ASHLAND, KY., JAN 1 - 1925 192

M Mrs. Cook Means
Ashland Ky
IN ACCOUNT WITH

I. N. Pollock Company

NCORPORATED

Jewelers and Stationers

PHONE 63 — 112 WEST WINCHESTER AVENUE

Dec 9	2	Portion Sets	600
			1200
			300
			2100

Paid 1/7/25.
I. N. Pollock Co.
Cks

OGDEN HARDWARE CO.
Incorporated

ASHLAND, KY.

Sheet No.

Sold to Mrs. E. C. Means Jan 192 5

Address 306 E. Lexington Ave. City.

All accounts due the first of the month after date of purchase.

Store Phone 227
Office Phone 500

DATE	DESCRIPTION	CHARGES	CREDITS	BALANCE
	Jan 5 Bf.			
1/5	2 Qts White Flat Zone	1 70		
	2 " White Enameloid	3 20		
	1 Pt. Turpentine	20		5 10

RECEIVED PAYMENT
FEB 11 1925
OGDEN HARDWARE CO.
BY L&O.

Ashland, Ky., 7/28 1925

M C. C. Means

306 - E - 1st

MOORE FEED & SEED CO.

INCORPORATED

Phone 1508 — 12th and Greenup

		Acct. Ren'd								
7	21	11199			# 225					

Pd. March 5 1925

OGDEN HARDWARE CO.
Incorporated
ASHLAND, KY.

Sheet No.

Sold to Mrs. E. C. Means — Feb 192 5

Address 306 E. Lexington Ave. City.

All accounts due the first of the month after date of purchase.

Store Phone 227
Office Phone 500

DATE	DESCRIPTION	CHARGES	CREDITS	BALANCE
1/15	Forward			5 10
2/2	1 Gal. Buff Flat Tone	3 00		8 10
2/6	½ Gal Buff Flat Tone	1 60		9 70
2/11	By Cash		5 10	4 60
2/12	1 qt Turpentine	35		
	½ gal White Flat Tone	1 60		6 55
2/19	1 qt White Flat Tone	85		
	½ gal " Enamelvid	3 05		10 45
2/24	1 Gal Yellow Enamelvid	7 00		
	1 qt Turpentine	40		17 85

Pd. March 5, 1925

CITY OF ASHLAND, KENTUCKY.
CITY BUILDING BONDS

$ 200,000.00

NOTICE TO BOND BIDDERS

Sealed bids will be received by the General Council of the City of Ashland, Kentucky, until 7:00 o'clock, P. M. Standard Time, on FRIDAY, MARCH 20TH-1925, at the office of the City Clerk, Ashland, Boyd County, Kentucky, for the sale of Two Hundred Thousand, ($200,000.00) Dollars of City Building Bonds, to be dated June, 1st., 1925, due Fifty Thousand ($50,000.00) Dollars in each of the years, 1962, 1963, 1964 and 1965. Said Bonds to bear interest at the rate of four and three-quarters (4¾) percent, payable semi-annually. A certified check on a National Bank for One Thousand ($1,000.00) Dollars shall accompany each bid, payable to John W. Henderson, City Treasurer, to be returned to bidder if bid is not accepted.

No bid shall be accepted for less than par and accrued interest.

The General Council reserves the right to reject any and all bids.

Dated this 10th, day of March, 1925.

W. M. Salisbury, Mayor.

A. N. Richardson, Auditor.

John W Henderson, Treasurer.

Harry L. Carroll, Clerk.

JESS E. McCLAIN, PRESIDENT AND TREASURER
ALBERT R. DAVIES, VICE-PRESIDENT
EDWARD TRESCH, SECRETARY

ALL BILLS TO BE SETTLED MONTHLY

Cincinnati, March 30, 1925

M

Mrs. E.C. Means,
306 E. Lexington Ave.,
Ashland, Ky.

Bought of **The Joseph R. Peebles' Sons Co.**

Established 1840

Grocers and Importers

Terms:

GOVERNMENT SQUARE

Inclosed postage	.13	
1 doz. Yardleys Lavender Soap	4.20	
Parcel post	.07	4.40

PAID MAR 30 1925

POSTAL INSURANCE

CERT: 40414-A-5

The Automobile Insurance Company Of Hartford, Connecticut

In consideration of **FIVE CENTS** does insure the party named in the Policy issued with the book from which this certificate is taken, against loss or damage to an amount as provided in the Policy, on Property while in transit by Registered, Unregistered or Parcel Post Mail. This Certificate to be enclosed in the package containing the Property or with the invoice describing said Property.

President.

Kentucky Sunday School Association

712 LOUISVILLE TRUST BUILDING

LOUISVILLE :: :: KENTUCKY

March 31 1925

Your offering, $10.00 to the Kentucky Sunday School Association has been received. We thank you for this co-operation in the work we are doing to produce a better citizenship for our State. As you thus contribute to the progress of the Sunday Schools of our State, may your own life be enriched and blessed of God.

Sincerely yours,

Clarence Watkins Treasurer.

OGDEN HARDWARE CO.
Incorporated
ASHLAND, KY.

Sheet No.

Sold to Mrs. E. C. Means Mar 192 5

Address 306 E. Lexington Ave. City.

All accounts due the first of the month after date of purchase.

Store Phone 227
Office Phone 500

DATE	DESCRIPTION	CHARGES	CREDITS	BALANCE
2/24	Forward			17 85
3/3	1 qt Yellow Enamelrid	160		19 45
3/4	½ pts Blk Iron Enamel	30		
	½ " Alum. Paint	65		
	1 pt Turpentine	25		20 65
3/6	By Cash		1785	280
3/19	19½ ft Brass Seam Binding 10	195		475
3/26	33 ft 38" Cop. Screen 106 sq ft 12	1260		
	¾" Brads	05		1740

RECEIVED PAYMENT
APR 3 1925
OGDEN HARDWARE CO.
BY

J. S. OGDEN, President
E. L. OGDEN, Vice-President

L. E. OGDEN, Secretary
G. H. OGDEN, Treasurer

Ashland, Ky., 4-1-25 192

M Mrs. E. C. Means

306 E. Lexington Ave. City.

To OGDEN HARDWARE COMPANY, Dr.

INCORPORATED

WHOLESALE AND RETAIL
HARDWARE, STOVES, CUTLERY, ETC.

Cor. Winchester Ave. & 17th St.
Opposite Postoffice

TERMS:—CASH

1	Eureka Vacuum Cleaner & Attachements	45	00		
	$5.00 Allowance for cash if paid at once (March terms)				
	By allowance	5	00	40	00

RECEIVED PAYMENT
APR 4 1925
OGDEN HARDWARE CO.
BY E M O

PAY BY BANK DRAFT OR POSTAL MONEY ORDER. PERSONAL CHECKS ARE SUBJECT TO A CHARGE FOR EXCHANGE

INVOICE

THE PILGRIM PRESS

19 SO. LA SALLE STREET

Chicago, 4-3-1925

Charge to Mrs. E. C. Means
306 East Lexington Ave
Ashland, Ky.

Sent to Same

These supplies are charged to Sunday School

Dept.	Lesson Year Begins with October		Public School Grade	Course	Part 1 Oct.-Dec.	Part 2 Jan.-Mar.	Part 3 April-June	Part 4 July-Sept.	$	C	No. of Copies	Amount Brought Forward	$	C
BEGINNERS	The Little Child and the Heavenly Father	Teacher	KINDERGARTEN	1st Yr.								The Church School		
		Pupil		1st Yr.								The Pilgrim Elementary Teacher		
	The Little Child and the Heavenly Father	Teacher		2nd Yr.							1	Adult Bible Class Monthly	1	00
		Pupil		2nd Yr.								The Pilgrim Teacher Quarterly		
	Beginners' Picture Cards			1st Yr.								Pilgrim Boys' and Girls' Teacher		
				2nd Yr.								Pilgrim Bible Story Teacher		
												The Home Department Magazine		
	Mothers' Letters											The Pilgrim Advanced Text-Book		
PRIMARY	Bible Stories for the Sunday School and Home	Teachers	1	I								The Pilgrim Lesson Leaf		
	Bible Stories for the Sunday School and Home	Pupils	1	I								The Pilgrim High School Quarterly		
	Bible Stories for the Sunday School and Home	Teachers	2	II								Pilgrim Boys' and Girls' Quarterly		
	Bible Stories for the Sunday School and Home	Pupils	2	II								Pilgrim Bible Stories for Children		
	Bible Stories for the Sunday School and Home	Teachers	3	III								The Little Pilgrim Lesson Cards		
	Bible Stories for the Sunday School and Home	Pupils	3	III								Bible Lesson Picture Roll		
	Folder Covers													
	Primary Picture Cards Full yearly sets only			I								The Wellspring		
				II								Boyland		
				III								Firelight		
	Missionary Pictures for Use of Teachers		3									The Mayflower		
JUNIOR	Stories from the Olden Time	Teachers	4	IV										
	Stories from the Olden Time	Pupils	4	IV										
	Hero Stories	Teachers	5	V										
	Hero Stories	Pupils	5	V								Subscription entered for 12 months		
	Kingdom Stories	Teachers	6	VI								Beginning Apr Ending March 1926		
	Kingdom Stories	Pupils	6	VI										
	Gospel Stories	Teachers	7	VII										
	Gospel Stories	Pupils	7	VII										
INTERMEDIATE	Leaders of Israel	Teachers	8	VIII										
	Leaders of Israel	Pupils	8	VIII										
	Christian Leaders	Teachers	HIGH SCHOOL	IX										
	Christian Leaders	Pupils		IX										
	The Life of Christ	Teachers		X										
	The Life of Christ	Pupils		X										
	Christian Living	Teachers		XI										
	Christian Living	Pupils		XI										
SENIOR	World: A Field for Christian Service	Teachers		XII										
	World: A Field for Christian Service	Pupils		XII										
	History and Lit. Hebrew People	Teachers		XIII										
	History and Lit. Hebrew People	Pupils		XIII										
	History of New Testament Times	Teachers		XIV										
	History of New Testament Times	Pupils		XIV										
	Bible and Social Living	Teachers		XV										
	Bible and Social Living	Pupils		XV										
												Total Forward		
												C 4246 Grand Total		

PAID

NO GOODS CREDITED UNLESS RETURNED IN TWO WEEKS FROM TIME OF RECEIPT. NOT RESPONSIBLE FOR GOODS DELIVERED AT CHURCH OR PARISH BUILDINGS.

THIS IS THE ONLY ITEMIZED BILL YOU WILL RECEIVE. PLEASE FILE FOR FUTURE REFERENCE

No. 200 Ashland, Ky., 5-4 192V

THE ASHLAND YOUNG MEN'S CHRISTIAN ASSOCIATION

acknowledge with thanks the receipt from

M Mr. C. C. Means

OF Twenty DOLLARS

ON ACCOUNT OF

MEMBERSHIP	$	
SUBSCRIPTION	$	20 00
LOCKER NO.	$	
DORMITORY	$	
RENT	$	
TOTAL	$	20 00

C. M. Mitchell

For the Treasurer.

THE YOUNG MEN'S CHRISTIAN ASSOCIATION
OF ASHLAND, KENTUCKY

INCORPORATED

CITY AND RAILROAD

LOCAL AND LONG DISTANCE PHONE NO. 370

FILE NO._____

ASHLAND, KY.,

May 4, 1925.

Mrs. E. C. Means,
Ashland, Ky.

Dear Mrs. Means:

Enclosed find our Treasurer's receipt for $20.00, acknowledging your check in payment of subscription to our 1925 budget.

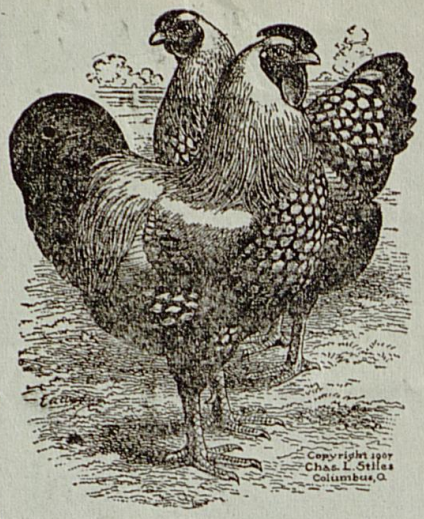
On behalf of our Board of Directors and personally I wish to assure you that we sincerely appreciated your continued interest in our work with young men and boys.

Yours sincerely,

C. M. Nicholas

General Secretary.

CMN:ME



INVOICE

R. PIERCE & SON

WHOLESALE DEALERS IN

POULTRY EGGS BUTTER

502 W. Greenup Ave. Phones 1273-1274

No. 473

Ashland, Ky., 4/16 192[illegible]

Name

Address

CASH	CHARGE	REC'D ACC'T	PAID OUT

Case Eggs	Doz. @			
Springers	Lbs. @			
Hens	14 3/4 @	31	4	43
O. R.	" @			
Ducks	" @			
Geese	" @			
Turkeys	" @			
Butter	" @			

All Bills due following Monday. No Balance carried

OGDEN HARDWARE CO.

INCORPORATED

ASHLAND. KY

SHEET NO.

Sold to Mrs. E. C. Means Apr. 192 5

Address 306 E. Lexington Ave. City.

All accounts due the first of the month after date of purchase

Store Phone 227
Office Phone 500

DATE	DESCRIPTION	CHARGES	CREDITS	BALANCE
3/26	Forward			17 40
4/1	1 323 Sargent Check Put On	10 00		
	Work on Washer	3 00		
	1 Eureka Elect. Sweeper & Attachment	45 00		75 40
4/3	By Cash		17 40	58 00
4/4	" "		40 00	
	" Allowance Mrs Anderson 5 00		5 00	13 00
4/10	6 12X14 Glass cut 11/4X14	1 20		14 20
4/14	2 3X12 D B Push Plates Put On Phone 1 25	2 00		16 20
4/17	2 Mellon Molds	2 50		
	1 Iron Pot	1 50		
	1 Lid	15		20 35
	By 1 Mellon Mold ret'd Mrs Anderson		1 25	19 10
4/18	1 Spade	1 50		
	1 Chamois	1 00		
	1 Sponge	1 00		22 60
4/25	1 Qt White Flat Tone	50		
	1 " " Enameloid	90		
	1 Qt Brass Lute	1 40		25 40
"	1 Dust Pan	75		26 15

PAID MAY 4 1925 OGDEN HARDWARE CO. BY

POSTAL TELEGRAPH – COMMERCIAL CABLES

CLARENCE H. MACKAY, PRESIDENT

CLASS OF SERVICE DESIRED	
FAST TELEGRAM	
DAY LETTER	
NIGHT TELEGRAM	
NIGHT LETTER	

The sender must mark an X opposite the class of service desired; otherwise the telegram will be transmitted as a fast telegram.

TELEGRAM

TELEGRAMS TO ALL AMERICA

THE MACKAY SYSTEM — POSTAL TELEGRAPH — COMMERCIAL CABLES — THE PULSE OF THE WORLD

CABLEGRAMS TO ALL THE WORLD

RECEIVER'S NUMBER

CHECK

TIME FILED

STANDARD TIME

Send the following Telegram, subject to the terms on back hereof, which are hereby agreed to.

Form F

To _____

May 14 1925

Rec'd from Mrs E. C. Means

fifty Cents Telegram

McKim

THE POSTAL TELEGRAPH-CABLE COMPANY (INCORPORATED)

OPERATOR'S NOTATIONS, TIME SENT, Etc.

