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PAPER TRADE JOURNAL

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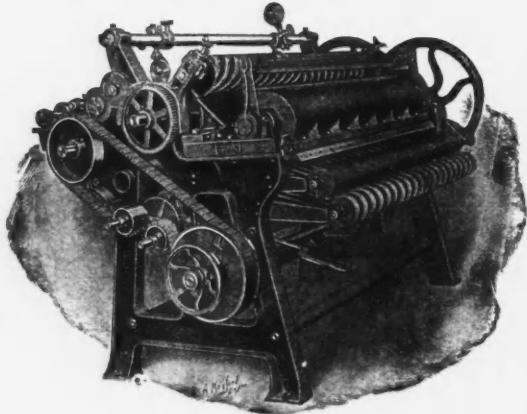
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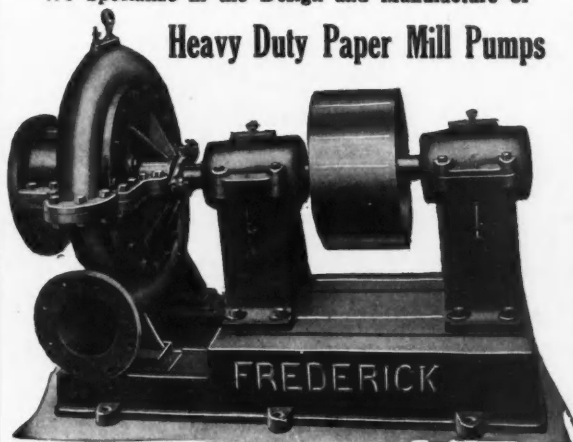
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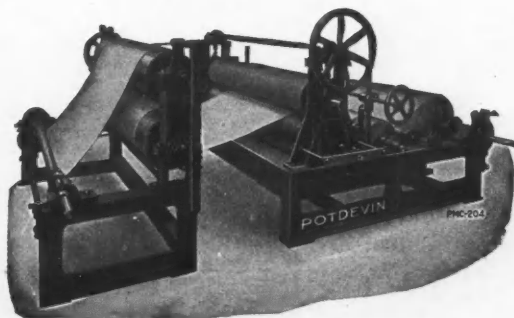


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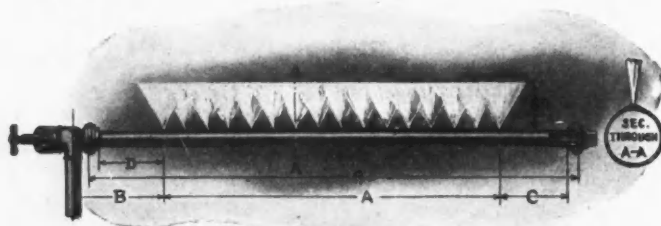
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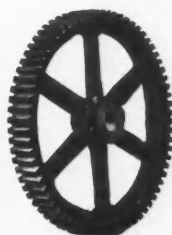
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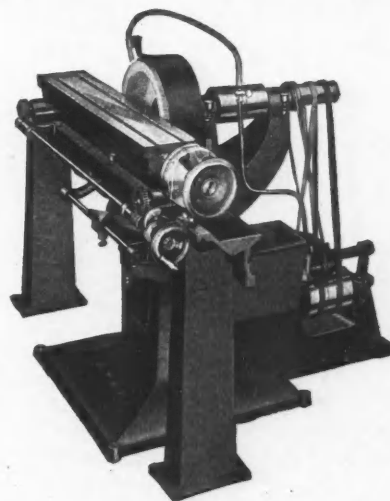
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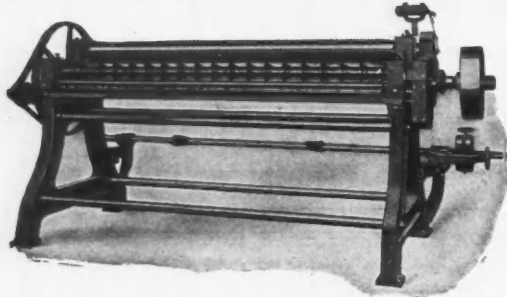
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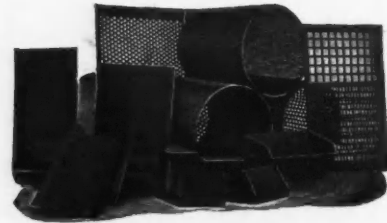
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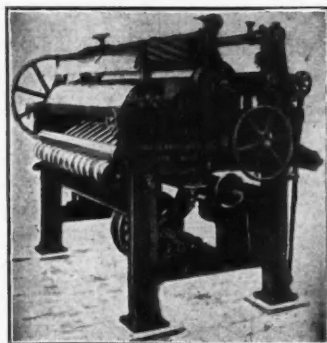
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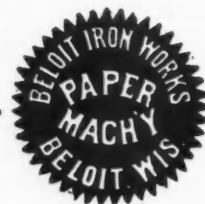
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THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY

FIFTIETH YEAR

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NEW YORK AND CHICAGO

Thursday, May 4, 1922

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PRODUCTION OF ALL PAPERS DURING MONTH OF MARCH

According to Statistics Just Issued by the Federal Trade Commission Mill Stocks at the End of the Month Equalled Six Days' Average Output, Book Paper Stocks Thirteen Days' Average Output, Paper Board Stocks Eleven Days' Average Output, Wrapping Paper Mill Stocks Twenty-seven Days' Average Output, and Bag Paper Mill Stocks Seven Days' Average Output.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 3, 1922.—The attached tabulation is a summary of production, shipments, and stocks of paper mills in the United States as reported to the Federal Trade Commission for the month of March, 1922. This summary is compared with the month of March, 1918 to 1921, inclusive.

The average production for all grades, except boxboard, is based upon the production for the years 1917 to 1921, inclusive, and the average stocks are based upon the stocks carried for the years 1918 to 1921, inclusive.

Figures for boxboard prior to March, 1920, were included in paperboard. The average production and stocks for boxboard are based upon the figures tabulated during the period March, 1920, to December 31, 1921.

The production has been classified for convenience into 12 grades, according to the grades of paper manufactured by the reporting mills. Some mills making several grades appear in more than one group which causes duplication in the body of the tonnage tables in the number of mills.

For each grade the number of mills includes all mills commonly operating on that grade, regardless of whether they produced any tonnage of that particular grade during the month. In other words, it includes all mills reporting either production or merely stocks or shipments of that grade. This way of counting the mills is the same as was used in previous years. In the Statistical Summary and Newspaper Review for the months of January and February, 1922, the number of mills shown was merely the number actually operating during those months on the respective grades. With the resumption now of the method of previous years there is for March an apparent but not a real increase in the number of mills. For example, of the 78 mills shown for March on news print (Standard and Special), 13 reported no production for the month but did report stocks or shipments. This leaves 65 mills that in March were actually operating on news print, which is the same number as was shown in the Commission's paper bulletins for January and February, 1922. Thus, the situation as to number of mills did not change during the first three months of the year.

The stocks of paper carried by different mills depend not only upon the condition of the market but also upon the kind of paper made, trade customs, etc.

Tonnage Summary

Production, Shipments and Stocks of Paper, by Grades, for the month of March, 1922, compared with March, 1921, 1920, 1919, and 1918, together with average production and stocks.

Grade	Number of mills	Stocks on hand first of month Net tons	Production Net tons	Shipments Net tons	Stocks on hand end of month Net tons
News Print (Standard and special Grades of News):					
March, 1922.....	78	27,815	117,507	117,142	28,180
March, 1921.....	85	39,176	107,532	104,919	41,789
March, 1920.....	90	27,955	127,847	128,238	27,564
March, 1919.....	68	25,471	114,746	108,285	31,932
March, 1918.....	66	28,014	105,700	106,730	26,984
Average.....	.....	.....	118,800	.....	25,307

Grade	Number of mills	Stocks on hand first of month Net tons	Production Net tons	Shipments Net tons	Stocks on hand end of month Net tons
Standard News:					
March, 1922.....	65	22,898	110,061	109,661	23,298
March, 1921.....	67	33,293	98,190	95,966	35,517
March, 1920.....	76	24,795	119,152	118,843	25,104
March, 1919.....	51	19,543	104,497	99,171	24,859
March, 1918.....	50	24,886	95,471	99,658	20,699
Average.....	.....	.....	107,676	.....	20,900
Book (M. F., S. S. C. and Coated):					
March, 1922.....	88	39,334	77,889	78,856	38,367
March, 1921.....	95	33,587	59,832	55,698	37,721
March, 1920.....	94	28,434	95,851	99,789	24,496
March, 1919.....	89	32,784	63,699	63,660	32,823
March, 1918.....	89	28,358	74,219	74,923	27,654
Average.....	.....	.....	79,191	.....	30,305
Paper Board, Total Straw, Fibre, Leather, chip etc.:					
March, 1922.....	229	63,908	192,308	184,230	71,986
March, 1921.....	241	60,723	139,723	133,052	67,394
March, 1920.....	250	44,667	207,854	213,089	39,441
March, 1919.....	234	59,452	136,175	135,240	60,387
March, 1918.....	234	34,995	161,616	161,299	35,312
Average.....	.....	.....	170,478	.....	49,989
Boxboard:					
March, 1922.....	140	29,196	140,167	135,800	33,563
March, 1921.....	139	29,361	98,771	95,827	32,305
March, 1920.....	130	19,829	147,098	149,075	17,852
Average.....	.....	.....	120,339	.....	26,048
Wrapping (Kraft, Manila, Fibre, etc.):					
March, 1922.....	152	59,251	70,141	64,461	64,931
March, 1921.....	145	51,276	49,879	43,619	57,536
March, 1920.....	152	31,453	68,403	69,565	30,291
March, 1919.....	160	59,552	48,069	36,383	71,238
March, 1918.....	160	36,437	59,884	60,978	35,343
Average.....	.....	.....	63,882	.....	43,482
Bag (all kinds):					
March, 1922.....	48	3,465	18,586	18,337	3,214
March, 1921.....	38	3,298	8,685	8,191	5,792
March, 1920.....	37	4,467	18,754	19,089	2,829
March, 1919.....	37	4,173	11,002	9,866	5,309
March, 1918.....	37	3,142	14,875	15,134	2,883
Average.....	.....	.....	14,337	.....	3,362
Fine (Writing, Bonds, Ledgers, etc.):					
March, 1922.....	104	35,804	29,346	30,027	35,123
March, 1921.....	108	37,397	19,058	17,100	39,355
March, 1920.....	116	32,260	33,671	35,720	30,211
March, 1919.....	108	37,623	23,514	23,318	37,819
March, 1918.....	108	25,352	28,865	30,690	23,527
Average.....	.....	.....	28,809	.....	33,192
Tissue (Toilet, Crepe, Fruit, Wrappers, etc.):					
March, 1922.....	99	8,023	17,965	17,354	8,634
March, 1921.....	97	8,854	10,760	10,889	8,723
March, 1920.....	101	6,784	15,363	16,150	5,997
March, 1919.....	86	7,407	10,575	9,841	8,141
March, 1918.....	86	5,977	12,017	13,594	4,400
Average.....	.....	.....	13,257	.....	6,737
Hanking (No. 2 Blank, Oatmeal, Tile, etc.):					
March, 1922.....	26	5,611	8,919	9,209	5,321
March, 1921.....	25	7,403	5,715	3,804	9,314
March, 1920.....	24	1,538	10,047	10,304	1,281
March, 1919.....	19	2,558	8,774	8,113	3,219
March, 1918.....	19	6,176	4,304	5,556	4,923
Average.....	.....	.....	7,506	.....	4,693
Felts and Building (Roofing, Sheathing, etc.):					
March, 1922.....	50	11,664	32,164	31,491	12,337
March, 1921.....	54	11,979	23,375	23,725	11,629
March, 1920.....	54	8,535	37,473	38,404	7,604
March, 1919.....	45	8,596	14,014	14,782	7,828
March, 1918.....	45	8,239	25,442	25,779	7,902
Average.....	.....	.....	27,027	.....	8,853
Other Grades (Specialties not Otherwise Classified):					
March, 1922.....	104	19,863	29,035	27,968	20,930
March, 1921.....	94	19,535	16,218	15,671	20,082
March, 1920.....	89	14,935	26,071	25,976	15,030
March, 1919.....	64	11,580	14,591	13,002	13,169
March, 1918.....	64	13,058	23,214	27,877	8,395
Average.....	.....	.....	21,222	.....	14,466
Total of all Grades:					
March, 1922.....	.....	274,738	593,860	579,075	289,523
March, 1921.....	.....	273,228	440,777	416,668	297,337
March, 1920.....	.....	200,059	641,343	656,658	184,744
March, 1919.....	.....	249,196	445,159	422,490	271,865
March, 1918.....	.....	189,748	510,136	522,559	177,325
Average.....	.....	.....	544,509	.....	220,386

The following stocks were reported on hand at terminal and delivery points on March 31, in addition to the mill stocks shown in the tabulation: news print, 316 tons; book paper, 3,187 tons, fine, 176 tons; paper board, 130 tons; wrapping, 35 tons; and "other grades," 275 tons.

Stocks of all grades, except book, fine, and hanging, increased during the month. Stocks of all grades reported by manufacturers

at the end of March amounted to 293,642 tons, including the stocks at terminal and delivery points. In addition to these stocks, jobbers and publishers reported news print stock and tonnage in transit aggregating 200,814 tons.

Ratio of Stocks to Average Production

Comparing the stocks on hand at the domestic mills on March 31, with their average daily production, based upon the combined production for 1918 to 1921, inclusive, the figures show that:

- News print paper mill stocks equal 6 days' average output.
- Book paper mill stocks equal 13 days' average output.
- Paper Board mill stocks equal 11 days' average output.
- Wrapping paper mill stocks equal about 27 days' average output.
- Bag paper mill stocks equal about 7 days' average output.
- Fine paper mill stocks equal about 33 days' average output.
- Tissue paper mill stocks equal 18 days' average output.

Imports and Exports

The imports and exports of all grades of paper for February, 1922, compared with February, 1921, as shown by the records of the Department of Commerce were as follows:

	February, 1922		February, 1921	
	Pounds	Value	Pounds	Value
Imports:				
News print.....	164,780,569	\$5,709,753	117,786,748	\$7,302,112
Book paper.....	51,572	2,618	10,146	1,362
Wrapping.....	1,886,000	68,237	854,272	67,926
Hanging.....		55,050		23,246
All other grades (a).....		223,723		274,741
Exports:				
News print.....	1,671,844	75,886	5,059,057	389,716
Book paper.....	1,353,408	145,847	8,042,296	1,388,061
Paper board.....		150,849		403,092
Wrapping.....	2,774,694	175,522	3,087,362	362,092
Bag.....		102,780		95,178
Fine.....		95,743		831,667
Tissue.....		92,953		140,505
Hanging.....		52,863		112,759
All other grades (a).....		339,923		995,950
Total imports.....		\$6,059,381		\$7,669,387
Total exports.....		1,232,366		4,719,830

(a) Includes some paper already converted into commercial articles.

Loss of Production

The idle machine time reported to the Commission for March, 1922, is shown by grades in the attached tabulation. This does not include the machines in 26 mills which were closed down completely. The reasons tabulated for lost time are lack of orders and repairs. "Other reasons" include lack of material; lack of water power, etc. The time lost in March, 1921, is given by grades and reasons for purposes of comparison.

Grade	Lack of orders		Repairs		Other Reasons		Total	
	1922	1921	1922	1921	1922	1921	1922	1921
Newsprint:								
Number of machines.....	13	22	8	19	10	21	31	62
Total hours idle.....	2,856	4,320	220	1,424	719	2,349	3,795	8,093
Book Paper:								
Number of machines.....	112	158	10	22	28	12	150	192
Total hours idle.....	15,551	36,024	674	4,017	2,180	2,883	18,405	42,924
Paper Board:								
Number of machines.....	129	205	53	32	99	60	281	297
Total hours idle.....	26,914	53,761	2,792	3,666	17,250	19,025	46,956	76,452
Wrapping:								
Number of machines.....	53	111	35	19	36	25	124	155
Total hours idle.....	6,125	30,171	2,465	2,867	5,277	6,585	13,867	39,623
Bag:								
Number of machines.....	15	22	1	2	5	9	21	33
Total hours idle.....	2,636	6,938	86	173	191	1,456	2,913	8,567
Fine:								
Number of machines.....	39	89	9	25	64	25	112	139
Total hours idle.....	11,857	26,681	1,362	9,135	9,326	10,011	22,545	45,827
Tissue:								
Number of machines.....	36	62	34	27	24	21	94	110
Total hours idle.....	5,917	15,763	2,312	4,407	2,785	3,865	11,014	24,035
Hanging:								
Number of Machines.....	14	13	6	3	2	2	22	18
Total hours idle.....	1,873	4,088	129	274	103	118	2,105	4,480
Felts and Building:								
Number of machines.....	30	33	18	3	15	19	63	55
Total hours idle.....	4,398	7,521	1,185	273	1,164	4,307	6,747	12,101
Other Grades:								
Number of machines.....	48	45	9	12	20	19	77	76
Total hours idle.....	7,648	10,040	317	1,797	3,115	5,098	11,080	16,935
Total number of machines.....	489	760	183	164	303	213	975	1,137
Total hours idle.....	85,775	195,207	11,542	28,033	42,110	55,697	139,427	279,037

Continue Present Wages Until May 15

During the conference held at the Murray Hill Hotel, New York, April 26, 27 and 28, between representatives of the Paper Mill Unions and of the eleven companies parties to the Arbitration Award, no wage-schedule agreement was reached to supplant the existing agreements which expire May 1 and May 11 respectively. The demands of the manufacturers for a 10 per cent reduction in rates for skilled labor, the prevailing local rates for unskilled labor and straight time for overtime, with a few exceptions, were refused by the union representatives.

It was finally agreed, however, to continue present wage schedules until May 15, allowing the unions an opportunity to take a referendum vote, and to call another conference in New York on May 10. It was generally believed that the real issue hinged upon the manufacturers' refusal to establish definite rates for all unskilled labor. This division alone represents about 50 per cent of the men involved.

The Great Northern Paper Company on April 25, signed a separate agreement with the unions fixing common labor rates at 40 cents per hour and reducing all other wages 10 cents per hour over the schedule which had previously existed. Many positions held by men inside the mill were reclassified, however, placing many of those who previously had been in higher classifications upon the common labor basis.

Contribution to Vocational Education Fund

The Vocational Education Committee of the Pulp and Paper Industry recently received a letter from The Pettebone-Cataract Paper Company, reading as follows:

"We are pleased to herewith enclose our check to your order for \$50 as a further contribution to the fund for bringing out the textbooks of the pulp and paper industry. We surely think they will be very valuable, and must have necessitated a great deal of labor and time by experienced men. We assure you we are glad to be of assistance, and have already ordered two sets, one of which we shall place in the Niagara Falls Public Library, as this city is, and always has been, what might be termed a 'paper city'."

Companies which had previously contributed less than \$100 to the fund were recently asked by the committee to make an additional contribution sufficient to bring the total up to this figure. The general appreciation of the work of the committee, such as evidenced by the Pettebone-Cataract Paper Company, is especially gratifying and helpful in the completion of the undertaking.

CANADA AGAINST PUTTING BOOK PAPER ON FREE LIST

Paper Men Assert That If Book Paper Is Put on the Free List It Will Be a Severe Blow to the Book Paper Mills of Canada and Would Undoubtedly Put a Complete Stop to the Expansion of That Part of the Industry—Following Judgment Against the Canada Paper Co. Because of Disagreeable Odor from Chemicals This Plant Has Been Closed Down.

[FROM OUR REGULAR CORRESPONDENT]

MONTREAL, Que., May 1, 1922.—Considerable apprehension has been caused in paper making circles here by the report that some of the Canadian publishers of periodicals are urging W. S. Fielding, the Federal Minister of Finance, to put book paper on the free list in his forthcoming budget. The general opinion appears to be that there is some danger that he may do this. He is himself a part owner of the *Journal of Commerce* and his inclination as a Liberal of the old School is for reducing the tariff wherever possible. If book paper should be put on the free list it would be a very severe blow to the five book paper mills in Canada and would undoubtedly put a complete stop to the expansion of that part of the industry. The fact is that if book paper can come into Canada free it is only a disadvantage to build a mill in Canada as by moving to the other side of the border the mill would have the advantage of the American market as well as of the Canadian. The duty of 5 per cent on imported Canadian chemical pulp would not affect the situation because against this the mill would avoid duties on a long list of articles which have to be imported into Canada such as wires, felts, clays and sulphur. Some of these articles carry a duty of from 20 to 25 per cent.

Wages of Paper Makers

The dispute between the Paper Makers' Union and the Paper Manufacturers of the United States has not so far affected Canada and if it should happen to result in a strike its effects are not expected to be very far-reaching on this side for the reason that only three of the mills in Canada are union mills. All the news print mills in the province of Quebec, with the exception of one at Three Rivers, maintain the open shop. Therefore, in the case of a strike in the United States, most of the Canadian mills would undoubtedly be called upon for larger supplies of news print.

Export of Forest Products

The official trade returns of the Dept. of Commerce shows that the export of forest products from Canada is second only in importance to agricultural exports. The agricultural exports for the month are shown at \$21,218,467 a sharp increase from the results of January and February of this year, and comparing favorably with those for March, 1921, which were \$27,140,241. Forest products are shown at \$17,531,802, as compared with \$19,813,456 for the same month in 1921.

Timber Limits Undervalued

Robson Black, Manager of the Canadian Forestry Association has given out a statement to the effect that a factor of considerable magnitude which is very seldom considered by the general public in estimating the assets behind Canadian pulp and paper companies is the rapid and inevitable increase in value of the timber limits on which most of our companies hold what are practically self-perpetuating leases. "The claim is seldom made," he says, "and yet might be made with a show of reason, that the valuation placed upon timber limits in the balance sheets of Canadian wood-using industries even three or five years ago is substantially under the present market price of the limits. In its wide-spread educational campaign

to bring about a sane public appreciation of the enormous national economical advantages identified with the possession of productive forest areas the point has been continually stressed by the Canadian Forestry Association that the remaining timber stands of the Dominion constitute Canada's most powerful industrial magnet and the only assurance of new population in areas which would otherwise be wilderness. That the average Canadian has not yet realized the bearing of the Canadian forest upon the future growth of the country is well illustrated by the annual plague of forest fires which in Ontario and Quebec alone ran up to 3,000 conflagrations in 1921 with a total loss of probably \$15,000,000. As the pulp and lumber supplies of the great consuming market south of the Canadian border display a more and more drastic depletion the strategic position of Canada's forest should warrant the Canadian people in insisting that the protection of such valuable national property from the present inroad of forest fires should be raised into the front rank of public issues."

Lawsuit Closes Mill

Following the recent judgment rendered in the Superior Court in Montreal in the case of J. Brown, K. C., vs. the Canada Paper Company, the plant known as the "Old Mill" at Windsor Mills, Que., has been closed down. Mr. Brown complained that the use of certain chemicals in the manufacture of pulp was detrimental to the enjoyment of his home. It is learned on good authority that the possibility of opening up the plant as a foundry is being seriously considered, and, if the plans materialize, this will mean employment for some two hundred people. The closing down of the "Old Mill" threw a large number of men out of work and several families were obliged to leave the town.

Abitibi Power and Paper

Abitibi Power and Paper Company is building its own railway for the transportation of raw material from Iroquois Falls to a point about twelve miles north. This will link the Iroquois Falls branch of the T. and N. O. Railway up with the village of Hughes on the main line of the National Transcontinental. The railway will pass through the townships of Edward, Mortimer and part of Stimson.

Proposed New B. C. Mill

There is a possibility of New Westminster, B. C., having a paper mill in the near future. A thirty day option on a site situated on the old Indian reserve has been granted to J. J. Herb, representing Eastern capitalists. It is expected that the projected pulp and paper plant for Prince George, B. C., will be commenced in June according to the principals in the proposition, and that the establishment will be in the producing state at the beginning of 1923.

T. W. Dunn Resigns From Detroit Sulphite Co.

DETROIT, Mich., May 1, 1922.—Theodore W. Dunn has resigned as vice-president and general superintendent of the Detroit Sulphite Pulp and Paper Company.

Theodore Dunn entered the paper business in October, 1888. At this time his father, George F. Dunn, was superintendent of the Detroit Sulphite Fiber Company. The company then made only Mitscherlich sulphite pulp, but in 1893 installed one paper machine of the cylinder type. At the time of George Dunn's death in 1902 there were four machines, three cylinder and one Fourdrinier. Theodore Dunn took his father's position of general superintendent. A year later, 1903, the plant was completely destroyed by fire. In 1911 and 1915, respectively, he installed two M. G. Yankee tissue machines making a total of five machines in the present plant.

For the last eight years, he has been vice-president and a member of the Board of Directors. During his period with the company he has brought the plant up to high efficiency.

Mr. Dunn has resigned, after being with the Detroit Sulphite Pulp and Paper Company continuously for over 34 years, but expects to still remain actively engaged in the paper industry.

May We Quote?

We are now booking tonnage for first open water shipment as well as for shipments for balance of the year 1922

WELL KNOWN SCANDINAVIAN

Unbleached and Easy Bleaching

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DEMAND GRADUALLY GROWS IN PHILADELPHIA MARKET

Gain Is Said to Be Permanent and Cannot Be Said to Be Due to Any Special or Seasonal Influence—In Spite of the Betterment, However, Offerings Are Said to Have Been Made of Both No. 1 and No. 2 Kraft at Reductions of From One-Quarter to One-Half Cent Per Pound—Philadelphia Paper Stock Dealers' Association Has Enjoyable Dinner at the Hotel Walton.

[FROM OUR REGULAR CORRESPONDENT]

PHILADELPHIA, Pa., May 2, 1922.—Philadelphia paper trade experiences in the closing week of April have given confirmation to the impression that business aplenty exists for the real go-getters and that just in proportion as sales organizations are being built up and stock from the mills is being carried to meet immediate requirements does business increase. On this point, there is unanimity of opinion from such representative firms as the Garrett-Buchanan Company, Riegel & Co., The Charles Beck Company, The Paper House of Pennsylvania and others of the leading establishments. The Garrett-Buchanan Company to point to an example which in a general way is typical rather than isolated found that its records disclosed sales for March in excess by a considerable amount of any of the preceding sixteen months and that while there existed early this month the feeling that perhaps because of the many holidays, Jewish and Gentile, taking place during the month a decline might fairly be expected, the actual result showed that April business was slightly in excess of that enjoyed during March.

Other firms also report a betterment in business, some in larger and some in smaller percentage than in the case instanced, but all agree that the character of buying is vastly more encouraging and steady now than it has been at any time during the year and that there are undeniable evidences every day that the gain is a permanent one and cannot possibly be ascribed to merely special or seasonal influences. In one respect, the increase in sales is the more remarkable because of the fact that there still exists in the opinion of the consumer and to a much more limited extent in the opinion of the distributor, the belief that further readjustment of paper prices downward are to come and the interpretation placed upon the increased buying of paper at a time when a considerable opinion exists that prices will be lower is that present day demand has increased to such an extent that purchases must be made at once to meet them.

In informed paper trade ranks, opinion is by no means general that prices will still further decline, but even those who look forward to some downward revisions at about the end of this new month, are quite certain that they will be of only a small amount and that under no circumstances can they be radical. Larger buyers apparently share in this opinion, although their wish of course is that sharp cuts will be made. The analysis of conditions which has been made applies particularly to the fine paper division of the trade and arises from the fact that the larger printers and consumers who are the heaviest buyers are beginning now to show an activity which has been sadly absent for many months. Closely associated with the increased orders are very decided increases in inquiries and these it is generally felt can be counted on with certainty to result in business later on.

In the coarse papers the market continues to improve but not nearly to such an extent as the fine and in this branch values are by no means as steady as they are in the printing paper division. Offerings of both number one and of number two Kraft at reductions of one-quarter to one-half cents are being made and there is reported to be a plentiful supply of screenings at from two to two

and one-half cents per pound. Toilet tissues also are rather weak in price and some of these grades, especially roll goods in cases are being quoted at close to pre-war levels.

Confirmation of the business diagnoses made in these columns during the last month will be given in the May report of the Third or Philadelphia district Federal Reserve Banks. Advance proofs furnished the correspondent of THE PAPER TRADE JOURNAL contain the following statement: "Definite improvement has occurred during the past month in the demand for paper, but business is still well below the capacity of the industry. This improvement is reflected in the slow increase in sales, in the greater regularity in the receipt of orders, and in the steadier character of the business. It may be said that the tone of the market is better, for the trade is undoubtedly more confident than it was a month ago. The betterment, however, is attributed by some firms to seasonable influences which ordinarily cause a greater demand at this time of the year. Orders are still small, and no one is buying for stock. Local dealers in particular complain that the small size of the orders makes the cost of doing business relatively greater. Some spottiness still exists, but the market is becoming steadier.

