keep a business from falling into bad habits. How about yours?—Silent Partner.

CONSTRUCTION AND EQUIPMENT EDITION

OF THE

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THE TURN IN THE TIDE.

Trade returns for October of this year show a decided improvement. Exports have increased and imports decreased compared with the corresponding month of last year. This increase of exports of domestic products amounts to $2,602,074; and the decrease in imports amounts to $5,221,515.

The total value of domestic exports for the month was $26,299,212, as compared with $23,697,148 for the same month last year. Exports of agricultural products increased by about four millions, while exports of the mine and of animals and their products each fell off about one million. Total imports, exclusive of coin and bullion, were $26,262,985, as compared with $31,484,500 for October, 1907.

For the first seven months of the present fiscal year the imports entered for home consumption totalled $162,908,302, a decrease of $59,726,936, as compared with the same period of 1907. During the seven months coin and bullion were imported to the value of $7,212,812, as compared with $1,396,375 last year. Exports of domestic products for the seven months totalled $136,408,263, a decrease of $12,862,525. The total trade for the seven months was $318,406,985, a decrease of $73,216,434.

MONEY PILING UP IN THE BANKS.

A year ago it was difficult to get money. Even well established firms were kept pretty close by the banks. Many firms found it difficult to secure funds to carry on their ordinary business. From the bank statement for October of this year is evidence that such is far from being the case now. The report showed that bank deposits in Canada during October had increased to the extent of $11,362,879, while the business of the country absorbed by way of current and call loans only $3,322,014 more than during the previous month.

When it is remembered that the crop movement began very early this year, and that the farmers were paid for their wheat and other products promptly, it will be understood that several million dollars of the increase in deposits may be due to the plentifulness of money in the rural districts. But there were probably also the fruits of greater thrift in the towns and cities where the pinch of the past year has taught caution.

Whatever the cause, the bankers of Canada are confronted with the fact that they have to earn interest on ninety-six millions of capital and six hundred and sixty-seven millions of deposits, or a total of $763,000,000—leaving reserves out of consideration—on loans at home and abroad of $659,000,000.

This situation will make it necessary for the banks to loan more freely than they have during the past year. It surely points out that the country is in a position to support an increase of industrial activity.

The banks will be forced to stimulate business by loaning freely wherever good security offers. Therefore for any legitimate enterprise, for necessary improvement or expansion of established enterprises, ample funds at reasonable rates should easily be obtainable at the present time.

For instance, if a manufacturer needs new buildings, the present is surely an opportune time to put them up. Materials and labor are lower in price than they have been in years: banks are out with telescopes after good investments. If a manufacturer needs new equipment, now is the time to buy it. Banks are most anxious to make good loans, and good terms can be secured from manufacturers and sellers of factory and mill equipment.

This condition of affairs cannot last long. With returning prosperity, the Banks will have no trouble in securing all the investments desired, and it will not be so easy to secure loans; and at the same time manufacturers and supply houses will be busy, and it will be more difficult to secure terms such as can be obtained at the present time.

What the railways are doing is generally a pretty good indication of the industrial situation, and the way the construction departments of the Canadian Pacific Railway and Grand Trunk Railway are getting down to work, is a pretty good indication of returning prosperity. Mr. D. McNicoll, general manager of the Canadian Pacific Railway, says that the construction department of that company is now busy building new equipment at nearly the pace marked out when the country was in the heyday of prosperity. The Angus shops, he said, are turning out 20 freight cars a day, and will be doing so for the next six months at least.

Construction of new locomotives has also been resumed at the Angus shops. Half a million dollars have been appropriated for this between now and the close of the fiscal year in June, and nearly $2,000,000 will be spent in passenger car equipment.

The Grand Trunk has just placed an order for 1,000 steel hopper coal cars with the Pressed Steel Car Co., of New York.

The Canada Car Co. is still busy with orders for Grand Trunk Pacific rolling stock, turning out about eight cars every working day, as it has been doing for the last four years. The original order was for 10,000 cars, and this has been executed and a new one undertaken. The cars are worth $800 each, representing an expenditure of about $2,000,000.

Sand-Lime Brick Plant in Edmonton

Detail Description of the Sand Lime Pressed Brick Plant Installed by the Berg Machinery Co., Toronto, for Pressed Bricks, Limited, Edmonton.

A large sand-lime brick plant has just recently been installed in Edmonton, for Pressed Bricks, Limited, by the Berg Machinery Mfg. Co., Toronto, which is shown in the accompanying illustrations.

The Berg Machinery Mfg. Co. recently became a joint stock company, and purchased the plant formerly occupied by the Canadian Shipbuilding Co., in Toronto. A great deal of money has been expended in thoroughly overhauling and equipping this plant. The Berg Machinery Co. have spared no effort or money in gaining a strong foothold in the Canadian market; and the company have shown great faith in the future development of the country. Already they are reaping the rewards of their foresight. This company will manufacture all the equipment necessary in brick plants as well as the brick presses and machinery. This will include engines, boilers, producer gas plants, etc.

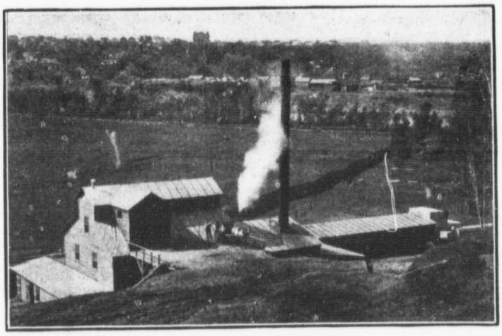


Fig. 1—General View of Exterior of Brick Plant at Edmonton.

This new sand-lime brick plant in Edmonton built for Pressed Bricks, Limited, has a capacity of 20,000 bricks per day of 10 hours. The plant is arranged so that it can be operated day and night. The entire equipment of the plant was built by the John Inglis Co., Toronto, for the Berg Machinery Co., this contract having been started before the Berg manufacturing plant had been fitted up and equipped.

The power equipment consists of a 150 h.p. Corliss engine and a 150 h.p. boiler, built by the John Inglis Co.

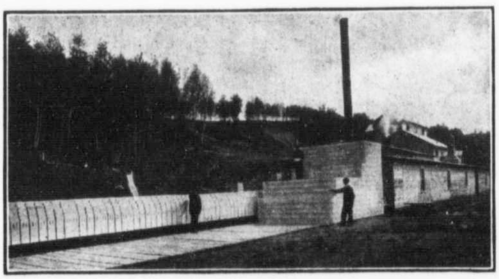


Fig. 2—Showing One Days Production on the Trucks and the Method of Stacking.

Fig. 1 is a general view of the plant. It is situated at the base of a hill. The sand is taken into the plant by gravity conveyor, which, however, is not shown in the illustration. The lime is taken into the plant by truck from the storage house to the left of the plant, part of which is shown in the illustration. This storage house is convenient to the Canadian Pacific Railway siding at the base of the hill.

After progressing through the plant in the regular way the bricks are taken out the lower end of the plant on trucks, and are stacked as shown in Fig. 2.

The sectional views, Figs. 5 and 6, show the progress of the sand and lime until the mixture reaches the press and is pressed into bricks.

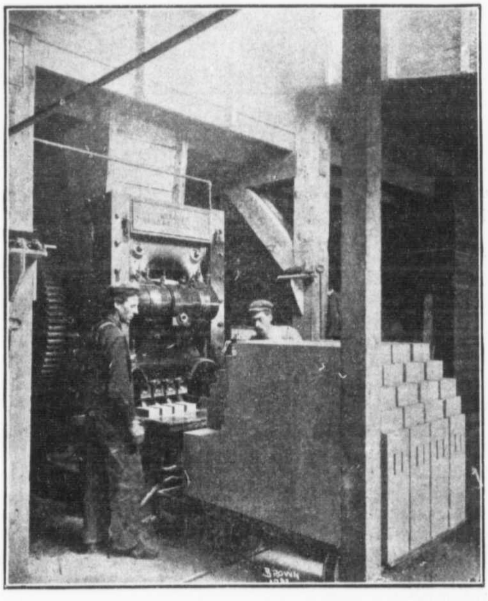


Fig. 3—Showing the Four Mold Berg Press and Method of Loading on Trucks from Machine.

From the gravity conveyor, which brings the sand from the top of the hill to the plant, the sand is taken by bucket conveyor to the rotary sand dryer, as plainly shown in Fig. 5. This rotary dryer is a two shell drum, the sand being in the inside drum, and steam being fed into the annular space between the two shells. The dryer is operated from the line shafting through belt, friction clutch and gearing, as shown in Fig. 5. A suction fan operates in the mouth piece of this rotary dryer to remove loam and other foreign substances. The difference in the weight of the silica and loam after having been thoroughly dried makes it comparatively easy for the fan to remove the loam and leave the silica. From the dryer the sand is dropped into the storage bin.

As before stated the lime is taken from the storage house, slaked and pulverized, and delivered to the storage bin. The slaking is done over night usually. The lime is placed in baskets on the truck and taken to the slaking or hardening cylinders, as shown in Fig. 4. From there it is taken to the pulverizer.

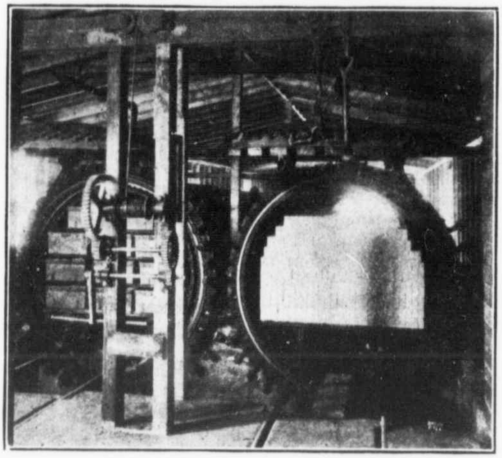


Fig. 4—Showing Berg Hardening and Drying Cylinders.

From the storage bins the sand and lime are taken in proper proportions by automatic measuring devices and discharged into a mixer. From this the mixture is delivered to an elevator, which takes it to the second floor where it is moistened, and again mixed. From this wet mixer it is fed to the brick press. The sectional view, Fig. 6, gives a good idea of the travel of the lime and the mixture.

In Fig. 3 is shown the four-mould Berg press. It will be seen that there is provision for a second press. As the bricks come from the press they are placed on the truck as shown, and taken to the hardening cylinder, Fig. 4, which is capable of holding a day's output. The brick is left in this cylinder over night usually, and the next morning taken out the opposite end and stacked as shown in Fig. 2, when it is ready for use.

This plant has been thoroughly tested by Pressed Bricks, Limited, and the Berg Machinery Co. have received several letters of appreciation from officers of Pressed Bricks, Limited, among them being the following letter from the President:—

"Edmonton, Alta., June 10, 1908.

"The Berg Brick Machinery Co., Limited, Toronto.

"Gentlemen,—It gives me much pleasure to add my testimony to what has been written by the other officers of the company regarding the sand-lime brick plant you installed for us here. When we first opened negotiations with you, we were informed that with your machinery we could manufacture bricks composed of 94 per cent. of sand and 6 per cent. of lime, equal if not superior to any bricks turned out in this part of the country. We ordered our plant from you, and it is now running. The bricks we are turning out are far beyond our most sanguine expectations; they are simply magnificent, both in shape, color and quality. The machinery works like clockwork. To-day we are drawing brick and putting them in the post office building hot from the cylinders; and when we consider that yesterday, the material for these bricks was in the sand bank, and that there are no delays, but simply continuous process, no burning, no waste, we believe that we have one of the greatest profit making industries in this part of the country.

"I cannot speak too highly of the pleasure it has been for me to do business with your firm, and you have not only done what your contract called for, but more.

"Wishing you abundant success in the future.

"Yours truly,

"Pressed Bricks, Limited,

"Per Chas. May, President."

[In future issues we will publish description of other

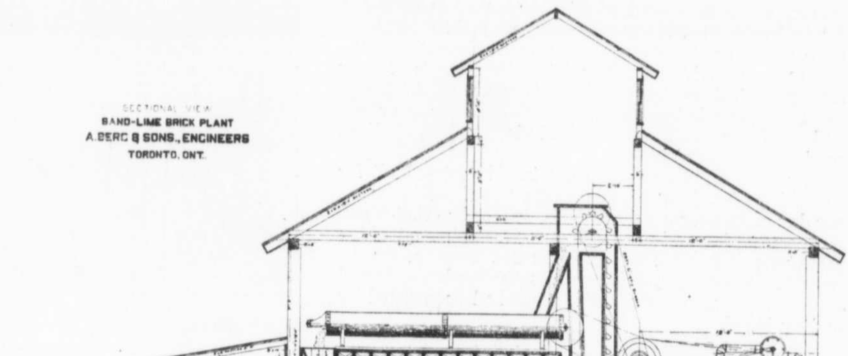


Fig. 5—Sectional View of Plant, Showing Path of the Sand.

brick plants, the object being to place before our readers the several methods of making brick for building purposes used in Canada.—EDITOR.]

Efficiency Factors

The conditions of modern industry are such that industrial survival is possible only by unceasing effort to increase the efficiency of all the agents of production and distribution.

So zealous has been the effort to enhance the efficiency of the various factors, that, nowadays, the successive advances are relatively small as compared with those made two or three decades ago.

In some cases, as for instance the steam engine, the demand for greater efficiency has resulted in the abandoning of effort along previous lines and a turning to an entirely new field, such as the turbine.

In the case of almost all instruments and tools, the improvements made from week to week now are very slight — yet no modification that shows actual increase in efficiency, no matter how small, is considered unworthy of notice.

It has been asserted that some of the big department stores of the large centres of population do business on such a close basis that their profits are made only by discounting their bills. Of course a two or three per cent. profit would be no profit at all were it not for the fact that these big stores are able to turn over their stocks many times in a year.

While every industrial concern that has been successful during the past several decades has been so because of its attention to the efficiency phase of its business, it is a fact that until a very few years ago this attention was very one-sided. Tools and processes were carefully studied but the human factor was just as studiously neglected.

But things have changed. It is realized now that the right kind of worker will produce more, even with inferior tools, than some other workers will with the most efficient instruments. So now the employee is as carefully studied as the machine.

Lighting, ventilation, shop conditions such as hours of labor, rest periods, safety-devices, the right kind of superintendence, bonus-systems—in short anything that will contribute to the physical and mental satisfaction of the workers, is looked into and made use of.

There are men who do nothing else but study shops and industrial institutions of all kinds just to make suggestions which will put concerns on the right track. These men are earning salaries that would make many other professional men jealous. Their work goes by many names, but the commonest is "welfare work."

The subject of increasing efficiency is one that no business can afford to neglect; and few are neglecting it to-day. Naturally the problem in every concern has its peculiar angles and must be studied for each business individually. But there are certain general principles that underlie the solution of every problem in this line, just as surely as there are general principles on which every question mechanical is based.—Silent Partner.