TRANSMITS AND DELIVERS THE WITHIN TELEGRAM SUBJECT TO THE FOLLOWING TERMS AND CONDITIONS:

To guard against mistakes or delays, the sender of a telegram should order it REPEATED: that is, telegraphed back to the originating office for comparison. For this, one-half the unrepeated telegram rate is charged in addition. Unless otherwise indicated on its face, THIS IS AN UNREPEATED TELEGRAM AND PAID FOR AS SUCH, in consideration whereof it is agreed between the sender of the telegram and this Company as follows:

1. The Company shall not be liable for mistakes or delays in the transmission or delivery, or for non-delivery, of any telegram received for transmission at the UNREPEATED-MESSAGE rate, whether caused by the negligence of its servants or otherwise, beyond the sum of FIVE HUNDRED DOLLARS; nor for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the REPEATED-MESSAGE rate, beyond the sum of FIVE THOUSAND DOLLARS; nor for mistakes or delays in the transmission or delivery, or for non-delivery, of any message received for transmission at the SPECIALLY VALUED MESSAGE rate, beyond the sum at which such message shall be valued, in writing, by the sender thereof when tendered for transmission and for which payment is made or agreed to be made of the amount of the repeated-message rate and an additional charge equal to one-tenth of one per cent of the amount by which such written valuation shall exceed five thousand dollars; nor in any case for delays arising from unavoidable interruption in the working of its lines, or for errors in cipher or obscure messages.

2. The Company is hereby made the agent of the sender, without liability, to forward this telegram over the lines of any other company when necessary to reach its destination.

3. Messages will be delivered free within one-half mile of the Company's office in towns of 5,000 population or less, and within one mile of such office in other cities or towns. Beyond these limits the Company does not undertake to make delivery, but will, without liability, at the sender's request, as his agent and at his expense, endeavor to contract for him for such delivery at a reasonable price.

4. No responsibility attaches to this Company concerning messages until the same are accepted at one of its transmitting offices; and if a message is sent to such office by one of the Company's messengers, he acts for that purpose as the agent of the sender.

5. The Company shall not be liable for damages or statutory penalties in any case where the claim is not presented in writing within sixty days after the telegram is filed with the Company for transmission.

6. It is agreed that prompt and correct transmission and delivery of this message shall be presumed in any action for recovery of tolls therefor subject, however, to rebuttal by competent evidence.

7. Special terms governing the transmission of messages under the classes of messages enumerated below shall apply to messages in each of such respective classes in addition to all foregoing terms.

8. NO EMPLOYEE OF THIS COMPANY IS AUTHORIZED TO VARY THE FOREGOING.

EDWARD REYNOLDS, Vice-Prest. and General Manager.

POSTAL TELEGRAPH-CABLE COMPANY (Inc.)
CLARENCE H. MACKAY, President.

CLASSES OF SERVICE

FAST TELEGRAMS. A full-rate expedited service.

NIGHT TELEGRAMS. Accepted up to 2.00 a. m. at reduced rates to be sent during the night and delivered not earlier than the morning of the ensuing business day. Night telegrams may at the option of the Telegraph Company be mailed at destination to the addressees, and the Company shall be deemed to have discharged its obligation in such cases with respect to delivery by mailing such Night Telegrams at destination, postage prepaid.

DAY LETTERS. A deferred day service at rates lower than the standard fast telegram rate. One and one-half times the standard Night Letter rate for the transmission of 50 words or less, and one-fifth of the initial rate for each additional 10 words or less.

SPECIAL TERMS APPLYING TO DAY LETTERS. In further consideration of the reduced rate for this special "Day Letter" service, the following special terms in addition to those enumerated above are hereby agreed to:

(a) Day Letters may be forwarded by the Telegraph Company as a deferred service and the transmission and delivery of such Day Letter is, in all respects, subordinate to the priority of transmission and delivery of regular telegrams.

(b) Day Letters shall be written in plain English. Code language is not permissible.

(c) This Day Letter is received subject to the express understanding and agreemen that the Company does not undertake that a Day Letter shall be delivered on the day of its date absolutely and at all events; but that the Company's obligation in this respect is subject to the condition that there shall remain sufficient time for the transmission and delivery of such Day Letter on the day of its date during regular office hours, subject to the priority of the transmission of regular telegrams under the conditions named above.

No employee of the Company is authorized to vary the foregoing.

NIGHT LETTERS. Accepted up to 2.00 a. m. for delivery on the morning of the ensuing business day, at rates still lower than standard night telegram rates, as follows: The standard telegram rate for 10 words shall be charged for the transmission of 50 words or less, and one-fifth of such standard telegram rate for 10 words shall be charged for each additional 10 words or less.

SPECIAL TERMS APPLYING TO NIGHT LETTERS. In further consideration of the reduced rate for this special "Night Letter" service, the following special terms in addition to those enumerated above are hereby agreed to:

(a) Night Letters may at the option of the Telegraph Company be mailed at destination to the addressees, and the Company shall be deemed to have discharged its obligation in such cases with respect to delivery by mailing such Night Letters at destination, postage prepaid.

(b) Night Letters shall be written in plain English. Code language is not permissible.

No employee of the Company is authorized to vary the foregoing.

THE FASTEST TELEGRAPH SERVICE IN THE WORLD

OGDEN HARDWARE CO.

INCORPORATED

ASHLAND. KY

SHEET NO.

Sold to Mrs. E. C. Means — May 192 5

Address 306 E. Lexington, City.

All accounts due the first of the month after date of purchase

Store Phone 227
Office Phone 500

DATE	DESCRIPTION	CHARGES	CREDITS	BALANCE
	Jno Anderson			
5/6	1 Qt 362 S-M Paint	125		125
5/11	1 Pt. White Flat Paint Jno. A	50		175
5/20	2 cans Wall Paper Cleaner	25		200
5/22	Jno Anderson			
	1 Pkg White Decotint	65		
	2# Johnsons Floor Wax 75	150		415
5/29	3 Cemetary Vases 20	60		475

OGDEN HARDWARE COMPANY

-PHONES-
STORE 227
OFFICE 500

INCORPORATED

ASHLAND, KY., June 3 1925

E. C. Mendez.

Address 306 East Lexington

Terms; Cash 1st of month after date of purchase.

SOLD BY	ORDERED BY	DELIVERED BY
H.	Phone	

Quantity	ARTICLE	Amount		
1	Stove Cane		1	50

PRINTED BY HAMILTON AUTOGRAPHIC REGISTER CO., HAMILTON, OHIO.

This statement includes your purchases to close of business on the 25th.

THE C. H. PARSONS CO.

INCORPORATED

110 WEST WINCHESTER AVENUE

ASHLAND, KY.

Purchases made on 26th to 30th will appear on next month's statement.

Sold to Mrs E. C. Means 192 5

Address 316 E Lex

Phone 1559 Phone 79

DATE	DESCRIPTION	CHARGES	CREDITS	BALANCE
6/	Balance			
16	Skeeting	1 00		1 00

All accounts due and payable on the 1st of month following date of purchase.

JESS E. McCLAIN, PRESIDENT AND TREASURER
ALBERT R. DAVIES, VICE-PRESIDENT
EDWARD TRESCH, SECRETARY

ALL BILLS TO BE SETTLED MONTHLY

Cincinnati, June 8, 1925.

M Mrs. E. C. Means,
306 E. Lexington Ave.,
Ashland, Ky.

Bought of **The Joseph R. Peebles' Sons Co.**

Established 1840

Grocers and Importers

Terms: GOVERNMENT SQUARE

2# Mission Garden Ceylon Tea	.73	1.46
	Par Post	.09
	Ins.	.05
		1.60
	By Check	1.60

40414-5

POSTAL INSURANCE

CERT. 40414-A-5

The Automobile Insurance Company Of Hartford, Connecticut

In consideration of **FIVE CENTS** does insure the party named in the Policy issued with the book from which this certificate is taken, against loss or damage to an amount as provided in the Policy, on Property while in transit by Registered, Unregistered or Parcel Post Mail. This Certificate to be enclosed in the package containing the Property or with the invoice describing said Property.

President.

OGDEN HARDWARE COMPANY

-PHONES-
STORE 227
OFFICE 500

INCORPORATED

ASHLAND, KY., 6/11 1925

E. C. Means

Address

Terms; Cash 1st of month after date of purchase.

SOLD BY	ORDERED BY	DELIVERED BY
Law	Jno. Anderson	

Quantity	ARTICLE	Amount
1	Galv. Inset made for Moken Basket	1 00

Paid

O K E O

L. O

THE C. H. PARSONS CO., INCORPORATED

No 3964 A

ASHLAND, KY., 6/30 192 5

RECEIVED OF Mrs E. C. Means

One & 10/100 DOLLARS

THE C. H. PARSONS CO., INCORPORATED

$ 1.00 Bal. In full Per C. Stiv

FIRST PRESBYTERIAN CHURCH
ASHLAND, KY.
JOHN L. STEELE, TREASURER

IN ACCOUNT WITH DATE JUL 1 1925

E. C. Means,
306 E. Lexington Ave.,
Ashland, Ky.

Pledge to Annual Budget - - - - - - - - - - - - - - - - $ 208.00

Paid to Date - $ 80.00

Balance now Due on First Quarter - - - - - - - $ -- --

Help Us Meet Our Obligations Promptly

FIRST PRESBYTERIAN CHURCH
ASHLAND, KY.
JOHN L. STEELE, TREASURER

IN ACCOUNT WITH DATE JUL 1 1925

Mrs. E. C. Means,
306 E. Lexington Ave.,
Ashland, Ky.

Pledge to Annual Budget - - - - - - - - - - - - - - - - $ 300.00

Paid to Date - $ 228.00

Balance now Due on First Quarter - - - - - - - $ --- --

Help Us Meet Our Obligations Promptly

PAUL·REVERE·POTTERY
AND·S·E·G·BOWL·SHOP
80 NOTTINGHAM ROAD
BRIGHTON MASSACHUSETTS

MISS·EDITH·BROWN·DIRECTOR
TELEPHONE·BRIGHTON·1095

July 2, 1925.

Dear Mrs. Means:-

You did not need to feel so conscience-stricken because you had spelled the little girl's name two different ways! Still we are very glad to have the extra orders, and shall take much pleasure in getting all of this ware out for you just as soon as we can.

Thank you, also, for sending the check in advance. We are sure you will enjoy the ware and the pleasure the sets will give to all the children.

Sincerely yours,

PAUL REVERE POTTERY INC.,

Edith Brown.

Mrs. E. C. Means,
306 East Lexington Avenue,
Ashland,
Kentucky.

Brooklyn, N. Y., Aug 1st 192 5

Mrs E C Means alonson Mich Ponshewaing Hope

BOUGHT OF T. B. VENTRES

Bookseller, Stationer and Engraver

Pictures and Framing

Church and Sunday School Supplies

BOOK BINDING

Telephone Triangle 3617

286 LIVINGSTON STREET

July 2	1 Reading Desk & Cover Children		2 00	
	1 Hymn & Prayer Book Combination Letter		2 —	
	1 Bible Hymn Book Combination Letter		85 —	✓
	2 Pencils Envelopes	35	70	
	Post		32	5.87

T. B. VENTRES PAID AUG 12 1925 Per

CITY OF ASHLAND, KENTUCKY

4-1/2 PER CENT WATER WORKS IMPROVEMENT BONDS

DATED - AUGUST-1-1925

AMOUNT OF ISSUE 100 000 00

INTEREST- 4 1/2% Payable on Feb.1st and Aug.1st.

DENOMINATION- $1 000 00

DATED- August 1, 1925.

MATURITY- $50 000 00 August 1 1963
50 000 00 August 1 1964

PRINCIPAL AND INTEREST-
Payable at American Exchange Irving Trust Company of New York City, unless purchaser of entire offering desires the payment of interest in Chicago or New York at a bank mutually agreed upon.

SINKING FUND- To be on a 4 % Basis.

DATE OF SALE- Bids will be opened Monday, at 2 P.M. Central Standard Time-January 10-1927.

PLACE OF SALE-City Building, Ashland, Kentucky.

DELIVERY OF BONDS- February 1-1927. With Feb. 1, 1927 and prior coupons detached.

CERTIFIED CHECKS REQUIRED:
A certified check for 2% of the par value of the bonds must accompany bids, such check to be made payable to John W. Henderson, Treasurer, City of Ashland, Ky. Checks of unsuccessful bidders will be returned upon the award of the bonds. No interest will be allowed upon the amount of the check of the successful bidder and such check will be retained, to be applied in part payment for the bonds or to secure the City against loss resulting from the failure of the bidder to comply with the terms of his bid.

RIGHT TO REJECT:
The Ashland Water Works Commission reserves the right to reject any and all bids and readvertise the bonds or any portion of the same remaining unsold.

LEGAL AUTHORITY FOR ISSUE:
Issued under Section 3069 Carroll's Kentucky Statutes. This bond issue was authorized at an election held Nov. 4th.,1924.

Votes for Water Works Improvement Bonds	3,599
Votes against Water Works Improvement Bonds	1,028
Votes necessary to carry - 2/3 -	3,084

We know of no litigation pending or threatening against these bonds. The total amount of bonds authorized at above election was $300,000.00 of which $150,000.00 have been sold.

CITY HAS NEVER DEFAULTED:

The City of Ashland has never defaulted on interest or principal of any of its bonds.

The City tax levy will provide an ample amount for both interest and sinking fund requirements.

The earnings of the Water Works are more than sufficient to meet the interest on all water works bonds outstanding and to provide adequately for depreciation.

FINANCIAL CONDITION:

For financial condition of the City of Ashland see balance sheet attached (Page 4).

ASSESSED VALUATION:

The Assessed Valuation has been as follows:

Year 1921		$ 14,306,136.00
Year 1922		17,766,122.00
Year 1923		20,335,233.00
Year 1924		23,614,102.00
Year 1925		24,416,010.00
Year 1926		25,844,039.00
Year 1927	(Estimated)	26,500,000.00

TAX RATE:

The tax rate per $100.00 for year 1926 is as follows:

General Purpose	$ 1.00
School Expense	1.00
School Bonds	.22
Water Bonds	.20
Sewer Bonds	.05
Contingent Fund	.06
City Building Bonds	.05
	$ 2.58

OTHER FACTS:

Population-

Year 1920 Census	14,790
Year 1924 Special Census	24,385
Year 1926 Based on School Census	30,895

Parks-

Central Park, owned by the City, contains 45 acres, is situated in the beautiful residential section, and is worth $750,000.00 and is paid for in full.

Paved Streets-

Ashland has 60 miles of paved streets and 4 miles of paved alleys, constituting an investment of $3,750,000.00. All of the costs thereof and the interest is payable in ten annual installments, with privilege of anticipating, a lien being given on the abutting property to secure payment of bonds.

The City is chargeable only where it owns abutting property or where the value of the abutting property is less than double the cost of the paving, and then only for its proportionate share.

HISTORICAL:

The first sale of town lots was held in 1854 and in the year 1856 the Town of Ashland was incorporated by Special Act. of the Kentucky Legislature and approved Feb. 23, 1856. It became a City of the Second Class by Act. of the Legislature March 22, 1924.

Ashland is known as the "Park City" and is famed for well paved streets, lined with beautiful trees, its excellent schools, great manufacturing plants, fine homes, and general prosperity. It is at the gate-way of the coal region of the Chesapeake and Ohio and Norfolk and Western railroads.

A large proportion of Ashland's working people are members of local building and loan associations and own their homes.