"All grades of paper have shared in this improvement, although the fine papers are probably in greatest demand at present. The call for book papers is still a bit irregular: Wrapping paper manufacturers, who last month complained of a slump in business, report that sales have increased materially, and that the situation is much more encouraging."

Paper Stock Dealers Dine

The seventeenth annual dinner of the Philadelphia Paper Stock Dealers' Association was held Wednesday evening of last week in the Hotel Walton. In point of mere numbers, it probably established the high water mark for the actual count of guests showed present just 152. But in the variety of industries represented the printing, engraving, stationery, boxmaking and other producers of waste, purchased by the stock packers, the function never was surpassed and in real warm hearted camaraderie, in the absence of all formality and in the full hearted participation in an evening of good old time revelry, a new record was established. Venerable heads of firms and youngest clerks sat down together on terms of absolute equality, enjoyed the menu as printed on the souvenir program and then looked at, listened to and to a more or less limited extent, actually participated in a vaudeville program by professionals of exceptionally high quality and which would have been more extensive, had it been possible to continue the festivities over until Thursday morning. There were dancers and soloists, a trick dog—a regular vaudeville house variety of entertainments and an unlimited supply of solid and spiritual hospitality.

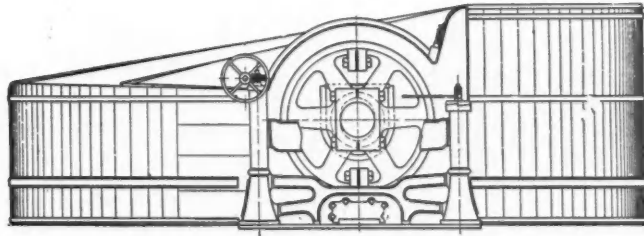
The Association's officers who contributed to the success of the evening is as follows: President, Evan G. Badger; vice-president, Wm. J. McGarity; secretary and treasurer, Wm. L. Simmons. Executive Committee, Simon Weil, Daniel I. Murphy, and H. Feldman. Banquet Committee, Thomas A. Kenny, Frank A. D'Millar, and Thomas F. Simmons. Reception Committee, M. C. Raiguel, Peter Infante, P. Sullivan, Leslie Q. Owens, Harry Rose, Wm. L. Simmons, Wm. J. McGarity, Daniel I. Murphy, David Neuman, Edward Corner, Simon Weil, H. Feldman, Isaac Minsky, Evan G. Badger and Louis Infante.

Wilcox, Walter & Furlong Open

The members of the new reorganized distributing firm of Wilcox, Walter & Furlong Paper Company took possession during the week of their new business home at 231 Chestnut street. Formal application for a charter for the company has been made and will be heard by the Governor on May 5. The officers of the company will be president, William S. Wilcox, vice-president Thomas F. Furlong, and secretary and treasurer, E. T. Walter, Jr. During the week, the firm held informal, but well attended housewarming

(Continued on page 22)

One company manufacturing liner and wrapping paper solved the problem of obtaining reasonable profit at present day prices and keen competition by cutting production costs through the installation of a "NIAGARA BEATER." The NIAGARA, which is beating charges of old paper and shavings, is giving a production of forty (40) tons per day. It has replaced three (3) pulpers and one (1) mixing engine.



Ask the Mill That Owns One

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Plant:
Appleton, Wis.

DEMAND GRADUALLY GROWS IN PHILADELPHIA MARKET

(Continued from page 20)

exercises at which were present many mill men and executives of other and competing firms to wish the new project their good will. The premises are four stories in height with basement, containing upwards of 7,500 square feet. All will be used for carrying a complete stock of high grade fine papers and specialties, save the first floor, the front half of which will be used for shipping and the rear for the executive offices which have been modestly but tastefully appointed in golden oak. Important announcements as to mill connections, the subject in which the trade most deeply is interested are expected shortly, but until the definite arrangements have been made, an official statement is withheld.

Fiber Container Plant Damaged by Fire

Two sections of the plant of the Fiber Container Company Nixon Road, Manayunk were destroyed by a spectacular fire on Thursday afternoon that caused damage estimated from \$500,000 to \$700,000. The fire started a few minutes before noon. Only a few of the 150 employees were in the building which is separated by four fire walls into five sections. The flames spread so rapidly that it was necessary to send in four alarms. The burned building is in the heart of the Manayunk mill district and adjoins the Philadelphia Paper Manufacturing Company on one side and by the Dill & Collins Company on the other. Clarence VanFosten, an electrician employed by the Dill & Collins Company who helped the 100 employees of the Fibre Company and the Philadelphia Paper Company fight the flames was injured by a blow in the abdomen from a hose-nozzle. The fire seems to have originated in a pile of paper bales near the bank of the Schuylkill River in the rear of the building occupied by the Container Company and is of unknown origin. The wind carried sparks into the first floor, section five and soon the entire rear of this part of the plant was ablaze. James and Walter McConnell, brothers, and John Benninger, Dill and Collins, employees, who happened to be in section five with the Container Company workmen on lunch hour discovered the fire. Benninger, who has only one arm, and the brothers tried to fight the fire, but the wind swept the flame so swiftly, that soon the entire plant was aflame. All but Section five of the plant is a one-story brick structure the office and storeroom being in the fifth section. Hundreds of volunteers from the plant protection brigade, fought the fire with lines of hose and concentrated efforts on saving the adjoining plant of the Philadelphia Paper Manufacturing Company after it was found that the fire in Container Company had made too great headway to save the building. The plant of both companies covers 35 acres of ground, three buildings each 56 by 255 feet were destroyed with their contents of fiber board. John Jacobs, president of the Philadelphia Paper Mills and J. M. Conners, general manager of the Fibre Container plant were present and took charge. Mr. Conners made the estimate of \$500,000 to \$700,000 loss, including stock and machinery. The plant of the Philadelphia Paper Company was not damaged except in its stock, part of which was destroyed. The huge 150-ton boxboard machine, the world's record-breaker which is structurally completed and is all ready for operation was saved from damage. The machine is said to have cost \$1,000,000.

"Made in Philadelphia"

"Made in Philadelphia" placards and posters and labels of large size and red lettered are being distributed or attached to all the home made products distributed by E. Latimer, Jr., 126 No. 4th street. Mr. Latimer says that he hopes he has caught the spirit of the city preparing for its World's Fair and Sesqui-Centennial celebration and that he knows that attachment of the "Made in Philadelphia" slogan has aroused attention, for though the first goods thus designated only was sent out during the week, he already

is in receipt of letters of commendation—and incidentally of propositions from label printers, advertising agencies and others to carry on the project. P. H. Dorsey for seventeen years connected with the Whiting Paper Company as both outside and inside representative has accepted a position as salesman in the fine paper division which Mr. Latimer now is developing in connection with his coarse paper and die wiping trade.

Old Employees Join Ward Co.

When some months ago, four employees of the D. L. Ward Company, Messrs. Megargee, Edwards, McNair and Griffith left together to join the organization of the Whitaker Paper Company the trade was much interested. An equal interest may now attach to the fact that two of them, Edward Edwards, and Charles E. Griffith have returned to their old affiliations, and the Ward Company reports that the application of a third, Arthur McNair is pending. Mr. Griffith will have charge of all inside telephone orders and Mr. Edwards will visit his customers throughout the city and elsewhere.

Richard Hartje, son of the late Augustus Hartje, paper manufacturer, who gained countrywide prominence through a divorce suit some years ago, was arrested here last week charged with forging a note for \$3,207.

According to detectives who arrested him, Hartje forged the name of Edmund S. Heath & Son to obtain that sum from the Angell Paper Mill Supply Company, New York. It was stated that he sent the note to the Angell company in payment of a bill. Hartje was held in \$6,000 bail.

General News of the Trade

The resignation of all the members of the Paper Trade Division of the Typotheta of Philadelphia were received by it, not as originally contemplated in a joint letter, but in the form of individual resignations, all however, received at almost exactly the same time and all very similar and almost identical. The ten resigning firms, each allege that because they have been advised legally that pending litigations against the United Typotheta of America might involve them, they deemed it advisable to retire. All, however, expressed great appreciation of the splendid educational work and other activity of the Typotheta. Formal acceptance of the resignations was made by the Executive Committee of the Typotheta at its meeting yesterday afternoon.

Trade visitors during the week included A. L. Whitaker of the Whitaker Paper Company; Charles W. Knode who carries a number of mill accounts; Louis Hayward, of the Fox River Paper Company, Appleton, Wis., and J. H. Calkins, of John Hart Company, Chicago, sales agent for the Keyes Fibre Company.

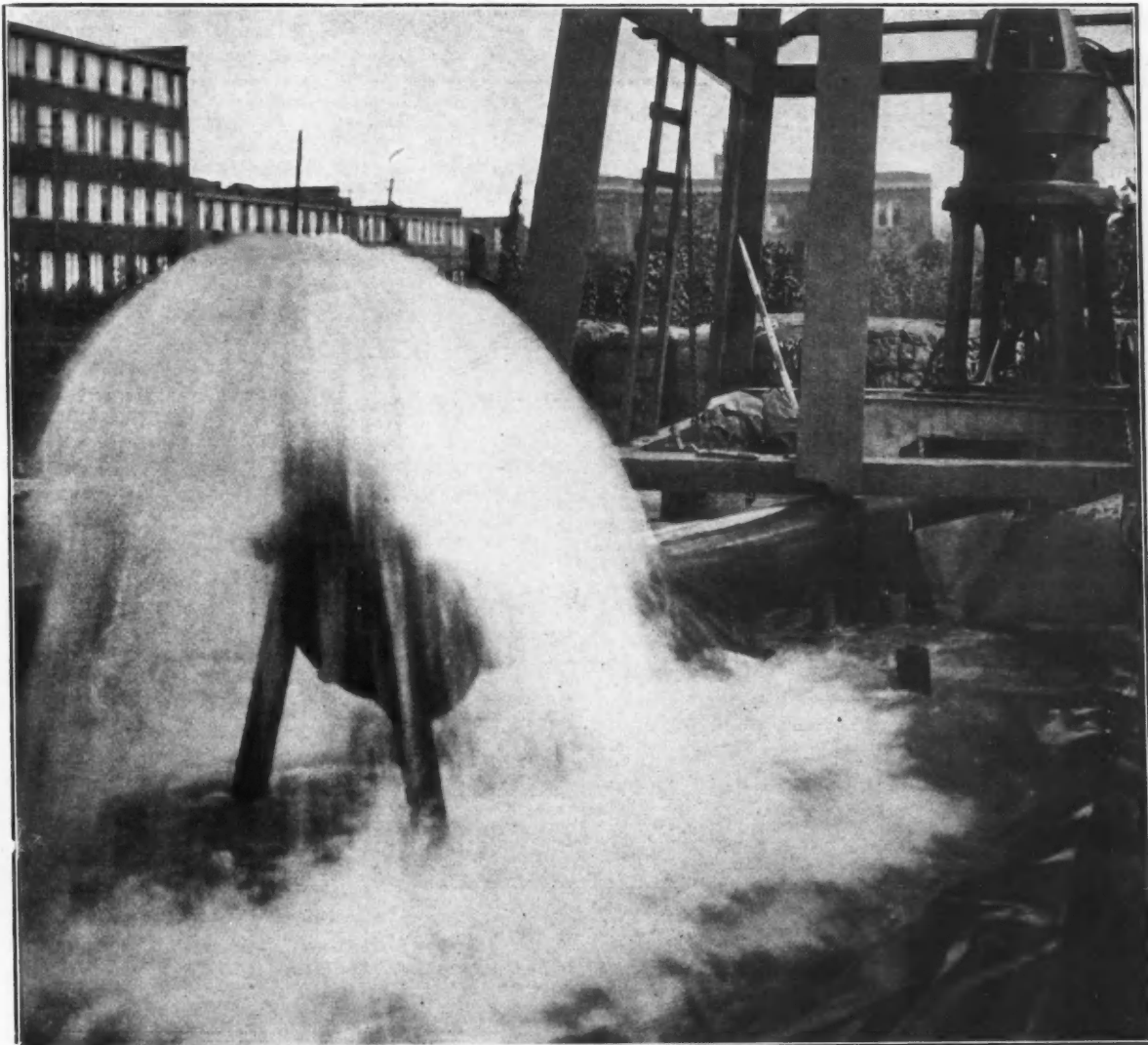
Skowhegan Paper Co. Formed

[FROM OUR REGULAR CORRESPONDENT.]

BANGOR, Me., May 1, 1922.—The Skowhegan Paper Company, a new corporation, has just been formed in Bangor to take over the bankrupt Maine Pulp and Paper Company whose property is located in Skowhegan. The stockholders of the new concern are creditors of the former corporation. James D. Rice, Esq., representing the syndicate of creditors, purchased the property of the bankrupt firm at Buffalo, N. Y., last week from the trustee in bankruptcy. Capital stock is \$400,000 of which \$200,000 is preferred and the remainder common.

Officers were elected as follows: Harold Hinckley, Bangor, president; James D. Rice, Esq., treasurer; Ballard Keith, clerk. Directors are Harold Hinckley, Charles W. Mullen, James D. Rice, Esq., Ballard Keith and James P. Quine.

The new company plans to resume operations in the near future.



The above cut shows one of two wells recently constructed by us for The Richardson Company, Lockland, Cincinnati, Ohio, which are furnishing over 7,000,000 gallons of water per day. In a recent letter, Mr. J. M. Richardson, President, said "All of our other present wells are now obsolete"; also, "Our new wells have, in our judgment, added hundreds of thousands of dollars to the value of our property and ended for all time to come the old problem of a plentiful supply of good water."

Our Slogan:

"WATER OR NO PAY"

We construct and equip

Large Capacity Water Wells

Using the Layne Screen
and

Layne Vertical Turbine Pumps

*Sole Selling Agent for Layne
Products in Ohio and Indiana*

THE LAYNE-OHIO COMPANY

WATER WELL CONTRACTORS

837 Dixie Terminal Bldg.
CINCINNATI, OHIO

PAPER DEMAND IN CHICAGO IS GRADUALLY IMPROVING

A More Stabilized Condition Prevails and the Market Is Growing Less Spotty—Orders Are More Plentiful and Some Business Is Being Placed for Future Requirements—Rumors That Bargain Paper House Was to Dissolve Said to Be Unfounded—Wausau Sulphate Fibre Co. of Mosinee, Wis., to Put Out New Issue of 7 Per Cent Ten Year Gold Bonds—Other News of the Trade.

[FROM OUR REGULAR CORRESPONDENT]

CHICAGO, May 1, 1922.—The trade here continues very optimistic and it is the consensus of opinion that business is on the upgrade gathering momentum and strength almost continuously. Several of the jobbers stated that they did a very good business last week and did not look for any immediate dropping off of the better buying.

A more stabilized condition is said to prevail. The market is felt to be gradually growing less spotty and buyers are beginning to feel that the bottom has been reached in most lines. While there still are some buyers holding out against further drops in prices, these are said to be comparatively few and most of the bigger buyers are beginning to place orders, some for future consumption.

Rumor of Dissolution Unfounded

A rumor has been going the rounds in Chicago to the effect that the Bargain Paper House of this city, was in the process of dissolution. This rumor is said to be unfounded.

Changes have recently been made in this company which are thought to have started the rumor.

Louis P. Dwyer, formerly president of the company, recently severed his identity with the house and has gone into business for himself. W. A. Garner, treasurer of the firm, severed his identity with the Bargain Paper House just about the same time as Mr. Dwyer. Mr. Garner has identified himself with a Chicago banking firm.

J. R. Ferguson, formerly of the Seaman Paper Company here, has assumed the general managership of the Bargain Paper House.

Wausau Sulphate Fibre Co. Bonds

A new issue of 7 per cent, ten year, gold bonds, of the Wausau Sulphate Fiber Company, Mosinee, Wis., is being offered the public through the Merchants' Loan and Trust Company of Chicago. The issue is said to have been made primarily to pay for a 38,000 acre tract of timber land which was taken under contract in 1920. This company specializes in bag, envelope, express, kraft and wrapping, maintaining Chicago offices in the Conway Building in charge of George K. Gibson. Officers of the company are: F. P. Stone, president; O. Bache-Wiig, vice-president; A. L. Kreutzer, treasurer; G. D. Jones, secretary.

New Jobbing House

Louis P. Dwyer, with his brother, Frank J. has started a new Chicago paper jobbing house, and after May 1, will have offices and warehouse at 344 North Canal street, where they have taken a second floor which will afford them approximately 15,000 square feet of space. This warehouse is very handily located on a switching track of the North Western Railroad which gives the firm access to all incoming and outgoing railroad lines in Chicago. In an interview, Mr. Dwyer told the representative of the PAPER TRADE JOURNAL that a company was now in the process of incorporation. He said they were handling bond, blotting, card board, book and coated paper, covering a general line, and also job lots in some stocks.

Mr. Dwyer is very well known among the Chicago trade having been identified with it for the past 18 years, 16 of which he was president of the Bargain Paper House, and two of which he was identified with the Seaman Paper Company.

The new company, not yet incorporated, has been operating under the title of Louis P. Dwyer, with four salesmen covering territory. Mr. Dwyer's knowledge of the industry and his acquaintance in the trade bodes well for the successful future of this new venture.

Well Known Paper Concern Moves Offices

The Felsenheld & Daniels Paper Company, 112 West Adams street, has moved to pretentious new quarters in the Wrigley Building, 400 North Michigan Boulevard.

This move is occasioned by the steady increase in business and expansion of organization of this well known concern which was organized about three years ago.

J. F. Felsenheld has been identified with the paper industry for over twenty-five years in various capacities and is a recognized expert in this field.

W. E. Daniels second member of the firm has also had a long and varied experience in the paper business covering a period of twenty years.

An important change in the organization is the affiliation of H. W. Jenkins, who, for many years, was assistant advertising manager of Seers, Roebuck & Co. in charge of purchasing the printing and paper. Mr. Jenkins has conducted a paper business under the name of Howard Jenkins, Paper.

This newly organized company is now in an enviable position to serve its old as well as new clients. Its long and varied experience in the selection of paper for the country's largest mercantile establishments, its close relationship with the larger mills and in fact all sources fit it for worthy service in their field.

Sode Paper Box Co. Formed

E. B. Sode, has sold out his interests in the Sode Paper Box Company, 1500 W. Harrison street, Chicago, to M. Woldenberg. Mr. Woldenberg, proprietor of the A. Darrger & Co., chemical establishment, is incorporating a new company under the title of the Mutual Paper Box Company, with a capital stock of \$100,000. He will be president and Alexander Fisher, formerly identified with Mr. Sode in the old firm, vice-president. I. C. Woldenberg will be secretary. The new company expects to make improvements and enlargements, adding new equipment, and discarding some old equipment. It also intends to add considerable floor space to the productive capacity of the plant.

General News of the Trade

The Chicago Paper Box Supplymen's Bowling Club met for the last time this year, at the North Chicago Bowling Club, Friday evening, April 28, with a very good attendance and the usual round of laughs. April 28 closed a season of regular weekly meetings of the Club, to which all supply men, whether members or not, were at all times invited, and a standing invitation was held by all out-of-town members of the trade, to visit the club when in Chicago.

Frank M. Sanborn, Chicago manager of the McLaurin-Jones Company, reported good business recently. He said that the flat gum and stay paper business had picked up considerably during April.

Robert Gordon, Inc., manufacturers of the Gordon Steam Unit Heater, formerly located on Monroe street, have recently moved to 1356 West Washington street, Chicago, where they have obtained quarters with double their former capacity, which will enable this firm to offer an increased service to the trade.

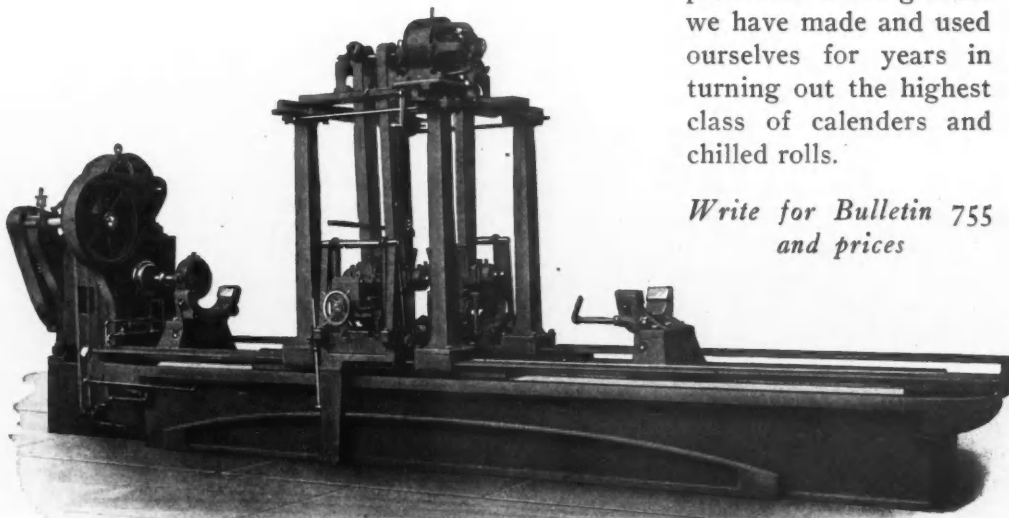
Rhineland Paper Co. Opens Chicago Office

CHICAGO, May 1, 1922.—The Rhineland Paper Company, Rhineland, Wis., has opened an office at 710 Otis Building. The new office is in charge of Robert N. McCreary.

Roll Grinders

For the sake of your product regrind your old Farrel rolls, or any others, on this heavy, sturdy instrument of precision—a roll grinder we have made and used ourselves for years in turning out the highest class of calenders and chilled rolls.

*Write for Bulletin 755
and prices*



Farrel Foundry & Machine Company

Established 1848

Ansonia, Conn.

**Branch Plant:
BUFFALO, N. Y.**

DANGER FROM HIGH WATER IS PASSING IN WISCONSIN

Mill Owners and Government Engineers Are Seriously Considering Plans to Avoid a Recurrence of the Danger—Feared That Dams and Locks Along the Fox River Were So Weakened That Considerable Money Will Be Required to Make Permanent Repairs—Slow Improvement in Paper Business in Wisconsin Noted in Past Few Weeks—Matter of Wage Readjustment Claims Attention.

[FROM OUR REGULAR CORRESPONDENT]

APPLETON, Wis., May 2, 1922.—After more than two weeks of constant menace from high water, papermill owners in the Fox river valley are breathing easier as the flood in Lake Winnebago and the Fox river is slowly subsiding. The danger is not entirely removed but it does not present so serious a menace as it did a few weeks ago when a shift in the direction of the wind or a heavy rain would have caused losses running into millions of dollars and destroyed navigation in the Fox river for this year and possibly for several more years.

With the flood almost in history, mill owners and Government engineers are seriously considering plans for avoiding a recurrence of the danger. It is feared that dams and locks along the river were so weakened that several thousand dollars will be required to make permanent repairs. Another flood like it may not be controlled.

Various plans have been suggested for reducing the menace. Several years ago it was suggested that the channel of the Fox river be deepened from Green Bay to the dam at Menasha so that it will be possible to draw more water from Lake Winnebago, lower its level and thereby provide a larger reservoir for spring floods. Papermill and other power owners along the river are said to have been willing to pay part of the cost of this improvement, which probably would amount to close to a half million dollars, but Congress thus far has refused to appropriate any money.

Another plan also has been suggested and that is to dig a canal which would drain off the water from rivers which feed Lake Winnebago and thereby keep the lake from reaching high levels. This plan presents, engineering difficulties of considerable magnitude and there is a possibility that it will take so much water away from the lake that it will not be adequate as a reservoir to feed the Fox river in the summer when rains are scarce and evaporation is great.

It is said that papermill owners prefer the plan of deepening the channel because it will provide them with a more constant source of waterpower and will be an aid to navigation.

Government engineers, it is said, also have considered the advisability of constructing large reservoirs along the Wolf river which feeds into Lake Winnebago, in order to take care of excess water in the spring.

Slow Improvement in Paper Business

A slow improvement in paper business has been noted in the last few weeks in Wisconsin. According to reports to bankers, the number of orders is increasing but the revenue from these orders is not mounting rapidly because of lowering prices. The market and business is showing a slight tendency toward improvement, however.

Wage Readjustments

The Fox River Paper Company is the latest Fox river valley company to announce a wage cut which became effective May 1. Several other mills announced cuts April 1 and labor difficulties followed. All the mills now are operating and it is reported that one or two companies rescinded the orders reducing pay and men are working on the scale effective before April 1.

Union labor leaders at Wisconsin Rapids, where the big news print plant of the Consolidated Water Power and Paper Company is located, are not anticipating a strike on May 1, when the proposed wage cut in the print paper mills becomes effective. They point to an announcement by officials of the Consolidated Company that no exchange in wage scales was contemplated for May 1.

In any event, he said, there will not be a strike at Wisconsin Rapids for several weeks after May 1, regardless of any changes in wage scales because the workmen will want plenty of time for consultation among themselves, with their employers and with national union officers.

Want Pay For Time Lost While Ill With Typhoid

Bacteriologists and chemists spent hours on the witness stand in Milwaukee during a hearing on a claim for compensation for time lost because several workmen contracted typhoid while employed by the Hoberg Paper Company in Green Bay. The petitioners maintained that the disease was contracted from drinking water supplied by the Hoberg company.

The hearing in Milwaukee developed an effort to place blame for the epidemic on the city of Green Bay's water supply. It may be several weeks before a decision in the case is announced. The Hoberg company was ordered to close its well after the illness was reported.

O. M. Porter Reelected Forester's Secretary

O. M. Porter, secretary of the Woodlands Section, and assistant secretary of the American Paper and Pulp Association, was unanimously reelected secretary of the New York Section, Society of American Foresters, in the annual meeting at Syracuse last week. He has been anxious to drop the duties of the foresters' organization, but the State foresters refused to allow him to retire, doubtless due to the fact that the paper industry is a leading factor in the forestry problem of New York State.

Many of the foresters in attendance were men who are officially connected with the paper industry. Prof. R. S. Hosmer, head of the Forestry Department of the State College of Agriculture at Cornell University was reelected president of the section.

Among the subjects discussed were notably the so-called minimum requirements for protection of the forest during lumbering operations, in order to promote the growth of a new crop of timber.

The paper industry is doing active work along reforestation lines in New York State, as well as elsewhere in the northeastern States, and George W. Sisson, Jr., former president of the American Paper and Pulp Association is chairman of the association's forestry committee which formulated a national plan of legislation to promote reforestation. Mr. Sisson was such a believer in the practical side of forestry that his son was educated at Cornell, taking the forestry course, in order that he might be able to handle scientifically the pulpwood lands of the Raquette River Paper Company, a Sisson interest.

Joseph Krockenburg Resigns From Deferiet Mill

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., May 1, 1922.—Joseph Krockenburg, superintendent of the Deferiet mill of the St. Regis Paper Company, has tendered his resignation to become effective at such time as his successor may be employed but not later than July 1, it became known today.

Mr. Krockenburg has been superintendent of the Deferiet mill for about two years, coming there from the DeGrasse Paper Company plant at Pyrites to succeed William F. Hazel. He is recognized as a very high classed paper mill man and it is since his connection with the St. Regis mill that several new records for production have been established.

It is said that he will remain to impart to his successor whatever knowledge of the plant and its operating may be desired.



Here's a good question to ask yourself

Why are so many of the best paper mills in the United States and Canada equipped with BIRD ROTARY SCREENS?

If you are about to purchase a new screen or replace an old one, ask a user if there is any relation between the installation of the BIRD SCREEN and increased production. Ask him if any time is lost in shut-downs for washing up the screen. Ask him if there are as many breaks in the paper caused by slugs, strings, lumps or slime as formerly. Ask him if the quality of the stock is uniform throughout the run. We shall be glad to give you the names of any number of mills using BIRD ROTARY SCREENS.

BIRD MACHINE COMPANY
SOUTH WALPOLE, MASS.

Western Representative
T. H. Savery, Jr., 1718 Republic Bldg.
Chicago, Ill.

Canadian Builders of Bird Machinery
Canadian Ingersoll-Rand Co., Ltd.
260 St. James St., Montreal, Quebec

88-212

BIRD ROTARY SCREENS

PAPER DEMAND IN TORONTO CONTINUES SLOW INCREASE

While There Are Good and Bad Weeks, the Volume of Business Is Growing and Larger Orders Are Gradually Coming to Hand—Slight Reductions Are Announced in Some Varieties of Paper—Western Canada Pulp and Paper Co. Plant, Port Mellon, Home Sound, B. C., to Be Sold—Prospects in Pulpwood More Encouraging—Clarke Bros. Bond Issue of \$600,000 Is Approved.