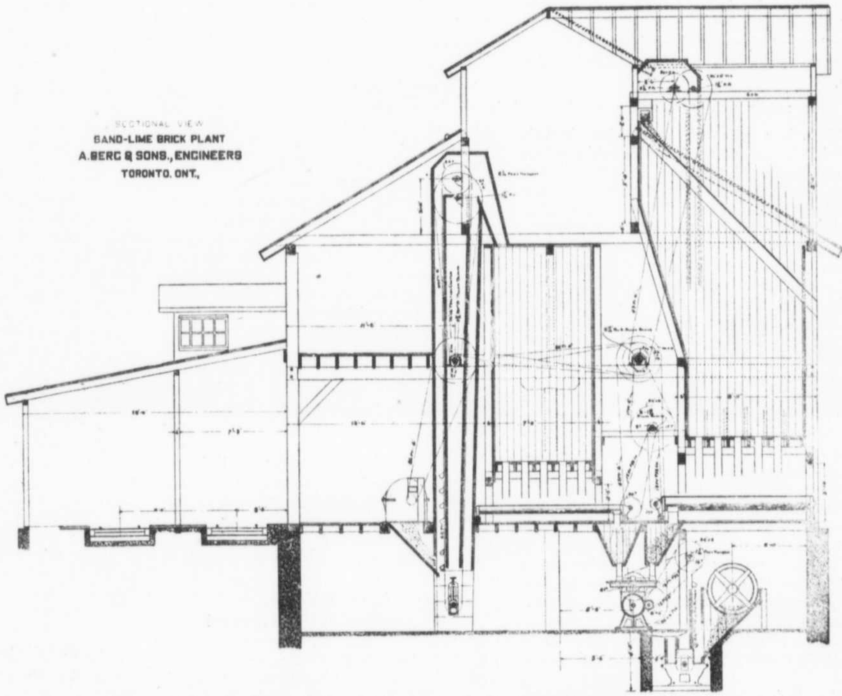


Fig. 6—Sectional View of Plant, Showing Path of Lime and Sand to Brick Press.

Catalogues Worth Having

These Catalogues will be sent by the firms upon request. Mention The Canadian Manufacturer.

KING OIL FURNACES.—Bulletin No. 1, October, 1908, published by the engineering department, Francis Hyde & Co., Montreal. Four furnaces designed for special work are described in this bulletin: the King oil heater, for removing and replacing locomotive tires, fitting laps on boilers, etc.; the King portable rivet furnace; the King flue welding furnace; and the King Crucible furnace. Strong claims are made for these oil furnaces on grounds of both economy and efficiency.

There is always a market for brains—the only problem is to locate the market.

Some Notes on Shop Lighting

A Timely and Workmanlike Discussion of the Relative Advantages of Various Methods of Shop Lighting and the Details of an Adjustable Bracket for Incandescent Lights.

By W. S. Giele

All our conceptions of size, form and proportion are dependent on mental impressions produced by relative values of light and shade. The workman's ability to produce pieces true to size and of pleasant form and proportion depends on nothing so much as on the truth of his mental impressions of these relative values. The best practice in shop lighting would therefore seem to resolve itself into means for producing differences in intensity of illumination of the correct relative values not only so as to produce the true impressions of size and form but to produce them with the least possible fatigue to the eye.

LIGHT AND ILLUMINATION.

There is a range of illumination through which it is possible to distinguish objects, but the brightest points are so little illuminated that the eye cannot readily be affected by the less bright points without considerable strain on it and the whole range of light values presented to the vision is so near the point where it is not possible to see at all that very little difference in relative light values is distinguishable, giving rise to false mental impressions as well as fatigue of the eye. On the other extreme are the objects so brightly illuminated that too much light enters the eye. In this case the darkest portions of the objects have a light value near or beyond the limit of the eye's capacity and the effect produced is again a strain on the eye and wrong impressions of size and form because the eye cannot distinguish the difference in intensity of illumination of various points on the object.

There is, however, a middle ground between the two extremes where the darkest point on the object is sufficiently illuminated to be distinct and the brightest point not so bright that it is dazzling. It is through this range that we get the clearest vision with the least fatigue because we are getting true impressions of relative intensities regardless of what the absolute intensity of any point may be.

More trying than either too bright illumination or too little illumination is the fluctuation from one to the other or even from the right amount of illumination to either too bright or too little such as is produced by a flickering source of light or one which is swinging so that points on an object are alternately in the light and in the shadow.

The foregoing considerations would lead to the conclusion that the most efficient illumination would be one in which:

The darkest shadow is not dark enough to strain the eye in the attempt to distinguish details.

The brightest point is not bright enough to dazzle the eye.

The light rays reach the eye only by reflection from the object we wish to see and never directly from the source of light.

The source of light remains constantly of the same intensity and perfectly stationary.

The most important and best source is always, of course, natural. Direct sunlight is, however, too brilliant for close vision though not too brilliant for comparatively distant objects out of doors where the eye is not kept for a long period on small details.

Direct sun rays should never fall on the object under observation. The best illumination is obtained from ample windows facing to the north or from skylights so arranged that the direct rays of the sun do not come through them. Where it is necessary to admit direct sunlight it should be through ribbed or ground glass or through translucent shades so that it will be diffused.

Arc Lamps.

For general illumination during the dark hours the source of light should be placed as high as possible to obtain an even diffusion over the floor area to prevent sharp shadows and to protect the eye from direct rays. For this purpose an open arc lamp is not well suited because its light is emitted from a very small area of very high intensity, giving rise to sharp shadows which are trying to the eyes and misleading. In this case the shadows are often illuminated brilliantly enough for perfect vision but objects in the shadow are not visible because the relative intensity in illumination of points out of the shadow is so much higher that the eye is adjusted to this higher value which is predominant. The flickering to which these lamps are subject whenever the feeding mechanism becomes deranged is also very trying.

The inclosed arc gives a much better illumination because the light rays are given off in all directions, and their source distributed over a large area, so that shadows are less sharp. The flickering due to irregular feeding of the carbons, however, sometimes takes place.

Mercury Vapor.

A most excellent light for general shop illumination is the mercury vapor lamp. Although the color values are not true with this light, its bluish-green quality is very restful to the eye. This light owes its good illuminating qualities to the fact that the source of light rays is distributed throughout the length of a long tube and does not have a high intensity at any one point. Though rather sensitive to voltage fluctuations which sometimes cause the light to go out, it is remarkably steady and no trouble is experienced when the voltage is kept within easily attainable limits. This lamp also has the advantage of not requiring trimming and of a very high efficiency in regard to current consumption.

Gas Lighting.

Gas lamps of the mantle type give a steady illumination with good diffusion but are frequently impracticable where vibrations would rapidly destroy the mantles.

Open gas flames are always subject to flickering, but where a large number are employed and placed at some height the aggregate effect may be quite steady.

Local illumination at the bench, vise, or machine is, however, the most important because of its more direct effect both on the work and the workman. Yet it usually receives the least attention. Here the light must be near the object and near the eye. Nowhere is it more true that a little light where it is needed is worth more than any amount of it where it is not needed. To be effectual the light must be perfectly steady, readily adjustable to any position and shaded to keep direct rays from the workman's eyes. It should also be protected against mechanical injury.

A good oil lamp on an adjustable bracket and with a suitable shade is available anywhere at any time though, of course, it requires considerable attention.

The mantle type of gas lamp is also well adapted to local illumination provided it has an opaque shade to protect the eyes and a ground globe to diffuse the rays as it is relatively quite brilliant.

Incandescents and their Adjustment.

The incandescent electric light, however, is generally conceded the best means for local illumination from all considerations of effectiveness, availability, economy of operation and minimum care required. Yet how often do we find it dangling unshaded from a long cord glaring in the workman's eyes so badly that it is hard for him to see anything else and chasing shadows from side to side as it swings. How often does it hang where it it most wanted? To be completely effective this light should be provided with a cone-shaped shade to keep the light out of the workman's eyes as well as to concentrate it on the work. Tin shades are cheap and also protect the bulb from mechanical injury. Of equal importance is some form of adjustable bracket which will keep the light stationary and exactly where it will do the most good. This bracket should be adjustable with one hand without the manipulation of thumbscrews or equivalent devices.

In conclusion the writer feels that he ought to add that he has merely recorded a workman's experience with shop lights as he found them in various plants rather than attempted to cover the whole science of illumination.—Castings.

OUTPUT OF ONTARIO MINES.

For the nine months ending September 30 the mines of Ontario produced $12,205,795 worth of mineral, according to a statement handed out from the Bureau of Mines yesterday. During that period the shipments from the Cobalt district amounted to 18,325 tons, including 480 tons of concentrates. In the list given below arsenic represents only the quantity recovered by reduction works in Canada, and cobalt only that for which the mine-owners received returns. The returns are as follows:—

	Tons.	Value.
Arsenic	464	$ 19,892
Cobalt	408	80,623
*Gold	1,738	40,796
*Silver	12,223,834	6,141,090
Copper	5,892	837,559
Nickel	7,760	1,494 693
Iron ores	166,088	448,532
Iron pyrites	13,417	43,948
Pig iron	189,287	3,098,661

*Ounces.

Sheet Metal or "Pressed" Radiators*

A Response to the Principal Arguments Advanced Against this Type of Radiator, Taking Up the Relative Efficiency of and Resistance to Corrosion of Different Types of Radiators.

By Ray D Lillibridge, Ass. A.S.M.E. and A.I.E.E.

Notwithstanding the obvious advantages of sheet-metal radiation in the way of reduced weight, reduced space occupied, facility of handling, and ability to withstand, without injury, the freezing of contained water, there prevails in some quarters the general impression that this new form of radiation also possesses inherent defects which render it unworthy of consideration as a substitute for cast-iron radiation. This impression is due, perhaps, in no small measure to the adroitly conducted "Campaign of Discouragement" that has been directed against this new thing—as comprehensive and systematic a campaign as was ever directed against any innovation, the advent of which threatened the commercial supremacy of the interests occupying a chosen field.

Such opposition and obstacles are not unusual. It was so with the railroad, and the automatic harvester, with the telegraph, the telephone, etc. It was so with steel itself. Benjamin Huntsman, the inventor of the process that produced the world's steel up to the invention of Henry Bessemer, found difficulty in introducing his product in his own country, owing to the conservatism of the Sheffield cutlers, who "perversely declined to work a metal so much harder and denser than any to which they had been accustomed, so that he was compelled to introduce his product, which was destined to revolutionize steel making, through a foreign market."

But, as in the case of those great inventions, it is also to be expected that the hindrances put in the way of the new form of radiation will be ineffective in the end; since anything of the kind of genuine merit, if properly exploited, cannot long be prevented in this age of progress from coming to its own. Now that this particular new thing has survived the vicissitudes of the experimental stage, and has entered upon a career of commercial success, it may prove advantageous to point out the fallacy of some of the arguments advanced against it. A permanent record of the discussion of the subject may also be of value for future reference.

The durability and efficiency of the new form of radiation have been assailed particularly. Dire predictions have been made as to the short life of the thin steel walls of the pressed radiation as compared to the thick walls of the cast-iron type. Ominous comparisons have issued, of which, perhaps the one most often heard is that likening the pressed radiator to the steel kitchen boiler, which has proved to be comparatively short lived. Finally, on the subject of efficiency, ignoring the more compensating virtue of a thin metal wall versus a thick one, capital has been made out of the theory that steel has a slightly lower radiating power than iron.

If we are going to discuss the vulnerability of steel to the corrosive impurities of water in radiating systems, one has but to refer to the steel nipples connecting the sections of the cast-iron radiators, which are located in the direct path of all circulation, to call to attention that the cast-iron chain is no stronger, at the point of its weakest link, than steel. The screw nipple used between sections of cast-iron radiators is of much smaller cross-section, especially after threading, than the 20-gage (16-gage after galvanizing) steel radiator. As for push nipples, these as regards durability are about on a par with the walls of pressed radiators, except that the many that have come under the writer's observation were either not galvanized at all or the galvanizing was decidedly scant. Or, why not refer to the steel pipe connections, which are similarly weakened by threading (figure 1), but which are as integral a part of the radiator system as the radiators themselves? In both the screw nipples and pipe connections, not only is the material pared down, but the galvanizing, if any, is removed by the threading; so that these elements are far more liable to be eaten away than is the continuous, well-galvanized sheet metal of the pressed radiator.

Consider further the small quarter-inch pipe commonly used with vacuum systems and compare the thinness of the wall of this quarter-inch pipe, especially after cutting the threads, with the thickness of the pressed-radiator wall. Moreover, it is seldom that these pipes have any interior protective coating. Think of the trouble that would arise with vacuum systems if these little pipes should fail from corrosion. As this consideration seems to arouse no anxiety, is it logical to condemn on the same score the pressed radiator?

It is safe to say that a very small proportion of the pipe used for connecting radiators is really wrought iron, although "wrought-iron pipe" is usually specified. Although Mr. T. N. Thomson's paper before this society last January has led to much discussion, no one has questioned his observation that of the samples sent to him from all over the country of "good old wrought-iron pipe" 80 per cent. proved to be steel. At the recent Atlantic City meeting of the American Society of Testing Materials, Professors Howe and Stoughton outline corroborative testimony of a most convincing character. Incidentally, Mr. Thomson's tests concluding that steel withstands better the corrosive impurities of water than wrought-iron, are more than substantiated by Professors Howe and Stoughton's conclusions. I beg to quote you just a paragraph from the latter. The italics are mine.

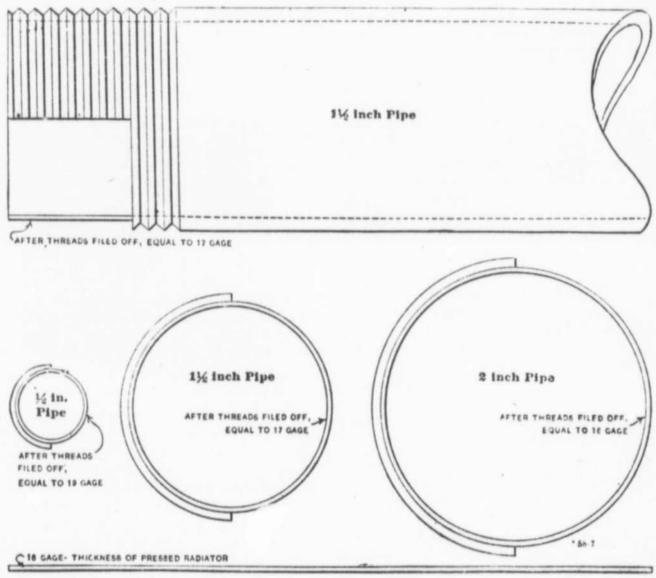


Fig. 1—Illustrating the Comparison Between the Thickness of Wall of Various Sized Pipes After Threading, with Pressed Radiator Wall.

* Presented at July, 1908, Meeting of American Society of Heating and Ventilating Engineers.

"It is found that . . . *the wrought-iron skelp, though from the best makers, pitted in seven months much deeper than the steel did in thirteen months.* It seems to us that the fairest way is to confine our attention to the deepest pit in each plate, because, as has well been said before this Society, if there is a hole the water will run out, no matter how much the pipe weighs. Using thus the deepest pit in each piece, as a basis of comparison, in our tests *the steel pitted very much less than the wrought-iron.*"

The comparison of the pressed radiator with the kitchen boiler for durability is particularly inconsistent for the reason that the very service of the kitchen boiler insures that the water is constantly changed, and the effect of any contained corroding agent is thereby multiplied thousands of times as compared with the corroding effect in a closed-circuit radiating system. Moreover, the majority of kitchen boilers are made of inferior grades of steel, and actual investigation has shown that the galvanizing they receive upon the inside is often of proverbial "lick-and-promise type;" whereas pressed radiators are made of the very best open-hearth sheets, low in phosphorus, carbon and sulphur, and *after manufacture* are galvanized with a coating of 4½ ounces of zinc to the square foot, increasing their effective thickness from 20 gage to 16 gage.