The high esteem in which Ashland is held by bond purchasers is evidenced by the handsome premiums which the City's bonds offerings invariably command.

WATER WORKS:

This plant has always been operated under experienced management. It is modern and has been a financial success from the beginning. The purpose of this bond issue is to provide for additional water mains, meters, an additional reservoir and other improvements.

CONDENSED BALANCE SHEET OF THE ASHLAND WATER WORKS.
For Quarter ending Oct. 31, 1926.

A S S E T S		L I A B I L I T I E S	
Property and Plant	1,114,638.48	City of Ashland:	
Less Reserve for Depreciation	81,786.93	From sale of bonds	846,000.00
	1,032,851.55	" Premium on bonds	11,829.60
			857,829.60
Stores and Supplies	24,492.44	Accounts Payable	2,004.01
Tools and Equipment	18,174.70	Consumers Deposit for extensions, etc. which no interest is	
Misc. Prepayments, Prepaid Insurance, etc.	1,643.53	chargeable.	70,126.02
Accounts Receivable	14,120.48	Earnings applicable to reimburse City of Ashland for interest	
Cash	27,070.07	paid on bonds by City.	159,104.65
		Earned Surplus	29,288.49
	1,118,352.77		1,118,352.77

ASHLAND WATER WORKS COMMISSION

All bids should be addressed to:

H. L. CARROLL,
CITY CLERK,
ASHLAND, KY.

CITY OF ASHLAND, KENTUCKY
CONDENSED BALANCE SHEET
JUNE-30-1926

ASSETS

General Fund - Cash -			2 292 30
Notes Receivable - Loan to Board of Education -			109 500 00
Sinking Funds:	Cash	Securities	
School Bonds	108 33		
Water Works Bonds	4 813 06	112 800 00	
Sewer Bonds	3 229 74	82 900 00	
City Bldg.Bonds	4 35	5 000 00	
	8 155 48	200 700 00	208 855 48
Other Funds:			
School Funds	2 88		
Sewer Purpose Funds	1 901 88		
Street Repair Funds	7 873 05		
Building Permit "	480 61		
Contingent Funds	355 43		
City Bldg. Fund	58 242 46		
Cash	68 856 31		68 856 31
Property Account:			
Real Estate and Buildings(Book Value)		85 575 90	
New City Building-Cost to date		146 377 84	
Water Works Plant & Equipment		857 829 60	
Sanitary Sewer System		261 356 82	
Tenth Street Sewer		7 013 28	
Equipment-Fire,Police&Street Depts.		31 224 95	
(Omitting increased value for Real Estate).		1 389 378 39	1 389 378 39
Proceeds from bond sales invested in School Bldgs.			396 500 00
Street Paving and School Property			8 269 26
Advances:			
School Bond Sinking Fund		15 800 00	
City Building Bond Sinking Fund		4 530 00	20 330 00
Advances to Street Paving Contracts			88 226 50
Election Expense - Bond Issue -			435 96
Taxes Receivable			590 722 36
			2 883 366 56

LIABILITIES

Bonded Indebtedness:		
School Bonds	396 500 00	
Water Works Bonds	846 000 00	
Sewer Bonds	250 000 00	
City Building Bonds	200 000 00	
Refunding Bonds	90 000 00	
Total Bonded Indebtedness	1 782 500 00	1 782 500 00
Current Liabilities:		
Notes Payable	32 000 00	
Vouchers Outstanding	1 565 34	
Accrued Accounts Payable	16 246 42	
Total Floating Debt	49 811 76	49 811 76
Reserves for uncollected Taxes		590 722 36
Excess Assets over Liabilities		460 332 44
		2 883 366 56

As distribution of Ashland Iron & Mining Co. $32.23

" proceeds of sale of the American Rolling Mill Co. 24.64

$56.87

Enclosure.

United States Trust Company of New York.

45 & 47 WALL STREET.

October 9, 1925.

Mr. Ellison C. Means,

Ashland, Ky.

Dear Sir:

For account of the Estate of Margaret A. Means, we received in July, 1924, stock of The American Rolling Mill Company representing a 5% stock dividend, and in July, 1925, we received further shares representing a 5% stock dividend upon the first stock dividend, leaving in our hands 67 14/20 shares of the stock. We are advised by our attorneys that these shares should be distributed to the beneficiaries in exactly the same proportions as the residuary estate. We accordingly hand you certificate for 4 shares of The American Rolling Mill Company stock together with our check for $24.64, being proceeds of the sale of the undivided stock. Kindly acknowledge receipt.

Yours very truly,

WCL:EP

Assistant Secretary.

Enclosure.

United States Trust Company of New York.

45 & 47 WALL STREET.

October 13, 1925.

Mr. Ellison C. Means,

Ashland, Ky.

Dear Sir:

We have received a distribution of 15¢ per share upon stock of the Ashland Iron & Mining Company which was at one time held for account of the Estate of Margaret A. Means, and we enclose our check for $32.23, being part of this distribution which is distributed in the proportion set down in the recent decree covering the accounts of the executors. Kindly acknowledge receipt.

Yours very truly,

WCL:EP

Assistant Secretary.

PARK CITY MARKET

Fancy Groceries, Quality Meats

315 15th Street

Ashland, Ky., 10-17 1925

M E C Means

No. 135

Phones 148 168 26

ACCOUNT FORWARDED

1	F C			40
2	Lg Loin	✓	1	00
3	Bac	✓		60
4				
5			3	3
6				
7				
8				
9				
10				
11				
12				
13				
14				
15	35			

Your account stated to date. If error is found return at once.

No. 11230

Presbyterian Board of Ministerial Relief and Sustentation

912 WITHERSPOON BUILDING, PHILADELPHIA, PENNA.

October 20th, 1925

Dear Friend:

We respectfully call your attention to the fact that, in accordance with the terms of your subscription of $ 10.00 per year for 5 years, the 3rd payment of $ 10.00 will be due November 1925

Kindly forward this notice with your remittance, and it will be receipted and returned to you.

Mrs. E. C. Means,
306 E. Lexington,
Ashland, Ky.

RECEIVED PAYMENT
OCT 27 1925
JOHN H. GROSS, Treas.
Per E.

Church 1st

Presbytery Ebenezer.

Relief Department, $

Sustentation Department, $ 10.00

Very truly yours,

John H Gross

(JOHN H. GROSS) Treasurer

PARK CITY MARKET

Fancy Groceries, Quality Meats

315 15th Street

Ashland, Ky., 10-21 1925

M Mrs C. C. Stears

No.

Phones { 148 / 168 / 26

ACCOUNT FORWARDED 35

1	OBB.	1		30
2	L C.	1		75
3	Bon	1		60
4				
5				
6			5	10
7				
8				
9				
10				
11				
12				
13				
14	21			
15				

Your account stated to date. If error is found return at once.

Going Back To Longdale

Where Furnaces, Mines and Mansions Were Part of a Principality

An Interesting Narrative of the Historical Longdale Iron Co. of Virginia

By William W. Hearne, President, William W. Hearne, Inc., Philadelphia

DURING the days before the Civil war there had developed in Virginia, along the James river, in the Blue Ridge mountains and the Allegheny mountains a great many charcoal blast furnaces and bloomeries. These ironworks sent their product out to the market on flat bottomed boats that could float on the James river and its various tributaries.

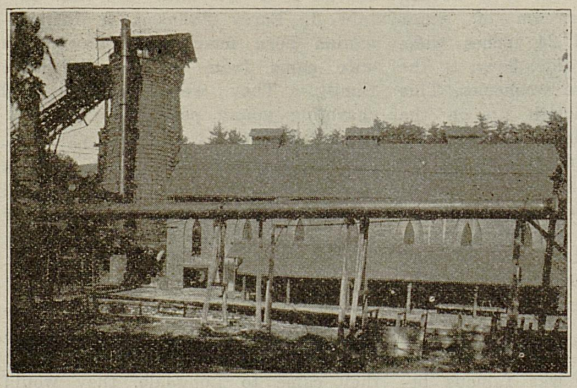
Among these plants was the Selina Moore furnace owned and operated by a family named Jackson. This furnace was supposed to have been built in 1827. In some way the property got into the hands of some people in Boston. Soon after the close of the war these people became financially embarrassed. Among their largest creditors were members of the Pardee family who had been shipping anthracite coal to them. The only way the Pardees could get anything on their claims was to take over the Jackson properties in Allegheny county, Virginia.

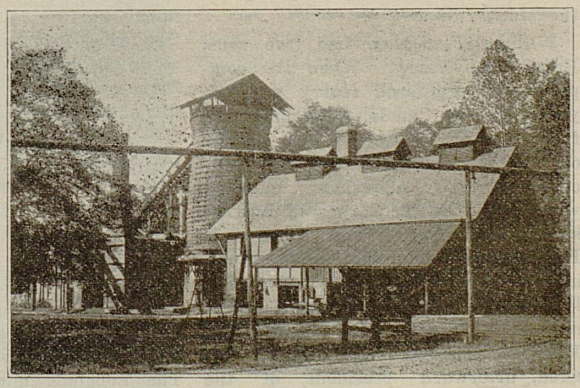
Up in Glendon, Pennsylvania, a suburb of Easton, there was a blast furnace owned by the Glendon Iron Co. This company was made up of Ario Pardee, Guilliam Fell and William Firmstone. These three families have been allied in business for several generations.

The Pardees and Fells were pioneers in the mining of anthracite coal and the Firmstones were among the pioneers of the pig iron manufacturing business.

The first Firmstone, the father of William, came to America from England to build a hot blast stove at a charcoal iron furnace in Sciota county, Ohio, near Portsmouth and this was the first hot blast stove in America. William Firmstone came over after his father had operated blast furnaces in various parts of the United States, at first on charcoal and then on coke. Swank, in his "History of Iron in America," credits him with being the first man to smelt iron ore with coke in this country. This was at Union furnace in Pennsylvania.

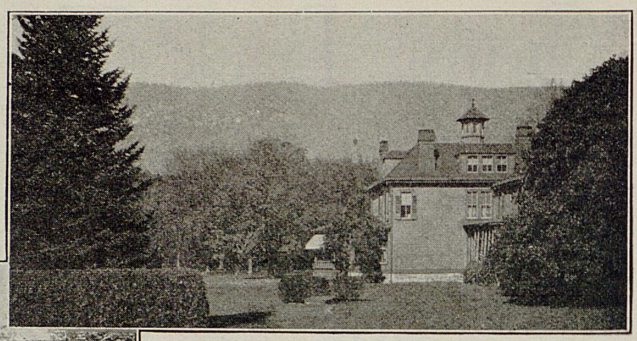
The Pardees, R. D. Wood and the Fells and Firmstones started the Rock Hill furnaces at Rock Hill, Pennsylvania, on the Little Broad Top. Naturally, when the Pardees came into posses-

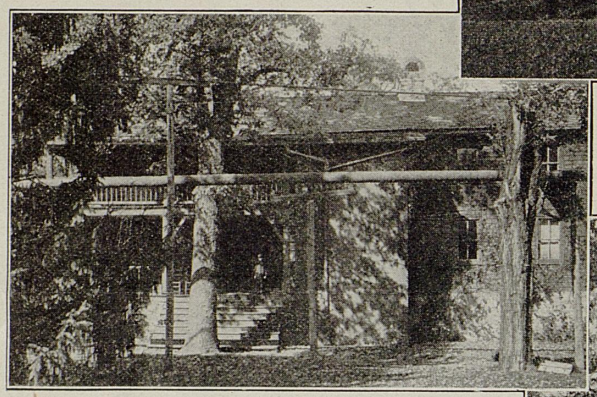




"The Firmstones being of English heredity and tradition the Longdale furnaces were built to conserve heat. The furnaces had no steel jackets, but brick walls surrounded by heavy iron bands"

THE manager's home in this 23,400-acre "principality" was built according to his wife's ideas. There the owners lived when they visited the furnaces. Below at the right is the mine superintendent's house, in leafy bower; and at the left, office of the Longdale Iron Co.





sion of the large iron property in Virginia, they called on the Fells and Firmstones to go in with them, as the Firmstones were practical iron people while the Pardees were coal miners.

When they came to examine the property they found they had acquired a principality. They owned 23,400 acres, a tract about three miles wide and ten miles long. On the western edge was the Cow pasture river, a beautiful clear stream which still affords fine bass fishing. On the other three sides they were surrounded by North mountain.

William Firmstone and his son, Frank, were operating the blast furnace at Glendon, Pennsylvania, on the Lehigh river. They organized a stock company called the Longdale Iron Co., of which the Firmstones eventually owned the majority of the stock.

William Firmstone had two sons, Frank and Harry. When the company was organized Harry was too young to be made president, but from the beginning he had charge of the engineering. He was educated at the Polytechnic Institute which stood at the corner of Market street and South Penn Square in Philadelphia, where the Third National bank now stands. It was directly opposite the present Broad street station. In the same class with Harry Firmstone was James McCrea, afterward president of the Pennsylvania railroad, and Jonathan R. Jones for many years treasurer and general sales manager of Alan Wood & Co., afterward the Alan Wood Iron & Steel Co.

Longdale was peculiar in many ways. All of the ore that was used there from 1867 to 1912 was mined on the property within sight of the furnaces. The quarry from which the company obtained all of its limestone also was on the property within easy walking distance from the furnace.

One of its great assets was a large spring. This was walled up with concrete and from it a wooden flume carried a stream of water 24 inches deep and 24 inches wide, along the mountain side, down to the furnaces and the ore washeries. This flume was high enough up on the side of the mountain so that at the furnace it had sufficient power to operate conveyors on two inclined planes, one for each stack, on which all the stock used in the furnaces was raised. The stock was elevated without any cost except the maintenance of the flume.

The ore used at Longdale was a limonite, and known as Oriskany ore. The Longdale mine was famous because of its high grade ore and because it was the largest deposit of Oriskany ore in the United States. The mines were worked continuously by the Longdale people from 1867 to 1912. After the Longdale Iron Co. was liquidated the mine was leased to the Low Moor Iron Co., which operated it for several years.

Soon after the owners acquired this property they decided to employ a general manager, and they found a young man who had been a captain in the engineering corps of the northern army, who had been located at Lick Run on the James river, in charge of a saw mill. He was Captain J. Esrey Johnson, a Pennsylvanian born near Bryn Mawr. His wife came from an old Baltimore family. They were educated and charming young people.

None of the owners of the property wanted to live at Longdale as they were wealthy men, well advanced in years. There was no place for them to stay at Longdale, except with the Johnsons, and this was inconvenient as the house was small. Finally the owners proposed to the Johnsons that if the latter agreed to let them stay at their house when they came to Longdale, they would build them a house on Mr. Johnson's own plans. The result was the house

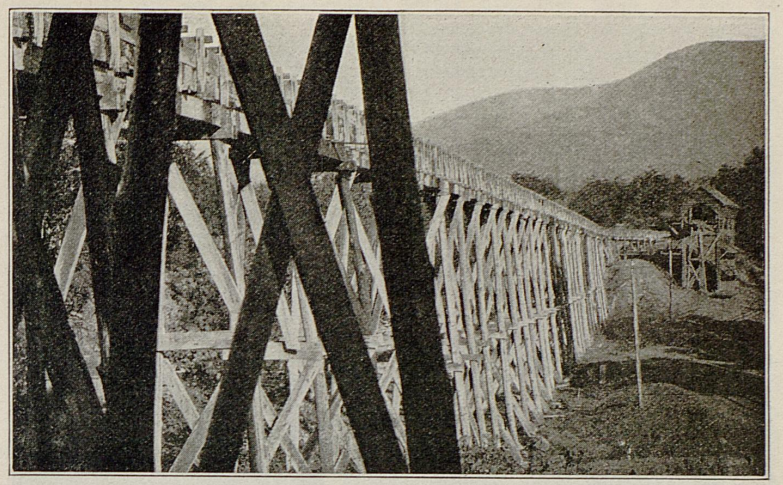
in the park at Longdale that became quite famous for its gracious hospitality.