[FROM OUR REGULAR CORRESPONDENT]

TORONTO, Ont., May 1, 1922.—The month of April was a very satisfactory one with the jobbers and the mills and the turnover was considerably ahead of the business done a year ago. The market continues to improve but is still spotty. The general trend is, however, in the right direction and while there are good and bad weeks, still, on the whole the volume continues to increase and larger orders are gradually coming to hand.

There have been some reductions in prices on certain lines. Sulphite drug papers are down a cent, tints now being quoted at eight cents and No. 1 bleached at ten cents. There has also been a decrease of about ten per cent on tissue paper towels, toilet papers have been reduced ten per cent, which is the first decline in many months and a drop of five to ten cents per ream on tissues is announced. The new list is as follows:—manila, 24 x 36—\$1.05; 20 x 38½—.80 cents; white cap, 24 x 36—\$1.25; 20 x 37—.90 cents; No. 1 manila and natural sulphite—\$1.40 and \$1.00; No. 1 white—\$1.55 and \$1.10. There has also been a reduction of about ten per cent on S O S bags which include heavy and light manilas and kraft. In the rag and paper stock market prices remain about the same with prospects looking brighter all the while. The mills are getting more business and dealers look for a strengthening in quotations very shortly.

Paper box manufacturers are much busier than they have been particularly in the set-up and folding line, some firms having orders enough ahead to keep their plants fully employed until well into June. It is rumored that board prices may stiffen in the near future. The board mills are all well employed at present, the plants of the Canadian Paperboard Company operating to capacity.

The demand for kraft paper is good and dealers report the past month as the best this year. There has been no change in prices but unofficial reports are in circulation that an advance may be expected before long. The pulp market continues rather dull and prices do not show much evidence of strengthening at the present time.

Western Canada Pulp Plant to be Sold

The debenture holders of the Western Canada Pulp and Paper Company whose plant is located at Port Mellon, Howe Sound, B. C. met last week in Toronto to consider what action should be taken to protect their interests. The company defaulted in the payment of interest on its bonds on February 1 last and the bondholders have instituted foreclosure proceedings and are now offering the company's properties for sale. The debenture holders, who have second claim upon the assets of the company, decided to allow the sale to proceed. They will share in the proceeds if any after the claims of the bond holders are satisfied.

Newsprint Demand is Growing Steadily

The demand for news print continues active and several newspapers are carrying a larger number of pages than ever. During the war a number of daily papers in Ontario either suspended publication or amalgamated due to the heavy cost of production. This state of affairs is now being reversed for, during the past week, two new daily journals made their bow in the province. They are the

Telegram, of Windsor, Ont., and the *Sun-Times* of Owen Sound, both of which present creditable appearances. Some of the larger news mills have found demand very heavy, particularly on rush orders. It is stated that the Spanish River Pulp and Pulpwood Mills recently were forced to borrow supplies from the Abitibi Power and Paper Co. to tide them over an emergency. Such instances are indicative of the improved tone of the market.

Disposition of Abitibi River Power

Disposition of a large part of the immense electrical power stored in the Abitibi river has finally been made. As a result of recent conferences held in Toronto, at which the Abitibi Power and Paper Company, the Hollinger Consolidated Gold Mines, the Temiskaming and Northern Ontario Railway Commission and the Ontario Government were represented, it was practically decided to reserve the Long Sault Rapids, representing 60,000 horsepower electrical energy for future disposition. The T. and N. O. Railway has waived its rights to any powers for electrification or other purposes on the river between Iroquois Falls and Tin Can portage, a distance of forty miles. It is understood, however, that it will develop a power on the Frederick House river for use in electrifying a portion of the T. and N. O. in the vicinity of Cochrane.

Pulpwood Prospects Look Brighter

Shipments of pulpwood are now being made from Port Arthur and other points by water to points across the border. The New Ontario Colonization Company, whose mills are at Jacksonboro, Ont., say that the production of pulpwood in its district during the past season was considerably reduced but it is believed that the market will strengthen as the months pass and that wood will be in fair demand this fall. Other concerns report that, with the growing activities of the paper mills and the lessening of their "wood piles," there is bound to be a change in conditions before many months pass. Wood is being shipped quite freely over the T. and N. O. railway at the present time and many cords which were lying alongside the tracks, have been moved out of late.

Bondholders Approve Clarke Bros. Issue

The bondholders of Clarke Brothers, whose sulphate pulp plant is at Bear River, N. S. and has a capacity of fifty tons a day, met in Toronto last week and approved the issue of \$600,000 prior lien, sinking fund bonds, bearing seven per cent interest and maturing in fifteen years. The proceeds of the new issue will be used to supply working capital, to liquidate present liabilities and to provide for the additional water supply facilities required for the enlarged mill.

It is understood that the issues of bonds, which have been made by several paper companies, are being rapidly taken up and in some instances have been sold already and the issue price has been advanced. No better indication that the pulp and paper industry has reached a favorable turn, could be furnished.

General Jottings of the Industry

S. J. Frame of Toronto, who is secretary-treasurer of the Canadian Paper Box Manufacturers Association, Inc., states that the annual convention will be held at the Windsor hotel, Montreal, on June 26 and 27.

Col. Thomas Gibson, vice-president of the Spanish River Pulp and Paper Mills, Limited, has returned to Toronto from a business trip to England in the interest of the company.

The Belleville Paper Mills, Limited, of Belleville, Ont., which are represented in Ontario by Joseph O'Brien, are busy at the present time on straw board. The company recently removed its Toronto office to the York building at the corner of King and York streets.

Paper Sales, Limited, of which John Hewitt, Jr., is president, have removed from the Webster Building, Yonge street, to the new Colonial Building, King street west, Toronto, where they have much larger quarters.



BUY LIQUID CHLORINE THE NEW WAY

It is safe to handle and store QUANTITIES shipped
in the

Mathieson

Multiple-Unit Chlorine Tank Car

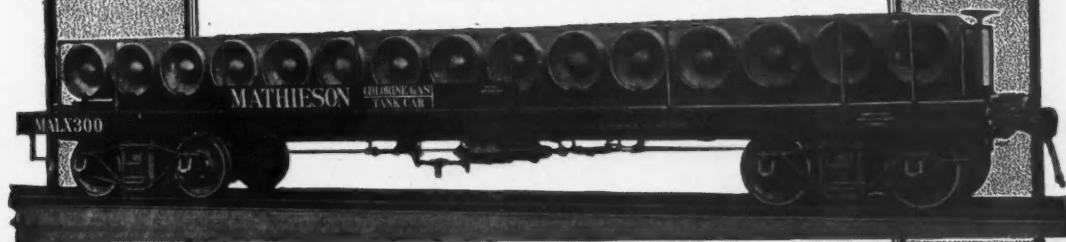
(Patents Pending)

(A specially designed car carrying 15 one-ton individual containers of seamless, forge-welded steel, pressure tested to 500 lbs. per square inch, which comply with Interstate Commerce Commission specifications, and are inspected internally and cleansed before each charging.)

The position of Mathieson "EAGLE-THISTLE" Brand Liquid Chlorine as a bleaching agent is well known. With this system of transportation and the economy and safety in handling at the mill, is given conclusive evidence of the organization's ability to be of great service.

The ton container used is the familiar package in use many years, equipped with two valves and four fusible plugs. The control of the pressure on the line to the absorbing system is exceedingly close, it delivers every pound of its contents, and is cleansed and inspected, both inside and out, before each charging.

We'll be glad to quote price on Liquid Chlorine and send detailed information covering this improved method of shipping.



THE MATHIESON ALKALI WORKS, (Inc.)

25 West 43d Street, New York, N. Y.
Chicago, Ill. Philadelphia, Pa. Providence, R. I.
Charlotte, N. C.

Works:

Saltville, Virginia Niagara Falls, N. Y.

PRODUCTION OF WOOD PULP DURING MONTH OF MARCH

According to Statistics Just Issued by the Federal Trade Commission, Stocks on Hand at the End of the Month of Ground Wood Equalled Thirty Days' Average Output of News Grade Sulphite, Ten Days' Average Output of Bleached Sulphite, Six Days' Average Output of Easy Bleaching Sulphite, Five Days' Average Output, and of Mitscherlich Sulphite Eleven Days' Average Output.

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 3, 1922.—In connection with the Federal Trade Commission's current statistics of the paper industry, a summary of the monthly reports from manufacturers of wood pulp and other kinds of pulp used in paper making is submitted herewith for the month of March, 1922. The table shows the kind of pulp, the stocks, production, pulp used and shipments for the month. The pulp shipped during each month represents only pulp shipped to a concern different from the one producing it.

Pulp Production

The following is a tabulation of the production, pulp used by the company producing it, shipments to outside concerns, and stocks of finished pulp, in tons of 2,000 pounds on an air-dry basis, for March, 1922, compared with March, 1921, for the operating mills. The average production is based upon the reports covering the years 1917, 1918, 1919, 1920, and 1921, and the average stocks are based upon the stocks carried for the years 1919, 1920 and 1921.

	Num- ber of Mills	On Hand First of Month, Net Tons	Produc- tion for Month, Net Tons	Used During Month, Net Tons	Shipped During Month, Net Tons	On Hand End of Month, Net Tons
Ground Wood Pulp:						
March, 1922	158	125,725	143,596	119,929	10,002	139,390
March, 1921	166	155,997	142,850	107,010	9,810	182,027
March, 1920	167	105,574	139,667	125,476	10,477	109,288
March, 1919	161	132,147	137,766	113,045	7,193	149,675
Average	..	..	125,362	..	..	147,073
Sulphite, News Grade:						
March, 1922	62	23,694	63,458	57,153	6,798	23,201
March, 1921	62	22,728	53,370	45,610	7,862	24,626
March, 1920	63	18,896	72,904	61,689	11,568	18,543
March, 1919	62	24,233	54,598	45,144	6,543	27,144
Average	..	..	64,935	..	..	20,685
Sulphite, Bleached:						
March, 1922	32	7,967	39,321	26,139	11,260	9,889
March, 1921	31	13,229	25,057	16,034	8,105	14,147
March, 1920	33	6,210	46,643	28,542	17,629	6,682
March, 1919	34	11,579	35,644	19,266	13,717	14,240
Average	..	..	42,984	..	..	9,507
Sulphite, Easy Bleaching:						
March, 1922	10	697	6,278	4,231	1,426	1,318
March, 1921	8	1,774	5,968	3,419	3,405	918
March, 1920	7	941	5,392	3,887	1,573	873
March, 1919	7	2,509	5,632	3,124	1,988	3,029
Average	..	..	6,480	..	..	1,346

	Num- ber of Mills	On Hand First of Month, Net Tons	Produc- tion for Month, Net Tons	Used During Month, Net Tons	Shipped During Month, Net Tons	On Hand End of Month, Net Tons
Sulphite, Mitscherlich:						
March, 1922	7	1,600	7,956	4,235	2,736	2,585
March, 1921	7	3,990	3,467	3,763	860	2,834
March, 1920	7	1,560	7,008	3,895	2,996	1,677
March, 1919	7	1,731	6,627	3,888	1,995	2,475
Average	..	..	6,615	..	..	1,831
Sulphate Pulp:						
March, 1922	22	8,307	22,039	16,031	5,858	8,457
March, 1921	19	9,354	7,892	7,977	1,202	8,067
March, 1920	21	4,808	18,759	12,671	5,750	5,146
March, 1919	21	6,756	8,627	5,567	2,969	6,847
Average	..	..	14,094	..	..	6,499
Soda Pulp:						
March, 1922	28	10,599	30,680	20,231	9,725	11,323
March, 1921	26	9,378	21,116	14,862	5,890	9,742
March, 1920	27	3,282	36,031	19,872	15,903	3,538
March, 1919	28	5,737	29,096	19,085	8,368	7,380
Average	..	..	32,184	..	..	6,931
Other than Wood Pulp:						
March, 1922	6	120	1,263	1,255	34	94
March, 1921	4	156	612	598	13	155
March, 1920	4	157	739	693	86	117
March, 1919	5	90	685	648	0	127
Average	..	..	864	..	..	154
Total—for all grades:						
March, 1922	..	178,709	314,591	249,204	47,839	196,257
March, 1921	..	216,606	262,332	199,273	37,149	242,516
March, 1920	..	141,428	327,143	256,725	65,982	145,864
March, 1919	..	184,782	278,675	209,767	42,773	210,917
Average	..	..	292,518	..	..	194,026

Total stocks of all grades of pulp in the mills on March 31, amounted to 196,257 tons. Mill stocks of news grade and of other than wood pulp decreased during the month.

Ratio of Stocks to Average Production

Comparing the stocks on hand at the domestic pulp mills at the end of the month with their average daily production based on the reports covering the years 1917-1921, inclusive, the figures show that:

- Groundwood pulp stocks equal 30 days' average output.
- News grade sulphite mill stocks equal 10 days' average output.
- Bleached sulphite mill stocks equal 6 days' average output.
- Easy bleaching sulphite mill stocks equal 5 days' average output.
- Mitscherlich sulphite mill stocks equal 11 days' average output.
- Sulphate mill stocks equal 16 days' average output.
- Soda pulp mill stocks equal 9 days' average output.
- Mill stocks of "other than wood pulp" equal 3 days' average output.

Loss of Production

The idle machine time of grinders and digesters reported to the Commission for the month of March, 1922, is shown in detail in the attached tabulation. The reasons tabulated for lost time are lack of orders and repairs. "Other Reasons" include water conditions, etc. The time lost in March, 1921, is shown by grades and reasons for purposes of comparison. These figures do not include 12 mills not in operation.

Grade	Loss of Production March		Repairs		Other Reasons		Wood Pulp Total	
	Lack of Orders	March	1922	1921	1922	1921	1922	1921
Ground Wood Pulp:								
Number of grinders.....	75	73	146	73	546	299	767	445
Total hours idle.....	13,377	47,095	14,948	9,420	100,127*	73,344	128,452	129,859
Sulphite, News Grade:								
Number of digesters.....	45	48	26	24	45	38	116	110
Total hours idle.....	6,903	12,408	849	6,325	4,469	7,639	12,221	26,372
Sulphite, Bleached:								
Number of digesters.....	27	67	31	4	21	10	79	81
Total hours idle.....	2,458	11,786	1,927	456	4,067	650	8,452	12,892
Sulphite, Easy Bleaching:								
Number of digesters.....	0	7	0	1	4	0	4	8
Total hours idle.....	0	1,259	0	145	168	0	168	1,404
Sulphite, Mitscherlich:								
Number of digesters.....	0	19	17	6	0	0	17	25
Total hours idle.....	0	9,828	1,278	592	0	0	1,278	10,420
Sulphate Pulp:								
Number of digesters.....	23	23	14	1	0	9	37	33
Total hours idle.....	632	6,232	1,089	156	0	3,372	1,721	9,760
Soda Pulp:								
Number of digesters.....	77	105	0	0	32	18	109	123
Total hours idle.....	11,480	31,015	0	0	5,583	2,491	17,063	33,506
Other Grades:								
Number of digesters.....	2	2	0	0	2	2	4	4
Total hours idle.....	240	422	0	0	472	64	712	486
Total								
Total number of grinders and digesters.....	249	344	234	109	650	322	1,133	829
Total hours idle.....	35,090	120,045	20,091	17,094	114,886	667,749	170,067	224,699

*Includes 68,493 hours due to water and power conditions.



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BIDS AND AWARDS FOR GOVERNMENT PAPER

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 3, 1922.—The purchasing officer of the Government Printing Office has received the following paper bids: 4,375 lbs. 21 x 32½—87½, No. 48, Buff Commercial Ledger Paper: The Whitaker Paper Company, at \$.2075 per pound; Dobler & Mudge, \$.205; Mathers-Lamm Paper Company, \$.209, and Old Dominion Paper Company, \$.214.

2,475 lbs. 24 x 32—49½, No. 24, Blue Writing Paper: Ætna Paper Company, \$.117 per pound; R. P. Andrews Paper Company, \$.174; The Whitaker Paper Company, \$.1447; Old Dominion Paper Company, \$.179; Geo. W. Millar & Co., Inc., \$.276, and Mathers-Lamm Paper Company, \$.185.

5,800 lbs. 38 x 48—58, Rag Opaque Printing Paper: Mathers-Lamm Paper Company, \$.0925 per pound; Old Dominion Paper Company, \$.109; Dobler & Mudge, \$.125.

145,000 lbs. 38 x 48—58, Opaque Printing Paper; Mathers-Lamm Paper Company, \$.0975 per pound; Thomas Barrett & Son, \$.0796; Allied Paper Mills, \$.0769; International Paper Company, \$.075; Bryant Paper Company, \$.083; Dobler & Mudge, \$.077; R. P. Andrews Paper Company, \$.865; Whitaker Paper Company, \$.076; Old Dominion Paper Company, \$.0793; Maurice O'Meara Company, \$.0723, and Wilkinson Bros. & Co., \$.074.

50,000 lbs. 26 x 38—No. 50, Chip Board: B. F. Bond Paper Company, at \$36.75 per ton; Reese & Reese, \$32.12; Geo. W. Millar & Co., Inc., \$37.60; R. P. Andrews Paper Company, \$35.60; Mathers-Lamm Paper Company, \$34.45; The Whitaker Paper Company, \$32.93; Dobler & Mudge, \$32.15; C. L. LaBoiteaux Company, \$33.70, and Robert Gair Co., \$35.00. 3,650 lbs. Rope Manila Paper, 27 x 38—71, and 6,700 lbs. Rope Manila Paper, 38 x 38—134, Dobler & Mudge, at \$1.099 per pound; Whitaker Paper Company, \$.0777; Kraft, Mathers-Lamm Paper Company, \$.125.

The purchasing officer of the Government Printing Office will open bids on May 10 for 14,800 pounds (100 reams) of 24 x 38—148, Rope Manila Paper, and 4,800 pounds (100 reams) of 20 x 25—48, rough sage Cover Paper.

The Old Dominion Paper Company has been awarded the contract by the Purchasing Officer of the Government Printing Office for furnishing 5,800 pounds (100 reams) of 38 x 48—50, of high M. F. rag opaque printing paper at \$.109 per pound, and the International Paper Company will furnish 145,000 pounds (2,500 reams) of 38 x 48—58, opaque printing paper at 7½ cents per pound. Bids for these items were opened on April 24.

The Mathers-Lamm Paper Company has been awarded the contract by the Purchasing Officer of the Government Printing Office, for furnishing 35,000 pounds (21,600 sheet) of 25 x 20—No. 30, No. 2 quality binders board at \$50.95 per ton, bids for which were opened on April 14.

Dobler & Mudge have been awarded the contract by the Purchasing Officer of the Government Printing Office, for furnishing 4,375 pounds of 21 x 32½—87½, No. 48, buff commercial ledger paper at 20½ cents per pound, bids for which were opened on April 24.

The following bids have been received by the Purchasing Officer of the Government Printing Office for various kinds of paper:

4,375 lbs. buff commercial ledger paper 21 x 32½—87½, No. 48: The Whitaker Paper Company, \$.2075 per pound; Dobler and Mudge, \$.205; Mathers-Lamm Paper Company, \$.209; Old Dominion Paper Company, \$.214.

2,475 lbs. blue writing paper 24 x 32—49½, No. 24: Ætna Paper Company, \$.117 per pound; R. P. Andrews Paper Company, \$.174; The Whitaker Paper Company, \$.1447; Old Dominion Paper Company, \$.179; George W. Millar & Co., Inc., \$.276; Mathers-Lamm Paper Company, \$.185.

5,800 lbs. rag opaque printing paper, 38 x 48—58: Mathers-

Lamm Paper Company, \$.0925 per pound; Old Dominion Paper Company, \$.109, \$.089, \$.0874, and Dobler & Mudge, \$.125.

145,000 lbs. opaque printing paper 48 x 48—58: Mathers-Lamm Paper Company, \$.0875 per pound; Thomas Barrett & Son, \$.0796; Allied Paper Mills, \$.0769; International Paper Company, \$.075; Bryant Paper Company, \$.083; Dobler & Mudge, \$.077; R. P. Andrews Paper Company, \$.0865; Whitaker Paper Company, \$.076; Old Dominion Paper Company, \$.0793; Maurice O'Meara Company, \$.0723, and \$.0753; Wilkinson Bros. & Company, \$.074 and \$.083.

The Old Dominion Paper Company has been awarded the contract by the Purchasing Officer of the Government Printing Office for furnishing 4,200 pounds of 22½ x 28½—140 manila tag board at \$.089 a pound, bids for which were opened on April 17.

Reese and Reese have been awarded the contract for furnishing 10,250 pounds (100 reams) of various sizes of rope manila paper at \$.01606 per pound and Dobler & Mudge will furnish 50,000 pounds (50,000 sheets) of 26 x 38—No. 50 chip board at \$.1099 per pound. Bids for these items were opened on April 26.

Printing Sales Show Decided Decline During February

Printing sales in the United States for February show a decline of 17 points from the high average maintained in January, as indicated in the chart just issued by the American Writing Paper Company. The chart, which also shows the trend of paper purchases, has been prepared by Jos. A. Borden and the company's department of Commercial Research. It gives representative curves also for every month of the past four years.

Since conditions in the printing industry were more nearly normal in 1918 than in the years preceding or following, that year is considered as the normal basis for an average, and the curves represent the percentages of normal.

February is generally considered throughout the printing industry as a quiet month for business, and this month for 1922 proved to be no exception.

Although the printing sales declined greatly during the month, there was a slight increase in the value of the printers' purchases of paper stock. This may indicate that the prices of printing were cut but more probably reflects increased confidence in the stability of paper prices and a building up of paper stock.

The tonnage of paper purchased shows quick recovery from the sharp decline of January. This would indicate that merchants and printers are endeavoring to bring their warehouse and stockroom supplies back to normal quickly.

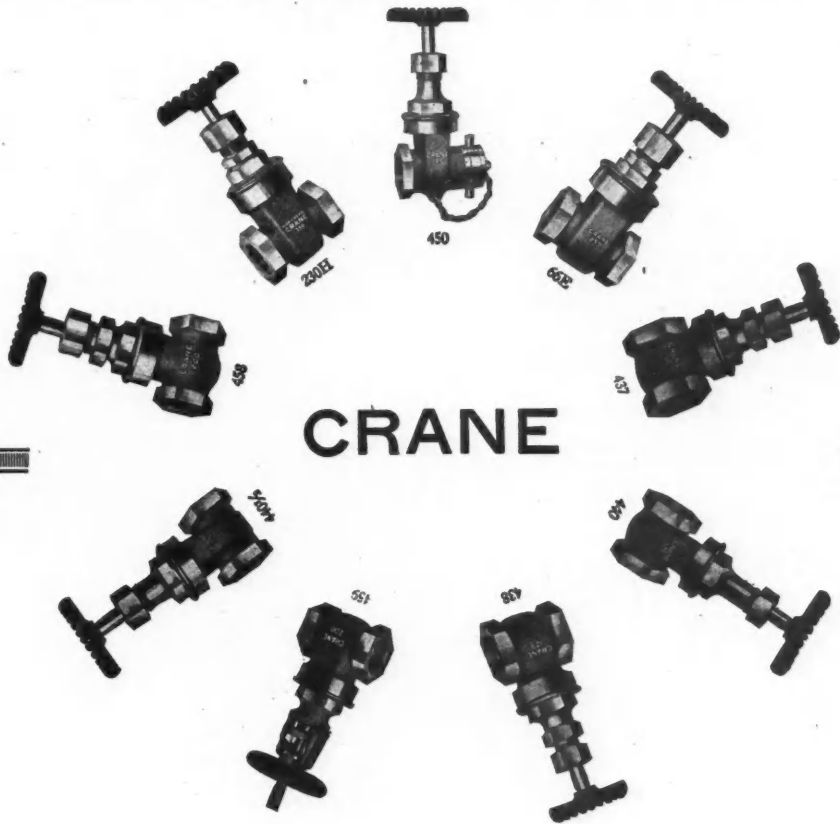
The figures for the average productive time of printing plants for the month of February were not available for this issue of the chart, and were therefore omitted.

The reports used in preparing this chart were submitted by representative printing and lithographing concerns located in various cities of thirty-nine States, the District of Columbia, and the Hawaiian Islands.

Forestry Exhibit Car for West

The Canadian Forestry Association has sent to British Columbia its Forest Exhibits Car, which will tour the Pacific Coast province. This car is one of the most picturesque and effective educational enterprises and is made up of a series of graphic exhibits driving home the commonsense facts of forest fire protection. Among other things, models of lookout towers, pulp and paper towns in Ontario, and methods of conservative and wasteful logging are shown.

The car has traversed all the eastern provinces and was visited at every point by large crowds.



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Obituary

E. F. Millard

HOPKINTON, Mass., May 1, 1922.—E. F. Millard passed away at his home here April 26, after an illness of about one month. He is survived by his son, E. H. Millard of Sewickley, Pa. Mr. Millard was one of the pioneer pulp and paper makers. In the early 80's he was superintendent of several pulp mills in Michigan and Wisconsin. Since that time he has patented several devices and processes used in connection with the manufacture of paper from wood pulp.

William H. H. Stowell

APPLETON, Wis., May 2, 1922.—William H. H. Stowell, prominent paper manufacturer here 35 or 40 years ago, died last week at Amherst, Mass., after a brief illness. Mr. Stowell founded the Fox River Pulp Company here, probably the first groundwood and sulphite mill in Wisconsin. He also was connected with the old Atlas Paper Company. Mr. Stowell left Appleton many years ago.

Plans for Superintendents' Convention

[FROM OUR REGULAR CORRESPONDENT.]

KALAMAZOO, Mich., May 1, 1922.—The complete preliminary announcement of the program and entertainment to be offered at the joint international convention of the American Pulp and Paper Mill Superintendents' Association and the Cost Association of the Paper Industry, which will be held in Kalamazoo, June 1, 2 and 3, will be off the press in a few days and plans have made to mail out from 750 to 1,000 copies.

The general arrangements committee of the superintendents held an executive session the past week and went further into details of the plans for the big gathering here. A splendid program is being prepared.

J. H. O'Connell, international president of the Superintendents' Association, gave a report on his recent visit to New York city and his conferences there with the officers of the Cost Association. They furnished a general basis for the formation of the program here.

There is no intention whatever to deviate from the original plan of making the convention a Kalamazoo affair. While the speakers will be men known nationally in the paper industry, all entertainment and general supervision will be planned and worked out by local committees.

Over Capacity in Paper Mill

In a summary of the developments of the recent convention of the paper manufacturers at New York, the American Paper and Pulp Association in a bulletin to its members makes the following comment:

"One of the interesting developments of the situation in the paper industry following the annual convention has been the discussion of the capacity situation of the industry with reference to the current demand for the finished product. It was brought out during the week that the over-extension of the industry is one of the greatest problems which has to be faced. At the best, before the war, the mills were operating at about 80 per cent of total capacity, the demand never coming up to the potential supply.

"The discussion during the convention showed that since the war there have been 120 machines placed in commission, increasing the capacity 23 per cent. The growth of the demand in normal times is about 200,000 tons a year, and at this rate it would take at least three years to get back to the pre-war basis, presuming no new machines were added. To reach a normal operating basis of 90 per cent would take until 1928, these discussions brought out.

"This means according to leaders in the industry, that new uses for paper must be found, and new markets developed."

Recent Incorporations

Charleston Paper Manufacturing Company, Nitro, West Virginia; capital \$500; Incorporators W. D. Payne, Berkeley Minor, Jr., John V. Ray, C. P. Miller, V. C. Thomas, Charleston.

Lingert Roll Label & Gum Tape Company, Manhattan, New York, Capital \$25,000; Incorporators M. A. Duley, H. Edwards. (Attorney, B. L. Brandner, 15 William street.)

Neilsen Paper Exports, Manhattan, New York. Capital \$20,000; Incorporators S. Neilsen, E. V. Kidd, C. M. Mendenhall (Attorneys, Hays, Hirschfield & Wolf, 115 Broadway.)

Synthetic Product Company, Wilmington, Delaware, artificial leather, waterproof paper, capital \$500,000.

No Strike Expected Now at Watertown

[FROM OUR REGULAR CORRESPONDENT]

WATERTOWN, N. Y., May 1, 1922.—No strike in the paper mills of this section which operate under wage agreements is expected as the outcome of negotiations now in progress, according to opinions expressed by both manufacturers and union workmen in this city. While a truce until May 10, has been announced, at which time another conference of labor leaders and manufacturers will occur, it is believed that mills will continue to operate without serious interruption.

There is a general belief here that President J. P. Burke of the International Brotherhood of Pulp and Sulphite Workers is in a most serious dilemma. In fact some of the manufacturers not involved say that he is really in a pocket from which he can not escape. All but a small percentage of his members are classed as unskilled workmen. If he accepts the ultimatum of the manufacturers his union is reduced to a minimum, and if he decides to strike it is believed certain defeat is assured through the large supply of common labor available.