On the subject of efficiency, the original form of pressed radiation was defective because of the peculiarly shaped top to each section, which interfered with the free circulation of the air and because, in the light of more recent knowledge, insufficient space was allowed between the sections. This peculiarly shaped top is shown in the left-hand illustration, figure 2, which is a vertical section of the old (Model "K") pressed radiator. The two right-hand illustrations of this figure show, respectively, a section of pressed radiation with the single seam, and with the double seam as now manufactured, respectively. This improved double seam gives an entirely impervious joint.

As for the maintained superior radiating efficiency of cast-iron as compared with steel, Professor Carpenter, Professor Kent, Professor Allen, Mr. W. T. Monroe, M.E., and the many references quoted by these authorities incline to agree with the differences appearing between the radiating efficiency of various metals are due more to differences in surfaces, differences in sizes and shapes of radiators tested, and to different methods of tests, than to differences in metal. I beg to quote from Professor Carpenter's "Conclusions from Radiator Tests" (Page 112, Heating and Ventilating Buildings.)

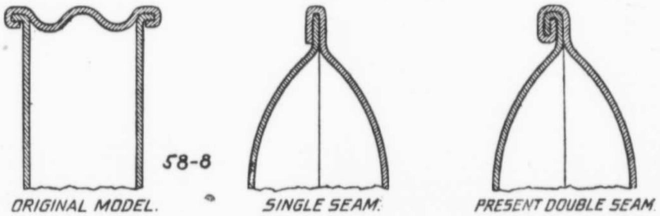


Fig. 2—Evolution of Pressed Radiators, Illustrated by Vertical Sections of Three Models. The Present Double Seam Makes an Entirely Impervious Joint.

"The experiments do not show any sensible difference for different materials used in radiators, or for hot water or steam, provided the difference in temperature between the air in the room and that of the fluid in the radiator is the same."

A favorite implication of some of the exponents of cast-iron is that pressed radiation is from "30 to 40 per cent. less efficient." The really vital test for any radiation is that of heating the particular room it is designed to heat. The calculating of the appropriate size of radiator from which to expect the adequate heating of a given room is sufficiently standardized so that any type of radiator failing so far short of the radiating capacity of cast-iron could not continue to live in the heating world. Is it conservative to say that pressed radiation continues to live after six years of existence. It is not, therefore, abundantly clear that the practical differences between the radiating efficiency of steel and iron resolve themselves into mere talking points, and that any references to vague and indefinite tests that show to the contrary should not go unchallenged?

Fig. 3—Section of a three-column pressed radiator, showing steam or water space and pipe connection. Each radiator section is made up of two pressed sheets, joined by the double seam shown in Fig. 2. The different sections, constituting a complete radiator, are joined in the same way. The joint at the pipe connection is made by folding the sheet metal snugly over a malleable-iron ring. The assembled structure is then heavily galvanized inside and out.

Comparative tests, to be of value, should be conducted by disinterested people and under specified, uniform conditions. It is too often taken for granted that the entering steam is "dry," whereas only calorimeter readings should be considered competent to determine this point. When even under such conditions differences *do* appear, it is well to bear in mind that great differences exist by condensation tests between the efficiency of different types of cast-iron radiation. For instance, I refer to tests conducted by Professor Allen, at the University of Michigan, showing a difference of 16 per cent. between two popular types of cast-iron radiators. I have also in mind the test which decided in favor of pressed radiators one of the most important installations of radiators in the world. This test was conducted by a committee consisting of the architect's engineer, the building engineer, the consulting engineers of the builders, and the contracting steam fitter. It is noteworthy that the conclusions reached were not based upon condensation, but upon the heat units conveyed to the atmosphere by the respective radiators under identical conditions.

Judging by various published tables and the extensive adoption of one-inch pipe for radiator service prior to the advent of cast-iron radiators, the most efficient proportion between containing capacity and heating surface of radiation is that of the one-inch pipe, very nearly one pint to the square foot. The average proportion with the steel radiator is just about one pint to the square foot, whereas cast-iron radiators average about 50 per cent. greater. Besides this nearer approach to the ideal proportion of capacity to surface, there is less water and steam and far less metal to raise to the working temperature before effective heating is available, and to remain heated after the discontinuance of heat is desired; so that pressed radiators heat up more quickly when the valve is open and cool off more quickly when the valve is closed than cast-iron radiators. This positiveness of operation becomes an especially valuable consideration when heat is needed, only for an hour or so a day—as in the spring and fall, when a little heat is required to take the chill out of the air, and during the mild winters that prevail in certain parts of the country.

Another argument advanced in favor of the cast-iron radiators as against the steel radiator is that the sections of the former possess all the advantages of individual units. For example, if they are broken they can be replaced, or, if it is desired to decrease or increase the size of a given radiator, one or more sections can be removed or added, respectively. **The comparative unwieldiness of the cast-iron radiator, and the formidable**

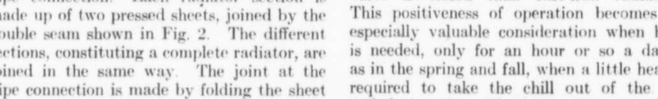


Fig. 4—Cross Section of Two-Column Pressed Radiator.

task of prying apart and pushing together the predominating type of iron radiators having push nipples, however, are material points against the unit argument, which more than offset the advantages. It will usually prove cheaper, cleaner, and quicker, to send for a new pressed radiator than to tamper with the sections of a cast-iron one.

The personal equation, unconscious bias, or mere conservatism naturally enter into any consideration of this new subject as they enter in to all others. So, when you hear of failures of steel radiators, it may be well for you to know instances that give testimony on the other side. For example, there are several concerns of heating contractors which have made many large installations of the pressed type of radiator who to-day declare that they would consider it a great misfortune if they were deprived of this new form of radiation.

As with anything new, more is expected of pressed radiation than of the older types. The same defects or troubles which would condemn the new are accepted as matters of course when they occur in the old. Job for job or radiator for radiator, it will be found to be absolutely true that with the pressed radiators as they are made to-day no more trouble develops than with cast-iron radiators.

[If any of our readers has any interesting data on this subject we will be glad to publish it; or if any reader has opinions on either side of this question, our columns are open for discussion.—EDITOR.]

Machine Shop Management: Schemes

Prime Facts Concerning Systems: Plan of Organization: The Military Idea in the Shop: Superintendent's Functions: The Foreman and His Work.

BY OSCAR E. PERRIGO.

This article concerns the management of a model machine shop or manufacturing plant in a general way, leaving the scheme of the different departments in detail for later consideration.

Probably no one will take exception to the proposition that we shall have reached the perfect system of management when we shall have devised methods by which we may produce the greatest amount of good work, with the smallest number of employees and the least amount of friction and irritation among them.

How this is to be accomplished is worthy of the most patient investigation, for the question of the management of machine shops and manufacturing plants is one of many phases. There are several general propositions in this connection that should be briefly stated. Among them are the following:

SOME PRIME FACTS CONCERNING SYSTEMS.

First. Any reasonable system is better than no system at all. There are shops to-day running, or trying to run, in which there is really no system worthy of the name, and things are allowed to drift along from day to day "by guess and good luck," just as they did forty years ago, and if we inquire why this or that thing is done so and so, we get the stereotyped reply, "That's the way we've always done it." One of these days these shops will "wake up and find themselves dead," as the Irishman said, or they will adopt some kind of a system that will be of modern brand.

Second. The adoption of a part of a system, or a system for one part of the works and not for the remainder, "just as a trial to see how it will work," is practically no better than no system at all."

Third. The endeavor to adopt a system composed of parts of various systems, grafted upon, added to, dovetailed together, and patched until they lose all their identity, like Joseph's coat of many colors, is but to invite a dismal failure. Many a good plan has been killed and its author humiliated by adopting it piecemeal.

Fourth. To be successful the system must be complete and comprehensive, clearly defining every regulation as to the progress of the work, the method of accounting for time and materials, records of pay and efficiency of employees, and the duties and limitations of authority of every person concerned, from the manager down to the errand boy, so that the fewest cases may arise that have not been provided for in the system, and that there may be as much certainty and distinctness as in the regulations of the United States Army. Then we shall realize the highest efficiency and the least amount of friction.

Fifth. The system must be carried out in every particular as it is planned, unless there are very serious reasons for a change. Of course, even the Constitution of the United States can be amended, but only for weighty reasons, and "while it stands, it goes." Shop regulations should be on the same basis, and all employees will soon come to respect them, and to realize that they operate just as much for their welfare and protection as for the benefit of the owners of the plant; that so long as they are obeyed in a spirit of faithful service the employee is always right; and that when they are disobeyed through carelessness, a desire to shirk duty, or even from the "smart Alek" notion that some employees get into their heads, there is a good prospect for trouble to the offending parties.

Sixth. The man who is to manage the administration of the system must be strong, able, honest, fearless and positive. He must be strong in carrying out the system that has been adopted. Otherwise his weakness will be soon discovered by his subordinates and the "backbone" of the system will be broken. He must be able, both by education and experience, to understand and appreciate all the details of the business. Of course, he must be honest in all his dealings with his subordinates as well as with the owners. He must be fearless, giving his orders where and when and to whom they are necessary and take the responsibility for their effect when faithfully obeyed. Hesitation, vacillation, or indecision will very materially injure his authority. To give an order, and when it has been obeyed faithfully and failed of the object sought, to blame those who executed it, is to cause his men to lose faith, not only in his ability, but in his sincerity. And there is only one thing more damaging to the administration in the minds of the employees than this, and that is to show a lack of faith in their ability and honesty. This will always prove discouraging and cause the men to lose interest in the successful progress of the shop.

Such being the general conditions under which we must organize, we may proceed with the further consideration of the system by which our plant is to be managed. We must first know what we are to plan for. It is assumed that the plant and all its accessories have been designed and equipped for manufacturing only. Therefore, with the exception of shipping facilities, the entire establishment is devoted to turning out and shipping what it is directed to make. To accomplish the results we seek, we must go about the matter with a definite and comprehensive plan. It will not do simply to decide some of the main features and leave the others to be determined as we go along. If we do so we shall probably be surprised to find that some of the minor matters will loom up as important features when we least expect trouble.

PLAN OF ORGANIZATION.

We will consider the scheme of organization. In deciding what plan is best we should look to efficiency as the first requisite. This will include the question of making the most of the services of each man in a responsible position; it will include the consideration of a plan that shall have the least friction between the different officials in the routine work of the shop. It will seek a proper division of responsibility, so that if anything goes wrong we may at once determine what man was responsible for the lack of attention to duty. It should be a plan that will produce a maximum of result with a minimum of effort. Every man must know exactly what his duties are, what are the limits of his authority, as well as from whom he takes and to whom he may give orders.

It will be understood, of course, that the entire management of the plant is under the charge of the superintendent and that all orders from the general office go to him direct, and that there is no interference with any other official of the shops by the general manager or anyone in the general office. This sort of interference "over the head" of the superintendent will break up the discipline of any shop, and it should never be indulged in by the authorities in the office or permitted by the superintendent. It should be the same with all officials in the shop. No official or employee should accept any order unless coming to him in the regular way through the next higher authority.

We think it has never been seriously questioned, that the organization of the United States army, with its division of responsibilities, the provisions for accounting for all property handled, and for ascertaining the final results, as well as for keeping a definite record of the individual efficiency of both officers and men is a well-nigh perfect system. Its practical utility is not thoroughly appreciated by the manufacturers of to-day, who are prone to look upon anything labeled "military" as savoring of arbitrary and summary methods that in the shop would be disagreeable to both employer and employee. That this is too apt to be the popular impression is evident from the remarks of a recent writer on this subject who says:

"Under the military type of organization the foreman is held responsible for the successful running of the entire shop. He must lay out the work for the whole shop, see that each piece of work goes in the proper order to the right machine, and that the man at the machine knows just what is to be done and how he is to do it. He must see that the work is not slighted, and that it is done fast, and all the while he must look ahead a month or so either to provide more men to do the work or more work for the men to do. He must constantly discipline the men and readjust their wages, beside fixing piece work prices and supervising the time-keeping."

This is hardly a fair conception of what military rules mean, as it is surely anything but military. No military officer has any such variety of duties to perform. As well might it be contended that the colonel of a regiment takes command of the police guard or drills the awkward squad, or that a captain teaches the recruits the manual of arms. On the contrary, the colonel commands a regiment, but he gives orders to his majors who command battalions and give orders to the captains of companies. They in turn give orders to the non-commissioned officers who instruct the enlisted men. Each officer has his clearly defined duties, authority and limitations. It is true that the organization and management of many of the larger and more successful manufacturing companies in this country to-day are using systems very closely modeled after the military methods, and in many cases, as investigation will show, following the army methods much more closely than is realised by many men.

The Military Idea in the Shop.

Let us consider for a moment the analogy which may exist between a regiment of infantry and a large machine shop plant, with its force of officials and employees. The general manager may be likened to the general in command, and the machine shop or manufacturing plant to a part of an army, say, a regiment of infantry on active service. The colonel in command will be represented by the superintendent or works manager. The colonel must have a staff, each of the officers composing it being at the head of one of the staff departments. So here we must have a staff, and it will consist of the office force, and include the chief clerk, purchasing clerk, time clerk, cost clerk and the stenographer, all reporting directly to the superintendent. A regiment is divided into two or three battalions commanded by majors. Our force will be divided into two parts, each under an assistant superintendent. Each battalion is composed of a number of companies, commanded by captains. Our two groups are divided into certain analogous departments each in charge of a foreman. Our arrangement will be for the first assistant superintendent to have charge of the drawing room, pattern shop, tool room, experimental room, stock room, power house, iron foundry, forge shop, carpenter shop, paint shop, shipping room and the yard gang.

The second assistant superintendent will have under his charge all of the strictly machine shop departments, consisting of the planing department, heavy turning department, drilling and boring department, milling and gear cutting department, small parts department, grinding department, polishing department, finished parts store room, small parts assembling department, erecting department and inspecting department.

This, then is the skeleton of the plan of our organization, and from this we may make up what is called in army parlance, the roster. This will include all responsible officials, commencing with the superintendent and the office force, then the assistant superintendents, foremen, etc. A little further on we will add others more intimately connected with the workmen.

Superintendent's Functions.

This plan requires the superintendent to look after his office force as to accounting, purchasing, issuing, time keeping, pay roll, manufacturing costs and the correspondence, and to hold the two assistant superintendents responsible for all of the requirements of their respective jurisdictions. In a plant of the capacity which we have been considering and the force employed this will be all that one man can be expected to do. In the same manner the two assistants will find their time quite steadily employed in the successful management of the eleven or twelve departments in their charge. The assistant superintendents should be men of good executive ability, good machinists and understand in detail the operations of machinery and working every variety of work or material handled under their supervision. They should understand drawings thoroughly and be able to make any of the calculations usually made in the drawing room. They should understand the character of the men under their control and the characteristics of machinists or other tradesmen working under them. While they are officials capable of handling men by direct contact with them, their positions now place them one step beyond that, and all matters of instruction as to the work, the everyday routine in passing work from one department to another, the discipline of the force under their charge, should be done with the foremen, and never with the men. An infallible rule for injuring the efficiency of a shop official of whatever rank, is for some higher authority to ignore him and pass orders on to the grade below him, or, in shop parlance, to "make a bridge of his nose." The foremen, in turn, give the work to the gang boss having charge of similar work and he instructs the workmen when necessary and sees that the work is pushed along. This may seem a little like "red tape," but it is at once the quickest, surest and safest way to manage the shop, and one that will produce the greatest amount of good work with the least friction and ill-feeling on the part of the employees. Still any official witnessing a violation of the sanitary, or, of what may be called the police regulations of the establishment, is expected to call the offender to account and later to report him to his foreman.