Soon after the Johnsons moved to Longdale Guy R. Johnson was born, and a few years later J. Esrey Johnson, Jr. Both lived all their youth at Longdale and were prepared for college by Mr. Townsend, who still lives at Longdale. After graduating from Haverford, Guy R. Johnson worked as an assistant to his father for several years and became a very able blast furnace superintendent. From Longdale he went to Embreeville, Tenn., from there to Youngstown, O., then to Duquesne, Pa., then to Chicago and at the time of his death was vice president and general manager of the Alabama Consolidated Iron & Coal Co.

J. Esrey Johnson, Jr., graduated from Haverford college, took an engineering course at Cornell, worked for the Sweet Engine Co., and after Guy R. Johnson left Longdale went back there and was assistant general manager for a number of years. In 1906 he was made general manager of the Princess Furnace Co., where he remained for a number of years. From the Princess Furnace Co., he went to the Lake Superior district where he had charge of the largest charcoal iron blast furnace in the country.

All of his life he was a student and an experimenter and there is scarcely a discussion of blast furnace practice during which discussion J. Esrey Johnson, Jr., is not quoted. By one of those unexplainable vagaries of fate, this brilliant young man was run down and killed near his own home by a reckless motor car driver.

If Longdale produced nothing else, she produced two young men who left their mark in the blast furnace industry of the country.



One of the company's great assets was a large spring. A wooden flume carried a stream down to furnaces, with power enough to elevate the conveyors for feeding the furnaces

When the property was acquired William Firmstone was well along in years, so while he exercised a supervision over the operations of the company the main work was done by his two sons, Frank and Harry. Both remained bachelors. Frank did not give much time to Longdale because he was interested in operating Glendon and afterward in operating the Cranberry property in North Carolina. This property belongs to the same families who owned Longdale. Harry Firmstone spent most of his life at Longdale and most of the time was the largest individual stockholder and president.

During the early days of iron making at Longdale, the pig iron was hauled by teams to the Cow Pasture river and loaded on flat boats which were floated down to the James river, whenever there was water. Before the river division of the Chesapeake & Ohio railroad was built there was a canal parallel to the James river. Some of the canal bed and portions of the locks still can be seen.

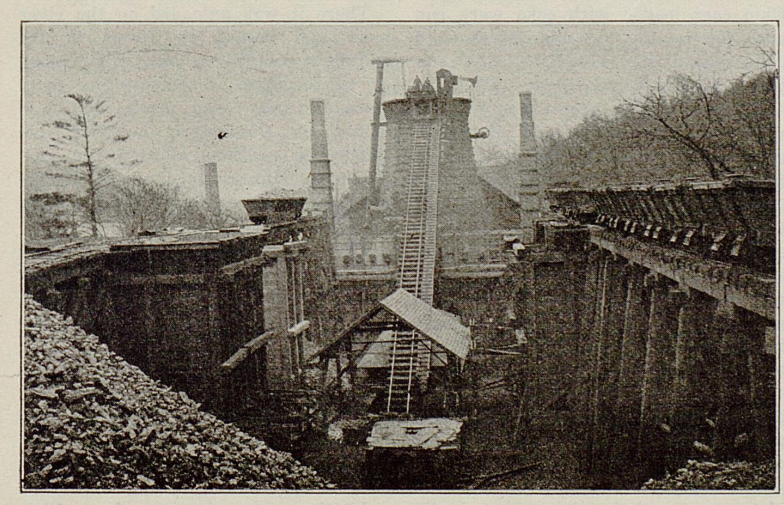
We do not know just when this canal was abandoned, but the stone wall that was built to raise the iron yard at the Princess furnace, Glen Wilton, Virginia, to the level of the car floors, so the iron could be wheeled directly into a box car, was made of huge stones taken from some of the canal locks. The wall was built in 1883.

The Longdale property was situated in a valley. Through this valley ran a beautiful creek, which was ideal for trout fishing, but the Firmstones never fished and did not post the stream, so the mountain people and the workmen kept it well fished out.

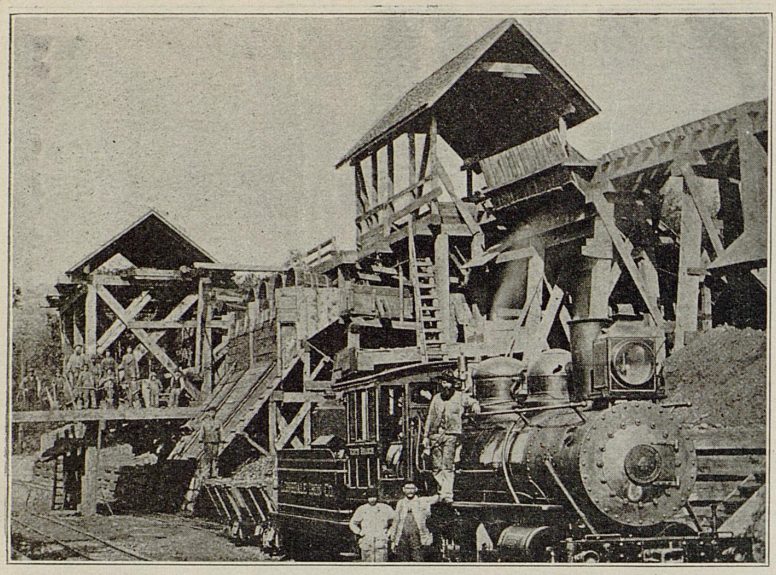
The furnaces were built as close to the mines as possible and were about the same place as the old charcoal stack. At this point the valley widened, so there was room for the two stacks and for the small amount of stock that was carried. The company seldom had more than 30 day's stock on hand as it practically never had both stacks out of blast and it regulated the mining and coking plant, and quarries so that raw material came forward as wanted.

The company's locomotives were purchased, but it had its own saw mill and wood working establishment and machine shops. It built all its cars and houses.

The main line of what is now the Chesapeake & Ohio ran from Rich-



View of the Longdale plant taken in 1883



The "iron horse" of the Longdale Iron Co., at the ore washer

mond to Covington, Va. This was the old Virgina Central railroad, built in 1867. In 1868 the Virginia Central and the Covington & Ohio railroad were consolidated under the name of Chesapeake & Ohio railroad, but they had only built as far as White Sulphur Springs by the year 1870. The most important part of the roaod from Kanawha Falls to White Sulphur Springs was completed about 1871. This was the section of the road that opened up the celebrated New River district and made the New River coal available.

The section of the road from Huntington, W. Va. to Cincinnati was not built until 1889.

What is now the James river division was leased by the Chesapeake & Ohio in 1889. Before that time it was the Richmond & Allegheny railroad.

The furnaces were located about seven miles from the main line of the Chesapeake & Ohio, but the Longdale Iron Co.'s property extended to the railroad. Accordingly the company built its own railroad from the furnaces to the Chesapeake & Ohio. Instead of having its iron yard at the furnace it loaded the iron from the pig bed onto flat cars and ran it down to the junction with the out-bound railroad, and piled the iron on its yard there in half ton layers.

When this iron was loaded onto the Chesapeake & Ohio cars it never was reweighed. So carefully was this iron piled and handled that there were practically no claims from customers for shortage. When a shortage was claimed Harry Firmstone always allowed it because, as he said, if the customer did not get his iron it must still be on the yard. This was a safe idea for the Longdale yard was practically inaccessible to thieves as there was no way to get to it except over the company's property.

This did not apply to iron going west before 1889 as it was the custom to pile the iron on the railroad property on the Ohio river bank at Huntington. These piles were easily accessible to unscrupulous boatmen on the Ohio river. Several times lots of iron were stolen, but in almost every case the thieves were arrested and convicted as it was always possible to identify the iron, with the name Longdale cast on every pig.

At Longdale there was a large coke trestle and the Chesapeake & Ohio cars loaded with coke were run onto the trestle and dumped through chutes into the Longdale cars and taken to the furnace coke stockpile.

If built today, there would be a standard gage track and the railroad would be run up to the furnace trestle. At the time this plant was built, however, the railroads did not have the money and would not construct the track. It was much cheaper to build and operate a 3-foot gage railroad than a standard gage, especially in a mountainous place like Longdale. As a matter of fact, it took no power to run the trainloads of pig iron to the junction, because it was down grade all the way, and the carloads of coke going back were lighter.

The Longdale railroad was so completely equipped that it could and did rebuild its own locomotives. All the castings used on the property were made from iron taken from the furnace. This included all the chills used in the pig bed.

The Longdale people acquired a large acreage of coal land in Fayette county, West Virginia. This land carried both the Sewall seam and the Fire Creek seam, the two most desirable seams in that part of West Virginia. The Fire Creek seam was so thin that the company never mined it, but drew all its coal from the Sewall seam.

It built its own coke ovens at Sewall on the main line of the Chesapeake & Ohio, and built its own railroad from Sewall to the mines. The coke was thoroughly burned, practically all of it 72 hours, as the Firmstones did not like soft coke. The coke never ran over 9 per cent in ash and seldom over .50 per cent in sulphur. After the Longdale Iron Co. ceased operating it sold the railroad and the mine to the Babcock interests of Pittsburgh.

The Oriskany ore was free from sulphur so that it was not difficult to make low sulphur pig iron. The practice at Glendon had been to make mostly gray forge iron for puddling. At Longdale it was the practice to carry a good burden of lime and to make low silicon, low sulphur iron. The iron was so pure that it frequently was used as a substitute for charcoal iron.

Before the failure of E. L. Harper & Co., in Cincinnati in 1886, the Longdale iron was sold in the West by them.

The Chesapeake & Ohio ended at Huntington, W. Va., until 1889, and all freight was transferred there to boats and carried down to various river towns, principally to Cincinnati.

There it was unloaded on the river bank and hauled by teams to the railroads radiating from Cincinnati, or to the local consumers, or to a storage yard. Not much iron was stored at Cincinnati, however, because the railroad allowed the iron to lie at Huntington free of charge and there were almost daily boats to Cincinnati.

The old Longdale pigs were about 48 inches long and rather slender so that they resembled charcoal iron in appearance. Every pig mold carried the name Longdale.

The agricultural implement makers at Springfield, O., and Dayton, O., were large users of the foundry iron and most of the gray forge iron was used in Wheeling, Bridgeport and around Pittsburgh.

In the early nineties, about 1891, the manufacture of basic open-hearth

steel commenced and the first to take it up were the Pennsylvania Steel Co., A. P. Roberts,, and the Phoenix Iron Co. It was difficult to get pig iron cast in chills. At first an attempt was made to use sand cast iron but the sand added so much silica that it was found impractical, and the mixer was not yet invented.

These basic makers found Longdale iron with its low silicon and sulphur ideal for their work. They tried hard to get the Longdale people to cast their iron in chill molds laid in the pig bed. Finally, the Pennsylvania Steel Co. agreed to send down the patterns for the pig molds and to pay Longdale 50 cents a ton premium for chill cast iron. For a number of years Longdale commanded a premium and many thousand tons of this iron were shipped to the eastern steel plants.

After the Longdale Iron Co. had become accustomed to casting in chills it refused to cast in sand. When owing to slack demand for basic iron it turned the furnace into foundry iron, it cast foundry iron in chill molds. It was the first to make chill-cast foundry iron.

Chilled Iron in Demand

The writer had the rather hard job of convincing the foundry people that the close grained chill cast iron would be soft on remelting. This, however, was not so difficult to do because while the Longdale iron was a little close around the edge it was never very close and never very white. The reason for this was that the iron was not cast in machines and dumped into the water as is the present practice, but was cast in iron molds washed with a thin loam.

The iron molds were very heavy. They were about 5 feet long, 9 inches deep and 2 feet wide. There were about four pigs to each section. The iron was left in the molds until cool enough to handle. The hot iron heated up the molds and the casts were close enough together so that they seldom were quite cold. Consequently, while the iron was free from sand, it was not really chilled. We have frequently seen Longdale analyses showing silicon 0.50 per cent sulphur 0.005 per cent.

Two large makers of air cylinders always bought Longdale iron for this class of work, no matter how high the price. At times they paid several dollars per ton more for Longdale than for local iron. The grade they used analyzed about as follows: Silicon 1.50 per cent; sulphur 0.05 and under, usually 0.02 per cent; phosphorus 1.15 per cent, and manganese 1.20 per cent.

One man had a peculiar test for fluidity. He had a pattern of bars about an inch wide, ⅛ of an inch thick and 18 inches long. One day he ran a test of high silicon southern iron about 0.90 per cent phosphorus, a local 2X foundry iron and Longdale, of the foregoing analysis. Neither the southern nor the local 2X filled out the mold. He said if he could have gotten the end of the mold open in time he thought the Longdale would have run to the end of the shop.

The lesson of this is that high carbon, moderately high phosphorus and manganese, together with low sulphur, are more dependable for fluidity than high silicon. Furthermore this class of iron is invaluable where castings are wanted that will be absolutely free from pin holes, as air cylinders must be.

The Firmstones being of English heredity and tradition, the Longdale furnaces were built to conserve heat. They had no steel jackets, but brick walls surrounded by heavy iron bands drawn together by turnbuckles. Their blast was heated by a very large battery of iron pipe Durham stoves. They seldom got over 800 degrees, but the blast temperature would not vary 10 degrees in a year. Their ore would not yield more than 45 per cent iron, but they made foundry iron with 2400 to 2500 pounds of coke to the ton of iron.

One Lining Lasts 7 Years

They were never without one stack in blast in over 40 years. They ran at times over seven years on one lining and during that time the blast was never off, except when it was stopped for a few hours at a time to clear the zinc out of the top of the furnace and the mouth of the downcomer. It was figured that the zinc oxide recovered more than paid for the temporary shutdown of the plant.

The Longdale Iron Co. liquidated because all of the owners were old men and rich. No one of them was willing to work hard enough to keep things going during the hard years that preceded the great war. They had no debts of any kind, so they sold their coal mines and railroad in West Virginia to the Babcocks and their dolomite quarries in Virginia to others.

They fixed a price on the Longdale furnaces, ore mines and limestone quarries and held to this price for about two years. Finally Harry Firmstone called the stockholders together and told them he was as anxious to close the matter up as they were and, if they were willing, he would give them his check for the amount they had fixed. They all agreed to this.

Mr. Firmstone let a contract to remove the 40 years' accumulation of blast furnace cinder. He leased the ore mines for a few years to the Low Moor Co. He then gradually dismantled the plant and sold off the machinery, but he kept the houses and the railroad property for several years following.

After Low Moor ceased to operate the mines, he decided to sell the railroad and a large part of the land to Mr. Wright, who had the contract for removing the cinder. He retained the mansion house and park and quite an acreage of land surrounding it, and lived there until his death, March 10, 1922.