It was said that the sentiment among the skilled workmen is against a strike, and it is believed that the men under J. T. Carey will accept a compromise, if it can be obtained, rather than strike at this time.

The feeling prevails here that the skilled workmen will accept terms and that the unskilled classes will be employed under the wage scales prevailing in the mill towns.

Upon his return to the city today Floyd L. Carlisle declined to comment upon the situation. It is expected that developments may come out of a visit J. T. Carey plans to make to this city late in the week.

Revokes Finding on Dumping of Tissue

WASHINGTON, D. C., May 3, 1922.—Announcement was made in the PAPER TRADE JOURNAL last week that the Customs Service of the Treasury Department intended to revoke its former finding to the effect that there was dumping on the American market in the case of tissue paper from England. The department under signature of Assistant Secretary of the Treasury, Dover, has now issued an official order, in which it not only revokes its former finding, but announces that proceedings pending before the customs officers based on the former decision are to be discontinued. The announcement is as follows:

"Further developments satisfy the department that the industry of making tissue paper in the United States is not being, and is not likely to be, injured by reason of the importation into the United States of tissue paper from England.

"T. D. 39036 of March 13, 1922, in which was published a finding under Section 201 (a) of the anti-dumping act of 1921, in the case of such tissue paper, is, therefore, hereby revoked, and all proceedings pending before customs officers based upon the said decision will be discontinued."



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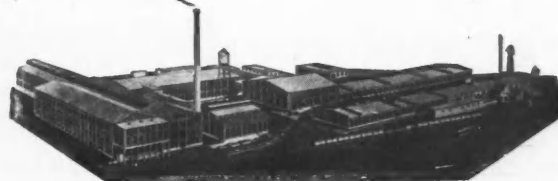


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MR. SALES MANAGER TO MR. GENERAL MANAGER:

"Something is wrong here at the mill. On my last trip our customers told me our prices were out of line and that our paper was not up to our competitors' grades, and that if we want any of their business we must get in line. What are we going to do about it?"

MR. GENERAL MANAGER:

"I don't know. We have the same organization we have always had. What suggestions have you to offer?"

MR. SALES MANAGER:

"I understand that the Superintendents and Cost Accountants are going to have a National Convention in Kalamazoo June 1st, 2nd and 3rd, to discuss practical and technical papers on cost and mill practice, and I would advise sending our Superintendent and Cost Accountant to that meeting to see how others are doing it."

MR. GENERAL MANAGER:

"A good suggestion, but say, if it's good enough for them it's good enough for us. Let's all go."

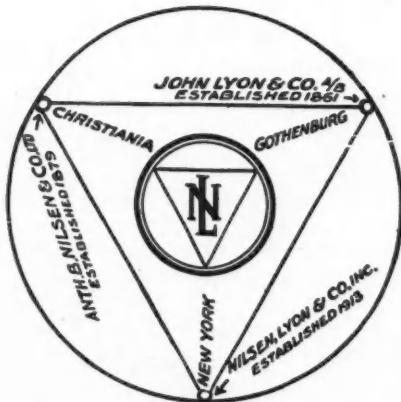
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It contemplates .300, registers .100 around the dial, repeating three times (trip indicator). The graduations are three times as far apart as on any of our previous Micrometers or as on the German Micrometer, hence, are more easily read.

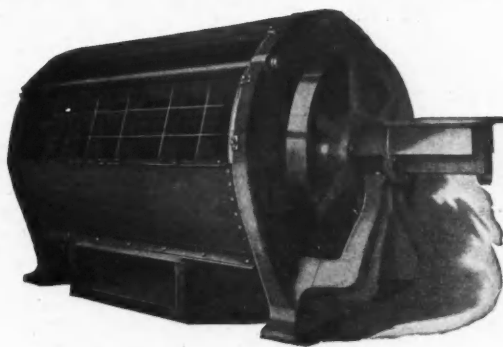
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As exclusive Sales Agents for all of the products of the WHALEN PULP & PAPER MILLS, LTD., in addition to stocks at the mills, we will carry large stocks of the above well-known brands in New York, thus insuring prompt deliveries.

Your inquiries addressed to any of our offices will bring prompt quotations by wire.

CANADIAN ROBERT DOLLAR CO., Limited
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Robert Dollar Co.,
Shanghai, Hong Kong,
Hankow, Tientsin,
Tchang, Chungking, and
Pekin, China; Kobe,
Japan; Calcutta, India;
Manila, P. I.; Singapore,
S. S.

New York Trade Jottings

The Pepperell Card and Paper Company announce their removal from room 1109 to room 1121, 200 Fifth avenue, New York city on May 1.

* * *

The Charles H. Prime Company, Inc., whose former address was Suite 619-619 A, Flatiron Building, have removed to Suite 1706 of the same building.

* * *

R. S. Kellogg, Secretary of the News Print Service Bureau was in Washington last week discussing paper matters with various Government officials.

* * *

Judge A. N. Hand appointed Percival Wilds receiver for Caine Brothers Paper Company, Inc., of 29 West Houston street, last week, under bond of \$2,000.

* * *

The Congress Paper Company of 206 West 29th street, New York city are now occupying about 10,000 square feet in their location at 287-289-291 Ninth avenue.

* * *

The Whaling Waste Products Company, Inc., of 299 Broadway, New York City, have changed the location of their offices to room 512 of the Dunn Building, 290 Broadway.

* * *

The American Wood Pulp Corporation, 374 Madison avenue, New York city, has filed notice with the Secretary of State at Albany of an increase in capital from \$70,000 to \$370,000.

* * *

The Warren Manufacturing Company has removed from its old location in the Woolworth Building to 8 West 40th street, New York city. The telephone number is Longacre 9755.

* * *

C. Mortimer Cooper, 200 Fifth avenue, has taken over the exclusive selling agency for the Tissue Company, Saugerties, N. Y. Crepe Paper Products in Greater New York succeeding Souther & Souther.

* * *

The Amsca Trading Company, Norwegian paper mills representatives moved May 1, from their old address of 110-116 Nassau street to their new quarters at 23-25 Beaver street with the telephone number Broad 3010.

* * *

The Unity Paper Box Company, Inc., of 46 Wooster street, filed schedules in bankruptcy Monday of this week, listing liabilities of \$15,078 and assets of \$2,931. Principal creditors listed are Louis Heller, \$6,864 and Municipal Bank, \$2,000.

* * *

The Reliance Paper and Twine Mills, formerly the M. L. Weill Corp. of 42 Cooper Square, are now located in their new building at 27 Great Jones street, with double the floor space of their previous location. The telephone number, Spring 2877-8 has not changed.

* * *

The Alexander-Holden Company, Inc., has removed to its new headquarters at 111-113 Hudson street, New York city where they will be better equipped to handle the requirements of customers on their regular lines of paper, cardboard and specialties. The new phone numbers are Canal 5972-3-4.

* * *

Warren B. Bullock, Director of the Information Service of the American Paper and Pulp Association, wrote an article on "Forestry and the Paper Industry" which appeared in the April number of *Industry Illustrated* of New York city. Mr. Bullock described very interestingly, if briefly, the various stages in paper

making from the forest to the finished product, and accompanied the story with scenes of logging operations.

* * *

The Union Bag & Paper Corporation in a notice to holders of its first mortgage 5 per cent gold bonds has decided to redeem the issue on July 1 by paying to the Equitable Trust Company, trustee, accrued interest on all bonds and 105 per cent of the principal. After that date interest will cease. Bonds and coupons may be presented for payment to the Equitable Trust Company of New York on and after the date mentioned.

* * *

On account of continued expansion, M. Gottesman & Co., Inc., 18 East 41st street, New York city, wood pulp merchants, have engaged larger quarters in the building where they are now located and are now occupying the entire 17th floor. The new offices have been laid out in accordance with plans prepared by one of the foremost consulting engineers in this line and will materially aid in facilitating the large volume of business handled daily.

* * *

Being "cookee" for the boss of the barbecue and the king of the bean hole was the job of Warren B. Bullock, Director of the Information Service of the American Paper and Pulp Association over Sunday when he was one of the speakers in the Columbia University course for camp directors when the directors of private camps for boys and girls ended two months of study of camp problems by spending a week in the Palisades Interstate Park putting into practice the lectures given during March and April.

* * *

T. J. McMannis, director of publicity and advertising in the Edison division of the General Electric Company, will be the speaker at the May 3 meeting of the Salesmen's Association of the Paper Industry for the New York and New England districts. This is a part of the plan for monthly meetings of the eastern salesmen who will meet at the Arkwright Club, New York. Other meetings will be held May 31 and June 28. J. D. McLaurin, the new vice-president for the New York district is progressing energetically to make the year a notable one for the salesmen of this district, and other well known men will be speakers at later meetings.

Ask for Four Cent Duty in Casein

[FROM OUR REGULAR CORRESPONDENT]

WASHINGTON, D. C., May 3, 1922.—The agricultural bloc of the Senate has made a request of the Senate Finance Committee to place a duty of 4 cents a pound on casein. Of course it is too early yet to state whether or not the Finance Committee will agree to the proposed amendment to the bill. At any rate, up to the present time almost all of the demands of the agricultural bloc have been met.

In connection with the request of the Agricultural Bloc for a duty on casein, Senator Ladd, of North Dakota, has introduced an amendment in the Senate asking for a 4 cent per pound duty on casein.

News Print Production

[FROM OUR REGULAR CORRESPONDENT.]

WASHINGTON, D. C., May 3, 1922.—The Department of Commerce in its monthly survey of business has the following to say in connection with news print production:

"A marked increase occurred in the production of news print paper. The March total was 117,507 tons, the largest since January, 1921. Shipments were slightly less than production, with a consequent small increase in stocks. There was a slight rise in the average spot price for the first time in many months. Contract prices of both domestic and foreign news print were relatively steady. Exports showed a marked increase."



**THESE
PROSPECTS**

**BURT'S
DRINKING
CUPS are**

Are all waiting for you to take their order for \$5 dispensers and cups—and then will send in regularly repeat orders for Burt's Drinking Cups.

Lowest in cost, Conical Always Open. No bottom to fall out or set aside on. Holds hot drinks. No wax to affect taste. Trebly reinforced. No waste in dispensing.

**Three Dollars a Day—
Keeps Sickness Away**

from 500 people, cutting down sick pay or maintenance expense in factory, office or institution.

F. N. BURT COMPANY, Ltd.

PAPER CUP DIVISION

BUFFALO, N. Y.

Editorial

Vol. LXXIV New York, May 4, 1922 No. 18
FIFTIETH YEAR

Better Times Approaching

"Everywhere in the newspapers, the consumer is getting a better deal," says a recent number of *Life*, "Even gypsies are telling fortunes with deuces wild." True, if exaggerated. The prevailing tendency has been to present the reading public with the rosier aspect of the economic depression, even when the actual situation assumed a much more sombre hue. Every possible construction has been turned by the press to the interest of the people. The paper manufacturer, the merchant, the retailer, the consumer, and the laborer have all turned to their daily newspapers and their trade papers in those times when it was difficult to see the silver lining of the dark cloud that enshrouded the paper industry.

It is a newspaper's duty to print the news—that fact cannot be gainsaid, but there are often times when the sordid details of a murder had best be omitted. It is not necessary to record the spattering of blood in a disastrous wreck. The news can be told without dwelling on the morbid.

What though the descending locomotive of prices has smashed into the automobile of the paper industry, wrecked the car, and scattered its occupants about the ground? No one has been killed. A few are suffering minor abrasions, but they are all up and about, hammering out the dents in the radiator, thanking heaven that they have survived the ordeal, and rapidly getting the car back into its old time running order.

In their every day contacts with business, paper men know only too well what they are up against. They don't need a newspaper to tell them the cold actualities. But when it comes to anticipating the warm rays of spring sunshine while industry is still frozen and hoary with the clinging frost of a persistent winter, the newspaper is in its element.

It is gratifying, however, to find constantly increasing signs of actual reconstruction upon which to base further predictions. The task was not so easy a year ago when prices swooped downward like an endless landslide and the market continued to weaken day by day. It was hard then, in view of the false stimulus created by the war, to say how far the market would drop. Labor prices remained permanent, foreign trade was completely shattered, printing costs soared, and altogether it looked as though the bottom would drop out of everything.

Now it is a somewhat different story. Normal consumption is returning by leaps and bounds. Look at the news print industry! March, 1922, saw the largest consumption of news print paper which has ever occurred in one month in the history of the industry. Over 169,000 tons were actually consumed. The first three months of the current year show an increased consumption of this product over the same period in 1919 of 24 per cent. January, February and March of 1920—the boom months of that year for news print had a consumption seven per cent lower than did the corresponding months of this year, and statistics show that there is an increase of ten per cent over 1921.

This has been brought about by the increased circulations of newspapers, increased advertising space, and above all, increased confidence in the market. Other branches of the paper industry are swinging into their old stride—some not keeping pace with news print, perhaps, but all heading slowly but surely in the right direction. Newspapers no longer have to predict the fortunes of paper manufacturers with "deuces wild."

Foreign Paper Prices Still Lower

The monthly average import price of news print paper per pound continued to show a decline during February according to statistics just furnished by the Department of Commerce. The average price for the month was .0346 cents as compared with .036 cents for January and .062 cents for February of last year.

The average monthly import price of pulpwood per cord for February also showed about the same decline that it has been showing for some time past. The average price for the month per cord was \$10.10 as compared with \$10.51 for January and \$15.60 for February of last year.

The average monthly import price of all varieties of pulp per ton for the month of February showed a considerable increase. The average monthly import price per ton of groundwood for the month amounted to \$32.34 as compared with \$25.18 for January and \$59.45 for February a year ago.

The average monthly import price per ton of unbleached chemical pulp for February amounted to \$63.12 per ton as compared with \$55.64 for January and \$117.36 for February of last year.

The monthly average import price per ton of bleached chemical pulp for February amounted to \$85.67 as compared with \$80.15 for January and \$158.62 for February of last year.

The monthly average export price per pound of news print paper for February amounted to .045 cents as compared with .043 cents for January and .077 cents for February of last year.

The monthly average export price of wood pulp per ton for February was \$48.75 as compared with \$58.90 for January and \$109.00 for February of last year.

No Danger of Coal Shortage

In an analysis of the coal situation issued today the Coal Bureau of the Natural Resources Production Department, of the Chamber of Commerce of the United States, calls attention to the unusual condition found in the general lack of demand for coal supplies that exists throughout the country.

At the present rate of production and consumption there is no danger of any general shortage, says the bureau, for at least six weeks. Summing up the situation as of April 22, the Coal Bureau says:

"On April 1, the stock of coal in the hands of railroads, industrial consumers, public utilities, and retailers was approximately 63,000,000 net tons. Adding to this 4,250,000 tons estimated at the Upper Lake docks and the unbilled coal on hand April 1, there was a total of 68,650,000 net tons above ground April 1. Stocks cannot drop below 20,000,000 tons without danger of a coal panic. The quantity of coal which apparently can be drawn from stocks before

a serious situation develops is 48,650,000 tons. To this supply there will be continuously added the output from the non-union fields which up to date has averaged about 3,500,000 tons per week. At the present time the average weekly consumption is estimated to be 8,100,000 tons. Therefore, supply from the non-union fields is falling short of meeting the consumption 4,600,000 tons per week. To cover this deficit, we have the 48,650,000 tons in storage. If the consumer continues to draw from this storage at the rate of 4,600,000 tons per week, unless there is an increase in production from the non-union fields, a shortage will be felt in approximately seven weeks from April 22.

"The above are average figures covering the entire producing and consuming areas, and rest on an even division of product and uniform storage capacity and uniform stocks on hand throughout the country. In reality, however, such uniform conditions do not exist in the different communities. If the strike continues the ordinary lines of distribution are likely to be disarranged and result in great variation in the ability of the different communities to secure needed supplies.

"An anomalous condition of special interest is found in the present strike, in the light demand for bituminous coal, and the large number of unbilled, unsold, loaded cars,—a condition not existing in previous strikes. It is not possible to obtain the average number of unbilled coal cars carried during normal times, but we have the following:

Cars

- "On March 4 about a month before the strike was called...14,000
- "On April 1, the beginning of the strike.....28,867
- "On April 15, the end of the second week of the strike...26,790
- "Or approximately 1,330,000 tons of coal for which there were no purchasers."

Power Exposition in New York, December 7-13

Announcement has been made of the National Exposition of Power and Mechanical Engineering to be held at the Grand Central Palace, New York, from December 7 to 13, inclusive (except Sunday intervening), by the managers of the exposition.

The exposition was decided upon by a group of engineers and manufacturers who had felt the need for such a means of having men get together, exchange ideas, see the latest development in equipment and lay problems before the manufacturer.

The business opportunity where a manufacturer may meet a large assemblage of power plant and mechanical engineers and capitalists interested in power, is significant to firms keen for such business. A number of progressive manufacturers have already engaged space for their exhibits.

The exposition will immediately follow the annual meeting of the American Society of Mechanical Engineers and it is expected that the exhibits will supplement the programs and discussions at the professional meetings of the society. The Professional Divisions of the society will hold sessions relating to fuels, stokers, steam power plants, railroads, steam utilization in the paper industry, textile and gas power, and it is expected that the exhibits at the exposition will throw interesting light on the papers presented at these sessions of the A. S. M. E. meeting.

The advisory committee for the exposition under the chairmanship of I. E. Moulthrop of the Edison Electric Illuminating Company of Boston, is comprised of: Milan R. Bump, president National Electric Light Association; N. A. Carle, vice-president, and general manager, Public Service Production Company; A. G. Christie, professor, Mechanical Engineering, Johns-Hopkins Uni-

versity; Fred Felderman, vice-president, National Association of Stationary Engineers; E. B. Katte, chief engineer, Motive Power, N. Y. C. R. R.; Dexter S. Kimball, president, The American Society of Mechanical Engineers; Fred R. Low, editor *Power*; David Moffat Myers, of Griggs & Myers, consulting engineers; Calvin W. Rice, secretary, The American Society of Mechanical Engineers; and the managers are Charles F. Roth and Fred W. Payne with offices in Grand Central Palace, New York, to which all requests for fuller information and reservation of space should be made.

International Paper Company Meets

The annual organization meeting of the International Paper Company held Wednesday noon of this week at the offices of the company at 30 Broad street, was described by President Dodge as a "harmonious" one. All of the old officers of the company were re-elected and in addition, Allen Curtis, previously a director of the organization, was elected a vice-president. Mr. Curtis will continue in charge of the manufacturing department.

Executive officers of the company now consist of the following men: Philip T. Dodge, president; Ogden Mills, vice-president; W. E. Haskell, vice-president; Chester W. Lyman, vice-president; Allen Curtis, vice-president; Owen Shepherd, treasurer; F. G. Simons, secretary, and B. O. Booth, auditor.

At the meeting of the International Paper Company held at Saratoga Springs on April 26, the following men were elected directors of the company for the coming three years: Philip T. Dodge, Albert H. Wiggin, Ogden Mills and Herbert A. Wilder. Malcolm G. Chase was chosen as the fifth director when W. D. Russell declined to be re-elected.

The chief topic of discussion at the meeting was the labor trouble which the organization has been experiencing during the past year, and the course pursued by the officials of the company was unanimously endorsed by a resolution. The annual statement of the company's finances showed that on December 1, 1921, a surplus of \$23,456,220 existed.

In an informal statement following the meeting, President Dodge deplored dealing with outsiders on questions of labor. "The International Paper Company will continue to work on the American plan," he said, "We shall not deal with outsiders on questions connected with the labor we employ, but we always shall discuss wages and working conditions with our employees either singly or in groups, and shall co-operate with them to the fullest extent in order to improve their conditions."

New Paper Company at Scranton

The Pennsylvania Paper Company with offices at 240 Pennsylvania avenue, Scranton, Pa., was established last week. M. Weinberg, president of the concern, was in New York, Wednesday and Thursday, for the purpose of getting in touch with local merchants and mill representatives. Mr. Weinberg has been in the paper business for many years, and his company will specialize in the handling of kraft wrapping papers and allied products. J. Fink, also of Scranton, is vice-president of the new organization.

During his visit to New York, Mr. Weinberg came to the offices of the PAPER TRADE JOURNAL for the purpose of establishing direct contact with manufacturer's representatives in this city. Quotations on kraft paper, all grades of wrapping paper, folding boxboard, etc., together with samples may be forwarded direct to the offices in Scranton. The company is capitalized at \$10,000.

Hawley Paper Co. Increases Stock

PORTLAND, Ore., April 25, 1922.—The Hawley Pulp and Paper Company has increased its capital stock from \$800,000 to \$2,400,000.

**Exclusive****Manufacturers***Ryan-Seaman Process***DRY SATIN WHITE**

The Latest Development in The Coated Paper Industry

Casein
Crystal Boro Phosphate
 (A solvent for casein)

ALUM

Both Commercial and Iron Free

Pulp Satin White
English China Clay

FOR PAPER MAKERS**THE KALBFLEISCH CORPORATION**

200 FIFTH AVENUE, NEW YORK, N. Y.

FOR SALE**New Multi-Cylinder Board Machine***(Packed ready for immediate delivery)*

7 Vats, 3 Presses, 1 pair Smoothing Rolls, 120 42-in. Dryers, 3 Stacks Calenders—120 in. wide on face, complete with Winder, Duplex Cutter and Slitter.

This machine is modern in every respect, only having just been completed. Trimmed width 112/114-in.

For further particulars apply:

BOX 5041, Care PAPER TRADE JOURNAL

Section of the

Technical Association of the Pulp and Paper Industry



AN ORGANIZATION FOR THE ENCOURAGEMENT OF ORIGINAL INVESTIGATION AND RESEARCH WORK IN MILL ENGINEERING AND THE CHEMISTRY OF PAPER, CELLULOSE AND PAPER-MAKING FIBERS GENERALLY; IT AIMS TO PROVIDE MEANS FOR THE INTERCHANGE OF IDEAS AMONG ITS MEMBERS IN ORDER THAT PROCESSES OF MANUFACTURE MAY BE MADE MORE EFFICIENT AND IMPROVED ALONG TECHNICAL LINES.



Conducted by W.G. Mac NAUGHTON, Secretary

CONTRIBUTIONS TO A MORE EXACT KNOWLEDGE OF THE CHEMICAL COMPOSITION OF SPRUCE WOOD*

By PROF. DR. PETER KLASON

PART I

Historical

The general occurrence of lignified tissues in the plant world, and the important functions which they perform in the life of the plants have hitherto principally engaged the attention of the plant physiologists. Indeed, wood has, since a long time past, an importance in the private household, as well as in industry, such as no other natural product, except food, although in this capacity the physical properties have been the fundamental consideration rather than the chemical properties, and therefore the latter have developed no special interest in the practical arts. At present, however, the situation has changed considerably in these respects. In the same proportion as printing has displaced writing as an exponent of civilization, so the demand for paper has risen, and grew toward the end of the great Napoleonic wars to such an extent that within a short time the supply of the former raw material for this purpose, rags, was not sufficient by far. And in contrast to this the wood of coniferous trees may now be considered the most important raw material for paper which is prepared therefrom in a large portion by purely chemical processes, the nature of which, without the knowledge of the substances of which wood is composed, cannot be fully understood. There has developed in this field to a much greater degree than heretofore, a chemical technical interest, a striving for the amplification of knowledge, as a foundation for a rational technique.

It is inherent in the nature of the subject that marked difficulties stand in the way of progress along these lines. Research has neither made rapid nor great strides, and is on the whole not very widely successful.

In the eighteen fifties the analytical characteristics of cellulose were established; its blue color produced upon treatment with zinc chloride-iodine (Radekorper, 1857),¹ and its solubility in ammoniacal copper solution (Schweitzer, 1857).² Fremy³ pointed out that in the majority of cases cellulose not prepared chemically is not soluble in ammoniacal copper hydroxide solution. He sup-

posed from this that there were isomeric forms of this substance. The cellulose insoluble in ammoniacal copper hydroxide he called paracellulose, so far as it was soluble in caustic potash solution, and the balance fibrose or metacellulose. Disregarding the main question, whether the different characteristics of cellulose depend upon isomeric forms, or difference of texture, or that it is combined with other materials, a question which has not yet been satisfactorily solved, Fremy's para and metacellulose were obviously only cellulose unpurified from lignin.

In connection with decreasing protoplasmic activity the cell membrane experienced a more or less chemical change, and becomes, as Payen⁴ said, encrusted with foreign matter, which fills up the original cellulose network. Moreover, the material on which the transformation into wood depends, has been called lignin (F. Schultz, 1857).⁵ The lignification becomes recognizable physically inasmuch as the elasticity of the fibers decreases while their strength increases, and chemically, on the other hand, by the fact that the percentage carbon content rises from approximately 44.5 per cent in the cellulose to approximately 50 per cent, while at the same time the hydrogen content remains unchanged, amounting to about 6.1 per cent. Wood is also distinguished essentially from cellulose in that it does not dissolve in ammoniacal copper hydroxide, and is colored not blue, but yellow to brown by iodine chloride of zinc solution.

By suitable oxidizing agents, especially nitric acid and potassium chlorate (Schultz, 1857),⁶ the lignin can be oxidized away, or by treatment with alkalis may be dissolved (C. Watt and H. Burgess, 1853),⁷ whereby the cellulose remains behind unaltered. By such methods it was found that wood consists of approximately equal parts of cellulose and lignin. On these grounds Schultze⁸ even assigned to lignin the formula $C_{10}H_{14}O_{10}$.

In 1860 we do not find many researches pertaining to these matters. Erdmann⁹ thought he had come to the result that wood purified by heating with very dilute acetic acid, and afterwards washed with alcohol and ether became a specific compound, which he named glycolignose, with the formula $C_{30}H_{46}O_{17}$. Upon boiling this compound with dilute acids one obtains grape sugar and a

*These contributions were originally published in Swedish in Arkiv för Kemi, Mineralogi och Geologi, and later also in German. This, the first English publication, is a translation, with his special permission, of the author's original Swedish, from personal copies which Prof. Dr. Klason kindly sent to the translators, Carl L. Fineman and W. E. Byron Baker. The original Swedish title is "Bidrag till närmare kännedom om granvedens kemiska sammansättning. I."

¹Liebig's Annalen, 94, 332.

²Journ. f. prakt. Chemie 72, 109.

³Jahresberichte f. Chemie 1859.

⁴Chem. Centr.-Blatt 1857, S. 321.

⁵Sachse, Farbstoffe, Kohlenhydrate S. 145.

⁶Jahresber. d. Chemie 1857, S. 491.

⁷Hofmann, Entw. d. Chem. Industrie 1877, II., S. 134.

⁸Sachse, Farbstoffe, Kohlenhydrate S. 145.

⁹Ann. Chemie Ph. V, Sppt. B., S. 223 (1867).

residue of approximately 65 per cent, which was named by him lignose, with the formula $C_{15}H_{10}O_{11}$. As Bente¹⁰ showed later, this conception is by no means proved to a sufficient degree.

The eighteen seventies stand out prominent in this line of work through the discovery of a considerable number of lignin reactions, chief of which is that of Wiesner's¹¹ reagent phloroglucine, which colors wood brought in contact with it in admixture with hydrochloric acid an intense red violet. However, previous to him Schapringer,¹² and even long before him, Runge¹³ had called attention to the yellow color which aniline sulphate gives to lignin, which color can also be employed as a reaction for this substance. Wiesner also pointed out later that pyrocatechin and resorcin, under combined action with hydrochloric acid, colored lignin red violet, although feebly, and that pyrogallol acid with hydrochloric acid imparted to wood a gray violet color.

A very sensitive reagent for lignin is pyrrol. If one holds the substance dampened with hydrochloric acid in the vapor of pyrrol, the wood is colored cherry red. Conversely, as is known, a spruce splinter dampened with hydrochloric acid is employed as a reagent for pyrrol.

Lippmann found that orcin reacted towards lignin similarly to phloroglucine, and Max Niggel¹⁴ showed that indol in combination with hydrochloric acid reacted to lignin like pyrrol (1881). Bayver had already shown in the eighteen sixties that indol colors a spruce splinter dampened with hydrochloric acid cherry red. This is next to the phloroglucine reactions the most sensitive for lignin.

It was already long known that a spruce splinter is colored blue by the action of phenol and hydrochloric acid, and this reaction was employed for the detection of phenol, without knowing the bodies in the wood which occasioned the coloration.

Tiemann and Haarmann¹⁵ first announced that the reaction apparently depended upon traces of the glucoside coniferin present in the cambial sap, which gives precisely the same reaction (1874). Tangl and von Hohnel¹⁶ showed that the reaction characterized all portions of lignified plants. The color, blue green to sky blue, appears best in direct sunlight, after the drying of the reagent. According to Singer, the sensitiveness is increased by moistening the specimen first with a mixture of phenol and potassium chlorate, and after that with hydrochloric acid.