The Foreman and His Work.

The foreman should be a man of excellent mechanical ability, understand drawings thoroughly and be able to make any of the ordinary calculations necessary. He should be able to make estimates as to time, cost and material, of anything handled in his department. He should know the characteristics of men in general and the abilities and dispositions of those under his control. If his room is large enough to have gang bosses he should give his orders to them, and not to individual workmen. He should know every item of work passing through his room, keep things moving in it, and see that work transferred to him from another department is in proper condition and is promptly used and that the product of his department going to another one is in proper condition for the transfer and is passed on without unnecessary delay.

It is not at all necessary that the foreman of a small department, or over a few men, should devote all, or even a large percentage of his time to strictly foreman's duties, as he may be able to do considerable work himself while directing others. The point is, to have one competent man in charge of the force, the gang, the room, or the department, whom we can hold responsible for the results in that department.

In our analogy of the plan of organizing and administering the affairs of a manufacturing plant to the military organization, we had got to the foreman as corresponding to the captain. Our gang bosses will fittingly represent the non-commissioned officers. These are privates of more than ordinary ability and faithfulness and have been promoted for these reasons. They are the real leaders as well as instructors of the privates and form what might be termed the connecting link between them, as a class, and the commissioned officers. So should the gang boss or assistant foreman be, and his influence for good in the smooth running and harmonious, as well as efficient and profitable, conduct of the shop, is a very important matter which should receive the most careful consideration in the organization and operation of the plant. The gang boss should be a man properly qualified for the position; able to read drawings readily; to know enough of human nature to "size up" the abilities of the men under him, and to know, not only each man's practical knowledge of the business, but his natural disposition, so as to be able to direct him intelligently and for the best good of the establishment. In the foregoing remarks as to foremen, etc., those of the machine shop proper have been meant. But in a general way the principles are equally applicable to those of other departments.—Iron Trade Review.

CAPTAINS OF INDUSTRY

Opportunities for Business. News of Building or Enlargement of Factories, Mills, Power Plants, Etc.—News of Railway and Bridge Construction—News of Municipal Undertakings—Mining News.

COMPANIES INCORPORATED.

Ontario.

TORONTO—British Canadian Departmental Stores, Limited, have been incorporated with a capital of $600,000 to establish and conduct a general department store. The provisional directors include James Casey, C. E. Freeman and Abraham Singer, all of Toronto.

TORONTO.—Dominion Co-Operative Association, Limited, have been incorporated with a capital of $1,000,000 to carry on the business of a general merchant. The provisional directors include F. H. Potts, A. W. Holmsted, and F. D. Parmenter.

New Brunswick.

MONCTON.—Sovereign Coal Co., Limited, have been incorporated with a capital of $300,000, to carry on the business of mining The provisional directors include Hiram Shaw, Beesville, Que., Eugene Mead, Adamsville, Que., and E. O. Seeley, Maccan, province of Nova Scotia.

Quebec.

MONTREAL.—The Imperial Fire Insurance Co., Montreal, have been incorporated with a capital of $2,000,000 to carry on a fire insurance business. The provisional directors include Mr. R. Forget, Mr. Charles Archer and Mr. Geo. H. Roberts.

BRIDGES AND STRUCTURAL STEEL.

British Columbia.

REVELSTOKE.—The Government engineers are getting out plans for the new bridge to be built over the Columbia here. The bridge will cost about $40,000.

BUILDING NEWS.

Ontario.

CHATHAM.—Architect Harry J. Rill, Detroit, is receiving estimates for the erection of an auditorium building here.

HAMILTON.—The Dominion Power & Transmission Co. have taken out a permit for the erection of car barns and shops.

TORONTO.—W. D. Charlton, 140 Close Avenue, has been awarded the contract for a $10,000 apartment house.

TORONTO.—The West End branch of the Y.W.C.A., Dufferin Street, intends to erect a new Y.W.C.A. building.

THOROLD.—On November 23 the boiler house at Battle Quarry here was completely destroyed by an explosion.

TORONTO.—It is reported that a large new building to be used for both wholesale and retail departments will be erected by the Steele-Briggs Co., here.

NORTH BAY.—The new Cecil Hotel here has been damaged by fire to the extent of $2,000.

TORONTO.—Plans are being prepared by architects Ellis & Connery, Manning Chambers, for a $20,000 apartment house for Mr. J. A. Cleary, Toronto.

TORONTO.—The T. Eaton Co. have applied for a permit to build a two-story addition to the north section of their Yonge street store at a cost of $76,000.

TORONTO.—Plans are being prepared by architects Ellis & Connery, Manning Chambers, for a large department store building for the British-Canadian Departmental Stores, Limited, London.

CORINTH.—The depot and freight sheds of the Grand Trunk Railway have been destroyed by fire. It is stated that the company will rebuild at once.

BELLEVILLE.—A by-law will be submitted to authorize the issue of $40,000 or $50,000 debentures for the erection of a new collegiate institute.

Quebec.

MONTREAL.—Messrs. A. Poirier & Co., St. Paul St., are having a large freight elevator installed by Messrs. Cote Bros. & Burritt, Conde St.

MONTREAL.—Contracts for roofing the new Lymans Limited warehouse, St. Paul St., have been awarded to Douglas Bros., 19 St. Maurice St. Messrs. Mitchell & Crighton, Inglin Building, are the architects.

MONTREAL.—The Light and Fire Committee of the corporation of Montreal, have recommended that new fire stations in Rosemount and Mount Royal ward be included by the Finance Committee in their estimates for the coming year.

MONTREAL.—Architect J. A. Karch, 17 Place d'Armes Hill, Montreal, has prepared plans and is inviting tenders for the erection of a warehouse for the Campbell Mfg. Co.

MONTREAL.—The Parks and Ferries Committee have approved plans for improvements to Victoria Square amounting to about $7,500. They also recommend the expenditure of $5,000 for a restaurant in Lafontaine Park, and $7,500 for crushed stone for the mountain roadway.

THREE RIVERS.—Messrs. Bellefeuille & Giroux will erect a new store at Three Rivers. The contract for steel work has been awarded to the Phœnix Bridge Co., 83 Colborne St., Montreal. Mr. Theo. Daoust is the architect.

THREE RIVERS.—A market building costing about $40,000, will be erected at Three Rivers, Que. Mr. Theo. Daoust is the architect and Mr. Bigras, Three Rivers, is the contractor.

ST. ROCH.—Tenders are being called by Nap. Tessier, secretary, Department of Public Works, Ottawa, for the construction of a postal station at St. Roch, Que.

Manitoba.

WINNIPEG.—The Carson Hygienic Dairy Co., Limited, have taken out a permit for the erection of a dairy building here, estimated cost, $15,000.

WINNIPEG.—The Western Canada Flour Mills Co. will erect a brick warehouse on Lombard Street at a cost of $6,000.

WATERWORKS, SEWERS, SIDEWALKS.

Ontario.

BEAMSVILLE.—Eleven thousand dollars will be spent here upon granolithic sidewalks.

RENFREW.—The Town Council have passed a by-law to raise $5,000 by debentures for the extension of the sewerage system.

PETERBOROUGH.—Engineer Kennedy, Montreal, has plans for the construction of a new dam and pump house for the waterworks system.

Saskatchewan.

MOOSE JAW.—A by-law to raise $40,000 by debentures for sewer and water extensions and other purposes will shortly be submitted to the ratepayers.

YORKTON.—Twenty thousand dollars is to be raised here for the improvement of the waterworks system.

MILL AND FACTORY EQUIPMENT.

Ontario.

RENFREW.—The contract for the erection of the Renfrew Knitting Co.'s new factory has been awarded to the Renfrew Manufacturing Co.

DRESDEN.—The Wm. Rudd carriage factory has been partially destroyed by fire. The building will probably be rebuilt.

WESTON.—Tenders will be received by Architect Leonard Foulds, 43 Victoria St., Toronto, for the erection of five factory buildings and an engine house here for the Consolidated Chemical Co.

PEMBROKE.—The Pembroke Milling Co. will at once rebuild their mill which was recently destroyed by fire.

TORONTO.—E. H. Harcourt & Co., Limited, Wellington Street West, have taken out a permit for the erection of a three story brick addition to their factoty.

PETERBORO.—Mr. Weatherstone, Peterboro, has made application to the city council for the purpose of purchasing land on which to erect a new one story factory.

PETERBORO.—A large factory will be erected here for the manufacture of door mats. Mr. Weatherstone is dealing with the manufacturers' committee.

RODNEY.—The sawmill owned by F. A. McCallum has been totally destroyed by fire, the loss amounting to $5,000.

NORTH BAY.—The Temiskaming and Northern Ontario Railway will build a car repair shop and a pipe casting shed here.

RIDGETOWN.—The foundation of the large new canning factory is now being put in

The total cost of the plant and machinery will be about $25,000.

FORT FRANCES.—The C. Mathison Machine Works, Beloit, Wis., may locate here, where they will erect a foundry and factory.

OTTAWA.—New hydrographic steamer. G. J. Desbarats, Department of Marine and Fisheries, Ottawa, will receive tenders up to Dec. 10, 1908, for the construction of a twin screw steel steamer for the Hydrographic Service on the Atlantic coast, of the following leading dimensions:—Length over all, 173½ feet, beam, moulded 29 feet, depth, 15½ feet. Plans and specifications at the Department of Marine and Fisheries, Ottawa, at the offices of the collectors of customs, Toronto, Hamilton, Collingwood, Midland, Vancouver, Sydney, N.S., and at the offices of the department of Marine and Fisheries at Montreal, Quebec, St. John, Halifax, Charlottetown and Victoria.

Alberta.

OKOTOKS.—The Electric Light Co. are putting up a new building and installing $10,000 worth of new machinery.

Nova Scotia.

BRIDGEWATER.—The Acadia Gas Engine Co. with a capital of $50,000, which is a new concern, will locate here.

Quebec.

MONTREAL.—J. W. Williamson, 54 Notre Dame St. East, is installing a gear cutting machine for Betts Brown & Co., Limited, Guy Street.

MONTREAL.—Tenders will be received for an extension to the Mount Royal Spinning Co., at Cote St. Paul, by Architects Finley & Spence, Guardian Bldg., Montreal.

British Columbia.

MASSETT.—The Graham Island Lumber Co. will build a large sawmill here on Graham Island.

VANCOUVER.—The factory and planing mill of the Royal City Mills on False Creek, have been completely destroyed by fire on Nov. 24. The saw mill and dry kilns were saved. The loss is estimated at $100,000.

POWER PLANT OPPORTUNITIES.

Ontario.

TRENTON.—A large water power development is planned by the Electric & Water Power Co. J. J. Wright, Toronto, is manager.

Nova Scotia.

WOLFVILLE.—The citizens have voted an additional $20,000 to the sum previously voted on for the construction of an electric light plant for this town.

British Columbia.

KELOWNA.—The Hinton Electric Light Co., Vancouver, are installing a $40,000 electric light plant in this town.

Quebec.

MONTREAL.—E. Leonard & Sons have installed a power plant consisting of a 150 h.p. boiler and a 100 h.p. engine for the New York Steam Laundry, Montreal.

MONTREAL.—Power plant, including engine, boiler, and shafting, has been installed by G. Leonard & Sons in E. H. Catelli's new macaroni factory.

Manitoba.

WINNIPEG.—On Nov. 23 the Board of Control decided to call for tenders for the electrical power works at Point du Bois. The amount to be expended next year will be $1,500,000, and the total cost $3,500,000.

TRADE NOTES.

Ontario.

GALT.—The Goldie & McCulloch Co have recently shipped large safes to Vancouver and St. John, N.B.

CHIPPEWA.—The British-American Smelting Co., here, is working day and night in the effort to keep pace with the large volume of ores shipped from Cobalt to be smelted. About thirty men are employed at present, but the management contemplate an extension of the plant to three times the present capacity in the early spring.

TORONTO.—On Nov. 28 there will be a meeting of the shareholders of the Canadian Oil Co., to consider the reorganization of the company. If the reorganization measures are approved by the shareholders the name of the company will become Canadian Oil Companies, Limited.

Nova Scotia.

HALIFAX.—The Dominion Iron & Steel Co. have just received a large order from the government of New South Wales, Australia, of about 18,000 tons of steel rails.

Quebec.

MONTREAL.—During the coming winter extensive alterations and improvements will be made to the "Athenia," of the Donaldson Line.

BIG CAR BARNS BURNED.

On Nov. 24 the large passenger car shops of Rhodes, Curry & Co., Amherst, N.S., were completely destroyed by fire, together with all the contents including raw materials, finished and unfinished cars.

The loss to the company is in the vicinity of $100,000, of which $75,000 is covered by insurance. The mechanics suffered a severe loss in their tools, ranging in value from $50 to $200 per man.

Mr. Rhodes, vice-president of the concern, says that the building will be replaced immediately, possibly by a larger and more modern structure, and that no doubt by the time material for cars is obtained the building will be ready for work. The men who are thrown out of work will be given immediate employment at the erection of the new building.

Clayworkers Will Meet in Brantford

The Annual Convention of the C.C.P.M.A., to be held in Brantford, Ont., on January 12, 13 and 14.

At a meeting of the Executive Committee of the Canadian Clay Products Manufacturers' Association, held at the office of The Canadian Manufacturer, Toronto, with President J. S. McCannell, of Milton, Ont., in the chair, it was decided to accept the invitation of Brantford, Ont., to hold the next annual convention of the body in that city.

The dates set for the annual gathering were Tuesday, Wednesday and Thursday, January 12, 13 and 14, 1909.

Brantford, Ont., is one of the most central cities in Western Ontario and there is every reason to expect a large attendance at the meeting.

The committee went into the question of a programme in great detail and arranged to secure a number of papers that should be of the utmost technical value as well as of great interest to clay-workers who attend the meeting.

A feature which should prove of great importance is the "Practical Experience Afternoon." A circular letter has been sent out asking every clay worker in Ontario to contribute a short talk or a paper dealing with a practical experience, showing how some difficulty was overcome in his plant or else to place before the meeting a statement of any trouble he has not yet been able to overcome so that a discussion regarding the difficulty can be arranged for, so that if any members have overcome similar troubles they can explain how it was done, for the benefit of the others.

Any clayworker who would like any particular subject discussed is requested to write to the Secretary, D. O. McKinnon, 408 McKinnon Bldg., Toronto.

Obituary

H. P. Coburn, vice-president and general manager of the Sawyer-Massey Co., Hamilton, Ont., died at his home on November 25.

Deceased was born at Dracut, Mass., on August 21, 1835, his ancestors going to the States from England, and being among the pioneers of New England. He was educated at Phillips Academy, Andover, Mass., and after completing his education entered his father's general store. He then came to Hamilton, and became associated with the late L. D. Sawyer, head of the Sawyer Co. He first had charge of the collecting and sales department, and, showing great aptitude for business, was readily advanced, until he became a partner and general manager of the business. Under his management the business grew rapidly, until it became one of the most extensive of its kind in Canada. When it was converted into the Sawyer-Massey Co., Mr. Coburn was appointed vice-president and general manager, which office he held up to the time of his death.