Copper Plates Shingles

The problem of copper plating a nonmetallic substance, long believed impossible, has been accomplished by the Anaconda Copper Mining Co., New York, according to a recent announcement. Since discovery many years ago that copper could be deposited electrolytically, with fine texture and high tensile strength, innumerable attempts have been made to commercialize the process using nonmetallic bases. The achievement of the Anaconda company has provided a new roofing material, namely, copper clad asphalt shingles. The roofing is asphalt covered and impregnated with copper by a manufacturing process which has been termed "galvanoplastry."

Displays Progress

The pre-eminence of America in the generation and consumption of electricity is emphasized at the Electrical Show being held this week in the Grand Central Palace, New York. The exhibits, which contain over 30,000 electrical devices, represent an investment of several million dollars and the equipment in operation shows the manufacture of a great variety of products.

A graphic chart displayed by the Edison Co., shows that New York City, with a population of 6,000,000 uses more electricity than twelve European countries combined, with an aggregate population of 109,000,000. The annual consumption is shown as some five billion kilowatt-hours of electricity.

THIS is a description of the safety organization and methods at the Carnegie Steel Co.'s plant in Duquesne, Pa., as presented at the Cleveland meeting of the National Safety council by the author who is superintendent of transportation and general labor department of the Duquesne works.

Operating the Plant Railroad Safely

By J. A. Hughes

WE HAVE 2500 men on our safety committees," says the author, who evidently believes in giving all employes an opportunity to become personally interested in the safety problem as it relates to the entire plant. The principles, which the company follows, are the same, whether 5000 or 500 are employed.

OUR department has a safety committee of six members who include the superintendent, general foreman, foreman, brakemen or conductors. They serve for four months and meet every two weeks.

The members make a note of the date, time and place of everything they have done between meetings for the protection of the employes. If they notice any worker doing anything unsafe in any department they speak to the individual and call the attention of the foremen to the practice. If the matter is important it is reported to the head of the department who investigates immediately. This method has brought wonderful results which are noted in our minutes which give each committee man credit for what he has done between meetings. Copies of these minutes are forwarded to the general superintendent, safety engineer and our city office.

All of our foremen and yardmasters speak to their men regarding safety before starting work each day. They observe the men very closely and if they detect the odor of intoxicating liquor on any man he is sent home and not permitted to return until permission has been granted by the superintendent.

We also inspect all tools before they are taken from the tool house to make sure that the bars are not burred and that the cutters and hammers are in good condition so that there will be no danger of men being injured by their tools. Our men have instructions to wear goggles at all times when they are using bars or cutters. If their tools are not in the proper condition pieces are liable to fly and injure somebody. Pick handles, shovel handles, sledge handles, etc., are kept in good condition as we have had experiences in the past of split handles causing serious injury to the hands of our workers. It is also the duty of the foremen to see that their men get proper instructions regarding the places in which they are to work and to see that everything is safe before they begin.

We feel that the term "foreman" or "boss" should be eliminated and the title should be "educator," as we believe that the most successful person is the man who makes a study of his men and makes them feel they are a real part of the organization. A man who takes such an interest in his work and does it to the best of his ability in a safe way, should be praised, as all of us are human and like a pat on the back when we have done something worth while.

Danger Signals Are Required

For the protection of men who are loading or unloading cars a red flag is displayed on each end of the track during the day time and at night a red lantern is shown. On all excavations before leaving the job the men put safe guards and red lanterns so as to prevent accidents. The track men who are repairing tracks display red flags at day and red lanterns at night. When men are unloading materials, inspections are made to see they have proper clearance along the tracks.

If our men find any protruding nails in the material they are unloading they are instructed to hammer them down. This also applies to nails in material found in the yards. Anything that may fall from cars or rubbish which somebody may leave in the yard is immediately removed so as to prevent possible injury.

In cases of men who stand on rails or inside of rails or on frogs or switchpoints, or who get on the footboards of approaching engines, we insist that they stand on the outside of the rail on the ground and that when they are on the footboard they must give their engineers an appropriate signal so that the latter will know all is safe.

Coupling cars on the short side of a curve is a dangerous practice so our men are instructed to couple on the wide side.

Adjusting draw-heads with feet is also dangerous and in the past some men have been hurt from this practice. We are doing everything possible to prevent such accidents.

A report is made immediately to the superintendent's office regarding the location of all derailments and running through switches, giving the causes so that our track men can investigate and see that the track is made safe and to ascertain if any footguards in frogs, switchpoints or crossings are damaged. It is important that such be replaced immediately.

Swinging of cars, sometimes called flying switches, and poling cars are practices that are discouraged in our department as we know this is a menace, as serious injury and death have resulted from this practice in the past.

We insist that when our men throw a switch they glance at the switch point to see if it is properly closed as there may be a small piece of dirt in the point which would cause derailment and possible injury.

Records are kept regarding all accidents. When there is a derailment caused by running through switches or any other dangerous practices the records of our men are looked up and the offenders are brought before the safety committee. In the majority of cases it is only necessary to reprimand the careless men in the presence of the committee and the violators then promise to be more careful in the future. If the offense is so seri-

ous that it cannot be overlooked the offenders are suspended and copies of the suspension notice, giving the names of the men and the causes, are posted. Employes who do not have good safety records and who do not carry out the safety practices are dismissed.

We are instilling in the minds of our men the importance of being truthful in all of their statements and it is very gratifying to note how openly the men come to our investigations and voluntarily confess when they are responsible for accidents. They realize that it is important to be truthful so that we can take the necessary steps to protect all of our workers.

We insist on our men going to the hospital to have dirt removed from their eyes.

When we find that there is any ill feeling among our men we investigate the matter and then bring the parties involved before the safety committee which endeavors to induce the men to settle their differences. Before they leave the committee meeting the parties involved in the dispute must promise to work harmoniously in the future. Good fellowship is an important factor in safety work.

We have 2500 men on our safety committees and it is a wonderful thing to look back and compare our present methods and conditions with those of yesterday. We feel that we all have a great work to perform. We realize that it is important that we should relieve the relatives of our workers from the fear of losing fathers or brothers or friends whose loss of life may mean the sole support and means of educating the family. It is very gratifying for the women to know that their men folk are safe at work.

One-Third of "Key Men" Are College Trained

Nearly 15 per cent of all the men in the electrical industry of the United States hold executive or other positions of importance, and of these 37 per cent are college trained, approximately 33 per cent being men who attended or were graduated from technical colleges. A survey of technical education in its relation to the electric manufacturing industry, by the National Industrial Conference board, New York, also developed the fact that of all the college men included in the survey the largest number, or 71 per cent, have had collegiate training in electrical engineering, while the next largest group, totaling 11.8 per cent, received college training in mechanical engineering. The third largest group, 11.5 per cent, were trained in other than engineering subjects, such as academic or business administration courses.

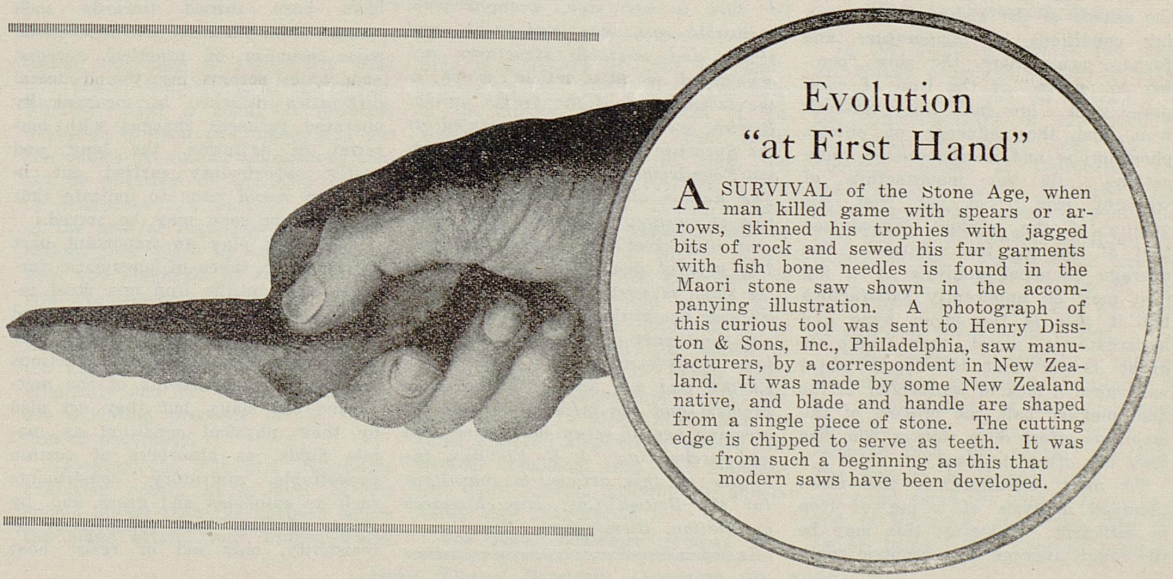
The largest number of college men occupy positions as engineers; then follow in order salesmen and sales engineers. The largest number of nontechnical college men are found in sales positions. The board's survey encompassed 149 plants and about 153,000 employes, of whom 73 per cent are in the two largest companies.

The main point which should receive the attention of those in responsible positions in industry and educational fields, the board concludes, are: What can industry do to further assist students in obtaining a practical knowledge of the industry before graduation; to fit men for wider usefulness in production and operating positions, and what can the technical college do to develop the latent qualities of personality of its students; to give its students a better command of the English language both in ordinary writing and in public speaking and to insure a choice of vocations more in keeping with the aptitudes and personalities concerned.

Molding Sand Tested

Experiments have been completed by the bureau of mines, Washington, in devising a method for running softening temperature determinations on molding sands. A report on the investigations, made at the request of the committee on molding sand research of the American Foundrymen's association, is being prepared for guidance of the committee in formulating the conditions under which molding sands should be tested for refractoriness. In conducting the work it was necessary to determine first the effect of furnace atmospheres on the raw sand, the washed sand, and the bond used in forming the sand into molds. Six typical sands were selected and tested under both oxidizing and reducing conditions. The softening range of the sand was determined on cones and test bars.

Exports of hardware of brass or bronze during July totaled 114,783 pounds, according to the nited States department of commerce.



Evolution "at First Hand"

A SURVIVAL of the Stone Age, when man killed game with spears or arrows, skinned his trophies with jagged bits of rock and sewed his fur garments with fish bone needles is found in the Maori stone saw shown in the accompanying illustration. A photograph of this curious tool was sent to Henry Disston & Sons, Inc., Philadelphia, saw manufacturers, by a correspondent in New Zealand. It was made by some New Zealand native, and blade and handle are shaped from a single piece of stone. The cutting edge is chipped to serve as teeth. It was from such a beginning as this that modern saws have been developed.

Correlates Iron and Steel Making Practice

By J. E. Fletcher

Part II—Wrought Iron and Steel

AN INTELLIGENT interpretation of the pig fracture, combined with the practice of reading the chemical analysis in terms of the microstructure is of the greatest possible value to the foundryman and to the responsible worker in puddled iron and steel manufacture. The experienced puddler in Britain looks askance when he is asked to puddle a charge of iron possessing what he calls a mixed fracture, which is generally of the nature of an open-grained structure in which patches of close-grained metal are embedded. One part of the metal comes to grain normally while the other remains steely and unless great care and labor is exercised, the tendency is for the puddled ball to be uneven in plasticity, composition and weldability.

The author wishes to praise the intelligent puddler from whom he has learned much at the furnace side. In no other furnace can so much be learned of the melting characteristics of cast iron. There the effect of hypereutectic iron can be clearly seen during melting and refining—the escape of the kishy carbon varying conditions of temperature and furnace atmosphere, the slow "coming to nature" of the iron as compared with a low carbon-hypereutectic iron, and the influence of silicon, phosphorous and manganese on these actions. In the manufacture of wrought iron from pig iron, the quality of the product depends on that of the pig iron charged. The average chemical analysis of a pig iron may be apparently satisfactory but if this is the mean hypo and hypereutectic metal then there is great danger that the latter metal will cause a lack of uniformity in the final puddled ball, the product of the laborious effort of a worker who has been too often despised.

To most metallurgists the mean chemical analysis of a pig of iron is sufficient. However, this may be the rough average of concentric zones of metal containing from, say, 0.8 to 0.2 per cent combined carbon rings of absolutely dissimilar metal in a structural sense. When melted, these may produce a molten mass of as heterogeneous a character as the initial structure possessed, and may be prone to segregatory habits because of the variable condition and distribution of the carbon, especially when this is changing from the combined to the graphitic form or vice versa.

We are familiar with the migratory character of carbon as shown in the processes of cementation, case hardening, malleableizing and graphitization. Is it not remarkable that so little attention has been given to the structural homogeneity of pig iron and to the means for producing iron of such regular structure as will produce, when properly remelted and poured, iron castings whose internal architecture shall not need costly methods of heat treatment to rearrange a structure which has been primarily confused and segregated in the blast furnace?

The variability of the blast furnace product is recognized by the steel maker where, in mixed processes, the standardization of the liquid cast iron is of such importance. If carbon did not migrate and if, in large molten masses, phosphorous and manganese diffused regularly throughout the metal, the mixer method might find a wider use in the manufacture of high quality castings. As mass effect plays such a large part in the segregation of the lighter constituents in iron and steel, however, the habit of only melting sufficient metal at a time for the making, separately, of large castings is likely to persist for sound scientific reasons.

In the realm of the iron founder and wrought iron worker, success in obtaining pig iron direct from the ores free from the effects of intimate contact with the reducing fuel and hence controllable in the direction of carbon content and homogeneity of structure, has for years been a cherished dream. In Britain longing eyes have been turned towards such sponge iron processes as have given some promise of practical success, and while recognizing the technical difficulties attached to mechanically operated furnaces charged with material in agitation, the long and costly experiments carried out in America would seem to indicate that the problem soon may be solved.

The slags play an important part in the three types of pneumatic furnaces used in the iron and steel industry. Not only do they control the composition of the metal by means of thermochemical reactions between the constituents of the metal and the slags, but they act also by their physical condition as mobile fluids, as absorbers of certain undesirable migratory constituents such as sulphides and gases and, by virtue of their heat conductivity or resistivity, may aid or resist heat

Slags Affect Structure

INTER-relationships of microstructure in cast iron, wrought iron, malleable cast iron and steels and stable and unstable structures are considered in this article, which is the second part of the fourth annual British exchange paper presented at the Syracuse convention of the American Foundrymen's association, Oct. 5-9. The author also discusses the function of working slags and their dominant fluid conditions and composition. The neutral and active conditions of the slags in various ferrous processes likewise are given attention. The third and final part of this paper will appear in an early issue of IRON TRADE REVIEW *and will deal with the scrap problem and the influence of the increasing use of scrap in modern iron and steelmaking. J. E. Fletcher, the author of this article, is consultant for the British Cast Iron Research association, Birmingham, Eng.*

flow from the fuel or heating gases to the metal in contact.

If the slag composition corresponds to a condition of chemical neutrality, the basic and acid oxygen contents being equal, certain objectionable reactions at the metal surface may be stopped when functioning at suitably controlled temperatures. Thus, in the blast furnace, when the slag becomes neutral the further absorption of silicon from the silica in the slag ceases. Until this point of neutrality is reached the slag, if functioning at a sufficiently high temperature and if overcharged with silica, will allow the reaction between the carbon in the metal and the free silica to proceed, silicon being transferred to the metal. When lime or magnesia are present in excess of the neutral condition, the slag if sufficiently fluid will absorb sulphur from the metal. Further, such a condition prevents oxidation of iron and manganese for the oxides of iron or manganese cannot be absorbed by the slag if lime or magnesia are present in excess of the neutral requirements. Similar actions take place in cupola practice, lime and magnesia in excess of neutral requirements acting as sulphur absorbents at definite temperatures. In this case, however, the slags are too acid (high in silica) to function efficiently and the iron and manganese oxidation proceeds in the direction of neutrality.