Malich¹⁷ has shown that indol and also resorcin in union with sulphuric acid colors lignified fibers rose red to violet.

From the researches of more recent date it has further been learned that lignin is colored carmine red by dimethylparaphenylenediamine, violet by hematoxylin, yellow by naphthylamin hydrochloride, green by alphanaphthol in alcoholic sulphuric acid solution, red by amidoanthracene in hydrochloric acid solution, and yellow by phenylhydrazine hydrochloride. Damp cheese colors paper containing lignin intense yellow,¹⁸ paraphenylenediamine brick red,¹⁹ paraaminobenzylideneautophenone brown red,²⁰ and nitroaniline blood red.²¹ Paraaminodiphenylamine²² produces a Bordeaux coloration. We have now mentioned not all, but the majority of and most important lignin reactions. Grandmougin has given a tabular synopsis of the lignin reactions.

To the achievements of the eighteen seventies in this field also belong the process of Hugo Miller,²³ of oxidizing away the lignin by alternate treatment with bromine water and very dilute ammonia and thereby obtaining a quantitative method for the determination of cellulose. This procedure gives undoubtedly a better result than

the above mentioned method of Schultze.

While the first start in the manufacture of alkali cellulose was made in the eighteen fifties, the far more important manufacture of sulphite cellulose began during the eighteen seventies. In German literature there arose at that time a great controversy in reference to who was the first producer of this cellulose, Ekman or Mitscherlich. By my published data,²⁴ out of which it resulted that sulphite pulp prepared by C. D. Ekman at Bergvik was on the market since the third of October, 1874, although the process was kept secret until 1882, shortly before which time the manufacture according to Mitscherlich's process had begun, this extraordinarily imposing priority question is finally settled. In February, 1875, the factory in Bergvik was destroyed by fire, but was again put in operation as early as the eighth of May. By the end of 1875 there was prepared there 437 tons of sulphite pulp, of which a considerable portion was exported to England, Russia, Germany and Holland.

In the eighteen eighties the problems pertaining hereto were to a small extent a subject of research. M. Singer²⁵ conducted a research in Wiesner's laboratory relative to lignocellulose. He pointed out that vanillin gives the very same reactions as lignin, as it is colored red violet by phloroglucine and hydrochloric acid, yellow by aniline sulphate, and cherry red by indol, and so on. From this he drew the conclusion that vanillin was the substance which caused the lignin reactions, an assumption which should receive some support, because of the fact that evaporated wood extract has a weak vanillin odor.

Theodore Thomsen²⁶ showed that dilute alkali extracted from deciduous woods contained very significant quantities of wood gum, so named by him. From coniferous woods, on the other hand, none or indeed very little was obtained.

Wheeler and Tollens²⁷ obtained by such procedure 3 per cent.

The chemical investigations pertaining to these matters during the eighteen nineties concerned principally the now rapidly developing sulphite cellulose process. Tilghman²⁸ had stated already in his English patent of 1866 that one can cook with either sulphurous acid or sulphurous acid salts, but that the latter possessed the advantage that they neutralized the sulphuric acid formed in cooking. Mitscherlich and Frank²⁹ also believed that the sulphite is only an accipient for the sulphurous acid, and that its intrinsic function consisted of absorbing the oxygen of the encrusting matter. Mitscherlich believed that the matter produced in this manner formed compounds with tannic acid. According to A. Ihl,³⁰ the sulphurous acid breaks up the lignin and occasions the formation of salts of arabic (gum) acids. Harpf³¹ pointed out that by the ordinary cooking by Mitscherlich's process the calcium content in the liquor decreased by approximately 23 per cent, while on the other hand the sulphurous acid decreased about 75 per cent. From this and other observed facts he drew the conclusion that the cooking process consists of a partial reduction of sulphur dioxide to sulphur, and that the other part oxidized to sulphuric acid, forms a compound with lignin. Lindsey and Tollens³² believed that a true combination forming a sulphonic acid salt takes place. By the precipitation of the waste liquor with lead acetate or treatment with concentrated hydrochloric acid a substance was obtained which corresponded approximately with the formula $C_{10}H_{10}O_{12}$. As the sulphur contained therein is apparently present as a sulphonic acid complex, they assigned the formula $C_{10}H_{10}O_{10}$ to the organic substance, or lignin. The lime sulphonate obtained resembles tannic

¹⁰Ber. Ber. 8, 476 (1875).

¹¹Zeitschr. f. anal. Chemie, 17, 511.

¹²Zeitschrift f. anal. Chemie 4, 250 (1865).

¹³Pogg. Ann. 31, S. 65 (1834).

¹⁴Compare Singer, Monatschrift f. Chemie 3, S. 409.

¹⁵Ber. Ber. 7, S. 608 (1874).

¹⁶Singer, loc. cit.

¹⁷Singer, loc. cit.

¹⁸Compare Harpf, Beiträge z. Kenntnis der chem. Vorgänge beim Sulfitverfahren, Leipzig 1893.

¹⁹Chem. C. B. 1906, I, S. 381.

²⁰Chem. C. B. 1906, II, S. 1761.

²¹Chem. C. B. 1907, II, S. 186.

²²Z. E. Farben- und Textilchemie, S. 32 (1906).

²³Hofmann, Ber. über die Entw. d. Chemie. Ind. 1877.

²⁴Tekn. Tidskrift, 1893, S. 17.

²⁵Loc. cit.

²⁶Tourn. pr. Chem. (2) 19, S. 146.

²⁷Jeb. Ann. B. 3, 254.

²⁸His method was published in the following year in Bull. de la Soc. chim.

1867, vol. VIII, page 137.

²⁹Papier Zeitung, 1887.

³⁰Chem. Zeitung, 1891, S. 202.

³¹Beiträge zur Kenntnis der chem. Vorgänge beim Sulfitverfahren, Leipzig, 1893.

³²Ann. Chem. Pharm., 268, S. 341 (1892).

acid in that it precipitates a solution of gelatine. Already Benedikt and Bamberger had detected approximately 2.25 per cent methoxyl in spruce wood. Lindsey and Tollens obtained on the basis of the above mentioned formula approximately two methoxyl groups or 12 per cent. Of pentoses, Tollens and Chamot³³ had already demonstrated the existence of 7.8 per cent xylose in fir wood. Since then mannose was detected in the waste liquors. By inversion of the waste liquors and by fermentation alcohol can be obtained in small quantities.

In the following year the author³⁴ published an investigation which likewise referred to the waste liquors of the sulphite mills. On the basis of analytical researches, and cooking experiments, as well as from calculations from practice, it was shown that in the sulphite waste liquors the lignin must be combined with about 36 per cent, as Lindsey and Tollens found. The cause of this great difference can at least in part be due to the fact that Lindsey and Tollens had investigated a waste liquor obtained from the Mitscherlich system its weaker acid, while on the contrary, Klason had investigated one obtained by cooking with stronger acid and higher temperature.

It was meanwhile determined that the greater part of the lignin in Lindsey and Tollens liquor must have been bound with far more sulphurous acid than 13 per cent, and further that the lignin in the waste liquor is combined with sulphurous acid in two ways, one stronger and one weaker. Finally it was shown that wood contains, in addition to cellulose, approximately 30 per cent lignin and 12 per cent other carbohydrates, and that consequently by sulphite cooking there must be used approximately 100 grams sulphur dioxide per kilogram pure wood.

The author also succeeded in preparing lignin in isolated form by the cooking of wood with alcohol and sulphuric acid or hydrochloric acid, and this lignin showed, after sufficient purification from resin and fat, the constitution 64.86 per cent C, 5.66 per cent H, and 29.48 per cent O. The methyl number was 7.38 per cent. It was precipitated from the alcoholic solution by water.

In the water solution, after warming, mannose can be detected in small amounts as mannose phenylhydrazone and also larger amounts of xylose as xylose phenylosazone.

In the same dissertation the author called attention to his researches concerning the chemical reactions in the preparation of soda cellulose. It was shown that the carbohydrates are thereby transformed into lactic acids, and that the lignin to a great extent is dissolved in unchanged form in the so-called black liquor, out of which it can be precipitated by the agency of carbonic acid and salts. The resulting lignin had essentially the same constitution as that above designated. Of the saccharic acids there could be detected metasaccharic acid, characterized by transformation into trioxyadipic acid, and a saccharic acid which gave alpha-methyl-calcerolactone by reduction with hydriodic acid, and which had apparently the constitution $CH_2(OH)CH(OH)CH(OH)CH(CH_2OH)COOH$.

The black liquor contained at the same time significant quantities of formic and acetic acids.

One thousand (1,000) grams of substance dissolved out of the wood consisted of approximately:

Carbonic acid	12 gms.
Formic acid	70 gms.
Acetic acid	7 gms.
Lactic acids	326 gms.
Lignin	232 gms.
Substances soluble in ether.....	232 gms.

1,000 gms.

From the research it resulted that one kilogram of substance dissolved out of the wood neutralized 200 grams caustic soda. Cook-

ing trials showed at the same time that even by using insufficient quantities of alkali there is always present in the black liquor free titratable alkali. The quantities of this may not exceed 30 per cent of the combined quantity, if cellulose is not to be dissolved to a greater extent in cooking, but it may not essentially fall below this amount, if the lignin is to be completely dissolved. The normal alkali requirement amounts therefore to about 330 gms. per kilogram of absolutely dry wood, or one-third of the weight of the wood.

The cooking takes place as a rule at a temperature of 150°-180° C., at which temperature pure cellulose is rather rapidly dissolved by alkali. That this happens to no greater extent, depends apparently upon the fact that the alkali in the liquor is not really free, but is weakly combined in phenolic compounds. Sodium sulphide is advantageous in this respect, as the free alkali which must be present in the end of the cook is not sodium hydroxide, but sodium hydrosulphide, which attacks the fibers to a far less extent. The yield of cellulose by the sulphate process is consequently approximately 10 per cent higher than by the procedure with sodium hydrate.

The author³⁵ showed in 1897 that the aromatic portion of coniferin, coniferyl alcohol, exhibited essential similarity to spruce wood lignin in the respect that it, heated in the form of coniferin with acid calcium sulphite under the same conditions as lignin, yielded a sulphonic acid salt which in all essentials had the same properties as the sulphonates in the waste liquor from the sulphite mills. One can even prepare an "over cook" out of coniferin and calcium sulphite. In still another respect these bodies exhibit a striking similarity. Just as mineral acids transform coniferyl alcohol into a polymerized, colored resin, which cannot be dissolved by sulphites, so the mineral acids also transform lignin into colored resinous bodies which will not be dissolved by sulphites. It is, therefore, highly plausible that lignin contains a propylene or oxypropylene group, which is one of the most common complexes in the plant world. The entire cinnamic acid family proves this to a certain extent.

Finally, I would like to mention at this point the work of Cross and Bevan³⁶ on cellulose, in which they make exhaustive observations on the structure of cellulose. They assume that the principal portion of the wood is a cellulose lignin ester which is hydrolyzed in the cooking, while simultaneously the lignin is decomposed into aldehyde-like compounds which unite with the sulphurous acid. The double bonds existing in lignin also add sulphurous acid.

At the sulphite mills an oil goes off with the relief gases. This consists, as the author³⁷ has shown, completely of cymene. This hydrocarbon, however, does not exist as such in the wood, but is formed from the turpentine contained therein, probably through the oxidizing action of the sulphurous acid.

In consequence of this detailed account, it is regarded as quite probable that the chemical structure of lignin is somewhat similar to that of coniferyl alcohol in one respect, and to vanillin in the other. Sufficient data for the determination of a formula for lignin are nevertheless lacking. For the object of reaching this goal by the most feasible means, I have closely investigated the sulphonic acid, which, according to the foregoing, is found in the waste liquor of sulphite mills. I tried at first to separate the spruce lignin sulphonic acid salt of calcium from the carbohydrates present in the solution by fractional precipitation with alcohol. It was found, however, by exhaustive trials in this direction that only a very incomplete separation could be effected. However, the object was attained by another procedure.

³³Sv. Kem. Tidskrift 9, S. 133, also Kirchner, Das Papier, III. Bd. C, S. 137.

³⁴XXXIII, Cellulose by Cross & Bevan, London, 1895. Compare also A. Klein: Die Verfahren der Holzstoff-Fabrikation. Verein der Zellstoff- und Papier-Chemiker. Hauptversammlung 1908, S. 41; also G. Lange, Zeitschrift für physiologische Chemie 1891, S. 15.

³⁷Ber. Ber. XXXIII, S. 2343 (1900).

³⁵Ber. Ber. XXIV, S. 694 (1891).

³⁶Loc. cit.

Preparation of Barium Lignosulphonate from Waste Liquor in the Manufacture of Cellulose from Spruce Wood

The waste liquor was obtained by the cooking of spruce chips with acid calcium bisulphite, according to the process used in technical practice. The solution was first evaporated almost to dryness in vacuum and the residue again dissolved, after which some sulphite and calcium sulphate were filtered off. The calcium sulphate existing in the solution can neither be directly separated from the calcium sulphate therein dissolved, nor as I have already mentioned from the carbohydrates existing in the solution by fractional precipitation with alcohol, which precipitates practically all bodies present. It is, however, possible to accomplish this in another way. To the concentrated liquor, neutralized with chalk, which is obtained in the above-mentioned manner, crystalline calcium chloride is added as long as it continues to dissolve. The result is a viscous, slimy precipitate. The entire mass is now poured in a vessel with a loose cover and placed in an autoclave fitted with a loosely fitted cover, together with water and boiled two to three hours. The precipitate by this procedure coagulates decidedly, and can be separated by pressing from the mother liquor. The procedure is repeated once, and the precipitate is then completely freed of calcium chloride by washing with alcohol. In this manner the carbohydrates are separated by going into solution. It is not possible, however, to obtain all the calcium salts existing in the solution, only about the half can be obtained.

Moreover, the calcium salts so obtained still contain calcium sulphate. To eliminate this the calcium salt is changed to the barium salt as follows: An amount of sulphuric acid equivalent to the calcium content is added to the solution. Then the solution is allowed to evaporate at normal temperature until it begins to become very viscous, and then sufficient alcohol is added to make the solution free of calcium (sulphate). After separating the calcium sulphate the alcohol is allowed to evaporate at normal temperature, and then the solution is diluted with water and neutralized with solid barium hydrate. The amount of barium hydrate is determined by test titration. The solution usually will not filter clearly, and therefore alcohol is carefully added until the precipitate begins to form, which carries down the turbidity with it. Before the addition of alcohol the solution must stand as long as barium sulphate, which forms continuously, precipitates. From the clear solution so obtained the barium lignosulphonate is precipitated. The barium salt is not gelatinous, and is easily filtered by vacuum, and then dried at first at normal temperature, and finally for the purpose of analysis to constant weight over phosphorus pentoxide at 40° C. By subsequent heating to 100° C. the weight is not changed. The salt is easily soluble in water and forms a clear yellow brown, weakly acid solution. If sulphuric acid is added the barium sulphate obtained is suspended for a long time, as in a glue solution.

Two preparations from different experiments yielded the following figures when analyzed:

- 0.4145 g. gave 0.0815 g. BaSO₄,
0.296 g. gave 0.5356 g. CO₂ and 0.1125 g. H₂O
0.3377 g. gave, oxidized, by Carius Method, 0.1504 g. BaSO₄
- 0.272 g. gave 0.0534 g. BaSO₄,
0.271 g. gave 0.4948 g. CO₂ and 0.114 g. H₂O
0.3042 g., oxidized by Carius Method, gave 0.1382 g. BaSO₄

Formula C ₄₀ H ₄₄ O ₁₇ S ₂ Ba				
C ₄₀	480	48.15	49.34	49.79
H ₄₄	44	4.42	4.54	4.67
O ₁₇	272	27.27	....	....
S ₂	64	6.42	6.12	6.24
Ba	137	13.74	11.56	11.55
	997	100.00		

The too low barium content and equivalently too high carbon content was at least partly occasioned by the above slightly acid re-

action. It is not possible to obtain a completely neutral salt without the separation of sulphuric or sulphurous acids.

The lignin in the salt must consequently have the composition C₄₀H₄₄O₁₇, with a calculated molecular weight of 698.

Determination of Molecular Weight

The molecular weight of the barium salt dried over phosphorus pentoxide was determined in water solution by the freezing point depression method. The freezing point was determined for various concentrations in order to observe the degree to which the dissociation affected the molecular weight. In order to completely dissolve the salt the solution in the freezing tubes was in each case warmed to about 40° C.

	Substance dissolved in 100 g. water	Depression of freezing point	Molecular weight
No. 1	2.8679	0.007°	7494
No. 2	5.0543	0.020°	4675
No. 3	7.2215	0.030°	4453
No. 4	8.7576	0.037°	4378
No. 5	12.0074	0.047°	4726

The molecular weight is, as was to be expected, very high. At greater concentrations it increases only a little, which indicates that the salt dissociates only slightly. The abnormally high molecular weight obtained at lower concentrations is probably due to experimental errors. A determination of the conductivity gave for alpha the figures 0.27 and 0.20 respectively on samples number 2 and 5. The salt seems therefore to have a molecular weight of at least 6000 and consequently to contain 6 times 40 carbon atoms. Lignin belongs, therefore, like cellulose, starch, and the albuminates to the substances of high molecular weights. It may also be observed that the figures obtained can in no wise be claimed to show the real size of the molecule, as probably associations of chemical molecules occur in the solution in this case, as is the case with all colloidal substances.

Color Reactions

The known color reactions which vanillin gives on one hand with phloroglucine and hydrochloric acid and on the other hand with phenol and hydrochloric acid, and which are founded upon resulting consideration products, are more or less like those which wood gives with the same materials, and are therefore apparently caused by vanillin or a vanillin derivative in the wood. As the coniferyl alcohol in coniferin can partially form vanillin by oxidation, likewise a coniferyl complex in the wood can be the foundation of these reactions through its oxidation to a vanillin complex. Also, the sulphite waste liquor, after the excess calcium sulphite is removed, produces the greatest portion of the lignin reactions, which has been previously mentioned. It gives with phloroglucine and hydrochloric acid a pale light red color, and in the presence of alcohol a deeper red. Paper, dipped in the aqueous solution of the salt acidified with hydrochloric acid, is colored a beautiful red by pyrrol vapors. Hæmatoxylin gave with the solution of the salt a violet color, which colored filter paper pure blue. Indol and hydrochloric acid colored a filter paper treated with calcium lignosulphonate beautiful red. Aniline sulphate gave to the solution of the salt a yellow coloration. With phenol and hydrochloric acid, however, no reactions could be obtained, not even after the addition of a trace of potassium chlorate.

It is, however, very noteworthy that the calcium salt purified in the previously given manner, did not give a single one of the above stated color reactions, and, in general, no color reactions whatever. Now this can depend upon the probable fact that the group which is bound by the sulphurous acid, namely, the ethylene group, is the group which causes the coloration. It could also be that the colorations are occasioned by the approximately half part of the quantity of lignin which does not form a component part of this salt.

I am inclined to believe that the materials which cause the color reactions of wood, are present in very secondary quantities.

The Determination of Methoxyl Groups

This determination was carried out according to Benedikt and Grüssner.³³ The process is based upon the fact that the methoxyl groups are changed by concentrated hydriodic acid into methyl iodide which is distilled over and taken up in alcoholic silver nitrate solution, in which it causes a white precipitate to form by a combination between the nitrate and the iodide. As in this case the substance investigated contained sulphur, which is reduced to hydrogen sulphide, a glass tube of 20 mm. diameter and 200 mm. length was interposed before the absorption vessel, and filled with moist bog iron ore, which, as was shown, retained the hydrogen sulphide to the last traces. A blank test with hydriodic acid of specific gravity 1.7, and some acetic acid yielded in the silver nitrate solution only a pale opalescence.

Of two determinations one gave 11.6 per cent, and the other 11.5 per cent methoxyl. Calculated on the basis of the formula $C_{16}H_{14}O_{17}S_2Ba$ four methoxyl is equivalent to 12.4 per cent. Coniferin:— 0.4004 g. yielded 0.2544 silver iodide. The formula of coniferin is $C_{16}H_{22}O_8 + 2H_2O = 378$.

In this molecule there is one methoxyl group, equivalent to one molecule silver iodide = 235. From 0.4004 g. coniferin we should therefore obtain 0.2489 g. silver iodide. The excess of 0.0055 g. silver iodide obtained is explained by the fact that according to Tiemann and Harmann's observations some ethyl iodide is also formed from the oxypropylene group.

The Determination of Hydroxyl

In this determination one cannot acetylate, as sulphurous acid is thereby evolved.

Parabrombenzoyl chloride gives in alkaline solution with the hydroxyl group a brombenzoylated product, in which the content of bromine can be determined and the quantity of hydroxyl calculated from this.

For this determination the calcium salt was employed. Five grams with 9.5 per cent moisture was dissolved in 250 cc. water, and treated with 1.87 grams crystallized potassium oxalate, for the precipitation of the lime. To the filtrate was added 3 grams caustic potash and 10 grams of brombenzoyl chloride. The mixture was shaken for two hours in a shaking apparatus after which all aroma of the last mentioned addition had disappeared. On the bottom of the flask lay a precipitate of brombenzoic acid. The solution was concentrated and precipitated with alcohol. The precipitate was washed on a suction filter with alcohol and ether, and dried over phosphoric acid anhydride to the constant weight of 6.1 grams. By this procedure a light yellow product was obtained. In the precipitation of the substance with alcohol, potassium chloride also falls out, so that the chlorine as well as the bromine contents must be determined. In addition to this there is also present a contamination by calcium sulphate from the gypsum.

0.5 gram substance yielded 0.1809 grams barium sulphate and 0.2089 grams silver haloids, which was transformed into 0.1909 grams silver chloride by heating to redness in a stream of chlorine.

From this and from the original calcium sulphate the following composition of the sample was calculated:

Potassium sulphate	0.0092 g.
Potassium chloride	0.0970 g.
Pure substance	0.3938 g.
And from this,	
Sulphur	0.0232 g.
Bromine	0.0324 g.

The atomic ratio is 2 atoms sulphur to 1 atom bromine. The compound should therefore contain 1.1 hydroxyl complexes.

An experiment in bromacetylating in sealed tubes with 160° C.

³³Chem. Zeit. 1880, 872.

finishing temperature, yielded as a result a dark, pitch-like mass, and much sulphurous acid.

Determination of Active Carbonyl

Trials were made to condense the lignonsulphonic acid salt with both phenylhydrazine and with benzyl-phenylhydrazine. By this procedure no condensation products, but the salts of the named bases were formed.

The following observations and experiments, however, make it in a high degree probable that the lignonsulphonic acid contains active carbonyl.

Calcium lignonsulphonate prepared in the above described manner and in known quantities was added to the acid calcium sulphite solution of known strength and known quantity, in a tube filled with carbonic acid and drawn out at one end, and then the tube was melted together. After this the tube was heated for 12 hours in a toluol bath, after which the sulphur dioxide loss was determined by iodine titration. In similar manner this was carried out on a blank sample, and the loss in titre which took place in the last case was subtracted from the first. It was not shown that in titre 128 parts SO_2 had gone lost, on 900 parts salt. A combination of 2 molecules SO_2 permits, according to the calculation, the same loss in titre. The calcium sulphite is, however, here so weakly bound that it remains behind to a great extent as neutral sulphite upon the evaporation of the solution to dryness in vacuo and upon solution of the residue in water.

Still more significant is the following experiment: 425 g. of clean spruce wood chips with a moisture content of 10.55 per cent (= 380 g. of absolutely dry chips) were heated with 3 liters of sulphite liquor containing 40 g. SO_2 and 8 g. CaO per liter to a temperature of 108°. There resulted 200 g. dry almost pure cellulose, so that 180 g. had been dissolved. It may be supposed that these 180 g. had raised the volume of the liquid to approximately 3100 cc. By immediate titration of the amount of sulphurous acid after the end of the heating, the amount which was united could be determined.

For 100 g. dry wood there was at the beginning 31.77 g. SO_2 .

For 100 g. of dry wood after heating 22.76 g. SO_2 , 100 g. wood had united (in heating) with 9.01 g. SO_2 .

The lignin content of the wood lies between 28 and 30 per cent, as will be shown later. If one assumes 28 per cent and the molecular weight = 698 then 698 parts lignin have united with 220 parts $SO_2 = 3.43$ mol. SO_2 . If one accepts 30 per cent lignin then 3.2 mol. SO_2 have been bound. The solution was then evaporated to a strong concentration in vacuo, again dissolved and precipitated with barium chloride. After some time, when no more barium sulphate precipitate formed, the solution contained instead of 220 parts SO_2 only 130 parts or 2 mol. SO_2 (calculated 128 parts SO_2). The loosely combined sulphurous acid which could not be titrated with iodine was therefore removed by the stated operation. Presence of barium salts hastens this separation, apparently because there is not an acid barium sulphite. Furthermore, if the lignin stands exposed to the air the more weakly bound sulphurous acid gradually splits off in the form of crystallized gypsum. This experiment showed only about 1.4 mol. loosely bound SO_2 . Probably there are, however, 2 mol. combined in such a manner that a part of the so combined sulphurous acid can be titrated with iodine.

An experiment on a large scale showed in practice that under the assumption of 28 per cent lignin in the wood, in 698 parts lignin (1 mol.) 3.8 mol. SO_2 , but only 1.6 mol. CaO were united. The loosely bound sulphurous acid was therefore partly even at the end of the cooking not united to the calcium. This also accounts for the facts that the waste liquor was appreciably acid.

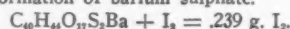
Attempt to Prepare a Sulphonchloride

Two and five-tenths (2.5) g. of the brombenzoylated product were moistened with phosphorus oxychloride, after which an excess of

phosphorus pentachloride was added. By this a partially carbonized product insoluble in water of 1.87 g. weight and with 6 per cent moisture was obtained. In order to determine the chlorine content of this it was treated with potassium hydroxide, which left behind a brown undissolved residue. The filtrate gave with sulphuric acid a precipitate of brombenzoic acid which was filtered off and which was then precipitated with silver nitrate, and the precipitate was dried over night at 100° C. By this there resulted a thick, brown precipitate, insoluble in acids, and having a strong aroma of vanillin. It invited no further investigation.

The Additive Powers of Barium Lignosulphate in Respect to Iodine

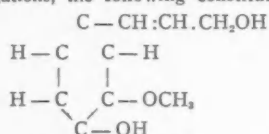
0.942 g. of the salt were dissolved in 25 cc. of water, whereupon n/10 iodine solution was added. After this the solution was kept heated to 30 to 40° for two days, or as long as the iodine content decreased. The salt took up thereby .225 g. iodine, without the formation of barium sulphate.



It is probable from this that the salt contained an ethylene group, if this one, as the above quoted experiments show combined with the sulphurous acid more loosely than the both other double bonds, which possibly depended on the fact that the addition of 2 mol. SO₂ decreases the strength with which the third one held.

Summarization of the Above Results

The simplest possible formula obtained for barium spruce lignin sulphate is as given above, C₄₀H₄₄O₁₁S₂Ba. If one molecule of barium sulphite is subtracted then one obtains as the formula for the lignin C₄₀H₄₂O₁₁, or in consideration of its high molecular weight (C₄₀H₄₂O₁₁)_n. As above cited, the lignin shows properties which are almost identical with the equivalent properties of coniferyl alcohol. This, for example, combines with acid calcium sulphite to form a sulphate salt, which is essentially similar in its properties to calcium lignosulphonate. The formula of coniferyl alcohol is C₁₀H₁₂O₂ and it has, according to Tiemann's and Haarmann's investigations, the following constitutional formula:



If this formula is quadrupled we obtain C₄₀H₄₀O₁₂. If one conceives three molecules of water split off by condensation and 2 CH groups converted into 2 COH groups, then one obtains the formula C₄₀H₄₂O₁₁. It could therefore be logical that the lignin is formed by the condensation of coniferyl and oxyconiferyl alcohol.

The easy resinification of coniferyl alcohol by acids finds also its counterpart in the resinification of lignin by mineral acids, wherein lies also the reason for the phenomenon in the preparation of sulphite known under the name of black or over-cooking, which occurs if a deficiency of lime is present in the digester, and the resulting lignosulphonic acids thereby work in a resinifying manner on the lignin of the wood.