NEW TOOLS AND SHOP EQUIPMENT

Only Descriptions of New and Interesting Machines, Tools or Appliances Can Be Published. No Mere Write-Up Can be Used.

Bristol's Electric Time Recorder

Bristol's new electric time recorder was designed to meet the widespread demand for a simple and practical instrument to record automatically the occurrence and

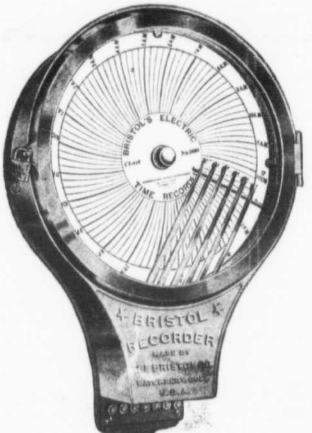


Fig. 1—Recording operations at six different points.

duration of various operations such as the starting and stopping of machines, the opening and closing of valves, the duration of runs, the passing of trains, etc., etc. With this recorder it is possible to record several different operations on the same chart and the recorder may be located a long distance from the points at which such operations occur.

These new recorders have already been used in connection with machinery to show when the machines have started and stopped, how long they remain idle, and just when they were started again. Fig. 2 is a reduced cut of a record chart showing complete twenty-four hours records of the operation of two paper machines. This record shows the time and duration of each break and also the time required to wash the felts and put on new wires.

One of these recorders arranged to record operations at six different points is shown on Fig. 1. Each one of the six pens shown on this instrument makes an independent record, continuously and automatically, and in this way six different operations may be recorded on the same chart. Each pen arm is actuated by an independent electromagnet battery circuit, so arranged that closing the circuit causes the pen to move a certain distance on the chart.

Binding posts are provided at the base of the recorder, to which pairs of small lead wires are attached. These wires may be of almost any desired length, it only being necessary to have the object whose motion is to be recorded open or close the circuit whenever the motion occurs.

These recorders are usually operated by a battery circuit, but any convenient circuit may be employed by the insertion of lamps or other resistance to reduce the E.M.F. across each electro-magnet. The object whose motion is to be recorded is caused to make and break this circuit through any convenient contact.

The Bristol Co., Waterbury, Conn., are the manufacturers of these recorders.

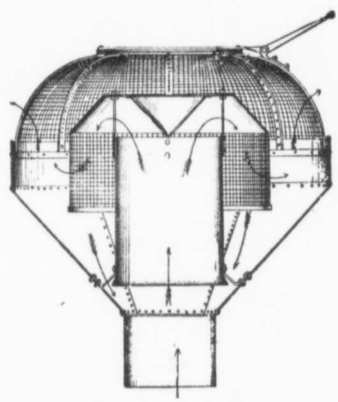
Thompson Improved Spark Extinguisher

In saw mills and factories where wood or rubbish is used to any great extent for fuel, sparks are a constant source of danger to property, a danger allowed for by insurance companies in the rates they charge for insurance.

The Thompson Improved Spark Extinguisher is now being manufactured in Canada by Geo. W. Reed & Co., Limited, Montreal. This device has been manufactured in the United States for some years by O. V. Hooker & Son, St. Johnsburg, Vermont, and is being used by a number of Canada's largest sawmills.

The construction of the Thompson Spark Extinguisher is shown in the accompanying illustration. The important parts are the casing and nipple, the draft tube, the pan, and the cap. For brick chimneys, a casting is made to fit the chimney, and the extinguisher is inserted as far as the top of the nipple. For stacks, the nipple is made tapering so that it will easily slip in at the top.

The draft tube guides the smoke and sparks to the pan. It is adjusted to a distance



Thompson Improved Spark Extinguisher.

from the bottom of the casing to allow the proper return of the sparks without injuring the draft.

The pan keeps returning all dangerous sparks to the flue, where they are finally consumed. It is adjustable to allow for forced or natural draft.

The cap is attached to the casing, and is made of wrought iron and netting. Very few sparks ever get past the pan, but the netting of the cap serves as a double protection.

It will be noted that the design of this extinguisher is such as to give the greatest possible safety with the least interference with the draft.

These machines are very light, a 26 inch extinguisher weighs only 250 pounds, and is easily carried by a 26 inch stack one-sixteenth inch thick.

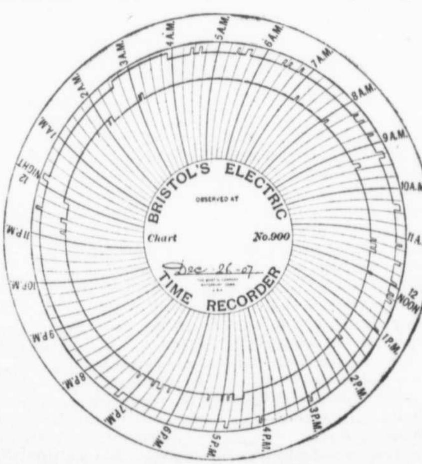


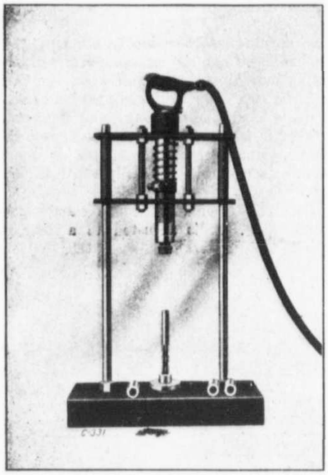
Fig. 2—Chart showing complete 24-hour record of operation of two Paper Machines.

Broaching Hammer

The accompanying illustration is of a pneumatic broaching hammer, a most useful tool, manufactured by the Canadian Rand Co., Limited, Montreal. It is used for hexagon, squares, octagon, and other shaped holes up to 1¼ in.

The driving end of the broaching device is almost identical with that of a rivetter, and the value movement is the same. Striking back is prevented by a strong spring which is held in place by the upper support. When the tool is not in use, it can be raised as shown in the cut, in which position it is held by a spring set in the side rod.

The work is set in a jig placed in the base block where it is rigidly held. The



Broaching Hammer

tool is turned from a solid bar having three or more cutting edges, according to the depth of hole desired.

These tools operate most successfully under air pressures ranging from 80 to 100 pounds.

Something New in Old Rags

By A. B. Farmer.

A line of wipers prepared by a special process which has been endorsed by the Quebec Board of Health, is being placed on the market by the Imperial Waste & Metal Co., 5-9 Queen Street, Montreal. These wipers, known under the trade name of Imperial Hygienic Cotton wipers, are guaranteed to be absolutely hygienic, and it seems that for economical as well as hygienic reasons they are rapidly gaining favor with progressive manufacturers.

The rag business must be as old, or nearly as old as the manufacture of cloth, and the suggestion of an improvement in the handling and treatment of rags for use as wipers may come as a surprise to many, but the system described in this article will be appreciated by those who have recognized the danger to which users of old rags of unknown antecedents are constantly exposed.

The need of better methods of treating rags was indicated in a very emphatic way a few years ago, when several large concerns stopped using rags altogether, after having suffered much inconvenience through employees developing sores which were attributed to the use of old rags as wipers. It was the experience of these firms that led the Imperial Waste & Metal Co. to improve on old methods and place upon the market their line of Imperial Hygienic Cotton wipers.

The "raw material" for the wipers is large cast off cotton garments. These are first sorted according to color, as the different colors must be washed separately to prevent the colors running. They are then washed and scalded five or six times in a strong solution of soda and soap, thoroughly cleansing and sterilizing every part of the material. The garments are then partly dried in a machine, and are afterwards hung up in large cool rooms to remove all odor of the wash.

This process renders the rags as clean and fresh—perhaps cleaner than one's own laundry. It also removes all starch, grease or sizing, reducing the weight of the material nearly 25%, and greatly increasing the absorptive capacity of the cloth.

The clean garments are placed on large tables before competent workers who cut them up with large shears into convenient sized pieces ready for use, and carefully remove all buttons, hooks, and heavy material, thick seams, etc.

The finished wipers are packed in bales of 100 pounds and 500 pounds, ready for shipment.

The careful removal of all buttons and hooks makes these wipers suitable for use in wiping and polishing the finest furniture or machinery without danger of scratching, and in the majority of large furniture plants waste has been discarded and these wipers are used in preference.

People were skeptical at first, but the widespread demand that has sprung up within two years shows that these sanitary wipers are filling a longfelt want, and men appreciate wipers that are clean enough to use, as one manufacturer reports his men are using them as towels. Already they are used by such representative concerns as the Montreal Rolling Mills, Montreal Light, Heat and Power Co., the Northern Electric & Mfg. Co., the Shawinigan Water & Power Co., the Montreal Gazette, the Dominion Motor Car Co., the Granby Rubber Co., the King's Printer, Ottawa, the Government Mint, the Canada Car Co., the Ontario Power Co., the Bell Organ & Piano Co., and many others. This list of firms also shows the wide range of industries in which these hygienic wipers can be used.

The Factory Floor

Up-to-date factory people are now giving more or less recognition to the idea that it is as much a matter of economy to have the best practical factory floor as it is to have up-to-date machinery. There are some old-time rough floors to be found yet, but the tendency in equipment is to make the floor both smooth and substantial; and frequently an old factory can be materially improved by the addition of a new floor. The advantages of a good, smooth floor are all so readily apparent that they scarcely need setting forth here in all their details, and what those who are seeking to improve their floors desire more than argument on this point is information on the matter of material used and how to construct floors to get the best service.

Where it is a basement—that is, where the floor rests practically on the ground—the best plan is to fill in and make a concrete floor. Some people make a concrete floor and then put a wooden floor on top of it. Others use the concrete face as it is. Choice in this matter depends on requirements. In places that are not on the ground, where it is essential to cover with wood of some kind, a factory will naturally be influenced more or less by the availability of specific woods for flooring. In the Mississippi valley country, especially the upper half of it, maple is regarded as the best, but beech is coming in a pretty close second, and probably will constitute a fair share of the flooring. On the west coast they probably use fir more than anything else. In the south yellow pine is used extensively. It is largely a matter of location with reference to the different species of wood. There is some difference, of course, in the wearing qualities. Maple would wear longer, and splinter less than pine, yet where there is considerable moisture pine is considered the most durable and less subject to decay. Where pine is used extensively it is generally advisable to use edge-grain, because this kind will not splinter so much as the plain sawed or flat-grain pine.

One point to keep in mind, no matter what kind of wood, is to use narrow stock so as to avoid prominent cracks from shrinkage.

Maple and beech generally come in narrow widths, but pine is made in widths up to 6-in. stock. This 6-in. stock is not the best for flooring, however, by any means. Even 2½-in. or 3 in. is better than the 4-in. The narrower the stock the less shrinkage there is in each board in case it is not thoroughly dry when laid, consequently the smaller cracks. The ideal wooden floor is a floor laid of narrow stock, then finished off with a scraper, or gone over with a plane or something to smooth down any unevenness, after which it may well be given a coat of oil or paint, or something to help preserve the wood. It will be found, too, that the little extra attention in finishing will be well worth while for a good floor.—The Wood-Worker.

Montreal Builders' Banquet

The annual banquet of the Montreal Builders' Exchange will be held Thursday, Dec. 10th. Among the distinguished speakers who have been invited are Hon. Sir. Lormer Gouin, Premier of Quebec; Hon. J. W. Pugsley, Federal Minister of Public Works; Hon. ex-Judge Doherty, M.P., for St. Ann's division; Honore Gervais, M.P. for St. James Division, and His Worship Mayor Payette.

Well Satisfied

The C. W. Raymond Co., Dayton, Ohio, who recently shipped for the gove nment, a special train loaded with brick machinery to Fort Leavenworth, Kansas, rejoice in the fact, that notwithstanding the contract for the machinery called for 60 days time payments, so well pleased with the outfit were the government inspectors, that the entire amount of twenty-one thousand dollars was paid within ten days after arrival.

"My grandfather was a captain of industry.

"Well?"

"He left no sword, but we still treasure the stubs of his check-books."—Houston Chronicle.

History of Chains and Chain Making*

Following the Early History of the Manufacture and Use of Chains to the Present Time. Present Practice in Manufacture.

BY JAMES A. BAKER.

Just when chains were first made is uncertain, because the word has meant almost any kind of connection. Thousands of years ago rings of metal were made and fastened to cloth, thus making chain armour. Later rings were joined together by other metal rings, and this was the first metal chain. Apparently chains were used more as ornaments than anything else up to about 125 years ago, although occasional patents were issued during the past 275 years. The first patent the author has knowledge of was issued in England in 1634 and described as follows:

"A Way for the Mearing of Shipps with Iron Chaynes by finding out the True Heating, Ppaeing and Temping of Iyron for that Ppose, and that he hath nowe attayned to the True Use of the said Chaynes and that the same wilbe for the great saveing of cordage and Safety of Shipps, and will redound to the Good of our Common Wealth."

In 1690 a British admiral recommended the use of chain moorings, but not until 100 years ago were chains used as ships' cables. (The orginal meaning of "cable" was "capable.") For nearly 100 years more there was stretch. In 1808 the first chain was put on a vessel as a cable and then numerous patents in England followed quickly. The one that probably had the most to do with furthering the use of chain cables was granted in 1808 to Samuel Brown for swivels and shackles. Shackles met the greatest objection to iron cables, which was that they could not be quickly parted, while a hempen cable could easily be cut. A shackle such as the one in Fig. 1 has a tapered pin a, which is easily removed, and then the bolt b can be driven out. The form of shackle first patented has scarcely changed since. All shackles, rings, hooks, end links, etc., should be heavier than the body of the chain, often much heavier. The shackle shown is a joining shackle. End or anchor shackles were and are larger.

To stimulate the stretch of hempen cables twisted links with studs in them were patented, and it was claimed that a cable of these would stretch and recover 8 or 10 feet, but these never came into general use.

ENGLISH PROGRESS.

*Side welding, while practiced somewhat did not become prominent until about 1840, and became more so as sizes increased. It has fallen into disrepute with the United been mostly of cast iron, but our Government now uses drop forged studs and demands that the grooves for the links be milled. During this time close link chain—that is, unstudded—kept pace in the manner of making, and in the improvement of the iron for it, but less has been said about close link chain, as the interest largely centered in ship's cables. Nearly all improvements as to forms of welded chain were made in England, but this country has made great progress in the direction of increasing production and stands abreast of any country in the matter of fine material for chains. At a, Fig. 3, is shown a crown at the weld, which all fine end welded links have, and this swell is often also sidewise, as at d; but, even with the crown, the links will be weak at the point where the ends of the laps come, indicated by b. The best end welded links have the ends of the laps carried well back on the sides, or about to f.

In 1811 an English patent was granted for winding rods into a spiral and cutting the links from it. Fig. 4 shows a device which was operated by hand, taking the rod hot as it came from the rolls.

Fig. 5 shows a blank of half round section, the two halves of which are welded together, with their end welds diametrically opposite.