Moreover, the iron and manganese oxidation occurs at a level in the cupola higher than the position where the slags attain their proper working constituency and requisite fluidity, and there is little or no contact of the fluid slag with the metal in the fusion zone. The coke below the fusion zone is then in contact mostly with the trickling slags, and such desulphurization as occurs takes place in the coke and not in the metal. Hence the developments of methods for removal of sulphur from the metal by means of slag contact as it flows into or from the well of the cupola.

In the case of the acid bessemer steel process it is worthy of note that the oxidation of the silicon, manganese and iron proceeds in the direction of the formation of a neutral slag but stops short at a composition which is similar to that of a normal cupola slag, in which the lime is displaced by iron and manganese oxides. Here, as in the case of the cupola, the oxidation of the silicon, manganese and iron takes place in the absence of slag, the oxides formed uniting to form a slag at the metal surface. There is also considerable further oxidation of the iron and manganese which passes off as fume. From the estimation of the metal loss it would appear that a slag of neutral composition is actually formed, part of which is blown away as fume. When melting high manganese mixtures in the cupola there is often much loss in fume and the slag tends toward the neutral condition, iron and manganese oxides being present in abnormally high proportions.

The basic bessemer process furnishes an example of neutral or inert slags. During the process of the blow the basic oxygen content gradually increases, in the lime, magnesia, alumina, and manganous and ferrous oxides, from 40 per cent of the total oxygen present in the slag to 50 per cent, at which point neutrality is reached. In the basic open-hearth steel process a similar transition in the working slags occurs during the melting and refining periods. Immediately after melting of the charge the slags may consist of oxides containing 65 per cent of acid oxygen. During the progress of the melt the consistency changes gradually from acid to basic, the basic oxygen content of the finishing slags being about 60 per cent of the total oxygen present, the point of neutrality having been passed on the way. In the acid open-hearth steel melting process the working slags, by reason of the availability of the siliceous material in the hearth lining, retain a strongly acid character. The acid oxygen content is high, from 70 to 76 per cent of the total oxygen present in the slag. These slags are interesting from the fact that the composition is often closely similar to that of cupola slags. The pasty condition of slags containing more than 55 per cent silica with 10 per cent lime is analogous to cupola slags of similar composition which function badly and often give troubles in iron foundry practice. The latter are useless from the desulphurizing point of view and liable to affect the fluidity of the metal by encouraging "bridging" or scaffolding and by preventing clean and easy tapping through accretion on the walls of the cupola well.

Table IV

Transitions of Ruling Types of Slags

Process	Nature of first slags	Inert or neutral constituents	Nature of Finishing Slags	Excess constituents in slags
Blast Furnace	Acid	2 $CaO.SiO_2$ 2 $MgO.SiO_2$	Basic	CaO and MgO
Cupola	Acid	2 $Al_2O_3SiO_2$ 2 $CaO.SiO_2$ 2 $MgO.SiO_2$	Acid	SiO_2
Acid bessemer	Acid	2 $Al_2O_33SiO_2$ 2 $FeO.SiO_2$ 2 $MnO.SiO_2$	Acid	SiO_2
Basic bessemer	Acid	3 $FeO.Fe_2O_3$ 2 $FeO.SiO_2$ 2 $MnO.SiO_2$ 2 $CaO.SiO_2$ 2 $MgO.SiO_2$ 5 $CaO.P_2O_5$	Basic	CaO
Acid open hearth	Acid	3 $CaO.Fe_2O_3$ 2 $FeO.SiO_2$ 2 $MnO.SiO_2$	Acid	SiO_2
Basic open hearth	Acid	3 $FeO.Fe_2O_3$ 2 $FeO.SiO_2$ 2 $MnO.SiO_2$ 2 $CaO.SiO_2$ 5 $CaO.P_2O_5$	Basic	CaO
Puddling furnace	Acid	3 $CaO.Fe_2O_3$ or 3 $FeO.Fe_2O_3$ 2 $FeO.SiO_2$ 2 $MnO.SiO_2$ 5 $FeO.P_2O_5$	Basic	FeO
Electric furnace	Basic	3 $FeO.Fe_2O_3$ 2 $CaO.MgO.SiO_2$ 2 $MnO.FeO.SiO_3$	Basic	CaO

Slag An Important Factor

In the puddling process the slags are chiefly composed of ferrous manganous silicates and phosphates. At the commencement of the puddling the slags are feebly acid. As the "boiling" period is approached the basic oxygen content increases; and when the metal comes to grain the slag attains the neutral condition and finally contains excess basic oxygen, as a result of the addition of iron oxide produced during the oxidation of the iron while being balled.

Under correct temperature control, the puddling process is regulated by the manipulation of the slag composition. The slags are never far removed from the neutral condition. The process is slowed down on the one hand when the slag becomes acid and is hastened when the slag becomes basic. The neutral condition

corresponds to a suspension of oxidation or refining during the first part of the process and to a slackening in the rate of iron crystal growth, or coming to grain, in the latter half of the process.

It may be noted that in all ferrous processes mentioned the finishing of the smelting, melting or puddling charges must be carried out in the presence of fluid slags which may be described as consisting of a neutral matrix in which is dissolved the active constituent necessary either for the alloying of the primary metal or for the removal of the last traces of an objectionable constituent. The temperature at which the slags are held is of course a vital matter, and the author attempted to emphasize this fact in a paper read before the British Society of Chemical Industry in 1917 on the superheating of slags and metals during refining, smelting and alloying operations. The necessity for a mobile fluid condition in working slags was first clearly demonstrated by H. H. Campbell about 1902. Campbell's conclusions concerning the fluid condition and the influence of excess basic or acid constituents in the working slags of the steel processes were of fundamental importance and must be considered as the real beginning of practical and scientific research.

In Table IV a summary of the above notes is given and in Figs. 2, 3 and 4, graphs illustrative of the ruling types of slags in the transition from the metastable to the stable neutral compositions may help in emphasizing the points raised. In Fig. 4 the progress of the transition from the acid to the neutral and finally basic condition of the working slags of the basic open-hearth steel process is shown.

No figures have been given relative to electric furnace slags but their composition progresses from a feebly basic condition to a strongly basic one, the high temperatures available being sufficient to keep slags of high lime content in the fluid state. Such slags function well as absorbers of sulphur and phosphorus.

Compares Iron and Alloys

The well known character of the polyhedral structure of wrought iron, dead mild steel, well annealed malleable cast iron and of siliceous cast iron when slowly cooled from the molten state and completely graphitized, points to the possession by the iron family at large of a common structural basis. However masked this polyhedral microstructure may be as a result of the thermal treatment and of the alloying, more or less permanently, with nonferrous metals or metalloids, it is generally possible to so heat treat the cast or mechanically worked iron or alloy rich in iron as to bring to light the fundamental structure associated with maximum stability.

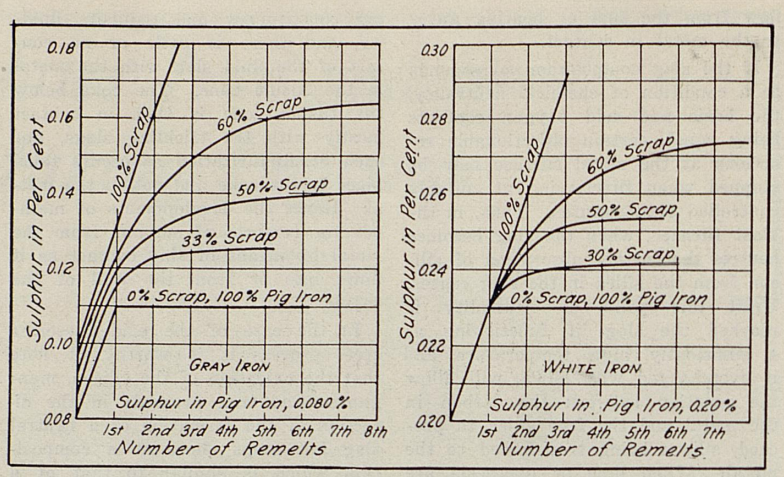


FIG. 2—CURVES SHOWING RULING TYPES OF SLAGS IN TRANSITIONS FROM METASTABLE TO STABLE NEUTRAL COMPOSITIONS

Underlying these problems connected with metal structure, it must be recognized that the outer form of an individual crystal is of secondary importance, the atomic structure as revealed by the exact detail of its space lattice and the disposition of the atoms being incomparably more important. This field of inquiry is being explored but as yet the knowledge of the internal crystal structure, which is, in most of the technically important metals, of the same space lattice as modified by the presence of one or more additional metals or metalloids, is far from complete. In cast iron the size of the crystal grain not only varies with the temperature of casting, the mass of which the grain forms a part, and the rate of cooling, but with the metals dissolved in the iron and with the constituents present at the borders of crystal grains.

Suppose it be accepted that in the

(*Concluded on Page* 1036)

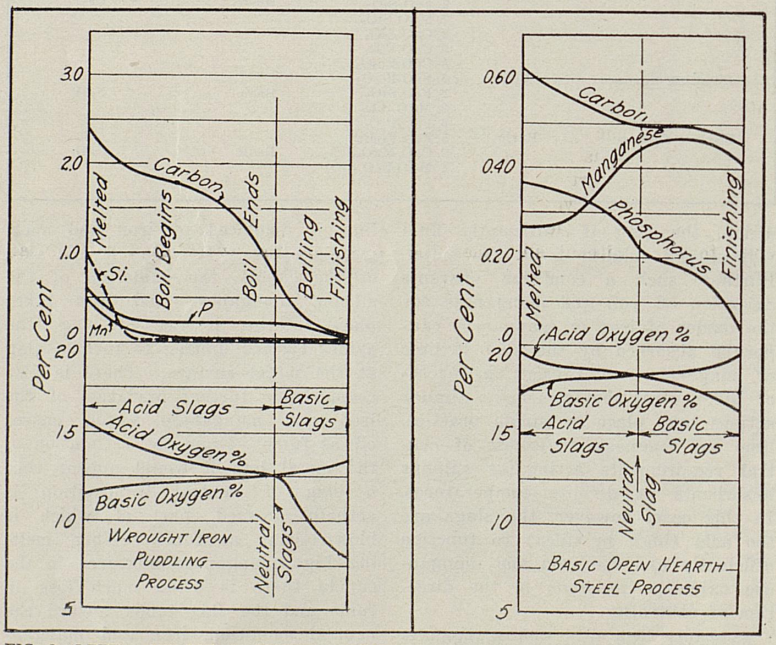
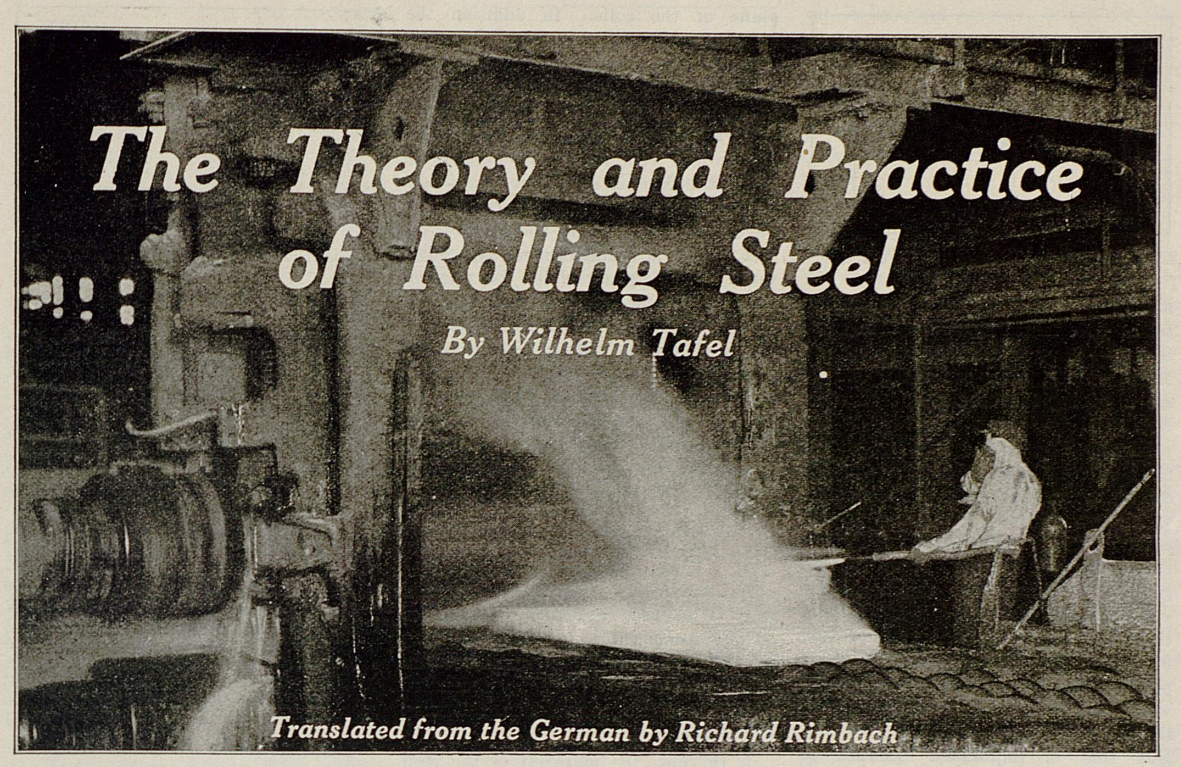


FIG. 3 (LEFT) AND FIG. 4 (RIGHT)—ADDITIONAL CURVES SHOWING RULING TYPES OF SLAGS IN TRANSITIONS FROM METASTABLE TO STABLE NEUTRAL COMPOSITIONS. FIG. 4 SHOWS PROGRESS OF THE TRANSITION FROM ACID TO NEUTRAL AND FINALLY BASIC CONDITION OF WORKING SLAGS OF BASIC OPEN-HEARTH STEEL PROCESS



The Theory and Practice of Rolling Steel

By Wilhelm Tafel

Translated from the German by Richard Rimbach

Chapter II—Continued

WILL material move without slip between the points 1′ and 7′ in Fig. 15 which represent the entrance and exit from the rolls? In other words is the speed with which a point on the surface of the roll nears the rolling plane equal to the corresponding contact point of the rolled material?*

The circumference speed of the rolls is constant and equals V_0 as shown in Fig. 23. If the particles of the material to be rolled, which are pulled along by the roll surface, move themselves forward without slip, then the horizontal speed, with which the particles a near the roll plane MM' in the point is $a = v_{wa}$. This is designated as the rolling speed. It is $v_{wa} = v_u \cos a$ in which a is the angle at any position, which v_w and v_u make with one another. The line connecting the entrance point a with the center of the roll forms the same angle a with the roll plane, MM' called the angle of grip; because the radius r is perpendicular to v_u and v_{wa} is perpendicular to MM', angles with sides respectively perpendicular are equal. Cos a is smaller than 1 between $a = o$ and $a = 90°$. With $a = o$ it is equal to 1; therefore at that place the roll speed equals the circumference speed, always assuming no slippage. Then from n toward a, that is from the exit toward the entrance, the angle a increases, the cos a and with that V_{wa} ($= v_u \cos a$) also gradually gets smaller.