According to the above stated assumption it should be possible that 4 molecules of sulphurous acid are bound on the basis of 40 carbon atoms. That is also the case, although they are bound with varying degrees of strength, so that 2 molecules sulphurous acid bind themselves to the lignin under the formation of a true sulphonic acid with the same properties as those possessed by the sulphonic acids which result through the combination of coniferyl alcohol with sulphurous acid is bound much more loosely, so that it, though not titratable with iodine, still is gradually split off as sulphuric acid if the solution stands in contact with air, especially in the presence of barium chloride. In cold solution it is really not or only very incompletely split off by ammonia. The ability of

barium lignosulphonate to take up 2 atoms of iodine shows that the addition power depends upon the presence of an ethylene bond. That, nevertheless, the bond is weaker than those of the first two molecules might depend upon the fact that the binding power is weakened as more sulphurous acid enters the complex. The fourth molecule is by way of contrast bound incomparably weaker than the others, so that it is partially titrated by iodine even at ordinary temperature, also not more than 2 atoms of iodine can be bound by the barium sulphate. This points not to an ethylene bond but to an active carbonyl. On the other hand this active carbonyl seems not to be able to form any condensation product with phenylhydrazine and similar bodies. It is therefore doubtful whether really a true aldehyde group is present here. It might be conceived that the fourth group CH:CHCH₂OH, which should be present in the lignin according to the above mentioned assumption is present in an isomeric glycide form, CH₂-CH-CH₂, which could

explain that it combines well with sulphurous acid but cannot add iodine. A group CH₂COCH₃ might not be present in the lignin, as this does not give any acetic acid under careful oxidation at 40° with nitric acid. Naturally we tread here on the uncertain ground of analogical conclusions. But the general presence of lignin and the large extent to which sulphite cellulose is manufactured, makes a theory concerning the constitution of lignin necessary.

That lignin on the basis of 40 carbon atoms contains 4 methoxyl and three hydroxyl groups is also in agreement with the above mentioned hypothesis.

It is true there has not been determined more than one to two hydroxyl groups in the salt. However, this departure might not carry any great weight, since disregarding other circumstances, it might be conceived that a C-COH group has been transformed into a CH.CO group.

No experimental data contradicts the assumption that lignin represents essentially a condensation product of coniferyl and oxyconiferyl alcohol.

As stated above, only approximately the half of the lignosulphonic acid salts can be separated in the given manner. The question now arises whether the other half of the lignin has the same constitution as that which is obtained in the barium lignosulphonate. Different things point to the fact that this is not quite the case, although the fundamentals of the structure might be similar.

It has been stated above that Benedikt and Bamberger have found about 2.25 per cent methoxyl in spruce wood. If one assumes 28 per cent lignin then this would make 8 per cent on the basis of the lignin. If one assumes 30 per cent then it would be 7.8 per cent.

The following is in agreement with the above. In the investigation of lignin from spruce wood I obtained 7.01 per cent methyl. The lignin was prepared direct from the wood, which yielded 28 per cent of its dry weight. The lignin therefore contained all or the majority which was present in the wood. With four methoxyl groups approximately double this methyl value would have been obtained. It is therefore clear that the lignosulphonic acid the calcium salt of which is not precipitated by calcium chloride, does not contain methoxyl or at least very much less. In reality its composition is not the same as that of the lignin in barium lignosulphonate.

The lignin which was obtained direct from spruce wood in the amount of 28 per cent gave on analysis the following: 0.3277 g. gave 0.7999 g. CO₂, 0.162 g. H₂O and 0.0025 g. ash.

From this is calculated that the organic material contains 66.67 per cent carbon and 5.49 per cent hydrogen.

If one assumes that of this lignin the one half is the same as in the barium lignosulphonate and the other half is identical with the first in which four methoxyl are changed to four hydroxyl and a further hydroxyl is added, then the constitution finally becomes according to the formula C₄₀H₄₂O₁₁ - 2CH₂O = C₄₀H₄₀O₁₂, which

body has almost the same constitution as the one analyzed, as is seen from the following table:

Formula: $C_{38}H_{38}O_{12}$			Obtained
C ₃₈	456	66.47	66.67
H ₃₈	38	5.54	5.49
O ₁₂	192	27.99	
	686	100.00	

This lignin contains according to the stated formula or on the basis of 686 parts, four hydroxyl, as is evident from the following experiment:

Two (2) grams lignin were heated with acetic acid anhydride for

one minute and then washed and dried at 108°, whereby 2.457 g. were obtained calculated 2.489 g.

The similarity of lignin and the tannins is so great that it can be regarded as an insoluble tannin. Probably there are present here the side groups in the same position as in gallic acid, namely 1, 3, 4 and 5. The easy oxidation properties of lignin testifies for this.

As the main result of the investigation related above we find that the lignin from the spruce wood belongs to the aromatic compounds, that it contains several nuclei and is related to the coniferyl alcohol, that the solubility of the lignin in acid calcium sulphite partly depends upon its contents of active carbonyl and partly and mainly on the groups of ethylene nature. In the waste liquor the sulphurous acid is therefore partly loosely, partly strongly combined.

SOME SIMPLE ARITHMETIC FOR THE PULP MAKER

B. T. MCBAIN, DIRECTOR OF MANUFACTURING, NEKOOSA-EDWARDS PAPER COMPANY, PORT EDWARDS, WIS.

(Reprinted from N. E. P. Co. Bulletin)

Take your short pencil and figure with me, please, why so much water is necessary for the manufacture of a sheet of paper, under present-day conditions.

At one time 1 per cent consistency was considered about right for flat screens and quite heavy cut screen plates were used, it being nothing out of the way to use .016 to .012 cut plates in flat screens for groundwood, but the present demand for high-speed paper on both machine and printing press has made it necessary to produce a finer grade of pulp. Finer pulp called for finer plates, which in turn called for greater dilution, and greater dilution called for more water.

Centrifugal screens entered upon the scene and their makers guaranteed to screen certain tons of pulp per screen at ½ per cent consistency, only a difference of ½ per cent in the consistency of the stock, but twice as much water was found necessary to get this difference in consistency.

In many places, the stock is run at ¾ per cent, and even ¼ per cent consistency, the one case requiring 50 per cent more water than ¼ per cent, and the latter 100 per cent more than ½ per cent consistency.

These figures show:

100 pounds water 1 pound stock—1 per cent.
100 pounds water ½ pound stock—½ per cent.
100 pounds water ¾ pound stock—¾ per cent.
100 pounds water ¼ pound stock—¼ per cent.

For the sake of round numbers we will use 8 pounds of water per gallon:

1 per cent consistency—1 pound stock 12½ gallons water.
½ per cent consistency—1 pound stock 25 gallons water.
¾ per cent consistency—1 pound stock 37½ gallons water.
¼ per cent consistency—1 pound stock 50 gallons water.

Therefore to handle one ton of stock through the screens at the various consistencies mentioned, it is necessary to use:

1 per cent 2,000 x 12½ gallons—25,000 gallons.
½ per cent 2,000 x 25 gallons—50,000 gallons.
¾ per cent 2,000 x 37½ gallons—75,000 gallons.
¼ per cent 2,000 x 50 gallons—100,000 gallons.

For a given tonnage in a mill and the consistency known, it is an easy matter to figure the water required.

Now, in removing the water from, say, ½ per cent consistency to get pulp of 3 per cent consistency at deckers, we will use one ton of stock for our figures:

1 ton at ½ per cent consistency—50,000 gallons 100 per cent.
1 ton at 1 per cent consistency—25,000 gallons 50 per cent.
1 ton at 2 per cent consistency—12,500 gallons 25 per cent.

1 ton at 3 per cent consistency—8,332 gallons 16⅔ per cent.

Therefore you remove 83⅓ per cent of the stock, when deckering it to 3 per cent. To prove this:

8,332 gallons at 8 pounds—66,656 pounds—100 per cent.
Stock 2,000 pounds—3 per cent.

When stock is 40 per cent dry or 40 per cent consistency, such as from wet machine, there is contained in 100 pounds of lap stock: 60 pounds water at 8 pounds—7½ gallons.
40 pounds stock.

Therefore, for one ton of dry stock 2,000 pounds there will be water (375 gallons), 3,000 pounds, or ¾ of 1 per cent of the original water at ½ per cent consistency delivered to the wet machine, or it is necessary to remove 99¼ per cent of the water to make 40 per cent consistency dry lap stock.

Look at it again. For every ton of 40 per cent dry lap piled, 375 gallons of water is also piled, so a pulp pile of 1,000 tons of lap stock has 375,000 gallons of water piled up within its limits, really in effect piling up water, for it would take a very large tank to hold this gallonage.

Orders For Manufacture of Pulp and Paper

The Abitibi Power and Paper Company, Iroquois Falls, Ont., has ordered twenty sets of the textbooks on *The Manufacture of Pulp and Paper* being prepared by the Joint Committee of the Pulp and Paper Industry. Since Volume III has been issued on the Preparation and Treatment of Wood Pulp the value of the books is being clearly appreciated. As the Abitibi Company has one of the largest news print mills in Canada its men are particularly interested in the volume that deals with the processes they employ. The chapter on mechanical pulp was prepared by H. J. Buncke, C. E., of that company. Arrangements have been made so that workmen desiring copies may pay for them in deferred payments.

Since the convention in New York, the Hammermill Paper Company of Erie, Pa., has placed orders for thirty sets of the books.

The chapter in Sulphite Pulp was prepared by Dr. Bjarne Johnson of that company.

Wants to Build Paper Mill in Jacksonville

JACKSONVILLE, Fla., April 17, 1922.—The request of the Jacksonville Paper Company for terms under which it can build a paper mill at the south end of the Bentley shipyards, now owned by the city, has been referred to Frank H. Owen, chairman of the city commission and Commissioner W. A. Evans.

THE VALUE OF FUEL ECONOMIZERS IN PAPER MILL OPERATION*

BY G. E. WILLIAMSON AND G. C. DERRY

A Fuel Economizer is a machine in which feed water on its way to a boiler is heated by the flue gases on their way to the stack. Any apparatus which causes a saving in fuel is a fuel economizer, but the term "Fuel economizer" without qualification refers to a closed feed water heater which receives its supply of heat from the flue gases.

It is generally known that about 25 per cent of the heat value of the fuel is wasted in the stack due to the high temperature of the gases leaving the boiler. Figure No. 1 shows the approximate distribution of the heat value of the fuel. The figure 25 per cent has been taken as an average, but in some cases this value could easily rise to 35 per cent, depending upon the operation of the plant.

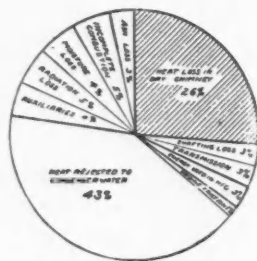


FIG. 1.

The decision as to whether or not an economizer will "economize" rests entirely on conditions which affect the rate of heat absorption such as flue gases and feed water temperatures, and the plant conditions such as amount of fuel burned, hours of operation, and space available. So many of these factors enter into the result that one is soon lost in an apparent maze of calculations and it would seem that reasonably correct estimates of results were a practical impossibility. Yet as a matter of fact, the economizer can be analyzed as accurately as any other item of power plant equipment.

Modern boiler practice is demanding more work from boiler heating surface in the effort to reduce fixed charges and investment and to economize space. Naturally, as high percentages of rating are demanded the gases from the boilers are hotter than when the boilers are driven at the old rating. It is also found that with the higher boiler pressures little extra heat can be recovered from flue gases by adding surface to the boiler.

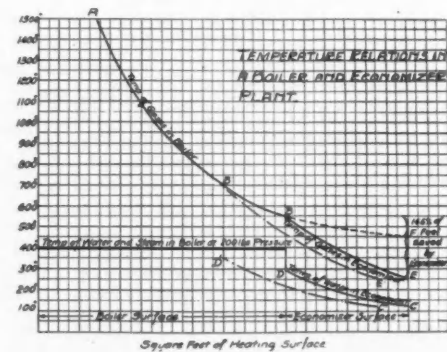
At 150 lbs. gauge pressure the temperature of the steam is 366° F., which, with an exit gas temperature of 500° F., leaves a difference of only 134° F. Under these conditions additional boiler surface will not absorb enough heat to pay for itself, and even with an infinite amount of surface the gases could not be reduced below 366° F. in temperature. At 300 lbs. gauge pressure the temperature of the steam would be about 421° F., so that the difference between this temperature and the temperature corresponding to 150-lbs. pressure is not as great as would at first seem.

The curves given below show the relations between temperatures of gases, water and steam in an economizer and boiler. The parts of a steam boiler which absorb most of the heat from the fuel are naturally those nearest the fire where the boiler surface receives a large amount of heat by radiation. As the rapidly cooling gases

move forward to succeeding parts of the boiler surface and approximate in temperature the boiler contents, the rate of transmission becomes less and less so that the boiler surface must be extended infinitely if the gases are finally to reach its temperature.

Thus it is observed that the last 40 per cent of the heating surface contributes an almost negligible quantity of the total heat absorbed, and a more advantageous result would be obtained if the gases from that point were directed, not over the boiler heating surface but into a preliminary feed water heater. This corresponds to the point where it does not pay to add boiler surface because the rate of heat transmission becomes so low that this added surface will not pay its own interest and depreciation charges. There is the added expense of frequent cleaning of scale on the inside and soot on the outside. Against this we find that economizer surface costs less than boiler surface, square foot per square foot, and is automatically cleaned. The economizer is much more effective for the transfer of heat than an equivalent extension of the boiler surface because of the lower temperature of its contents. In addition it allows the initial temperature of its feed water instead of the initial temperature of the steam to form the lower limit to which the temperatures of the gases might conceivably be allowed to fall.

From the curve it is noted that at the point "B" the boiler surface no longer absorbs sufficient heat to pay the annual maintenance charges. Even if 50 per cent more surface was added to the boiler heating surface the temperature would only drop to "F." However, by adding surface in the form of an economizer



and introducing cold feed water, the available heat head as "B" to "D," inducing the flow of heat can be multiplied by two or more. It is seen that the economizer heats the feed water from "C" to "D," while the gases are cooled from "B" to "E." An examination of the curve shows that the boiler surface could have been ended at "E" with the same overall boiler efficiency with about 10 per cent less total heating surface, ending at "D" and the water could have been fed to the boiler at the higher temperature "D".

High Temperature

At all gas temperatures below 750 degrees F. the economizer of low water temperature absorbs more heat units than does the boiler. With the gas temperature between 400 degrees and 500 degrees, the economizer absorbs from three to ten times as much heat as the boiler. Since flue temperatures below 500 degrees are common, the conclusion is inevitable that many power plants now in existence would have been better off had they dispensed with some

*Read at the Annual Convention of the Technical Association of the Pulp and Paper Industry, Waldorf-Astoria, New York.

of their boilers and put economizers in their places. This would appear to justify the European practice of small boilers with economizers.

Lately we have heard a great deal about high pressures, inches of vacuum, amount of air, etc., which are being studied by modern power plant designers.

We know that higher steam pressures will reduce the amount of steam per horse power and further that it requires only a few more heat units per pound above that of low pressure steam. But the fact cannot be overlooked that with higher steam pressures the gases will leave the boiler at higher temperatures and a great percentage of the heat units are carried up the stack. It is only natural to turn towards economizers to recover the heat wasted.

Exhaust Heat

Now that low pressure turbines have proven themselves to be a means of economy, more and more plants are using up their exhaust steam in this way instead of leading it directly to their feed water heaters, as steam is worth more when used to produce power than when used to heat up feed water, particularly when the heat of the flue gases is available and simply being wasted.

The tendency seems to be swinging towards motor driven auxiliaries. In large stations this is particularly true and house turbines are designed especially to furnish power to the auxiliaries at maximum economy. This practice reduces the amount of exhaust steam available to the point where the feed water can only be raised a few degrees or up to the point where it can be fed to an economizer without danger of "Sweating."

Inches of Vacuum

Improvements in condensers have developed as a result of this increased use of turbines. In the days of engines there was but little to be gained in vacua above 24 inches. At this point the temperature of the condensate would be approximately 140 degrees F. With vacua of 28 inches to 29 inches, as are general with turbines, the temperature is about 80 degrees F. This means a loss of 60 degrees F in the feed water temperature. By utilizing the heat wasted up the stack for heating the feed water this disadvantage can be offset.

Air Supply

CO₂ recorders have come into general use and every attempt is made to reduce the excess air. There is grave danger of trying to secure a maximum value for CO₂, for in doing so we may run into CO, which is a sign of incomplete combustion. The advantages derived from high CO₂ may be entirely offset by a direct loss of gasified fuel up the stack. Excess air is not so serious a matter when economizers are used because the gases are cooled to a low point. If it were possible to cool the gases down to the point at which the air enters the furnace it would not matter what excess of air were used to burn the coal, since all the heat generated by the fuel would be recovered or used by the boiler or economizer.

Saving by Using Economizers

The approximate saving effected by an economizer is illustrated by the following actual case:

- Boilers per unit—2 each rated at 720 H. P.
- Normal Output—2220 H. P. (153 per cent of rating).
- Coal Penn. Slask—13,200 B. t. u.
- Boiler efficiency—74 per cent at 150 per cent rating.
- Firing—Underfeed stokers.
- Draft—Forced and Induced.
- Feed Water—125° F.
- Steam Pressure—150 lb.

Location—Economizer to set directly over boilers with a short flue from uptake.

The amount of water evaporated would be 67,000 lbs., and the weight of the gasses of combustion would be 132,000 lbs. The economizer raises the temperature of the feed water from 125° F.

to 219° F. or 94° F. The B. t. u's. saved per hour are therefore, 67,000 × 94 = 6,300,000. The useful B. t. u. given up by each pound of coal per hour is 13,200 × .74 = 9770.

$$\begin{aligned} &\text{The actual coal saved per hour is} \\ & \frac{6,300,000}{9,770} = 645 \text{ lb.} \end{aligned}$$

The plant is operated 24 hours per day and 300 days in the year, and the coal costs \$7.00 per ton. The gross saving per year would then be

$$\frac{645 \times 24 \times 300}{2,000} \times \$7.00 = \$16,300.00$$

The total cost of the economizer, foundations, flues, water piping, induced draft fan and engine amounted to \$14,500.00. Deducting fixed charges of 15 per cent of \$14,500.00 or \$2,180.00 from the gross saving leaves a net saving of \$14,120.00.

This shows a net return on the investment of

$$\frac{\$14,120}{14,500} = 97\frac{1}{2} \text{ per cent.}$$

The economizer would pay for itself in about one year if operated steadily at this load. The load is not always constant and for this reason these figures are approximate, but in the average paper mill installation, economizers are found to pay for themselves in from a year and a half to two years.

Explanation of Table

The table below gives results of fourteen miscellaneous Economizer installations showing the amount that the temperature of the gases are reduced while passing through the economizer and the amount that temperature of the feed water is raised by transferring to it the heat taken from the otherwise wasted gases, and the resulting percentage of fuel saving.

The theoretical fuel saving when feed water enters at 120° F. and with 150 pounds boiler pressure is 1 per cent in fuel to every 11 per cent temperature rise in the feed water. The percentages of saving as shown in the table below vary from this 11 per cent basis, some being more and some being less, as they are taken from plants with various boiler pressures and different entering temperatures of the feed water.

Item	Gases Entering	Gases Leaving	Water Entering	Water Leaving	Gain in Water	Per Cent Saving	Kind of Draft
1	510	290	130	260	130	12.0	Chimney
2	475	215	71	230	159	13.9	Chimney
3	415	200	100	240	140	12.5	Mechanical
4	525	375	78	198	120	10.5	Mechanical
5	500	290	135	240	105	9.8	Mechanical
6	575	290	160	320	160	15.3	Mechanical
7	667	308	169	269	100	9.6	Mechanical
8	480	250	110	260	150	13.7	Chimney
9	600	375	90	230	140	12.5	Mechanical
10	600	350	110	240	130	11.8	Chimney
11	410	204	120	285	165	15.2	Mechanical
12	480	240	90	210	120	10.7	Mechanical
13	505	212	84	276	192	17.1	Mechanical
14	595	299	130	311	181	16.8	Mechanical

The sum of the percentages of fuel saving of the 14 installations divided by 14 gives the average fuel saving of 13 per cent which is fair and conservative.

$$\begin{aligned} &14) 181.4 \\ & \underline{\hspace{1em}} \\ & 13\% \end{aligned}$$

Used as a Hot Water Heater

Textile mills, paper mills and many other plants needing large quantities of hot water in processes of manufacture draw this from the supply in the economizer, thus securing their hot water at no fuel cost.

Other Advantages

Saving of the fuel is the main object of the economizer but in

addition to this there are other advantages of sufficient importance to deserve consideration.

Increases Boiler Capacity

The extent to which the capacity of a boiler will be increased is determined by the percentage of heat furnished by the economizer. Suppose the economizer is supplying 15 per cent of the total heat required to convert the water into steam at a given boiler pressure, and the boiler is operating at the same rate as before the economizer was put in, then the boiler capacity would be increased about 18 per cent. This means that boilers may be laid off for cleaning and repairs in some cases, and in case of plants already up to capacity it permits greater loads to be carried without the added expense of new boilers, stokers, piping, etc. In reality the economizer is a heat reservoir which is most valuable in meeting sudden loads. Ordinarily the economizer holds in storage about one hour supply of feed water at a temperature which requires only about four-fifths as much heat to turn it into steam at boiler pressure as it would take to feed cold water into the boilers.

Increases Life of Boiler

The bad effects of feeding cold water to boilers is well understood and there is no doubt that the economizer increases the life of a boiler and reduces the repairs.

Reduces Scale in the Boiler

The scale forming constituents in feed water break up at temperatures around 200° F. into carbonic acid gas (CO₂) and the insoluble carbonates of lime and magnesia, which action results in the deposit of a precipitate. The economizer collects this precipitate in the form of soft mud instead of allowing it to go through to the boiler, where it would bake onto the tubes. The soft precipitates can be easily removed from the economizers through the wall caps.

Types of Construction

The economizer receives its heat by conduction and not by direct radiation; therefore, its construction will naturally be different from that of a boiler. In the designing of the economizer it is necessary to consider temperature strains since the machine is filled with water at various temperatures. Due consideration must also be given to the removal of the impurities in the water which precipitate from the water as sludge.

Temperature strains are met by building the economizer in sections. From four to twelve pipes can be pressed into top and bottom headers with the pipes varying in height from nine to twelve feet. Sections are placed vertical or horizontal side by side, and as many are built as are required by the operating conditions. The top headers are then connected to manifolds running along a row of headers and the bottom headers to wall boxes on the diagonally opposite side.

Gases enter at one end of the row of sections and leave from the opposite end, being pulled through by the action of the stack or a fan. Water enters at the cold end or stack end of the economizer and leaves at the hot end or the boiler side of the economizer. It will thus be seen that the flow of gasses and water are in opposite directions.

The completed sections are enclosed by sectional covers consisting of two steel plates with about two inches of insulating material between. These covers are built in angle iron frames which are bolted together side by side and to the tops of the economizer sections which makes the covering air tight as well as heat proof.

Relief valves are furnished to provide against pressure building up in the sections and blow-off valves are supplied to facilitate the removal of the impurities which have been precipitated from the water.

Method of Cleaning

The pipes are placed in a vertical position to facilitate the removal of soot from the outside of the tubes and the re-

moval of sludge on the inside. The soot is removed by scrapers made in three sections and carried in lifting bars held in pairs by chains passing over sheaves supported on a frame work above the economizer. The sheaves are driven first in one direction and then the other by an attachment to worm wheels driven by worms on a shaft running the entire length of the economizer, this shaft being driven by a self-reversing unit which gets its power from a motor or engine.

Another method of cleaning is with the use of soot blowers similar to those used on boilers. If the fuel conditions and its resultant soot accumulations on the economizer tubes are half way favorable to removal by a steam soot blower and the exception to this would be where there is an excessive amount of ash and particularly sulphur in the fuel, then soot blowers would, undoubtedly, work out well. However, do not lose sight of the fact that condensation is apt to take place and corrosion be set up in the machine. Condensation is not apt to occur when the temperature of the incoming water is about 150° F. although some operating engineers and consulting engineers have had good results with temperature as low as 120° F.

Certain waters will throw down solids at a temperature just about the exit temperatures of feed water to boiler. In case of deposits of foreign matter, blowing down must be resorted to. Several important plants made a practice of blowing down economizers once or twice each week to remove loose scale and sludge; also of boring out the tubes once a year or oftener if necessary, all depending on the quantity of feed water. In many cases, boring out of tubes has not been necessary for several years after operation.

Operating Code

The economizer pipes should be tested before being placed in their respective headers; the sections should be tested after they are assembled and well within their elastic limit; the sections should be carefully installed and so far as possible should be kept at an even temperature from the time they are assembled until they are installed. The sections must be carefully plumbed when installed, and the water test of the economizer, after completely erected, should be well within the elastic limit of the material, regardless of the operating pressure.

When putting into service, the economizer should first be thoroughly dried out by passing the gas through the economizer before the economizer is filled with water; the temperature, however, should not be allowed to go higher than 500° F. It should then be allowed to cool off to within 100° F. of the water with which the economizer is to be filled. The economizer, of course, should be filled with the relief valves open or one or two top caps removed before an attempt is made to pump the water through the economizer to the boiler.

When the economizer has been filled with water, the cap should be put in place and the valves closed, and the valves from the economizer to the boiler and from the feed pump to the economizer should be open; the former being open first, naturally, and this should be all done before any considerable quantity of gas is allowed to pass into the economizer chamber.

If the valves, including the relief or safety valves and the valves between the economizer and boiler and pump and economizer, including the check valves, are properly operated, and if the dampers admitting or shutting off gas to the economizer be properly operated there will never be an explosion unless the design of the gas passage be such that there will be gas pockets formed which would cause gas explosion and thereby rupture the economizer.

The operation of these valves and dampers is purely one of common sense and not one of mystery and complication. Most of the explosions that have occurred that were not caused by gas explosion have been due to an absolute bottling up of the economizer while the gases were passing through the chambers.

In removing the economizers from service, the more gradually this can be done, the better for the machines. The first action, of

course, is to cut down gradually the amount of hot gas passing through the economizer chamber. When this is entirely shut off and while the water is still passing through the economizer to the boilers, the relief or safety valves can be gradually opened and when there is no further pressure in the economizer the blow-off valves can be opened to drain the economizer, if it is desired to drain it.

Induced Draft Fans and Air Leakage

It is sometimes necessary to provide induced draft fans with economizer installations where the stack capacity is limited or where stack capacity is large enough for normal rating but not enough to take care of peak load conditions. It is of greatest importance to keep the air infiltration down as low as possible, not only in the boiler and economizer setting and casings but also in the smoke flues leading to the stack.

In a number of cases of economizer installations it has been found that the fans were of too small capacity to handle the desired overloads. In almost every case it was found that this trouble was due to large amounts of excess air which was not taken into consideration when the fans were designed. Some engineers figure 10 to 20 per cent air infiltration but ordinarily 30 to 40 per cent should be allowed, for as the settings get older it is only right to expect that fans will sometimes be called upon to handle this amount of gas.

In general, great care in design, construction, and operation should be exercised and the induced draft fan must be made larger than ordinary theoretical allowances would show. The effect of high excess air is the increase of weight of the flue gases and also the draft required, and as fans have definite pressure-volume-and-speed characteristics the results are often times enough to throw the fan performance beyond proper limits.

Care of Economizer

In the operation of economizers it is generally agreed that the temperature of the water entering the machine should not be lower than 90° F.; preferably temperatures should be higher than this. At lower temperatures than 90° F. moisture is very apt to condense on the outside of the tubes, particularly on the cold end of the machine. The acid forming constituents in the gases readily unite with this moisture to form sulphuric acid which, of course, attacks the outside of the tubes. This is particularly true when economizers are first started up before the feed water and economizer parts reach a constant temperature. This should be watched very closely because sulphuric acid will not vaporize lower than 600° F.

In general operation, this matter will not be serious where the sulphur content in the coal is small. It should be particularly watched in the middle west where higher percentages of sulphur are present in the coal. We bring this point out particularly to caution users of economizers against the practice of washing the machine with water. In spite of the best of care, moisture will be absorbed by little spots of soot and, when the gases are started through the machine, are apt to form a corrosive action. Washing of economizers should never be resorted to but the tubes should be cleaned by hand or possibly air pressure at certain definite times to take off any deposit of soot which might not have been taken off by the scrapers.

Careful Cleaning Essential

The economizers should be cleaned periodically on the inside by flushing out with water. The inside of the tube should carefully be inspected to see that no scale forming action is present. If any signs of this are noted, economizers should be properly cleaned by a turbine cleaner as otherwise the heat transfer will be materially decreased and the economy of the machine cut down in proportion.

There are many plants whose supply of feed water shows an acid reaction and this results in pitting of any cast iron product with which it comes in contact no matter whether it is economizers,

pipes, or fittings. This action should be closely watched and if severe, economizers should be filled with a solution of Crown Filler, or a solution of lime. This process coats the inside of the tubes and headers with an alkaline substance which reacts against the acid. If this operation is performed once or twice a year it will serve to lengthen the life of the economizer to a great extent.