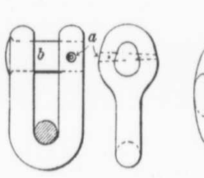


FIG. 1

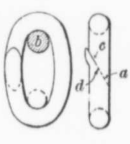


FIG. 2

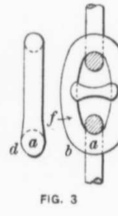


FIG. 3

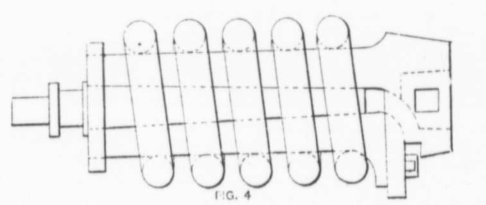


FIG. 4

no progress. Almost all conceivable forms of chain were brought out between 1790 and 1820. Many machines were invented later for making the different kinds of chain, but in this country nearly all the welded chain is still made either by hand or under simple power hammers. There has been quite a development in wire wound or weldless chains, and electric welding has made progress within the last 25 years, but both these methods so far have only been successful in light chains. Wire wound chains hardly run over ¼ inch and electrically welded not over ½ inch.

In 1783 a patent was issued in England for making chain by casting link after link into one another, and annealing the chain when done. Later this was tried under improved conditions in France, but has not succeeded. Another patent, in 1791, covered a combination of metal and leather to prevent noise and give elasticity, probably because hempen cables were noiseless and would stretch and recover a great deal. Iron chains were objected to because they would not States Government, probably due to the method by which side welds are made. Fig. 2 shows a link of which one-half of the lap at a has been welded The link b in this link is then shifted to the other end and the remaining part of the lap, c, welded. When, as is likely, slag is imprisoned at d, a good weld is not made, and the larger the diameter the more difficult it is to expel this slag by hand working. Moreover, the large links are hard to heat properly with the cold link b in such close proximity. Stud chain in the largest sizes, if made, as it should be, by proper machinery, would unquestionably be the best as well as the cheapest, and no doubt such machinery can be devised. The only end welded chain comparable to a good side welded article is hand welded, and that is expensive.

In 1813 stud chain, Fig. 3, was patented, and seems to be the last English patent of much consequence, though many efforts were made there in the next ten years to improve chain. Studs were welded in the links, but these, too, soon passed away. Studs have Fig. 6 shows a blank of square bar bent three times around and welded. Fig. 7 shows a Belgian method. This compound winding and welding at the same heat has the objection of necessitating the links to be of too great length for many purposes.

An English patent in 1812 was for link blanks, Fig. 8, forged with heavy parts to form the ends of the links. Figs. 9 and 10 show an effort to form the studs integral with the links. Figs. 11 and 12 show links welded and looped. This is probably one of the oldest forms of chain, though at first the links were not welded. Fig. 13 shows how, about 80 years ago, link stock was rolled so as to give extra strength at the welds. This was rolled in the usual way to the size of the large part, then passed through an extra set of rolls to reduce the intermediate parts, and then cut at an angle while hot. Fig. 14 shows a plan for making links from a solid bar, cut at an angle, after punching out the central portions e, e, and finally bending and welding together a and a' and b and b'. This plan has been elaborately tried in other forms, such as star sections. All the above ideas except the Belgian and the intermediate

* From a Paper Presented before the Engineers' Society of Western Pennsylvania.

* From "Chain Cables and Chains," by Thomas W. Trail, Crosby, Lockwood & Co., London.

rolling were brought out within about 14 years after the introduction of the first iron cable in 1808.

AMERICAN PROGRESS.

It seems strange that the largest chain of any length ever produced in this country was made about 130 years ago, when there were no rolling mills or steam hammers used here. It was 500 yards long and the links were made of $3\frac{1}{2}$ in. square stock, with the corners slightly rounded. Each link weighed about 275 pounds. This chain cost the Colonies over $2,000 per ton and was made to keep British ships from ascending the upper Hudson River. The contract was given in the evening and work on it commenced next morning at Sterling, about 20 miles back of West Point, N.Y. It was shipped in lengths of eight links on ox carts and joined at the river. There were seven welding and 10 forging fires at work on it. When finished it was held at the desired height in the river by logs and bolted together. Notwithstanding all the English enterprise later, it was nearly 50 years after the production of this large chain before that country made a chain as large as $1\frac{1}{2}$ in., and it seems that this country has not made as large chain since.

There is not much on record concerning chain making in this country. Little chain was made in factories here until about the time of the Civil War. A ship's cable chain works was established about 1835 or 1840 in Boston, and in 1865 the Carr Chain Works was incorporated at Troy, N.Y., and became quite a factor, especially in the making of fine chains. This company is believed to have been in some way connected with the Burden Iron Works. About the same time A. Hewitt & Co. established a works in Trenton, N.J., which also made much progress. One among the earliest was the Hayden Chain Works, at Columbus, Ohio, which started by making harness and saddlery chains and finally made high class crane chains and had much to do with displacing English chain in this country. Even up to 20 years ago English chain still had a hold here, one brand, the Lord Ward, being very popular for certain work. Pittsburgh to-day is the largest producer of chains in the country, the principal works being the James McKay Co, Jones & Laughlin, and the Standard Chain Co. In the last named company the Baker Chain Works was merged. Pittsburgh not only stands first in production, but it is at the head in fine chain material in both iron and steel.

Many curious and some very ingenious machines have been invented for making welded chain, such as those for making it automatically from the straight rod, etc. A large number of chain patents have been issued in this country, but the great bulk of all chain made here is hand welded, such as crane chains, and about all chains from $1\frac{1}{4}$ in. in diameter up, or if not strictly hand welded, nearly so. Most smaller chain of the usual quality is made by coiling the links, cutting them at an angle and welding in dies. At first the hammers carrying the dies were generally operated by foot, but more and more these are being operated by power, even down to quite light chains. Men become very expert, and a proficient man or boy can cut 250 light links per minute. They are wound at a very rapid rate, and an expert can weld 500 links per hour of light chain. Heating for all such work is usually done in flat top furnaces, the links being suspended through holes in the tops of the furnace and held by rods with hooks on their ends. Usually a boy places the links on the hooks and puts them into the furnace, and the chain maker takes each link from the furnace, threads it into the chain and places it in the dies, turning it once or twice while welding.

ELECTRICALLY WELDED CHAIN.

Electric welding of chain was first tried about a quarter of a century ago by taking two half links, Fig. 15, and joining them at a a. Links as large as 3 in. diameter of stock have been made by this process, but it seems it had to be abandoned for large chain. Recently electrically welded chain up to $\frac{1}{2}$ or $\frac{5}{8}$ in. has been made commercially by automatically cutting the blanks from a bar so as to form a socket in one end and a corresponding taper on the other end of the link blank, Fig. 16. This is then bent and joined on one side and these joints welded. This obviates the usual amount of upset in such cases. The laps, or area of contact is much larger than in the squarely cut ends, and a nice appearing and good weld is made.

WELDLESS CHAINS.

Weldless chains have greater strength in the small sizes, say, below $\frac{1}{4}$ in. than welded chains, because the wire from which they are

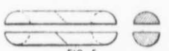


FIG. 5

FIG. 6

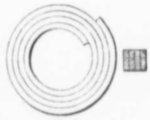


FIG. 7

made, being cold drawn, has a much greater strength than rod steel; the smaller the chain the more difficult it is to make a weld which will be as strong as the rod from which the link is made.

NOMENCLATURE.

The chains of commerce have as many names as the uses to which they are put. Proof chain is such as has been pulled in a testing machine up to a certain strain. This is usually somewhat below one-half of the load it should take to break the chain. B chain is an abbreviation of "best"; competition resulted in B B (Best, Best) and later B B B (three B), so that now hardly any one speaks of one B chain. Well made chain of Swedish iron when pulled to the breaking point is stiff enough for a walking stick, caused by the links closing in on each other sidewise. Dredge chain is the same as three B, but should have special attention paid to the hardness of its stock to stand wear in sand and dirt. Steel chain resembles Swedish iron chain in extreme elongation. Nearly all common chain is now made of steel, and a good deal of chain above common is also made of this material and is giving satisfactory service. But for particular purposes, especially where great safety and resistance to wear are required, special iron is keeping first place. All welded chain manufacturers make some iron chain.

WEAR.

The greater the number of links in a given length the longer the chain will wear, for the greater the angle at which the links play in each other the faster the wear. Therefore, a chain will wear, sometimes more than double as fast in one part as in another. For instance, the old style tongue chain on wagons wore much faster next to the tongue than at the horse's collar. Breast chains wore faster in the centre than at the ends next to the horse's shoulder. It used to be the custom to make these chains with heavier parts accordingly.

Chains used in critical places should be annealed at times. The principal need for this arises from a strain sufficient to bend the links, as this bending being really "cold work" on the material hardens it. If certain that a chain has had no strain over, say, one-quarter of its proof strength, or one-eighth of its breaking load, then there is little occasion for annealing. But if a chain has been strained well up to its breaking strength it should be annealed, if that is every day. Of course, there is no sense in using a chain to this limit except in dire need.

RELIABILITY.

Much depends on the honesty both of the manufacturer and the chain maker. Honesty in the manufacturer has an influence on his workmen, because he will endeavor to keep as honest men as he can find for making chains, which are intended for work which would be dangerous without such care. This may seem a platitude, but the preference should be given always to men who have the best character for honesty. A good chain maker knows when he is making a doubtful weld. Chains are generally proved, but while this is important proving does not tell all the story. Users should understand that they should not expect common chain, which has a wide and useful field of its own, to equal the higher class product needed for certain purposes.

All manufacturers give tables on chain; Trail already referred to gives a most complete collection of tables. They are, therefore, omitted here, but some rules that have been deduced by the author and found useful are given below. From the nature of the case figures as to the strength of chain can only be given approximately:

DIMENSIONS OF LINKS.

Stud Chain.—Maximum length inside, four diameters of the bar from which it is made. Maximum width inside, 60 per cent. of inside maximum length.

Standard Close Link.—Maximum length inside, three diameters of the bar from which it is made. Maximum width inside, 70 per cent. of maximum length inside.

Coil Chain.—This generally runs about like close link, but if anything somewhat longer in the links.

Crane Chain.—Length inside, $2\frac{5}{8}$ times the diameter of the bar from which it is made, but it varies a good deal. However, as a rule the shorter the link the better. (Allowable variations under maximum dimensions may not be over 4 per cent. and should not be more than 2 per cent.)

WEIGHTS.

Stud Chain.—$3\frac{3}{4}$ times the weight of the bar from which it is made. (This includes the stud, it being equalized by the extra length of link.)

Standard Close Link.—3¾ times the weight of the bar from which it is made.

Coil Chain.—3⅜ times the weight of the bar from which it is made.

Crane Chain.—4 times the weight of the bar from which it is made. (This extra weight is due to the links being somewhat shorter and to the crowns on the welded links being heavier than on common links.)

BREAKING STRENGTH FOR WELL MADE CHAIN.

Stud Chain.—165 per cent. of the strength of the bar from which it is made.

Standard Close Link.—138 per cent. of the strength of the bar from which it is made.

Coil Chain—120 per cent. of the strength of the bar from which it is made.

B. B. Crane Chain.—145 per cent. of the strength of the bar from which it is made.

The weight and strength run a little higher on the light sizes up to about 1 in., as the bars from which these are made are 1.32 in. larger in diameter than the nominal size of the chain. When in light sizes, the chain is made of exact size bars the chain size is given as "neat." Ordinary, or die chain, from ¼ in. down, becomes further and further lowered in strength compared with the bar as the sizes become smaller, hence the greater strength of weldless chains in the very small sizes.

Fig. 17 shows how the sides of the links straighten at d; and, therefore, bend at a, when the chain has been loaded sufficiently to distort the links and explains why links will not stand double the load of the bar, because while the metal is stretching generally, the stretch is very much greater in the outer line at the quarter, and added to this is the fact that the ends of the laps end about at this point.

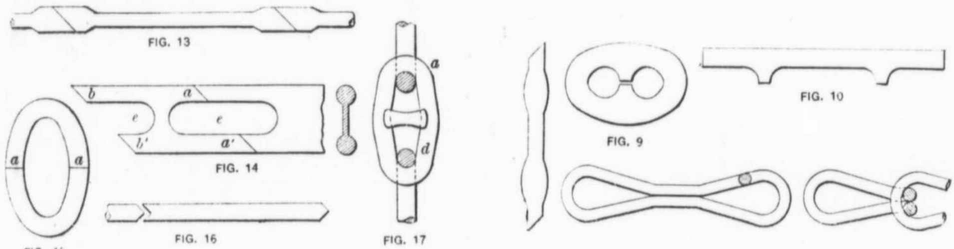


FIG. 13 FIG. 14 FIG. 15 FIG. 16 FIG. 17 FIG. 9 FIG. 10

Experiments with Electric Smelting

Swedish Firm Have Carried Out Series of Experiments, With Results So Encouraging That Dr. Eugene Haanel Has Been Asked to Come to Sweden to Investigate for Canadian Government.

A firm of ironworkers in Sweden have, during the past couple of years, been experimenting with electric smelting. They claim that very considerable progress in electric smelting has been made through these experiments. A furnace has been constructed along lines found advantageous during these investigations, and this furnace will be given a trial run, commencing December 1.

Dr. Eugene Haanel has left for Sweden to witness the operation of the furnace. Dr. Haanel goes at the invitation of this firm, and will make a report.

It will be remembered that a couple of years ago tests were made of electric smelting at Sault Ste. Marie under Dr. Haanel's supervision, and that the results were satisfactory in that they indicated the possibility of the process assuming a commercial value. The Government appropriated $15,000 for this purpose, but the net cost was only $11,000.

SWEDEN QUICK TO ACT.

As soon as the results of the Sault Ste. Marie experiments appeared, a Swedish firm of ironmasters appropriated 200,000 kroner—about $56,000—and appointed a commission of three, a metallurgical expert, an electrical expert and a mechanical expert, to conduct further experiments along the same line. This commission has been at work for two years, and after constructing many furnaces seems to have achieved success. The furnace at Dumnarfvet is to be started on December 1, and Dr. Haanel has been invited to be present and report upon it. The firm previously refused a request of the Norwegian Government to be admitted to a view of these experiments, so that the compliment to Canada and to Dr. Haanel is considerable.

It has been learned that this new furnace is a great advance upon previous efforts. It will use 800 h.p. instead of 250 h.p., which the Sault Ste. Marie furnace used. On the same plan a furnace of 3,000 h.p. could be erected and a furnace of that size would have a capacity of 10,000 tons of pig iron a year. The cost in Sweden will be only $12.03 a ton. The cost of the furnace would be $20,400, without allowing for royalty, interest or amortization. It will be seen that this is only three-quarters or thereabouts of the cost of producing pig iron by the existing methods.

The report on the experiments conducted at Sault Ste. Marie, showed that only when electrical energy could be secured at $10 a h.p. year could electric smelting become a competitor of existing methods.

The Swedish experiments seem to indicate that the smelter might pay more for power and yet produce iron at a cost which would justify the use of the electrical process as a commercial enterprise.

It will be seen that Dr. Haanel's visit is fraught with importance for the industrial future of the country.

AN IMPORTANT ADDRESS.

In this connection it may be of interest to note some remarks made by Professor E. G. Von Odelstierna, in a paper read before a technical congress in Norrkoping, Sweden. "The iron industry of Canada," he said, "in certain ways resembles that of Sweden, viz., first, the largest number of the iron deposits are magnetites, very similar to certain of our ores; . . . second, the large deposits of magnetite seem in general to be located where abundance of good wood for charcoal is available; third, Canada possesses in these localities large water powers. There is no doubt in my mind that Canada will develop in the future a large iron industry, as already stated in my report on the exhibition in Chicago, and whatever doubt there was is now entirely removed when witnessing the energetic steps taken by the Government of Canada in later years to reach this aim.