An unconstrained passage of material through the rolls without slip can obviously only take place, if in the unit time the same volume of material as leaves the rolls would pass the point a and also at the intermediate points b, c etc. That is if B equals the width of the material to be rolled then, $B \times h_a \times v_{wb} = B \times h_c \times v_{wc} = B \times h_c \times v_{wc} = \ldots = B \times h_n \times v_{wn}$ (1). The equations show that passage without slip is only possible, if the heights from n toward a (h_n, h_1, h_c etc. to h_a) increase in the same relation, as $v_w = v_u \cos a$ decreases. This condition can be proven mathematically but is not fulfilled by the circular cross-section. If the dimensions are chosen this condition can be satisfied for 2 points but never for 3 or more. The condition is more readily understood when studied graphically rather than mathematically.

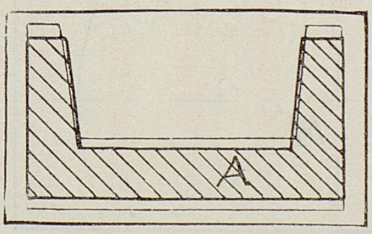


FIG. 21—SHRINKAGE OF OUTSIDE PARTS OF A CHANNEL SECTION

The increase of h from n toward c Fig. 26 can be expressed by the angle a and the roll radius r.

$$h_a = h_n + 2r\ (1\text{-}\cos a_a) \qquad (2)$$
$$h_b = h_n + 2r\ (1\text{-}\cos a_b) \qquad (3)$$

Equal volumes would pass through and no slip exists if from equation No. 1

$$h_a \times v_u \times \cos a_a = h_b \times v_u \times \cos a_b = h_c \times v_u \times \cos a_c = h_n \times v_u \times \cos a_n$$

The expressions of Nos. 2 and 3 etc. substituted for h_a, h_b, etc, give

$$h_n \times \cos a_a + 2r\ (1\text{-}\cos a_a) \times \cos a_a =$$
$$h_n \times \cos a_b + 2r\ (1\text{-}\cos a_b) \times \cos a_b =$$
$$h_n \times \cos a_c + 2r\ (1\text{-}\cos a_c) \times \cos a_c =$$
$$h_n \times \cos a_n + 2r\ (1\text{-}\cos a_n) \times \cos a_n =$$

Each of these equations set equal to one another denotes the volume, which would pass the points a, b, c, etc. up to n, if the rolls could transport without slip. This volume is plotted in Fig. 27 as ordinates, the curve $r \cos a$ (for a = 0 degrees, 30 degrees, 60 degrees and 90 degrees) in Fig. 27A first having been plotted from any table of circular functions. The ordi-

*The following theories and calculations were presented by the author at a meeting of the District Society of German Engineers, Berlin, 1912. Fig. 15 appeared in the issue of Aug. 15.

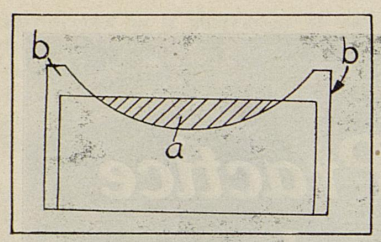


FIG. 22—DIAGRAM OF MATERIAL DISPLACEMENT

nates lying between it and the horizontal ss' determined by s, are then equal to $2r - 2r \cos \alpha$ or $2r (1 - \cos \alpha)$. These values, then are multiplied by $\cos \alpha$, giving the broken line curve of Fig. 27B.

Finally Fig. 27C gives the curves for the expression $h_n \cos \alpha + 2r (1 - \cos \alpha) \cos \alpha$, called the volume curve, which was found by adding to the curve A for $h_n \cos \alpha$, the curve B. This calculation shows, that from the beginning it rises above the horizontal nn' in Fig. 27C as long as h_n is greater than 0.86 D, which is always the case in rolling finished material. In all practice cases the rolls at entrance a will attempt to draw in more material than they can release at the exit n. But this is impossible because as much material must enter the rolls in the same length of time as leaves the plane of the rolls. In addition the volume curve indicates that between entrance and exit a sort of compacting, upsetting effect must take place in such a manner that the preceding material always presses on that lying nearer the roll plane, attempting to push it before itself faster, than corresponds to the rolling speed at the particular point. The size of this effect, which is designated the upsetting force S, is determined by the relation of area $12aon$ (sum of the volumes, which would pass through between a and n if the the rolling speed was the surface, in Fig. 26 equals F + f), to the rectangular surface $12an$ (sum of the volumes, which would pass between entrance and exist, if the rolling speed was the same denoted by F in Fig. 27C. Consequently,

$$S = \frac{F + f}{F}$$

As previously mentioned, material that is packed cannot be compressed to any great extent. The compacting effect of the roll surface between entrance and exit must be accounted for in another way. The following are possible:

1. In that, the material in the first part of the passage enters the rolls with less speed than corresponds to the circumference speed (Slip backwards).

2. In that, the material pushed forward from behind near the exit, goes through the rolls faster, than the circumference speed stipulates. (Slip forward, speed gain).

3. In that, the material, which is pushed forward faster from the rear, than the rolls are able to take up in the latter part of the passage, gives way to width (Spread). The accompanying equation No. 1 as will be recalled assumes the same width B of material during the whole passage. If at a Fig. 27C a volume enters the rolls equal to $o2$, while at n only one equals $n1$ is let out, this inequality easily can be corrected in that the width at passing through the rolls increases according to the relation $\frac{o2}{n1}$.

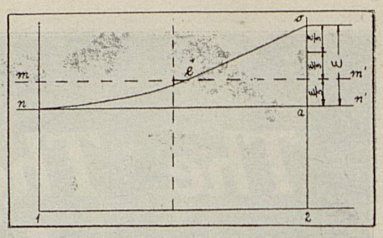


FIG. 24—BALANCING OF THE COMPRESSION FORCE BY SLIP AND SPEED

The balance is not effected by the spread alone, but probably according to the three reasons. In several cases a slip occurs according to the first reason. This can be seen plainly in the roll train, if a piece has so much draft that the rolls grip with difficulty. It also can be seen at the entrance of the steel that the rolls slide on the stock. The experiment of Hollenberg also indicates this backward compression.

Three Methods Are Found

A similar result was calculated by Fink. He assumed that the slip between entrance and exit took place in such a way that the roll speed was not equal to the circumference speed at either the former or the latter, but at a point lying between the two, perhaps at 1 relatively 1′ in Fig. 23. He recognizes only the first and second possibilities mentioned previously.

If the three methods of balancing are expressed in the volume curve in Fig. 27, assuming that the compacting is divided equally among all three, then Fig. 24 can be derived.

The balancing, due to the difference of $o2$ in comparison with $a2$, equals E. Of this approximately one-third goes to spread and a third each to slip retardation and speed gain. Designating the circumference speed of the rolls v_u, the actual rolling speed would not correspond with the conditional circumference speed at n, but at a

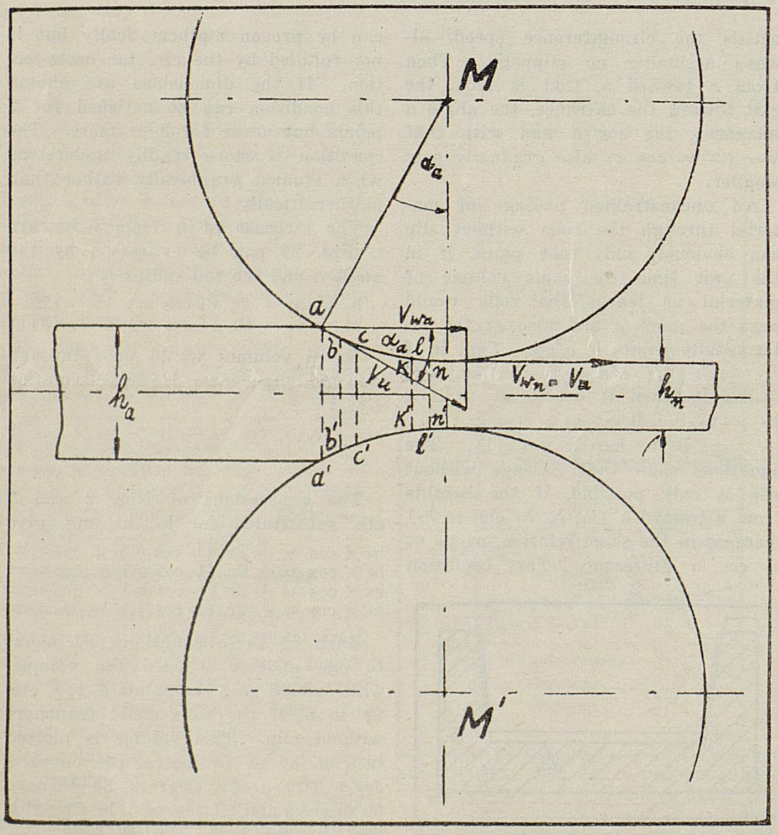


FIG. 23—RELATION OF ROLLING SPEED TO THE CIRCUMFERENCE SPEED

point lying between a and n, which is designated as 1 as before. The width B would increase in the same relation as the exit speed. Finally the last third of E will go on the backward slip. Because it has not been possible to calculate the relation according to which the balancing is divided, the determination of the spread remains complicated. According to the foregoing relation $B_2 = B_1 \frac{m}{n}$, the spread $B_2 - B_1$ must be proportional to B_1, the original width of the stock. Therefore, a rod twice as wide would have to spread twice as much as one of unit width, all other conditions being the same. On the contrary the linear spread decreases gradually with broad stock while narrow rods develop considerable spread. With the ordinary rod dimensions, the spread practically is independent of the width of the stock. This is shown in Geuze's formula, which is used mostly in practice for the determination of spread:

b (Spread of steel) = 0.35d (Draft)

That is to say, a steel rod lessened in height by 0.236 inches will increase 0.079 inches in width after rolling. Previously the roll designer considered that the rolling process and the change of form in the rolls took place principally in the plane of the roll, that is, in the plane of the drawing. Fig. 22 shows that the displacement of the material from the hatched area a to the parts b not hatched was only the flowing of the smallest particles in the roll plane. The central particles in this plane were pressed down and moved to the side or upward. That a part was elongation and stretched is acceded but the process is not considered important for roll design. For example the last pass of a tee usually is an edging pass as shown in Fig. 25. The head is given about 0.39 inches draft and in this case is equal to about 15 per cent; the web is upset about 0.354 inches. The web was permitted to go through the rolls without any draft to make the groove 0-1, 3-2 in Fig. 25 deeper. The question was, how high should the leader pass be, to have the finished profile come out hot with the height of 2.402 inches? Early contentions were that with 0.039 inches being taken off the head, this material would be squeezed into the web at the top as the web did not touch the roll at the bottom. In other words, the web would have to be 0.039 inches lower in the leader pass or 2.362 inches to have a hot finished profile of 2.401 inches. The draft on the head, was not increased but decreased, which means it shrunk. What was the cause?

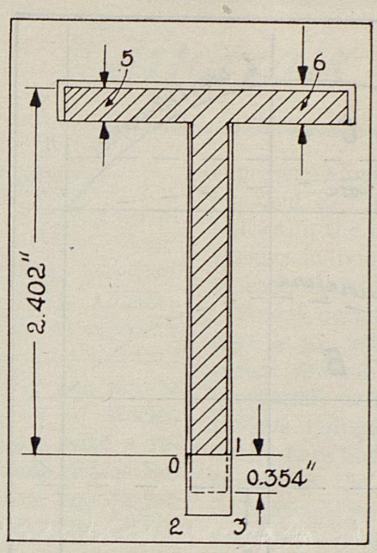


FIG. 25—FINISHING PASS OF A TEE WITHOUT COMPRESSION

The head had a draft of 15 per cent and as the spread was small, it was lengthened about the same amount. The web, which received no draft, has itself nothing to make it elongate, but as it is attached to the head it is drawn along with it. The result is, that like a rubber band when drawn out it becomes smaller, which in this case was a loss in height. The nonfilling of the pass, or exceptionally large or small spreading can easily be explained if this mutual influence of the different pressed parts of the cross-section is taken into consideration.

Has Effect on Roll Design

If, for example, a channel section as shown in Fig. 21 receives more draft in the center than at the outside, the central part has a greater tendency to elongate, and will therefore pull along the flanges. The latter will retard the center. This is only possible if the displaced material flows from the part with the larger draft to that with less draft in the same proportion. The nature of roll design lies in the recognition of this change effect between the shrinkage of the parts pulled along and the flowing away of material from parts of the cross-section which are retarded. The flanges, drawn along, will not fill the pass if there is not enough of the pressed material to flow into them. The amount of the missing material can be determined as will be shown later, in presenting an answer to the question: What average length L_m will a rod take whose single cross-sectional parts take the lengths L_1, L_2,

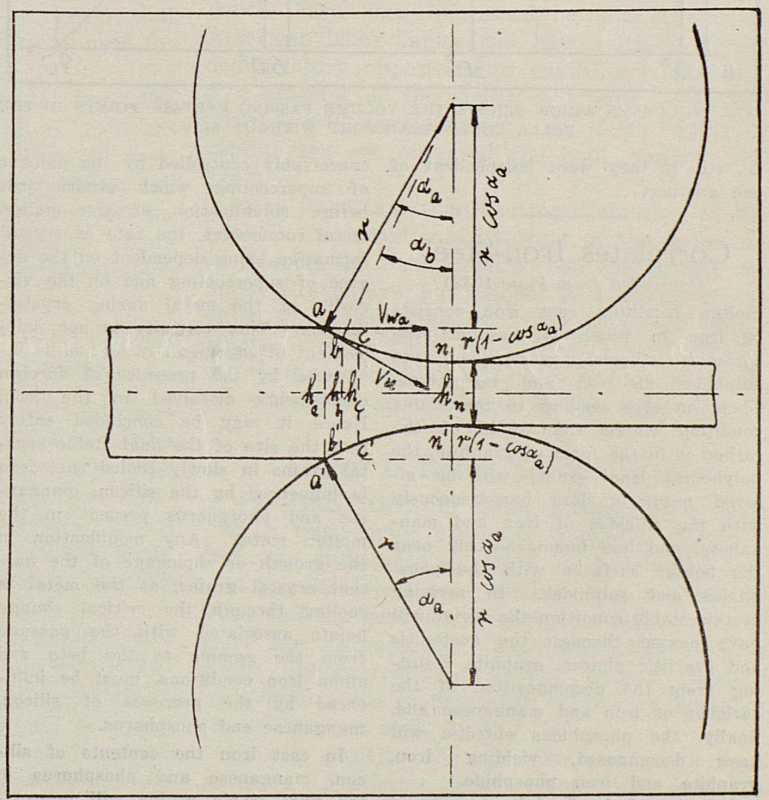


FIG. 26—DIAGRAM SHOWING THE VOLUME PASSING THROUGH THE ROLLS

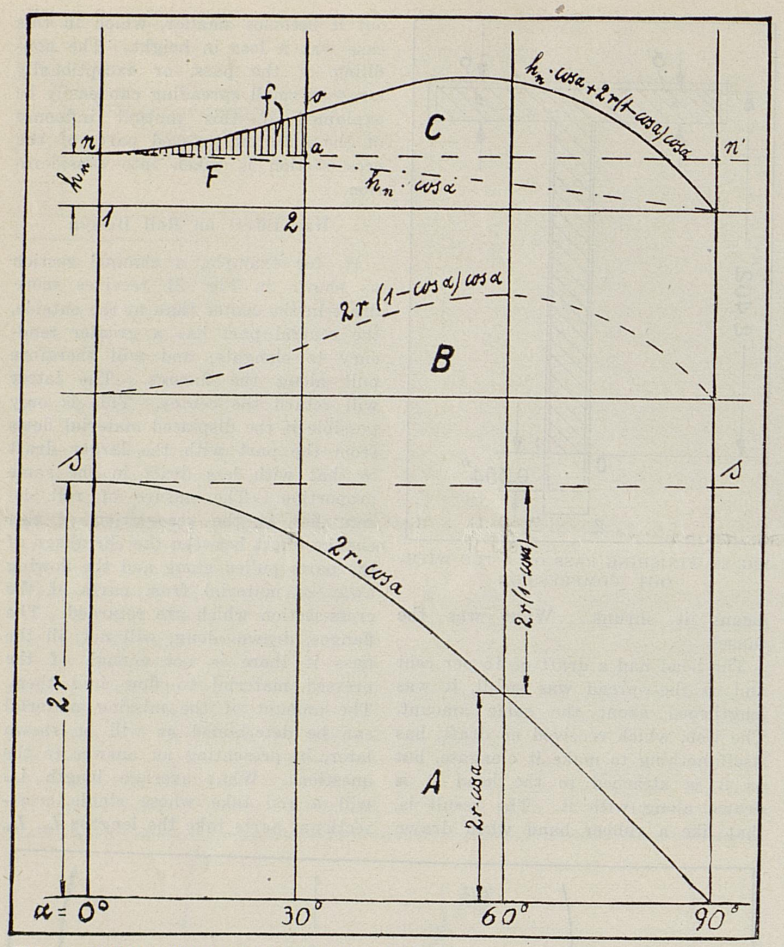


FIG. 27—CURVES WHICH DENOTE THE VOLUME PASSING CERTAIN POINTS IF THE ROLLS COULD TRANSPORT WITHOUT SLIP

L_2, etc. if they were independent of one another.