New Bark Pressing Machinery

Supplementing the article entitled "Waste Bark for Fuel" by G. D. Bearce in the PAPER TRADE JOURNAL on March 30, comes the announcement of a new development in bark pressing machinery which should serve to greatly reduce the moisture content of bark as comes from the drums, and increase the fuel value to the highest degree yet attained. The Nekoosa Motor and Machine Company, of Nekoosa, Wis., has recently introduced to the market a giant press driven by a 25 H. P. motor and operating somewhat upon the principle of the baling machine.

The Nekoosa press leaves wet spruce bark 52 per cent bone dry and wet hemlock bark 49 per cent bone dry, a gain over present bark-pressing devices of about 5 per cent in dry content, and of approximately 10 per cent in fuel value. These computations are based upon the theoretical curve of heat value by fuel worked out from Dulong's formula and included in the article of March 31.

Taking the nominal percentage of 75 to represent the amount of water ordinarily carried by the bark as it leaves the drums, it will have a corresponding heat value of 1,000 B. T. U. per pound of wet bark. Under the most common systems of eliminating the water content from bark in this state of moisture, a transitory pressure is exerted upon the bark as it passes between heavy presses.

The new bark press, however, maintains a steady pressure upon the bark by means of a system of compression whereby a huge plunger squeezes the moisture from successive loads of bark and then, by means of sectional stays, holds this pressure as each load is being shoved forward through the machine. This process allows the water sufficient time to escape through perforations and comes nearer to attaining the minimum of moisture content than has any other device yet produced.

Wet spruce bark pressed to a point where but 48 per cent of moisture remains represents over 3,500 B. T. U. heat value per pound as opposed to 2,500 B. T. U. when the bark has a water content of 60 per cent. As was shown in the previous article on this subject, 240,000 lbs. of wet refuse with a value of 1,000 B. T. U. per lb. is equivalent to 9 tons of coal (13,000 B. T. U.), whereas but half this amount or 120,000 lbs. of refuse with a value of 3,500 B. T. U. per lb. is equivalent to 16½ tons of coal.

This utilization of material which has been hitherto wasted now seems to assume a very tangible aspect. In place of disposing of enormous quantities of wet bark by running it into the river, the greatly increased fuel value obtained by scientific pressing should stimulate the demand for machines of this type. It will be interesting to note the successive stages in progress made in this as yet slightly developed field.

Bird Machine Co. Contributes

One of the earliest contributors to the Vocational Education fund was the Bird Machine Company, South Walpole, Mass. A letter received by the Vocational Education Committee last week carried an additional check, together with the following statement:

"Enclosed is our check for fifty dollars which we send cheerfully, knowing that it will be well spent."

Co-operation of this kind is especially helpful to the committee in raising the necessary funds for the completion of the set of textbooks, the first three volumes of which have already received favorable mention in every quarter.

CURRENT PAPER TRADE LITERATURE

Abstracts of Articles and Notes of Papermaking Inventions Compiled by the Committee on Abstracts of Literature of the Technical Association of the Pulp and Paper Industry

Cymene as a By-Product in the Sulphite Process.—O. Aschan.—*Zellstoffchem. Abhandl.*, i, No. 3, 73-76 (1920); *Chem. Abs.*, xv, 435 (Feb. 10, 1921).—Hintikka observed that 2-cymenesulphonic acid, upon treatment with concentrated nitric acid, yields *p*-nitrotoluene-*o*-sulphonic acid, with the splitting off of the isopropyl group, from which true azo dyes can be prepared. Upon nitrating under definite conditions, 2, 6-dinitro-cymene is formed, besides 2, 4-dinitrotoluene, which upon further nitration yields trinitrotoluene. Upon reduction the corresponding amine can be prepared. Cymenesulphonic acid may also serve for the preparation of thymol and carvacrol. The cymene yield is calculated to be 1 kilo per ton of pulp. In the sulphite process it is obtained 90 to 95 per cent pure.—A. P.-C.

Observations on Sulphite Waste Liquor.—P. Wahlberg.—*Svensk Pappers-Tid.*, xxii, 257 (1919); *Chem. Abs.*, xv, 171-172 (Jan. 10, 1921).—Solid substances are not precipitated from sulphite waste liquor of 35 degree Bé. by fine sodium chloride, though precipitation occurs in less concentrated solutions. Four g. of sodium chloride is the smallest amount which will precipitate one g. of sodium chloride-free sediment from a liquor containing about 40 per cent of solids. The precipitated organic substances diminish with the increase in the sulphur dioxide content of the liquor. Substances containing sulphur can be obtained by dialysis using collodion as the film. A combination of spectroscopic analysis and titration analysis has been devised for the colored solution obtained by dialysis.—A. P.-C.

Methyl Red as an Indicator in the Titration of Sulphite Liquors.—Per Rosenlund.—*Zellstoffchem. Abhandl.*, i, No. 5, 121-123 (1921); *Chem. Abs.*, xv, 2723 (Aug. 20, 1921). Methyl red may be used as an indicator in the modified Höhn method for the titration of fresh sulphite liquor.—A. P.-C.

Digesting Cellulose under High Pressure and Low Temperature.—*Papir-Journalen*, vii, 184-185 (1919); *Chem. Abs.*, xv, 1992 (June 20, 1921).—Instead of digesting wood with an alkaline liquor under 6 to 10 atmospheres and at 150 to 180 degrees, or with sulphite under 3 to 6 atmospheres and at 115 to 140 degrees, it is suggested to put the wood and liquor in the digester, and increase the pressure by pumping in liquor, air or gases to as high as 50 atmospheres. The digestion then takes place at a low temperature and gives a stronger cellulose. Thorough impregnation of the wood by the liquor may be assisted by vacuum.—A. P.-C.

New Institute for the Chemistry of Cellulose at the Technical High School at Darmstadt.—*Svensk Pappers-Tid.*, xxiv, 174, (1921); *Chem. Abs.*, xv, 2546 (Aug. 10, 1921).—Announcement is made of the opening of a new separate institution for chemical research on problems connected with the manufacture of paper pulp. This institute is made a part of the Technical High School in Darmstadt and follows the lines laid down by the Committee of the Society of Swedish Paper and Cellulose Engineers.—A. P.-C.

The Heat Problem in the Cellulose Industries.—G. Sundblad.—*Svensk Pappers-Tid.*, xxiv, 148-158 (1921); *Chem. Abs.*, xv, 2546 (Aug. 10, 1921).—The author has studied two sulphite and one sulphate plants and presents in much detail the manufacture, use, loss and saving of heat in the processes. He gives his results in 28 full diagrams and charts. His diagrams of a sulphite plant and of the old and new systems for sulphate plants are particularly commendable. Enthusiasm for this problem may easily lead to misdirected effort. A wise installation of heat-saving devices may easily wipe out the necessity of importing fuel into Sweden.—A. P.-C.

The Fuel Question in the Cellulose Industry.—G. Sundblad.—*Svensk Pappers-Tid.*, xxiii, 375 (1920); *Chem. Abs.*, xv, 435

(Feb. 10, 1921).—The author reviews various devices designed to reduce the amount of fuel needed for power, for digesting, for drying and heating in the cellulose industries during 1900 to 1922. Figures for each five years show a regular decrease in the amount of fuel needed in the sulphite and sulphate plants.—A. P.-C.

Saving Heat in Pulp Mills.—Communication from the Paper Pulp Office.—*Svensk Pappers-Tid.*, xxiv, 30-31 (1921); *Chem. Abs.*, xv, 1993 (June 20, 1921).—In order to avoid waste of heat it is suggested that for each part of a wood pulp plant simultaneous and accurate measurements be made of all the energy and material required, the amounts used, and the amounts lost. The waste heat from one department should be transferred to another department with as little loss as possible. Data from different plants should be collected and compared confidentially.—A. P.-C.

Heat Conditions During the Cooking of Sulphate Pulp.—H. Brahmmer.—*Svensk Pappers-Tid.*, xxiii, 269 (1920); *Chem. Abs.*, xv, 170 (Jan. 10, 1921).—The results of extensive investigations are shown in 26 diagrams and graphs. In the Sandberg-Sundblad heat systems part of the heat of the black liquor is used in the form of steam for indirect evaporation in Kestner apparatus. The steam is produced in two boilers simultaneously, one stoked with purchased fuel, the other with the dry residue from the black liquor. Part of the steam is led to the evaporation apparatus from which is obtained low-pressure steam, which, mixed with fresh steam, supplies the drying machines. Another part goes to the digester and the rest is used for incidental purposes. The production of steam in the steam-producing processes associated with the manufacture of sulphate pulp by the Sandberg-Sundblad system is essentially a function of the water content of the wood and of the white liquor. The saving of this water, or so-called water economy, is therefore of great importance. Effective water economy can save over 2 tons of steam per ton of pulp. The digesting process, when the escaped steam can be saved, is insignificantly steam consuming and may sometimes be steam-producing. The reaction heat produced in the digesting of strong pulp is 1.2 per cent of the heat of burning of the wood as determined by the bomb calorimeter. The specific consumption of fresh steam can be 50 per cent higher in stationary digesters than in rotary digesters. The total consumption of steam in bleached pulp compared with strong pulp is inversely proportional to the yield of the pulp. Indirect digesting of strong pulp has no heat-saving quality worth mentioning in the Sandberg-Sundblad system, if the evaporation apparatus is sufficiently large and the waste steam can be used. The production of sulphate according to the Sandberg-Sundblad system can be made self-supporting if the water economy is effectively carried out, and the production can be raised to 60 to 70 per cent in the soda pans.—A. P.-C.

Investigations Relating to Digesting Wood with Alkali.—P. Wahlberg.—*Svensk Pappers-Tid.*, xxiii, 294 (1920); *Chem. Abs.*, xv, 170-171 (Jan. 10, 1921).—Examination was confined to colloidal lignin solution from sulphate waste liquor, to obtain, if possible, some of the separate constituents. The waste liquor was dialyzed in an apparatus similar to a filter-press. Parchment membranes were used and water was run slowly through alternate compartments in a direction opposite to the liquor, thus giving a rather concentrated solution. The time required was from one to two weeks. The resulting solutions were dark brown, clear and neutral but got muddy on standing. At 50 degrees C. the solution becomes gelatinous and a slimy mass containing 95 to 96 per cent of water separates on boiling. The solution coagulates with small amounts of salts and acids. Electrolysis separates the bulk at the anode and a small amount of brown substance at the cathode.

Sodium bicarbonate, ammonia, and other bases in small amounts dissolve the coagulum easily and dialysis of this solution gives the colloidal solution again. The coagulation caused by heat after washing with warm water and alcohol becomes black and friable when dry, also insoluble in all the usual solvents though alcohol acidified with hydrochloric acid will dissolve it. Further study indicates that the solutions obtained by dialysis do not contain any single substance. The presence of resinous and lignin substances were indicated.—A. P.-C.

Removal of Printing Ink from Waste Paper.—B. Haas.—*Chem. Zeit.*, xlv, 913-917 (1921); *J. Soc. Chem. Ind.*, xl, 765A (Nov. 15, 1921).—Newspapers are the most important source of waste paper, and this paper contains 80 to 85 per cent of short-fibered mechanical wood pulp, 8 to 10 per cent of longer fibered chemical pulp, about 5 per cent of filling material and hardly appreciable amounts of binding materials. For loosening or decomposing the binding substances of the printing ink so that it may easily be removed and washed away, the best results, technically and economically, were obtained by the use of soda ash, which does not cause any subsequent darkening or yellowing of the mechanical wood pulp portions of the mixed fibers, and therefore eliminates the sorting of the waste material according to the proportion of chemical and mechanical wood pulps. This reagent readily loosens the printing ink, which is then easily removed. The mixed waste is sorted, disintegrated and then treated with reagent in a grinding and washing hollander until the material becomes uniformly grayish-black in color, when it is well washed and discharged. Alternatively the material may be treated with the reagent in a circular rotating steam heated boiler and subsequently washed in the hollander.—A. P.-C.

Refiner.—Can. Patent No. 212,209, Sherbrooke Machinery Co., assignee of A. J. Haug, May 31, 1921. Also U. S. A. Patent No. 1,302,469, April 29, 1919.—The stock is fed through a hopper into a casing containing a suitable number (preferably 4) of rolls which rotate about their respective axes and also the whole series of rolls rotates bodily, crushing the material against the casing. The rolls are driven positively, to prevent excessive slipping, but at such a rate as to have a certain amount of friction instead of true rolling contact, thereby exerting a drawing out action on the fibers. Means are provided for positively feeding the stock through the chamber and discharging it at the end.—A. P.-C.

Method of Feeding Pulp to Paper Machine Wires.—Can. Patent No. 212,197, American Coated Paper Co., Inc., assignee of F. P. Reed, May 31, 1921.—The apron and slice are completely eliminated, their place being taken by a sloping surface or dam over which the pulp flows directly onto the wire. It is claimed that this results in an even distribution of the fibers in all directions giving practically equal strength in all directions. Also, the head box is provided with an internal overflow chamber, having a vertically adjustable plate to regulate the height of stock passing over the dam, and by means of which the foam is skimmed off.—A. P.-C.

Electric Drive for Paper Machines with Rapid Regulation.—W. Stiel.—*Svensk Pappers-Tid.*, xxiv, 48-53 (1921); *Chem. Abs.*, xv, 1993 (June 20, 1921).—In order to ensure a speed for paper machinery which shall be constant, free from variations due to outside influences and capable of considerable range, Stiel suggests electric drive and shows by two diagrams the wiring and connections for the electric regulators (shown in 5 cuts). The range of speed is shown by 13 recording charts.—A. P.-C.

Plastic Masses.—H. Blucher.—*Chem. Ztg.*, xlv, 902-905 (1920); *Chem. Abs.*, xv, 1770 (June 10, 1921).—A description of the classes of commercial materials falling under the category of plastic masses. The author divides the important and most useful products into 6 classes: (1) glues, (2) papier mâché, (3) wood products, (4) cellulose products, (5) egg white and casein, (6) resins.—A. P.-C.

"Autovapor" Electrical Evaporating System.—E. Wirth.—

Bull. Schweiz. Elektrot. Verein, x, 347-355; *Chem. Abs.*, xv, 132 (Jan. 10, 1921).—This process for the evaporation of solutions offers a means of utilizing hydroelectric energy instead of coal and is more efficient than the use of direct electric heating. The solution to be evaporated is brought to its boiling point by means of a steam coil. The vapor formed by the boiling is drawn off, compressed, and delivered into a coil in the evaporating vessel. Here it is condensed and causes the evaporation of more of the solution. The hot condensate is then run into a pre-heater which contains a coil through which the solution is circulated before it enters the evaporator. From this pre-heater the cooled condensate is removed as distilled water.—A. P.-C.

Filtration and Filters.—Henry B. Faber.—*Chem. Met. Eng.*, xxii, 17-19 (Jan. 7, 1920).—Filtering problems may be classified as follows: (1) Those in which the slurries contain suspensions of colloidal nature; these can hardly be dealt with except by highly specialized forms of apparatus and might even be regarded as a class not applicable to simple filtration; they are not considered. (2) Those in which the solid suspension may be separated from the liquid by means of a filter medium, which can be subdivided as follows: (a) Slurries in which the suspensions are fine but not colloidal; (b) Slurries containing relatively free filtering suspensions, which permit the liquid content to be separated readily from the solid, where the solid content is of considerable bulk, crystalline, or definite in its form; (c) Slurries which are principally mother-liquors, containing relatively large crystals, in which the liquid content can be drained readily, the crystals washed easily, the principal problem being the automatic and easy handling of the solids. A description is given of the various types of filtering equipment to be applied to the various groups and of their limitations, together with a short sketch of the development of these various groups. A description is also given of an experimental filter for classifying filtration problems, and of the method of using it and the deductions to be made from experimental results.—A. P.-C.

Electric Power in the Paper Industry.—H. W. Rogers and E. E. Warner.—*Gen. Elec. Rev.*, xxiv, 559-562 (1921); *Chem. Abs.*, xv, 2547 (Aug. 10, 1921).—A discussion of the applicability of electric power to the paper industry. The paper machine and its drive, consuming about 75 per cent of the total power, should be a separate unit, to insure speed regulation, flexibility of control, and uninterrupted service. The necessity of having steam prevents complete electrification unless live steam is used. Eleven boiler-horsepower per ton (909 kilos) of paper is sufficient; while the average load, with properly applied motors, is about 80 per cent of the connected horsepower with a maximum demand little greater.—A. P.-C.

Process for the Preparation of Caustic Soda.—Fr. patent No. 514,509, Schweizerische Sodafabrik, Switzerland, April 26, 1920. *Industrie Chimique*, viii, 368, (Sept., 1921). A yield of 96-98 per cent of caustic soda can be obtained in a short time and in the form of a strong solution by suitably emulsifying a mixture of milk of lime and of sodium carbonate solution. The milk of lime is brought to a very fine state of subdivision in the sodium carbonate solution, and the coating of carbonate which is formed on the fine particles of lime is continually removed. Example: 2,000 kilos of carbonate are dissolved in 20 tons of cold water, giving a 12° Bé solution, and 200 kilos of quicklime are slacked in the solution. The temperature rises to 35° C., but only 60 to 65 per cent of the mixture reacts. The liquid is then circulated by means of a pump through a centrifugal mixer, and the reaction proceeds until the caustic soda content is about 85 g. per l, and the specific gravity 13° Bé. The yield of caustic soda is 96 per cent, and the temperature of the liquor about 35° C.—A. P.-C.

The Application of Electricity to Paper Mills.—E. E. Fuller.—*Electrician*, lxxxvi, 171-174 (1921); *Chem. Abs.*, xv, 1074 (April 10, 1921).—Application of Electricity to Paper Mills. A detailed

illustrated account of modern English paper mills. Among the topics considered are the potcher, the beating process, jordans, and strainers. Canadian and Norwegian pulps are used.—A. P.-C.

Water Purification for Boiler Feed.—F. J. Corlius.—*Power Plant Engr.*, xxiv, 1063-1121 (1920); *Chem. Abs.*, xv, 564 (Feb. 20, 1921).—A full discussion of the usual properties of characteristic combinations found in boiler feed waters is given. Permutit, lime-soda, and hot process treatments are briefly described. Possibilities of compound treatment are mentioned. The author recommends frequent tests of water from the boilers to determine the internal conditions in properly adjusting whatever treatment is applied.—A. P.-C.

Scraper for Paper Calenders.—Fr. patent No. 519,895, Vickery's Ltd., England, Feb. 3, 1921. *Papier*, xxiv, 355-357, (Aug., 1921); *Monit. Papeterie Française*, lii, 615-616, (Oct. 1, 1921). Same as Can. patent No. 193,339, Oct. 21, 1919.—A. P.-C.

Improvement to Paper Machine Suction Boxes.—Fr. patent No. 516,329, J. E. McLaughlin and J. O. Hamel, Canada, *Monit. Papeterie Française*, lii, 507-509, (Aug. 15, 1921). Same as Can. patent No. 198,391, March 23, 1920.—A. P.-C.

Beater.—Fr. patent No. 522,794, E. and O. Massart, France. *Papeterie*, xliii, 789-90, (Sept. 10, 1921). The beater contains three rolls placed close together and working together. Each of them works with a bed plate (the middle roll may or may not have one), and the outside rolls turn in the same direction and the middle one in the opposite direction. The floor of the trough, besides having a slope from the backfall to the front of the first roll, is considerably inclined, from the outside to the midfeather at the backfall, but this inclination gradually decreases, and may even be reversed in front of the first roll. When the beater first starts up the stock passes under the first roll, over the second, and under the third, and finally over the backfall. After a certain amount of pulp has been added to the beater, the consistency becomes such that part of the pulp instead of going over the backfall goes over and around the third roll, under the second, and over the first, thus mixing the pulp very thoroughly and giving an intense beating effect.—A. P.-C.

Report of the Advisory Committee of the Society of Paper and Cellulose Engineers.—F. Grewin, et al.—*Svensk Pappers-Tid.*, xxiv, 27-30 (1921); *Chem. Abs.*, xv, 1991 (June 20, 1921).—The committee recommends the establishment of several technical schools for the paper and cellulose industries and present curricula for 5 different 4-year courses of study.—A. P.-C.

The Advance in the Paper and Cellulose Industry During the Last Twenty Years.—Jos. Satoplet.—*Chem. Listy*, xiv, 19-22, 50-53, 65-66, 84-85, 99-101, 116-117, 127-130, 152-155, 179-181, 201-206 (1920); *Chem. Abs.*, xv, 1074 (April 10, 1921). An extensive review.—A. P.-C.

Observations from a Trip to the United States and Canada in the Fall of 1920.—A. Bywell.—*Svensk Pappers-Tid.*, xxiv, 87-91 (1921); *Chem. Abs.*, xv, 1992-1993 (June 20, 1921). All the stages from logs to paper as done in the United States and Canada are described and compared with similar processes in Sweden. Even labor conditions, wages and housing of employees are considered in detail.—A. P.-C.

LIST OF ABBREVIATED AND FULL TITLES AND ADDRESSES OF THE JOURNALS WHICH ABSTRACTS HAVE BEEN PREPARED FOR THIS ISSUE.

Chem. Abs.	Chemical Abstracts. Chas. L. Parsons, 1709 G. St., N. W., Washington, D. C.
Chem. Listy	Chemické Listy pro vedu a průmysl. Prof. Frant. Pizak, chem. ústav české univ. Praha II, Albertov, Czechoslovakia.
Chem. Met. Eng.	Chemical and Metallurgical Engineering. McGraw-Hill Publishing Co., Tenth Avenue at Thirty-sixth St., New York City.
Chem. Ztg.	Chemiker Zeitung. Walter R6th, C6then, Germany.

Electrician	The Electrician. Benn Bros., Ltd., 8 Bouverie St., London, E. C., England.
Gen. Elec. Rev.	General Electric Review. Canadian General Electric Co., Schenectady, N. Y.
J. Sec. Chem. Ind.	Journal of the Society of Chemical Industry. Central House, 46 and 47 Finsbury Square, London, E. C. 2, England.
Papeterie	La Papeterie: 9 Rue Lagrange, Paris (5), France.
Papir-Journalen	Papir-Journalen. Papierindustriens Hus, Huitf. gt. 1, Kristiana, Norway.
Power Plant Engr.	Power Plant Engineering. Technical Publishing Co., 537 S. Dearborn St., Chicago, Ill.
Svensk Pappers-Tid.	Svenska Pappers-Tidning. Svenska Pappersbruksf6reningen, Hofslagaregatan 3, Stockholm, Sweden.
Zellstoffchem. Abhandl.	Zellstoffchemische Abhandlungen. Verlag von Carl Hofmann, Papierhaus, Dessauer Str. 2, Berlin, S. W. 11, Germany.

Plans of T.A.P.P.I. for the Year

The executive committee elected at the annual meeting will hold its first meeting at Woronoco, Mass., on May 4 and 5, to formulate its plans for the coming year. Chairmen of the standing committees will be selected and suggestions made as to the activities desired on the part of each committee. For the committees on the manufacturing processes it has been recommended that at least two lines of work be undertaken, one along research investigation (such as in sulphite the value of estimating the alpha, beta and gamma cellulose as a practical method of establishing quality, and the factors affecting the content of each), and the other of a process nature of directly practical value.

In view of the need for lowered costs of manufacture it is believed that the work of the committees with the hearty co-operation of the members and their companies will have a very beneficial effect on the industry. During the past month the Technical Association sent out to each of its members a request for an expression of desire or willingness to serve on some particular committee or to co-operate in its work. While a number have so indicated, there is still a large proportion to be heard from. The executives of the paper and pulp manufacturing concerns should ascertain how their companies are represented in the membership of the Technical Association and encourage the co-operation of their plants in the work undertaken.

It is likely that two specific investigations will be begun this year in addition to those already started. In the past year beginnings were made on the drying operation and on beating, which will be continued. The new projects contemplated are on drum barker waste and on mill effluents.

The work to be undertaken by the Technical Association will be watched with interest.

N. H. Botsford to Supervise "World" Mill

The *New York World* has concentrated supervision of its paper mill and woodland interests in N. H. Botsford, with headquarters in New York. The subsidiaries concerned and their local managers are as follows:

De Grasse Paper Company, Pyrites, N. Y., E. A. Charlton, manager.

High Falls Pulp and Paper Company, Chateaugay, N. Y., Edward Wright, manager.

St. George Paper Company, Norwalk, Conn., C. A. Murphy, manager.

St. George Pulp and Paper Company, St. George, N. B., Harry Howes, manager.

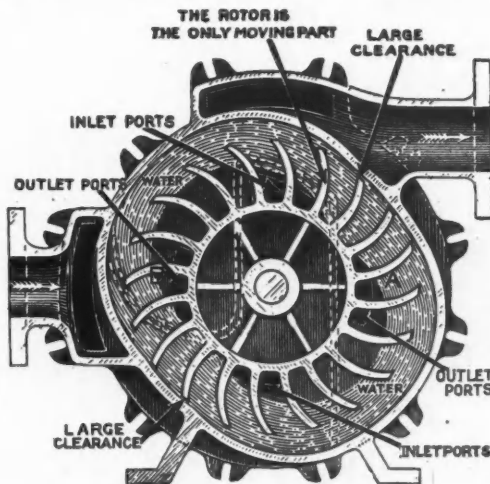
Mount Murray Woodlands Corporation, St. Fidele, P. Q., P. J. Brundage, manager.

Mr. Botsford is financial manager of the *New York World*, and next August will complete 33 years of service with that institution. In the paper companies he occupies the position of treasurer of De Grasse and High Falls companies; president of the two St. George companies, and secretary and treasurer of the Mount Murray corporation.

The mills are producing 230 tons of news print per day, exclusively for use of *The World*.

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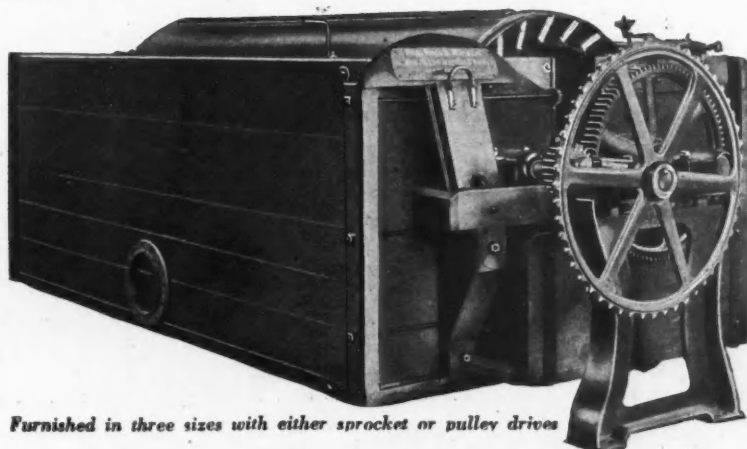
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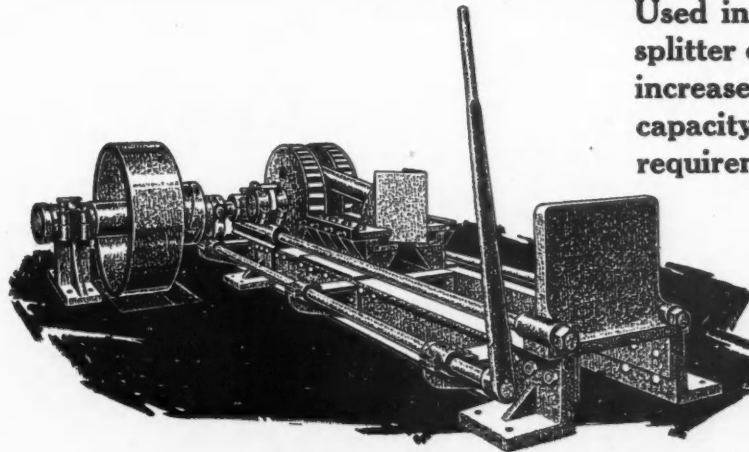
Technical Association of the Pulp and Paper Industry, Committee on Bibliography, Contribution No. 36

BY CLARENCE JAY WEST, CHAIRMAN, COMMITTEE ON BIBLIOGRAPHY, T. A. P. P. I.

(Continued from last week.)

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- Leeper, R. W.** Steam economy in drying on and driving of paper machine. Paper Mill 44, No. 17, 46, 48, 50 (Apr. 23, 1921); Paper 28, No. 10, 9-11, 41 (May 11, 1921).
- Lest, G.** Steam turbines and electric machinery in the paper industry. Papierfabr. 19, No. 10, suppl. 1-9 (Mar. 11, 1921).
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- New Paper machine hood.** Paper Mill 44, No. 25, 14 (June 18, 1921).
- New Type of paper machine flow box.** Papeterie 42, 72 (Jan. 25, 1921); Pulp Paper Mag. Can. 19, No. 46, 1164 (Nov. 17, 1921).
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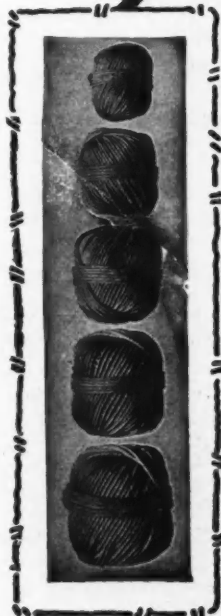
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(To be continued.)