EFFECT OF "CUSTOMS UNION."

"I require, therefore, now to add that this expansion of the iron industry in Canada will very soon be reached, to judge from the gratifying results obtained from the electric smelting experiments at Sault Ste. Marie. We have, therefore, to fear that the iron industry of Sweden can expect a dangerous competition from Canada, which not only can cut out our market in the United States, but also our market in England if that country should adopt the proposed customs union with the colonies; also in regard to China and Japan is Canada better situated."

A feature of special importance with regard to the matter is the fact that whereas blast furnaces must have ore that is almost free from impurities such as sulphur, by the electric process ores with an admixture of sulphur as high as 2½ per cent. can be handled. Much of the ore in Central Canada—Quebec and Ontario—is of this type, and thus would become available.

WILL INVESTIGATE PRODUCER GAS.

Dr. Haanel will also investigate the results of the latest experiments and discoveries made in Europe in connection with the use of producer gas engines for industrial purposes.

B. E. Walker's Address Before Chambers of Commerce, New York

"If You Do Not Open Your Doors a Little More Liberally to Us, So That We Can More Nearly Pay You In Goods, . . . You Will Leave Us No Alternative But to Keep Up Our Tariff Walls . . . ."

At the banquet of the Chamber of Commerce of the State of New York, Mr. Byron E. Walker and Mr. Sifton spoke as Canadian guests.

Mr. Walker spoke of the development of the United States and of the building up of Canada. He called attention to the much greater responsibility falling upon Canada than the United States in proportion to population because of immigration.

BUILDING RAILWAYS.

"The greatest difficulty in all new settlements is of course transportation, and we are building railroads at the rate of a thousand or more miles per annum, equal, relatively to population, to twelve or thirteen thousand miles per annum in the United States, but hardly sufficient for our needs, when considered in respect to the great areas being put under settlement. In the last ten years our railroad mileage has increased from 16,584 in 1898 to 22,452 in 1907. All railroad building in the west is being done by three great companies, and in a few years we shall doubtless have three completely equipped transcontinental railroad systems, truly a remarkable accomplishment for seven or eight million people.

BANKING FACILITIES GOOD.

"Next to transportation, adequate banking is one of the most important requisites. The number of bank branches in Canada is 1,900 in comparison with about 640 ten years ago. Multiplied by twelve this would mean 22,800 banks in the United States, and the fact that we are so abundantly supplied should check somewhat the silly statement, frequently made in the western states, to the effect that small communities are better served by individual and local banks than by the branches of large banks having their head offices in the monetary centres. The growth in railroads and banking will suggest without further detail what the strain of providing new towns, new schools, churches, teachers, doctors, lawyers, trading people of all classes, the early stages of manufacturing and all the other accessories of civilization has been. The history of the settlement of your great west shows in a large way what we are doing in a smaller degree."

JUG-HANDLED TRADE.

Turning to the trade issue, Mr. Walker, said in part:—"In the last ten years we have bought from Great Britain to the extent of $599,047,000, from the United States $1,430,-852,000 and from other countries $271,430,000, in all $2,301,335,000. In the same time we have sold to Great Britain to the extent of $1,174,385,000, to the United States $747,296,-000 and to other countres $226,545,000, in all $2,148,226,000. It used to be thought that while nations settle their accounts with bills of exchange and other forms of money, in reality they only exchange goods with each other; and also that if one nation bought from another very largely in excess of its power to pay in goods it must look to the nation it was buying from so largely to buy the securities which must be sold to pay the balance. But apparently we have changed all that. Great Britain takes our products far beyond our purchases from her, and buys our securities as well. You sell us sixty per cent. of our imports, but buy only 35 per cent. of our exports and rarely buy our securities. It is true that we are improving our purchases from England, and that you are improving your purchases from us and even occasionally taking an interest in our securities, but I invite your deepest, most broad-minded and wisest consideration of these most striking figures, and I ask you whether you think it is likely that trading relations so one-sided can continue forever.

THE ALTERNATIVE.

"*Beyond a peradventure, if you do not open your doors a little more liberally to us, so that we can more nearly pay you in goods instead of always drawing on London for the purchase price of what she has bought from us in order to pay you, you will leave us no alternative but to keep up our tariff walls until we can create at home almost every manufactured thing you sell us on the one hand, while on the other we seek trade preferably with any nation which takes pay in goods so as to lessen our payment of actual money to you.* Believe me, my dear friends, I am bold enough to say these things because some one should say them and because you of all bodies in the United States are the one to which they should be said.

THE BANKING SYSTEM.

"I have already spoken quite too long and I shall trespass further on your patience only for a few minutes. I was particularly requested to say something regarding our banking system, but I have so recently spoken to the American Bankers' Association regarding yours that I hesitate to refer to the subject again further than to add to my remarks at Denver regarding what Alexander Hamilton had tried to do in banking for the United States, the fact that when you threw his system overboard we picked it up and based our first charters largely on the charter of the first United States Bank, and that we have clung to this, building it up to suit our purposes, until we have a system which, whether suitable for other countries or not, admirably serves our purposes both as to the individual and as to the nation as a whole. The difference between the two countries, stated in the smallest compass, is that instead of about 17,000 individual banks we have thirty banks with 1,900 branches, and these banks being few in number, and each large in capital and importance, they are trusted to manage their own reserves, to issue credit notes, to hold the deposits of the Government—one being selected as the chief banker of all important Government business—and to open branches even in foreign countries, thus developing not only a local but a great international force in the finances and trade of the country."

CANADA OF THE FUTURE.

In closing, Mr. Walker enumerated some of the material resources of the Dominion of Canada, he said, had, in addition to her vast tracts of tillable land and of forest, more fishing waters than any other nation. "But," he added, "too many of our friends wish to fish in them." She had iron, nickel, copper and coal enough to rank with the greatest nations in this respects, and, while she was but the eighth nation in gold production, she was beginning to look important in silver, with the Cobalt camp turning out about a million a month. In horse-breeding and dairying Ontario had a high place; manufacturing was making great strides, and in some branches of manufactures Canada was beginning to seek a share in those markets open to the world's competition.'

A LAND TO LOVE.

"No one," said Mr. Walker, "can at present estimate the extent in horse power or the value in money of our water powers, which probably in these respects exceed those of any other nation in the world. We have a land most of which receives at least the average rainfall, with a summer climate almost everywhere which would please the most fastidious and a winter climate which, to the native-born at least, is a thing of beauty and a joy forever. We share with you the great lakes and we have at least twelve or fifteen great river systems, any of which would be remarkable among the river systems of the world, besides unnumbered smaller lakes and rivers. Finally, we are a contented people, with a fine birth-rate, with hardly any illiteracy, loving law and order and insisting on it in every mining camp and on the rudest frontier line. We hope to build up a nation as free as any in the world, with our own peculiar institutions, with a share of some kind in the British Empire, and with relations with your great country which should through the coming ages be of benefit to both nations materially, intellectually and ethically."

Cement vs. Clay Tile for Drainage

In an article on "Drainage Problems," Prof. Marston, of the Iowa State College, before the Iowa State Drainage Association, made the following references to the comparative worth of cement tile and clay tile:

The question of cement tile vs. clay tile is one concerning which our Engineering Experiment Station probably receives more inquiries at present than concerning any other one feature of drainage. It may be added that it is one of the questions concerning which we find very unsettled conditions of opinion among drainage engineers.

The Engineering Experiment Station has been making a series of tests of the relative strength of cement and clay drain tile. At the ages at which they are first used, there seems to be no question that cement drain tile are usually considerably weaker than good clay tile of the same diameter. There is, of course, an increase of strength with age in the case of cement tile, which is not found in the case of the clay tile. Just how much this is our tests have not yet shown, and our tests ought to be very much more extensive than at present before conclusions are drawn from them. It cannot yet be considered as proved, therefore, whether good cement tile, as at present made, will, or will not, be equal in strength to the average clay tile. The probabilities are that as present manufactured they will be found weaker on the average.

In any case, it is quite evident that it is possible to make cement drain tile of equal strength with clay tile by making the shells thick enough. It is evident that considerable more experimentation should be carried out to determine what proportions of cement and thickness of shell should be used in the manufacture of cement tile to give them sufficient strength. Here again, it will be of great importance to know what pressures must be carried by drain tile in the ground, a question which is not yet settled. Doubtless most of the trouble experienced at the present time with cement drain tile is due to the fact that there has been no exact determination of the best methods and materials of manufacture, of the necessary minimum proportions of cement, and of the minimum thickness of shell for different diameters. The attempt of inexperienced and uninformed men to manufacture such tile has led to disastrous results in some cases. I think any competent engineer would admit the possibility of manufacturing cement drain tile which will be thoroughly satisfactory in every way. Standard specifications should be prepared for cement drain tile, and it is desirable that these should be based on scientific tests as well as on the practical experience of engineers who have used them.

Utilization of Blast Furnace Slag

Manufacture of Brick and Cement from Blast Furnace Slag; Brick Press Invented in Germany. From a Paper Before Iron and Steel Institute, May, 1908.

By C. DeSchwarz

Taking the total production at all blast-furnace works in the world, according to recent statistics, at about 50,000,000 tons of blast-furnace slag for the last year, and assuming further that one ton of ungranulated blast-furnace slag measures, when broken up, about 20 cubic feet, the blast-furnace slag produced in one year represents a mountain of nearly 1,000,000,000 cubic feet. To dispose of such enormous masses yearly deserves serious consideration, taking into account that the production of pig iron, and with it also that of slag, is steadily increasing, and that the land in the neighborhood of blast-furnaces is, as a rule, of great value.

A brick press for making slag bricks was recently invented by Paul Thomann in Germany. The peculiarity of this press consists of an improved mixing apparatus, of special construction, for mixing slaked lime and granulated slag, as well as in a peculiar method of pressing the bricks. The process is as follows: Slaked lime and granulated slag coming from an automatic feeder are led to the mixing apparatus by means of a band conveyor. The mixing apparatus consists of a small cylindrical sheet-iron vessel containing a mixer with screw-like arms of peculiar shape, in which the materials are, owing to quick rotation, intimately mixed within a short time. The mixture of sand and slaked lime thus produced falls, by means of a hopper, into the brick press. The peculiarity of the latter consists in an arrangement by means of which the brick is formed in layers, each layer being hammered down separately, one above the other, until the brick mould is filled up. This arrangement has the advantage of cheaper working expenses and less initial outlay.

Another method of making slag bricks, still in use, consists in mixing 1 part of Portland cement with from 4 to 5 parts of granulated slag and passing this mixture into moulds. These bricks must remain in the mould for 24 to 30 hours after being pressed. As they are not allowed to harden in the open they have to remain, after having been taken out from the mould, for six to eight weeks in a covered shed, well protected against sun and wind, where they are moistened from time to time.

The bricks produced in this way are of very good quality, but the cost of manufacture is high, requiring also a considerable initial outlay.

The best slag bricks, so far as exact shape and dimensions as well as great hardness and resistance to crushing are concerned, are manufactured according to the English method.

By this process blast-furnace slag can be made into bricks or stones without any addition of cement, slaked lime, or any binding medium. It is based on the fact that insoluble silica is rendered soluble—i.e., ready for combination—if exposed to high steam pressure during a certain lapse of time.

The bricks, manufactured according to this process, can be transported to their destination and used for masonry as soon as they have left the hardening chamber. For this method of manufacturing bricks blast-furnace slag from the old slag heaps, even if exposed to free air for several years, can be utilized. The cost of producing 1,000 bricks of ordinary size, according to the English process, described above, is stated to be $3.16.

Slag bricks have the following advantages over ordinary baked clay bricks: (a) They have a considerably higher resistance against crushing; (b) houses built with slag bricks are never damp, and can be occupied without danger to health as soon as they are built; (c) slag bricks are more accurate in shape and dimensions because they are not baked, and therefore do not shrink like clay bricks.

Slag Cement.—The author, in spite of contrary statements, asserts that Portland cement of good quality can be made from such slag, containing 42% of lime and 4½% of oxide of manganese. The cement made from such slag showed not the slightest trace of instability of volume even after six years' use; it also stood all the tests required by the standards for Portland cement.

To a certain extent the presence of metal oxides, such as those of iron and manganese, which, as a rule, are higher in slag from white pig iron, renders the cement made from it more apt to resist the influences of sea-water, as already mentioned in previous papers. Secondly, the presence of metallic oxides reduces the temperature of fritting, necessary for the formation of clinker, thus effecting saving in fuel as a consequence. A high percentage of lime in Portland cement is not only not necessary, but is to a certain extent even injurious, as, being to a certain extent free, it causes the cement to "blow." Experience has also shown that cement, rich in lime, cannot be used advantageously for buildings in sea-water.

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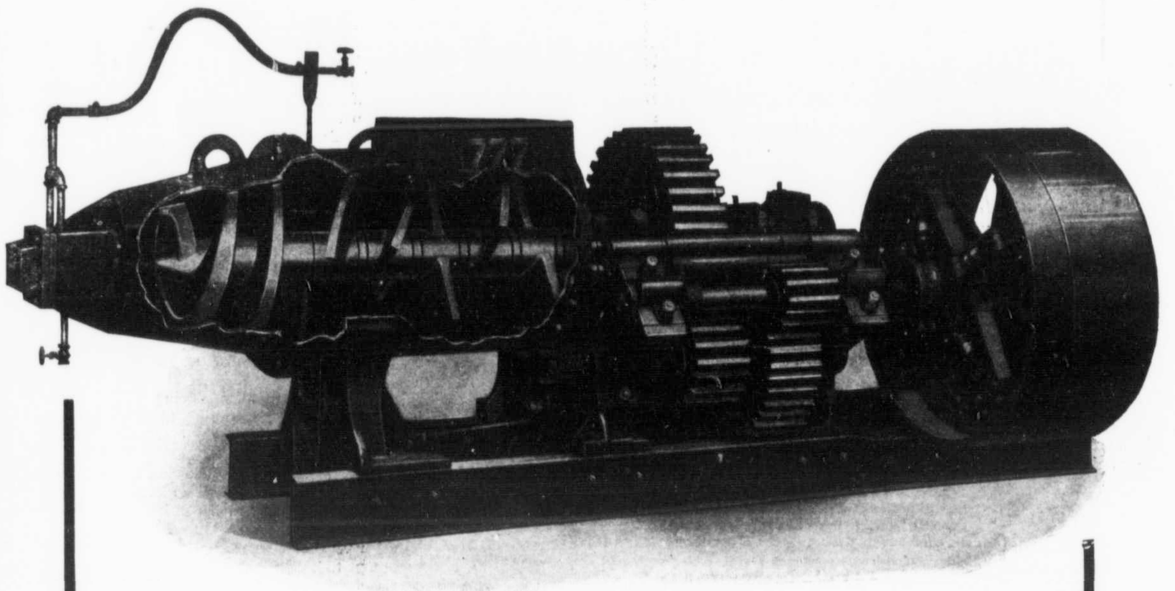