Correlates Iron-Steel

(*Concluded from Page* 1032)

molten condition cast iron consists of iron in which is dissolved the carbides, silicides, phosphides and sulphides of iron and manganese. Then, on slow cooling to the stable condition where the whole of the carbon is in the form of graphite, the polyhedral iron grains will be alloyed more or less homogeneously with the silicides of iron and manganese, and less homogeneously near the border surfaces with the phosphides and sulphides. In arriving at this stable condition the metal will have passed through the austenitic and pearlitic phases, graphite resulting from the decomposition of the carbides of iron and manganese and, finally, the phosphides eutectic will have decomposed, yielding iron, graphite and iron phosphide.

The size of the final iron grains is conceivably controlled by the amount of supercooling which occurs just before solidification of the molten metal commences, the rate of crystal formation being dependent on the degree of supercooling and on the viscosity of the metal during crystallization. This viscosity is not independent of the metal mass and is influenced by the presence of foreign constituents dissolved in the iron. Hence it may be concluded safely that the size of the final stable crystal grains in slowly cooled cast iron is influenced by the silicon, manganese and phorphorus present in the molten metal. Any modification in the growth or shrinkage of the nascent crystal grains, as the metal is cooling through the critical change points associated with the passage from the gamma to the beta and alpha iron conditions, must be influenced by the presence of silicon, manganese and phosphorus.

In cast iron the contents of silicon, manganese and phosphorus in the final stable grains will approximate the values determined by the chemical analysis of the cooled metal. The influence of the heat liberated during the graphitization of the primary iron carbide and of the gases liberated during solidification, some of which are entrapped within the solid metal, cannot be ignored. Both these liberations are accompanied by volume changes and influence the growth of the cooling crystal grains.

In the case of steel, the lower carbon and silicon contents in ordinary carbon steels do not appreciably influence the grain size during slow cooling, but if the cooling is exceptionally slow and the metal mass great, graphitization of the primary iron and manganese carbides occurs. The final stable structure is polyhedral-grained, the grain size being similar to those produced in cast iron of similar mass when cooled at the same rate. Here the graphitization follows the grain boundaries as a result of the decomposition of the carbide while slowly cooling through the range above 100 degrees Cent.

In the manufacture of puddled iron the iron grains are formed primarily during the supercooling of the alloy on the borderland between cast iron and steel, or 1.8 to 2.0 per cent carbon. The grains grow rapidly and have envelopes of pure iron. Centers of the grains, or clusters of grains, are richer in carbon than the outer envelope. The squeezed plastic mass of puddled iron is composed of crystal grains of similar form and often of similar size to those associated with the structure of slowly cooled cast iron. Grain size in puddled iron is influenced by the manganese, silicon and phosphorus content of the pig iron from which the iron is made and in some cases the original carbon content of the pig iron appears to play a part.

Puddled iron, therefore, may be considered as being the result of slowly cooling a cast iron through the higher temperature ranges, the carbon, silicon, manganese, and phosphorus being removed by oxidation during the liquid and plastic ranges. Gradual reduction of carbon during the plastic period is equivalent to the graphitization and decarburization which take place during the malleable white-heart process. The two final and stable structures are remarkably similar both in the form and size of the polyhedral iron grains, in the wrought iron and in the completely decarburized areas of the malleablized cast iron. The coincidence of low manganese and silicon content in similarly grained wrought iron and malleable cast iron should be noted.

Editorials

Association Rights Reaffirmed

WITH the end of litigation in the cases of the government against the Maple Flooring association and the Cement Manufacturers' Protective association another advance may be recorded in the unshackling of industry from too much paternalism. These cases involved the right of trade associations under the law to distribute statistical information as to stocks, shipments, production and prices, and with a rehearing recently denied by the United States Supreme Court, the cases are closed and may be set down as a guiding hand to trade association activities in the future.

Industrial firms and associations have watched with interest in these cases the process of legal tests being applied to the functions of these two trade associations. By reversing the lower court, the Supreme Court in its opinion last winter recognized that statistical knowledge is a legitimate part of an industry's existence. The opinion served to release many industries and associations of industries from bonds of uncertainty that have surrounded them. The denial of a rehearing rounds out the case. It is provided, however, that the exchange of information is not to be used for restraining trade.

Industrial groups now are delivered from the blight that would result from lack of free exchange of legitimate information. Through their trade associations, their business publications and other agencies, these groups may receive this information feeling assured they are wholly within the law in using it in their ordinary legitimate pursuits.

Work Should Be Well Defined

SO MANY Americans occupying high places in this country won their way upwards from the bottom of the ladder that the "office boy to president" idea continues to inspire vast numbers of workers in all sorts of activities. Associated with this is the impression of driving force, disregard of hours of labor and absolute ignoring of the established way of doing things.

At the meeting of the American Management association in New York last week, however, a different viewpoint was developed. Institutions where men "make their own jobs" were likened to a sack full of monkeys; every time a new monkey is put into the sack, there is a general scramble. All the expressions indicated that the best way for a management to function is to define all the responsibilities in the business and distribute them to the various individuals. After that, the performance of each individual should be recorded.

It was declared that no man functions 100 per cent in his job, and that the effort should be directed toward making each man do his job as thoroughly as possible, instead of encouraging the various individuals to reach out and grab new duties here and there. Included among those who supported the theory of management were the representatives of some of the most conspicuously successful companies in the United States.

Communism Spreads to Banking

COMMUNISM outside of Russia generally is regarded as being composed mostly of illiterate anarchists or degenerate demagogs. Their doctrines are iconoclastic and their practices defiant to all established government. Odd indeed is it then to learn that there has been started in Paris a soviet bank, to be known as the Workman & Peasant bank. Communists evidently have been impressed by the success of American labor banks, and have mitigated their denunciatory opposition to anything capitalistic. The attempt of the soviet to create capitalistic laborers will bear watching for, if the rights of capital are not observed the bank cannot long exist.

More important than the mere creation of the bank is the intentional ignoring of the authority of France, the bank having been constituted not under French law but subject to a decree of the union of soviet republics. The insidious propaganda to result from the success of this display of *lese majesty* will considerably encourage greatter activity of the soviet in foreign countries.

Labor Is Being Served Well

SUGGESTIONS of labor trouble have been a trifle more numerous recently. Barring the anthracite situation, no particular sore spot has developed, most strikes have been short-lived and the gestures of chronic disturbers have been less threatening. Yet there has been a slight undercurrent of unrest, caused possibly by labor's error in assessing volume of business as synonymous with profits.

Labor's position the past five years has been enviable. Statistics reveal tremendous gains in

savings bank deposits, home buying, stock and bondholders, active life insurance, automobile registration and taxable incomes. The cost of living has receded slightly since the war but war wages generally govern and in some instances postwar increases have been won. Employers have expended large sums in welfare work, housing projects, employe ownership, safety devices, group insurance and improved working conditions.

Never have employers been more assiduous in cultivating their employes and promoting their welfare. The object has frankly been to stabilize the labor situation, an end in which labor has a joint interest. Probably at no time in the world's history has a working class enjoyed greater comforts and at the same time entertained less fear of their curtailment. If in the next few years labor should become decidedly disturbing it will be because it is not alert and grateful, and the investment of many millions in employe welfare will have come to naught.

Wages and Production

WHEN the American federation of labor, at its annual convention at Atlantic City last week, declared in favor of higher wages and shorter hours as production grows, nothing was said about certain basic economic principles which are directly involved.

It safely can be said that the race as a whole has passed forever the dawn-to-dusk day of labor which was necessary when man had to satisfy his needs by primitive methods. On the other hand human kind never can be wholly emancipated from the burden of producing and earning its own living by the sweat of its brow.

The tendency toward shortening of the working period is well defined. As new methods are developed and man is enabled to perform a larger amount of work in less time, however, nobody should forget the fact that the greater the volume of production the more goods there are to go around, with resulting increased comfort to each individual. The American federation of labor would do well to drive home this law of economics among its members, and without delay, in order to avoid any misunderstandings or misinterpretations in connection with the new labor policy.

Business Outlook Is Favorable

THE industrial outlook presents a promising picture. Trade is expanding under an impetus which goes beyond mere seasonal stimulation. The iron and steel industry with its channels of consumption reaching out into every nook and cranny of the industrial structure is giving emphatic evidence of an activity that is genuine and widespread. Purchasing power is good in an extraordinary degree in both urban and rural centers, retail trade is breaking records, building activities and automobile outputs are unusually large for the season, credit is in ample supply, export demand is up to expectations and prices generally are steady and stable. In other words, the components of prosperity are at hand.

Fortunately business is not kicking its heels into the air and running off into a wild gallop. It is leaving the boom thrills to Wall street and to Florida. The reins of conservatism still are held taut. The result is that there has been no overproduction and no overstocking of goods. In fact there are growing signs that stocks are below normal in some lines. The situation looks sound in the main. This is not saying that there are no flaws in the prospect, for such a condition would be impossible in an organism so complex and so vast as modern industry. But it does take into account the fact that the favorable factors at the moment outweigh the unfavorable ones, and serve to indicate continued expansion of trade for some months to come.

What Our Readers Are Thinking

Advises Buying Coal Now

THE present strike in the anthracite fields is by no means merely a fight for higher wages. The wages of the anthracite miners are among the highest paid in industry and their leaders are well aware of this fact. Lewis is fighting for complete control of all the mines, nonunion as well as union and if he can force his present demands on the union operators he will have an unanswerable argument to use in persuading the nonunion miners to join the United Mine Workers.

The writer well realizes that the only sure thing about the coal market is that it will fool everyone when least expected and that in attempting to forecast the coming months he is treading on ground that makes Eliza's ice seem by comparison as solid as the Plymouth Rock.

What storage space a plant possesses should be filled to capacity with a maximum of 90 days' supply based on their expected operating time for the next few months. A heavier supply than this may prove to be an advantageous buy, but in case the unexpected happens and a settlement is made prices will drop and the plant may find itself snowed under with high priced coal for which it has no immediate use, and which could be replaced at a much lower figure. It is especially desirable this year to avoid last minute buying and the plant with heating coal to buy and a place to put it in will be doing both itself and other industries a favor by filling that space now.—B. L. VERNER, *Interstate Iron & Steel Co., Chicago. In the Chicago Purchasing Agent, October.*

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2			
3			
4			
5		5	70
6			
7			
8			
9	Rec'd Ck Nov 3rd		
10			
11	5.70		
12			
13			
14			
15	44		

Your account stated to date. If error is found return at once.

Enclosure.

United States Trust Company of New York.

45 & 47 WALL STREET.

October 30, 1925.

Mr. Ellison C. Means,

Ashland, Ky.

Dear Sir:

We beg to enclose certificate for 3 shares Ashland Fire Brick Company stock, and with this a check for $47.95, being your part of a stock dividend paid by that Company to the Estate of Margaret A. Means. The proportion sent to each party interested is as set down in the recent decree covering the accounts of the Executors. Kindly acknowledge receipt.

Yours very truly,

WCL:EP

Assistant Secretary.

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ASHLAND. KY

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All accounts due the first of the month after date of purchase
Interest charged on accounts past due.

Store Phone 227
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DATE	DESCRIPTION	CHARGES	CREDITS	BALANCE
10/9	1 Qt O'Cedar Oil	1 25		1 25

RECEIVED PAYMENT
Nov 4 1925
OGDEN HARDWARE CO.
BY L E D.

Enclosures.

United States Trust Company of New York.

45 & 47 WALL STREET.

November 27, 1925.

Mr. Ellison C. Means,

Ashland, Ky.

Dear Sir:

In order that we may fully know your status with respect to the Federal Income Tax Law and the New York State Income Tax Law to enable us to make the proper return of income required, may we ask you to carefully fill in the enclosed card, giving the necessary information, and return it to us at your earliest convenience?

Immediate notice to us of any future change in your status with respect to the above will be greatly appreciated.

Yours very truly,

FREDERIC W. ROBBERT,

Comptroller.

HWE

MONTH NOV. 1925

NAME E.C.MEANS,

ADDRESS 306 E.LEX.

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	MILK		CREAM		BUTTER MILK	BUTTER			ACCOUNT FORWARD	CHARGE	
	QT.	PT.	W 1-2 PT	C 1-2 PT							
DAILY ORDER		2	1/2								
1											
2		1/2	1/2			1	#	61¢			
3					1/2	1	#	61¢			
4			1/2	1/2							
5		1/2		1/2	1/2						
6						1	#	61¢			
7					1/2						
8											
9											
10						1	#	61¢			
11			1/2	1/2		1	#	61¢			
12											
13		1/2	1/2	1/2	1/2	1	#	61¢			
14		1/2	1/2	1/2		1	#	61¢			
15		1/2	1/2	1/2		1	#	61¢			

ALL ACCOUNTS DUE 1ST AND 15TH EACH MONTH
PRESENT THIS STATEMENT WHEN MAKING SETTLEMENT

TOTAL BILL 15.10

MONTH NOV. 1925

NAME E.C.MEANS,

ADDRESS 306 E.LEX.

TO ASHLAND SANITARY MILK CO. 34TH & WIN. AVE. DR.

	MILK		CREAM		BUTTER MILK	BUTTER			ACCOUNT FORWARD	CHARGE	
	QT.	PT.	W 1-2 PT	C 1-2 PT							
DAILY ORDER		2	1/2								
16											
17											
18		1/2			1/2	1	#	61¢			
19											
20		1/2	1/2	1/2		1	#	61¢			
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23											
24						1	#	61¢			
25											
26					1/2						
27											
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29											
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2/6/26