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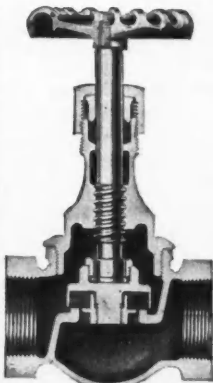
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New York Market Review

OFFICE OF THE PAPER TRADE JOURNAL.
WEDNESDAY, May 3, 1922.

With the possible exceptions of board and news print, the New York paper market may be generally characterized by the phrase, "firm but not active." Everywhere along the line there is a slight improvement over last week, but news print production is hitting the high spots during one of the most successful periods it has known for years, while board is slumping at almost the opposite extreme.

Basic industries have exhibited a pronounced expansion during the month of April, according to the monthly review of general business and financial conditions issued recently by the Federal Reserve Board. Active demand for building materials has had its consequent effect upon the paper industry, and marked changes for the better in cotton textiles, metal industries, the board found, iron and steel industries and the automobile trade, have served to stimulate the use of paper and paper products to a marked degree over the preceding month.

The following remarks are taken from the survey of current business issued by the Commerce Department: "From the figures available in recent months, it is clear that fundamental conditions are much better, and there is every reason to expect business to improve steadily, although perhaps slowly. With world conditions as they are today there is no likelihood of an immediate boom movement. Reconstruction in Europe is far behind what it is in this country, and, in general, big economic movements are world-wide in their scope." Exports of cotton cloth improved nearly 50 per cent over the month of February, and the clothing trade evinced ample signs of increased activity. This, combined with the fact that Rochester clothing workers have recently accepted a 15 per cent decrease in wages, which cut is expected to reach New York city, should greatly augment the use of tissues in this line.

Thus it may be concluded that with increased production in basic industries, a larger export trade, and more stable prices, the general outlook of the New York market is considerably brighter.

News print is in ever-increasing demand, and statistics recently released show that consumption is the greatest ever known in the industry, 169,000 tons of the product were consumed in March, 1922. This compares with the highest production for a single month of 163,000 tons, December, 1921.

Prices of book paper are stabilizing and the market in general seems to be on firmer ground. Additional business which is coming to manufacturers accounts for the increase in solidity.

Cheaper grades of sulphite bonds appear to be firm, whereas the better grades containing a higher percentage of rag content are gradually coming down to less prohibitive prices. Fine paper is in much heavier demand than it has been for the past month and optimism is expressed for the early summer season.

Tissue has been gaining firmness and pulling out of the slump brought about by labor troubles. Now that a settlement has been effected in Rochester, it is believed the market will take a marked change for the better.

Manufacturers of kraft papers are receiving more business, and the market shows signs of activity. Some grades of No. 1 domestic kraft have been selling for less than 7.00 cents per pound, but in most cases the prices were shaded due to large quantity buying, or else the paper was not of the usual grade.

Board is experiencing a good deal of difficulty in getting out of the rut, but increased activity in the boxboard market makes the market appear much firmer. Dealers in the latter are inclined to hold out for better prices than have been offered as opposed to the willingness to sell at any price merely to effect a turnover as has recently been the case.

Mechanical Pulp

It is the prevalent notion that groundwood prices have just about hit rock bottom, and confidence is being restored in the stability of the market. Activity has been pronounced during the past few weeks, and no drastic breaks in the market are anticipated for some time.

Chemical Pulp

Consumers are using more chemical pulp of late due to the current belief that manufacturing costs have been pretty well liquidated and that prices are about as low as existing conditions will permit them to drop. A competition of foreign sulphite has been an important factor in bringing American prices to a competitive standard.

Old Rope and Bagging

While most of the transactions in this market have only entailed small quantities of merchandise—hardly enough to demonstrate a market, it is generally believed that conditions in the market have become ameliorated despite the hand-to-mouth policy in buying. A change for the better is expected in the coming few weeks.

Waste Paper

The better grades of waste papers are in goodly demand and prices have tightened up considerably with the exception of some of the lower grades. The market appears to be steadily rising, and dealers do not seem disposed to sell far ahead.

Rags

A considerable improvement has been noted in the rag market during the past week. Prices are still quoted on a nominal basis, and while no great activity has yet been demonstrated, the situation is taking on a firmer aspect.

Twine

Changes for the better in the twine market are coming very slowly but evidences of improvement are noticeable. The market has not reached a basis that might be considered stable, but optimism is generally expressed for the near future.

News of the Kalamazoo Trade

[FROM OUR REGULAR CORRESPONDENT]

KALAMAZOO, Mich., May 1, 1922.—The Kalamazoo Vegetable Parchment Company has purchased its beater and jordan equipment through A. A. Bush, representative of the E. D. Jones Company, Pittsfield, Mass. The contract for the new mill calls for eight 2,000 beaters and three jordan engines.

V. D. Simonds, Chicago, consulting engineer, will be the speaker at the May meeting of the Michigan division of the American Pulp and Paper Mill Superintendents' Association. He will speak on "Old Paper Reclamation."

Frank N. Marshall, well known papermaker, is in Kalamazoo for the time being. He is supervising tests being made with a Marshall engine at the King division of the Allied Paper Mills.

The Kalamazoo County Community club were guests Friday afternoon, April 28, at the new community house of the Kalamazoo Vegetable Parchment Company. President Jacob Kindleberger gave an interesting talk on the development of proper community work.

Goes with Shuttleworth-Keiller

Miss F. T. Helmer, who for many years was treasurer of the Newton Falls Paper Company with offices in the Trust Company Building Watertown, N. Y., has accepted a position with Shuttleworth-Keiller & Co., wholesale paper dealers in New York, and has left for New York to take up her duties.

The company is one of the large New York concerns. In addition to the wholesale business the company owns the Ironsides Board Corporation, a three-machine board mill located at Norwich, Conn. A box factory is also connected with the company.

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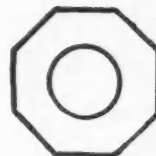
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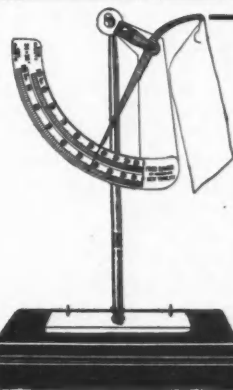
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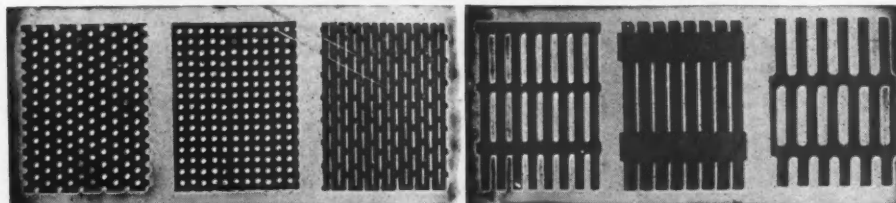
Collapsible, for Desk or Pocket. A small piece of paper indicates automatically ream weights per 480 and 500 sheets in sizes 24x36, 20x30, 17x22, 25x38 or any size desired. A scale for every purpose.

FRED BAKER

Manufacturer of Precision Paper Scales
34 West 28th St., New York City
Established 1912
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PERFORATED METALS

All sizes
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of Holes



All kinds
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For Centrifugal and Rotary Screens, Drainer Bottoms, Filter Plates, Pulp Washers, etc.

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PULP STONES

of absolutely the finest quality

Lombard & Co., Incorporated

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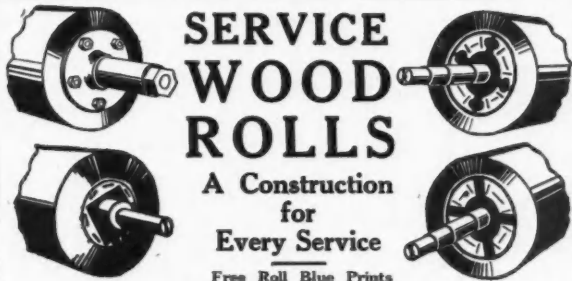
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SERVICE WOOD ROLLS

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Free Roll Blue Prints

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No. 63 Maple Street

Orange, Mass.

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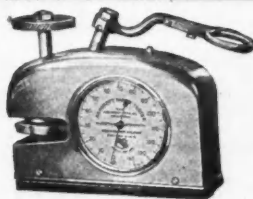
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Water Filters

Announce the removal of their offices to
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New England Representative: Hurricane Engineering
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Paper Tester**



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Actual necessities for all those who make, sell or purchase paper in
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Wire Stitched Tube

TOILET PAPER
MACHINERY

GRISSINGER MACHINE WORKS
PHILADELPHIA, PA.

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August 10, 1915

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LONGITUDINAL AND
CROSS DRUM TYPES
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ALL CORROSION PROOF TO THE CORE

Heine Boiler Company Saint Louis U.S.A.

BOILER MANUFACTURERS FOR 40 YEARS

WANT AND FOR SALE ADVERTISEMENTS

CLASSIFIED RATES

Minimum rate for advertisements of 25 words or less, first insertion, \$1.00.
SITUATION WANTED, 4 cents a word for first insertion and 2 cents a word for each subsequent insertion of same ad. No ad of less than 25 words accepted.

HELP AND MISCELLANEOUS WANTS, and small For Sale Ads, 4 cents a word for each and every insertion. No ads of less than 25 words accepted.

When answering advertisements, please address the Box Number given in ad.

Answers can be forwarded care Paper Trade Journal, and will be promptly forwarded without extra charge. All should be sent to the New York office, 19 East 39th street. And all should be addressed as the advertisement directs in every case and not simply to the paper.

All classified ads for the current issue must be in hand not later than Monday preceding date of publication.

HELP WANTED

SPECIALTY MILL wants superintendent with good conception of business, ability to develop ideas, and who is tactful and competent in handling help. A man familiar with cylinder and fourdrinier machines preferred. Applicant must state length of time in present position, experience fully, salary now receiving, and any other information that would be of interest to prospective employer. Address, Box 4976, care Paper Trade Journal. M-4

WANTED—Reliable machine tender, running tissues on cylinder machine. A good job for the right man. Apply Empire Paper Co., Ithaca, New York. M-4

ENGINEERS—DRAFTSMEN—A leading organization has position open for energetic, live and experienced resident engineer for paper mill construction; also in need of three or four draftsmen familiar with general plant equipment, lay-out in connection with paper, pulp and sulphite work, men of at least five years' experience wanted. Salary will be in accordance with ability. Address, Box 5007, care Paper Trade Journal. My-11

BAG PRINTER WANTED—One capable of taking complete charge of bag printing, composition, and stereotyping department. State experience, salary expected, etc. Address, Box 5008, care Paper Trade Journal. My-11

WANTED: Superintendent for solid container box factory operating Swift Automatic Cutters and Creasers. Address, Box 5024, care Paper Trade Journal. M-4

WANTED: For Board Mill, Western New York, machine Tender and Beaterman. Must be A. No. 1 on container, news and manilla lined. State wages required. Address, Box 5025, care Paper Trade Journal. My-11

WANTED: Experienced super calendar runners on book paper. Mill in New York State. Address, Box 5026, care Paper Trade Journal. My-4

WANTED: First class beaterman for beating and coloring stock for cylinder machine making specialties. Give references and previous employment. District of Columbia Paper Mfg. Co., Washington, D. C. My-4

WANTED: A high grade machine tender for Harper Fourdrinier. Must be proficient on light weight waxing papers. Good working conditions for proper man. State experience and reference. Address, Box 5028, care Paper Trade Journal. My-4

WANTED: Four beatermen. Must be first class on book paper. State age and experience in your first letter. Best of industrial relations. Address, Box 5030, care Paper Trade Journal. My-4

HELP WANTED

WANTED: A first class Boss Finisher. One machine mill in Western New York making fine papers. Good wages and living conditions. No labor troubles. Address, 107 Maple St., North Agawam, Mass. My-11

PAPER BAGS: Adjuster on satchel bottom bags machine, also Fischer Sack Machine. Miller, Tompkins & Co., 485 Washington St., New York City. My-4

SUPERINTENDENT WANTED for Toilet Paper Converting Plant. Old paper house in city, installing machinery for Converting Toilet Paper, has a position for reliable man to take full charge of that department. Address, Box 5064, care Paper Trade Journal, or phone Canal 4442. My-4

SALESMEN: One of the known and well established paper houses in city has an unusual opportunity for several energetic men who have an established clientele and direct-from-mill business and stock lines. Please give full particulars in application which will be held in strictest confidence. Address, Box 5045, care Paper Trade Journal. My-4

WANTED at once two boss machine tenders for a mill in Wisconsin running on news and catalog papers. Must be strictly non-union. Address, Box 5042, care Paper Trade Journal. My-4

MACHINE DESIGNER WANTED: One having experience in designing pulp screens, thickeners and wet machines preferred. Plant located half way between Boston and Providence. Address, Box 5043, care Paper Trade Journal. Je-8

SALESMAN WANTED: To travel in Middle West selling envelopes and paper bags to jobbing trade, must have knowledge of paper. Give full particulars regarding past experience. Address, Box 5044, care Paper Trade Journal. My-11

WANTED at once. Draftman, experienced in paper machine design. Apply to Box 2799 Montreal, P. Q., stating full particulars, experience and salary expected. None but experienced men need apply. My-4

EXPERIENCED MEN IN PAPER INDUSTRY: Write for information concerning our confidential and personal service. We are daily receiving requests for men with definite experience and ability. Address, The Industrial Bureau, 1502 Monadnock Block, Chicago, Ill. My-11

WANTED: First class beater engineer on book and bond. Apply with references to Newton Falls Paper Co., Newton Falls, New York. My-11

WANTED: First class head machine adjuster for square, flat, sack, and self opening paper bags. Also first class assistant. Give full experience, age, salary desired and references in first letter. Address, Box 5046, care Paper Trade Journal. My-4

WANTED: First class machine adjuster on Sack machines. Give full experience, age, salary desired and references in first letter. Address, Box 5047, care Paper Trade Journal. My-4

SITUATIONS WANTED

PAPER SALESMAN in New York City who can produce a large volume of business with adequate co-operation, desires connection. Drawing account on Commission basis. Correspondence invited. Address, Box 4635, care Paper Trade Journal. M-4

WANTED POSITION—As superintendent. Twenty-one years' experience; used to Specialties, Colors and Wrapping, all grades of Boards and Fibres. Knows how to handle help. Can keep up repairs. Used to Fourdrinier and Cylinder Machines. Address, Box 4786, care Paper Trade Journal. M-4

DOES YOUR MILL pay? If not, why not have a superintendent with proven ability and experience that will make it pay? Address, Box 4977, care Paper Trade Journal. Je-2

SITUATIONS WANTED

SUPERINTENDENT of ability open for position with good company making box board, container board, wall board, bristol board or straw. A man that understands a plant thoroughly and gets good results. Address, Box 4997, care Paper Trade Journal. M-4

SUPERINTENDENT - MANAGER Wants position. Twenty years' experience on all grades paper. Expert on colors. Fourdrinier and cylinder machines. Best references. Address, Box 4988, care Paper Trade Journal. MA-18

SUPERINTENDENT or assistant superintendent on tissues, toilets or towels desires position. Have had 17 years' experience in this line. A-No.-1 in production and upkeep. Can handle help. Location no object. Best references. Address, Box 5013, care Paper Trade Journal. M-4

MASTER MECHANIC desires position. Twenty years' experience in mills of all grades of paper and pulp, also on steam, water and electric power. Best references. Address, Box 5014, care Paper Trade Journal. J-16

SITUATION WANTED by beater engineer with 25 years' experience in fast news mills in States and Canada. Good color man. Best references. Address, Box 5015, care Paper Trade Journal. My-18

EXPERIENCED MAN, 32 years of age, connected with the paper industry for fifteen years, both as salesman and managerial executive, having thorough knowledge of fine, printing and coarse papers and boards, desires location with mill or reputable distributor. Address, Box 5022, care Paper Trade Journal. My-4

WANTED: Position as superintendent or production manager in prepared roofing plant. Thoroughly familiar with Guyton & Cumfer outfit. Experienced Asphalt chemist having handled asphalts over eighteen years. Over four years with large prepared roofing concern holding positions from chief chemist to assistant manager, and now engaged in research work. Thorough knowledge of raw materials as well as quality of manufactured products. Can increase production through improved manufacturing methods. Address, Box 5031, care Paper Trade Journal. My-4

EXPERIENCED PAPER SALESMAN, 28 years of age, well acquainted with the jobbing trade for the past eight years, desires reputable connection and change from his present position. Eastern or Middle Western territory preferred, but will consider other sections as acquaintanceship is countrywide. I have exceptional wide knowledge of coarse papers. Would prefer a commission proposition. All correspondence will be held strictly confidential. Address, Box 5032, care Paper Trade Journal. My-11

TORONTO PAPER JOBBERS and Mills agents desire exclusive agency, commission basis or direct purchase that can compete successfully in Canada in price and quality. Address, Box 5033, care Paper Trade Journal. My-11

BOOK AND BOND PAPER VERSUS CURLY PAPER.—Papermaker now employed, with references as to character and experienced in increasing the capacity of mill equipment and in eliminating defects in manufacturing, invites inquiries from mills with production limited by any particular department, equipment or difficulty. Assurance that correspondence will be held confidential, would be appreciated and inquiries from mill executives will be so considered. Address, Box 5034, care Paper Trade Journal. My-18

FOREMAN desires position with De-inking Plant. Thoroughly understands cooking, grading, and bleaching of old papers. Twenty years experience. Married man. Best of references. Address, Box 5035, care Paper Trade Journal. My-11

FOR SALE

FOR SALE: Rewinder for 100" Paper Machine. Ringel Brothers, Newark, N. J. My-4

FOR SALE: 14 Calendar Rolls, 58" face, 3' 14" diameter. 2 No. 1 Clafin Engines. 1 small Jordan Engine. 1 6" Horizontal Water Pump. 2 Air Fans. Complete triple-deck frames for 44 Dryers. Will arrange terms to suit. Chesapeake Paper Board Co., Baltimore, Maryland. tf

FOR SALE

Box Board Mill, nearly new. Central New York State. Plenty land for expansion. Siding, water rights, small water power possibilities. All equipment first class. Well situated for raw materials and near a box making center.

Will consider sale outright or capital from responsible and experienced man. Address, Box 4955, care Paper Trade Journal. tf

FOR SALE

FOR SALE: DRYERS—8-60"x120" Dryers with bearings. A bargain. W. V. Sullivan, Call Bldg., San Francisco. tf

FOR SALE—Paper machine reel 110" Face. Heavy pattern revolving reel for 4 drums. Marinette & Menominee Paper Co., Marinette, Wisconsin. tf

FOR SALE—Roofing and Saturating Machines, 72"x36" wide. Chilled steel rolls. Also Painter Mixing Machines, Grinders, etc. Address Box 4810, care Paper Trade Journal. tf

COAL—Moshannon and "E Seam" bituminous coals, low sulphur, low ash. Lowest freight rate east and north. Prices and freight rates will be furnished on request. Halden-Kelley Coal Company, 209 Market St., Clearfield, Pa. tf

FOR SALE—Two Dunning and Boschert Hydraulic presses, size 36 x 42", with 12 trucks and 50 extra mats. Address, Box 5020, care Paper Trade Journal. My-11

FOR SALE: Cylinder Press felts 13 x 86 and Cylinder wets 64 x 80, drier felt duck six naught 80 to 86" wide, 32 to 56 yards long, also stock pumps and motors. Address, Box 5038, care Paper Trade Journal. My-11

MISCELLANEOUS

WANTED: Job lots of Kraft Paper in rolls any size, any diameter. Basis 30 lbs. Mail samples and advise quantity. Address, Box 5061, care Paper Trade Journal. My-11

WANTED: Two Sulphite Digesters about 4 tons capacity and 5 flat screens, 14 plate. Give full particulars in first letter. Address, Box 5062, care Paper Trade Journal. My-4

OF SPECIAL INTEREST TO MILLS

We have about five thousand square feet of surplus floor space in the Paper District in New York, suitable for storage or consignment of paper or kindred products. We are paper jobbers, long established and are well equipped to handle paper, etc., and are open to a proposition to use this additional space to help market your product in New York.

If interested write for further particulars, Address, Box No. 5063, care Paper Trade Journal. My-11

PULP WANTED—Will pay cash for any quantity Foreign Pulps on spot and to arrive. Send particulars with price. Address, Box 4832, care Paper Trade Journal. tf

SWIFT, GEORGE W., JR., Designer and Manufacturer of Special Machinery for Manufacturing and Printing Paper Goods. Bordentown, N. J. 8-24-22

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Fully Equipped Specialty Plant in excellent condition. Four-Cylinder 65" trim Paper Machine. Five beaters. Two Jordans. Winestock De-Inking Machine. Up-to-date electrical equipments operate entire mill. Abundance soft, clear spring water for manufacturing. Product Glazed Press Boards, Jacquard Card, etc. Production 10,000 lbs. 24 hours.

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WESTERN PAPER MAKERS CHEMICAL CO.**

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CLAYS ROSIN SIZE
SATIN WHITE FOAM KILLER

FELT SOAP and OTHER SPECIALTIES

Perforated Metal Screens

For Pulp and Paper Mills

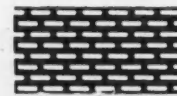
STEEL, COPPER, BRASS, BRONZE
and other Alloys

punched for Centrifugal and
Rotary Screens, Pulp Washers,
Drainer Bottoms, Filter Plates, etc.

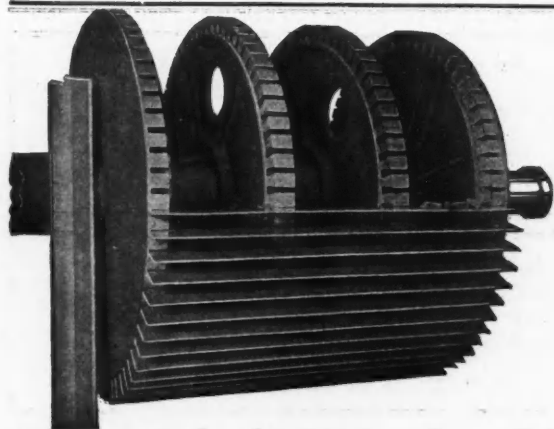
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.005 Inch Round



1/4 x 1/4 Inch Slots



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Manufacturers of

**BEATING and WASHING ENGINES
FLY BARS—BED PLATES—
MACHINE KNIVES**

Our new **KEYED TYPE BANDLESS ROLL** is the final result of Many Years of Experience.

May we not tell you about its many advantages?

The Lockport Felt

Use a Lockport *Cylinder Bottom* and *Top* combination for *Board* and watch your *Felt Cost*

ASK THE MEN WHO RUN THEM
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LOCKPORT FELT COMPANY
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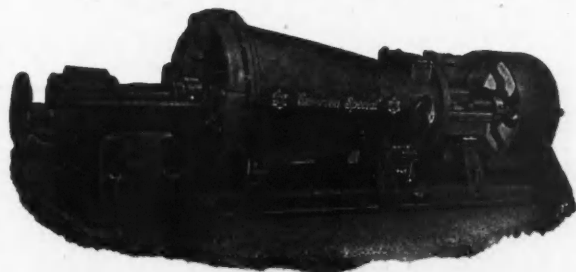
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They seldom wear out and are never thrown out. **PERFECT CIRCULATION. NO "PADDLING."**

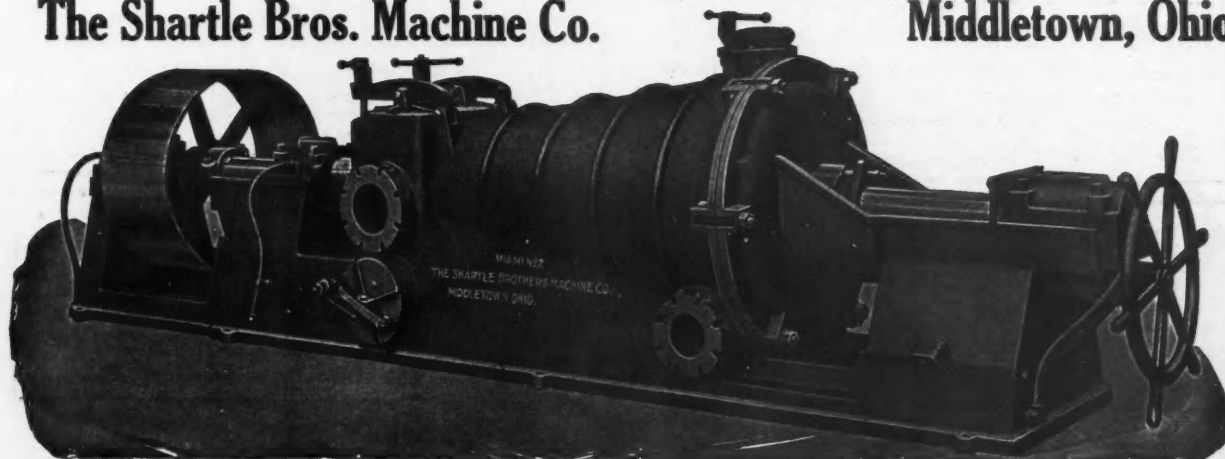
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does its work with half the power required by others of no greater capacity.

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Made from first growth Spruce and Pine, by approved processes.

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Felts-Jackets

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WILL NOT LICK UP AT ANY SPEED
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High Grade Fourdrinier Tissues in Stock for Immediate Delivery

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Out of our forty different grades of paper stock you are assured a steady, reliable source for procuring raw materials in practically every branch of paper making.

Having specialized for 35 years in this one field you can depend upon a clean, well-packed, uniform product throughout; fulfillment of delivery promises; and because of our output of 300 tons daily, big tonnage at all times. Write us your wants.

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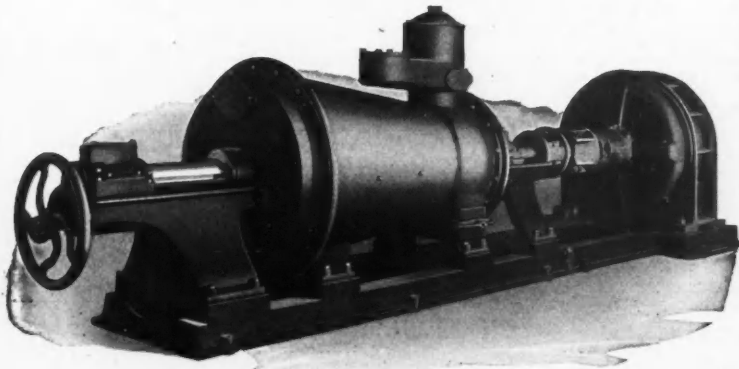
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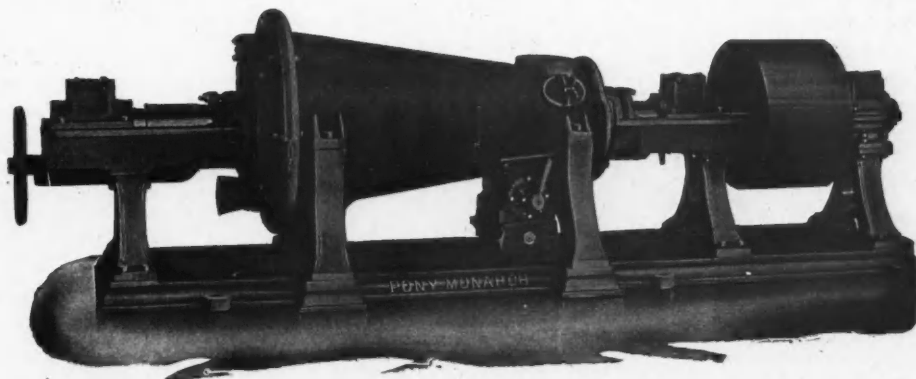
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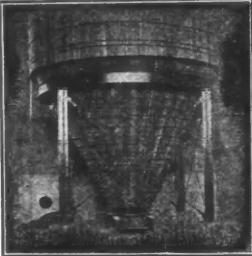
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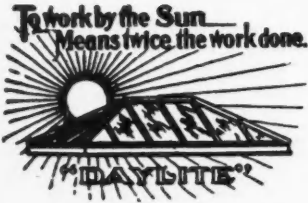
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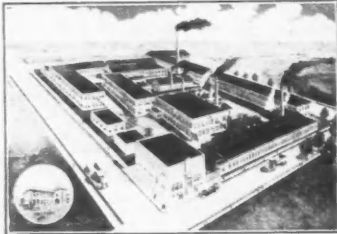


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