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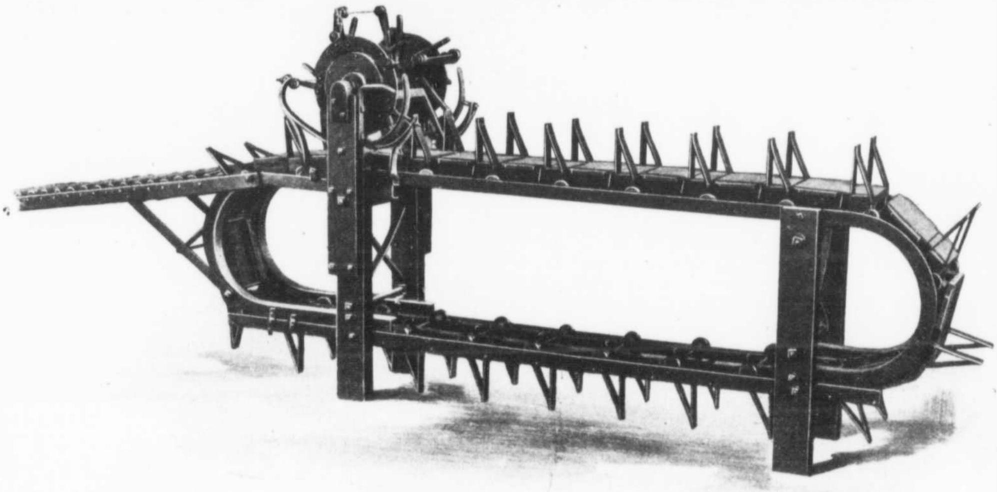

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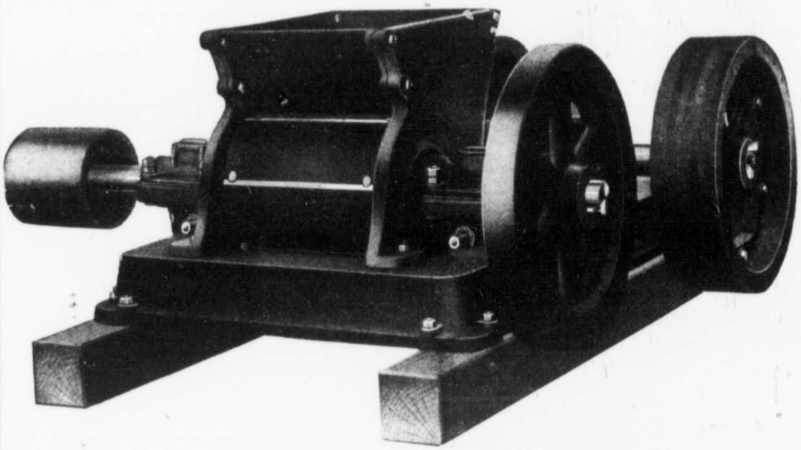

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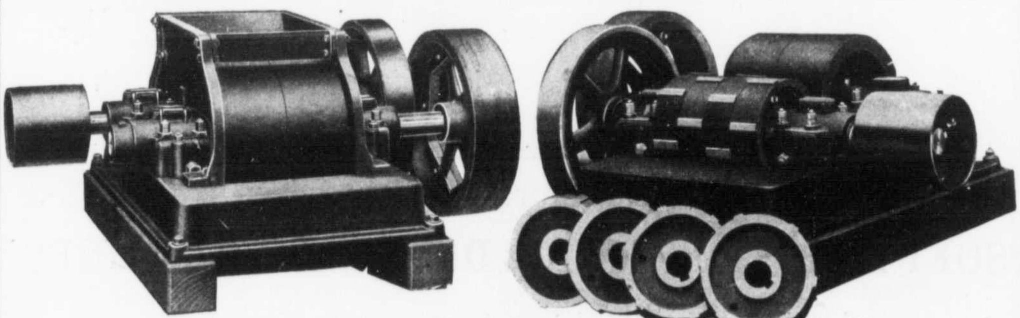
It is a well known fact that in the working of clay, that the more the clay is prepared by being worked and pugged, the more plastic it becomes, and consequently the product is improved. No other machine better prepares the clay than a good Disintegrator, and no better Disintegrator is manufactured than this one, and it is equal to any duty exacted of it. The main frame is heavy and solid, being cast in one piece. The large roll is a slow speed feeding roll with hard chilled face, the bearings of which are adjustable, so that the distance between the rolls can be regulated to any degree of fineness. This roll is 24 inches in diameter, and 18 inch face, and has driving pulley 24 inches in diameter by 6½ inch face, which should be run 70 to 80 revolutions per minute.

The small roll which is 12 inches in diameter by 18 inch face, has steel bars running continually across the roll which can be easily and cheaply replaced when worn. The driving pulley of this roll is 10 inches in diameter by 10 inch face, and should run from 700 to 800 revolutions per minute. It is provided with a heavy balance or fly wheel, which insures steadiness of operation and uniform speed. This machine will disintegrate clay for from 40,000 to 60,000 brick per day. Approximate weight 3,500 lbs.



No. 2 DISINTEGRATOR

This Disintegrator is constructed practically on the same line as our No. 1, but is not so large, and is designed for yards of smaller capacity, being able to thoroughly prepare clay for from 20,000 to 40,000 brick per day. It thoroughly shreds or separates the clay and leaves it in a loose and open condition and in proper shape to absorb water rapidly when being worked in a pug mill. It also pulverizes the small stone and separates the larger ones, putting the clay in the best possible condition. The slow roll is of hard chilled iron, and is 18 inches in diameter by 16 inch face, and is in two sections. The shaft in this roll runs in adjustable bearings so that the space between the rolls is easily adjusted. It is provided with a driving pulley 24 inches in diameter by 6 inch face, and should run from 70 to 80 revolutions per minute.

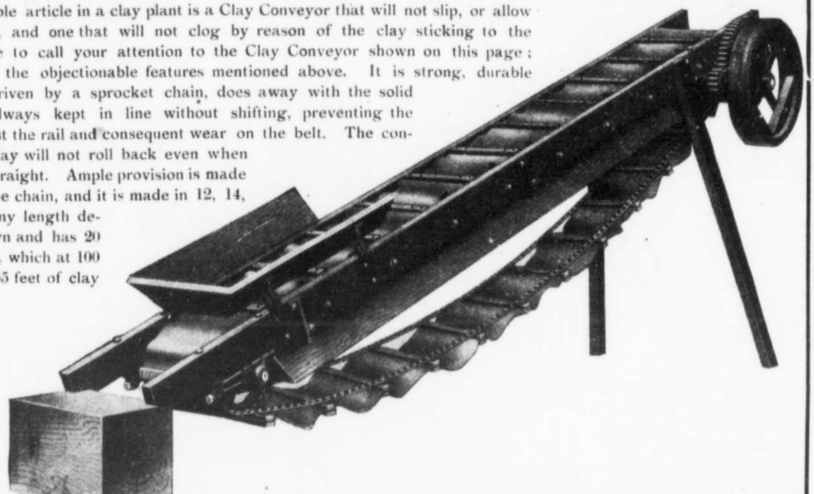
The speed roll is composed of four chilled iron sections, having lugs or teeth set alternately one with the other, and by this construction the clay is taken gradually, which gives evenness of motion. These sections are keyed on to a large shaft in such a manner that they are interchangeable and reversible, and when one cutting edge becomes worn they may be reversed, and an entire new cutting surface presented to the material. The speed roll is fitted with a driving pulley 10 inches in diameter by 10 inch face, which should run from 700 to 800 revolutions, and this roll is also provided with a heavy balance wheel.

Approximate weight, 2,500 pounds.

CLAY CONVEYORS.

SPROCKET CHAIN CLAY CONVEYORS

An almost indispensible article in a clay plant is a Clay Conveyor that will not slip, or allow the clay to roll backward, and one that will not clog by reason of the clay sticking to the rolls or spools. We desire to call your attention to the Clay Conveyor shown on this page; it is entirely free from all the objectionable features mentioned above. It is strong, durable and positive, and being driven by a sprocket chain, does away with the solid rolls or spools, and is always kept in line without shifting, preventing the rubbing of one edge against the rail and consequent wear on the belt. The construction is such that the clay will not roll back even when the Conveyor is set almost straight. Ample provision is made for taking up the slack in the chain, and it is made in 12, 14, 16 and 18 inch widths and any length desired. It is geared as shown and has 20 inch by 4 inch driving pulley, which at 100 revolutions will give about 65 feet of clay belt per minute.



BELT CLAY CONVEYOR

While we do not advise the use of the old fashioned drag belt Clay Conveyor, there is a demand for them and we make them of the style shown on this page. They are very strong and serviceable and ample provision is made for taking up the slack in the belt. We make them in 12, 14, 16 and 18 inch widths and any length desired. They are back geared as shown and the driving pulley is 20 inches in diameter with 4 inch face, which at 100 revolutions will give about 90 feet of the clay belt per minute.

Send for our Catalog and write us in regard to anything you need in our line and we will be glad to give you information and quote you prices.

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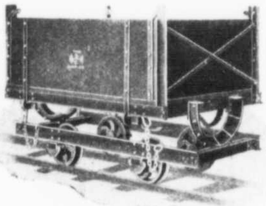

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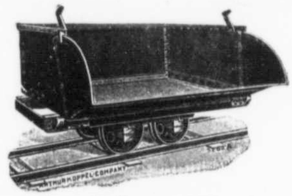

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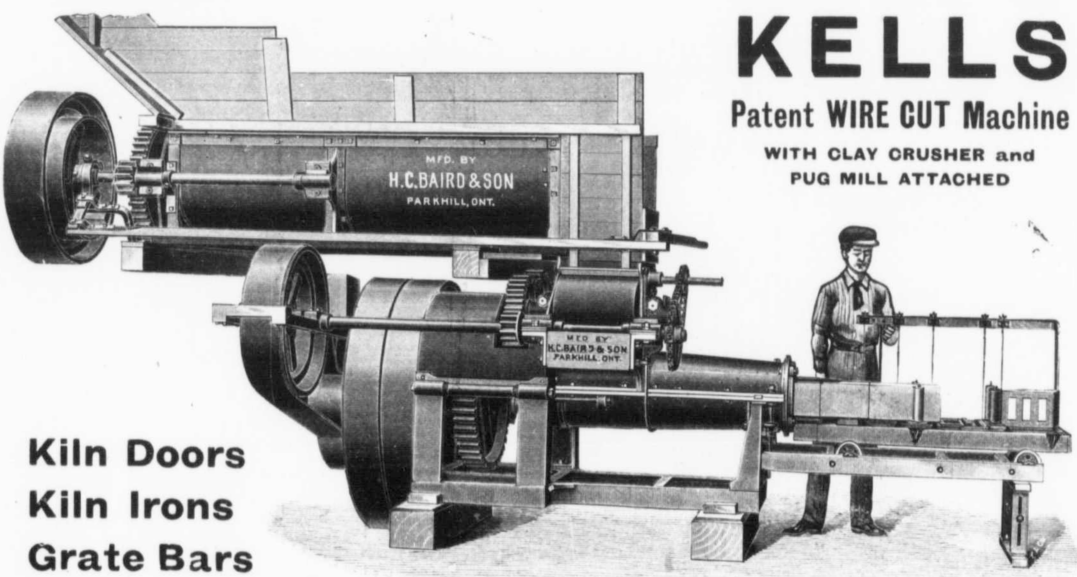

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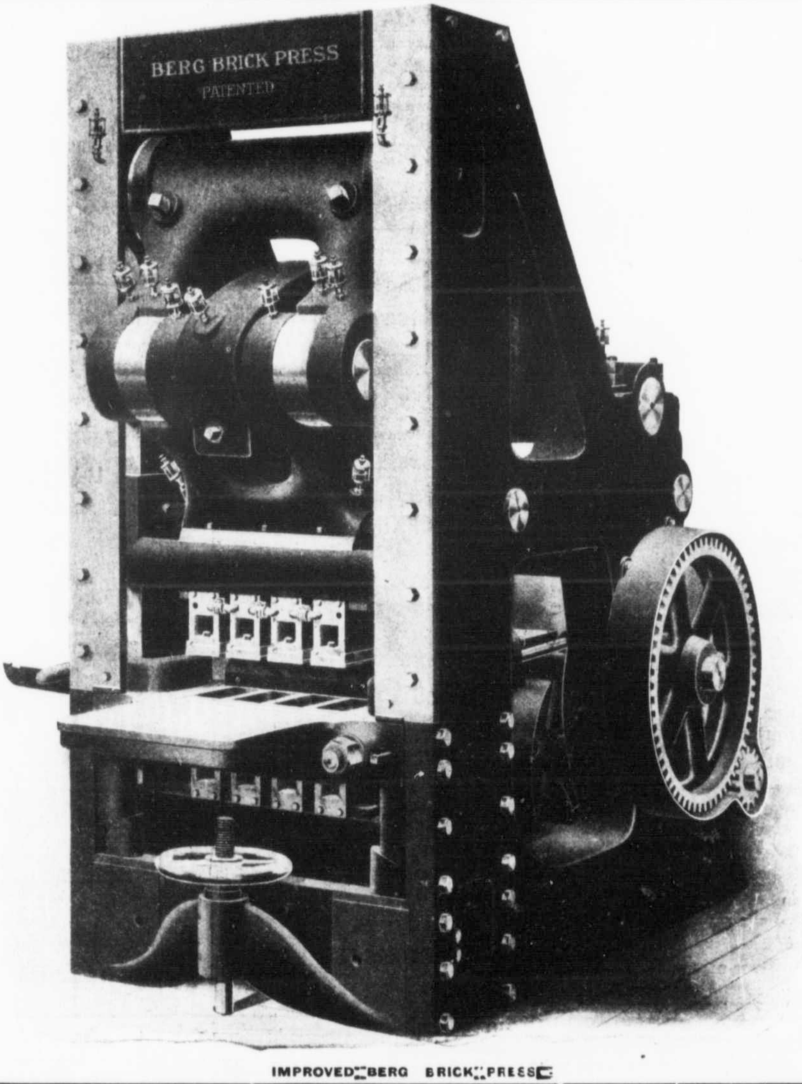

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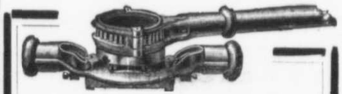

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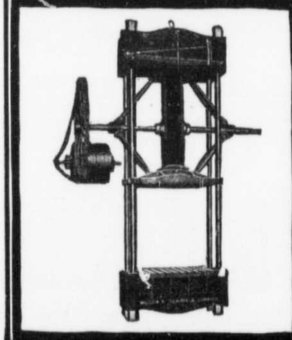

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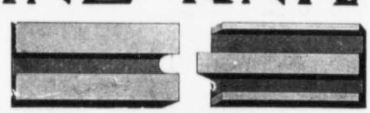

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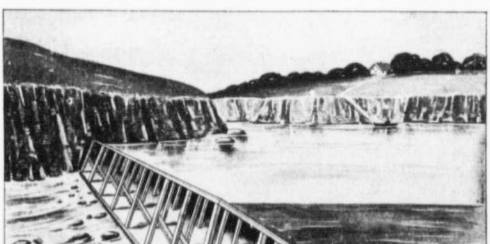

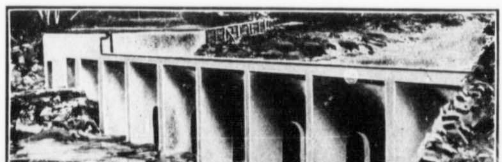

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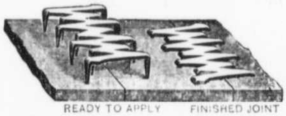

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