

# THE CONCRETE AGE

REPRESENTING THE INTERESTS OF MODERN PERMANENT CONSTRUCTION

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VOL. XXXIV. MONTHLY DALTON and Atlanta, May, 1921. \$1.00 Per Year. No. 2

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## Adjustable Poured Block and Concrete Log Molds

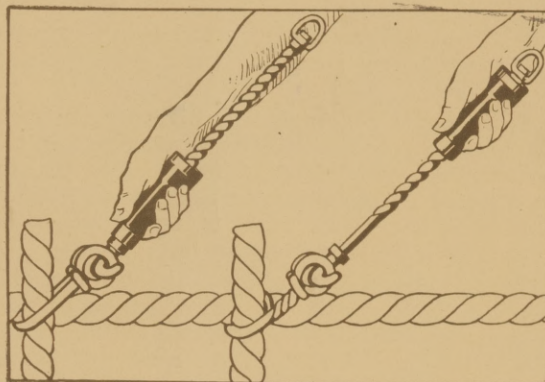
Pour your block in adjustable, non-sweat, true-to-size metal molds and you'll have a dense, waterproof, flint-hard product that will sell itself. Mo'lds make standard 8x8x16 units and 8x8 blocks of any length up to 8-ft., with air courses up and down, along the sides and around the corners, making a complete insulated air course.

The same molds that form the standard block can be used for pouring the logs. Out in this country, houses built of concrete logs, poured in adjustable metal molds, are mighty popular.

*Ask for Catalog and Exclusive Territory.*

**Ray County Concrete Mfg. Co.**  
Richmond, Mo.

FRANK CREASON, Manager. W. A. MULLIN, Engineer.



**You Are Out of Wire.  
We Have Full Stock.  
Wire Ties for Reinforcing Steel.  
Send In Your Orders Now.  
Thousands Using Them.**

**Bates Valve Bag Co.**

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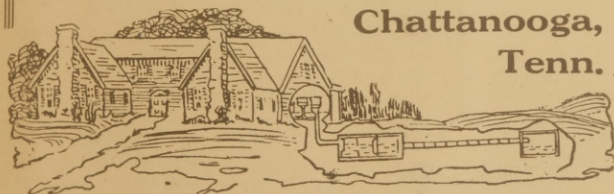
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Scientifically Designed for Suburban Sanitation.

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When in the market for Pipe Railing for Stairs, Bridges or Retaining Walls, send us your drawings. We can quote you prices that will be worth considering.

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are widely used in developing local deposits of road gravel

The cost of road construction begins — not with the actual work on the road — but with the first move which is made to get materials ready for the job.

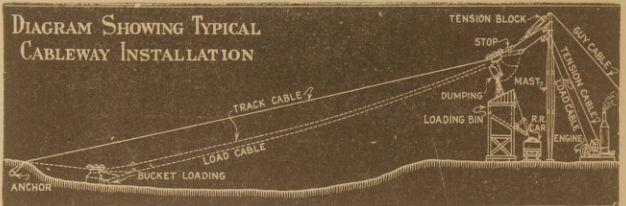
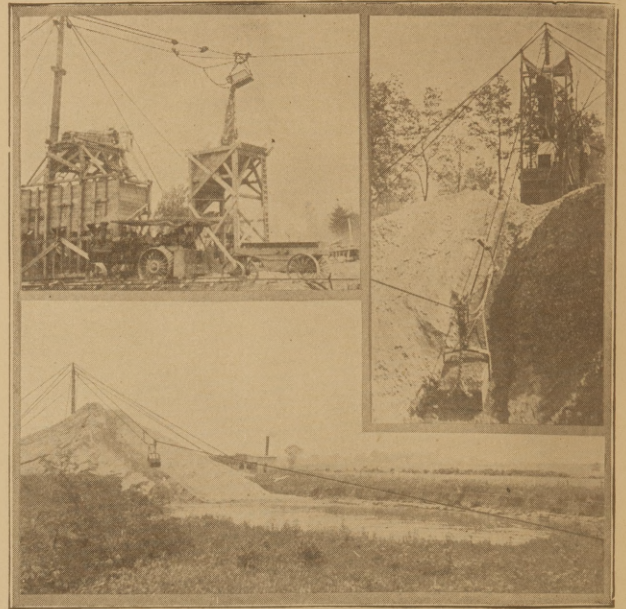
Sand and gravel producers, highway contractors and road commissioners in all parts of the country have proved the great saving which can be affected by installing the Sauerman Dragline Cableway Excavator when materials are to be rushed for a big job of road work.

Write today for literature describing the wide adaptability of this excavator which accomplishes the DIGGING, CONVEYING, ELEVATING and DUMPING of sand and gravel all in one continuous operation, and requires but one man to operate.

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Cableway Excavators Cableway Accessories  
Power Scrapers



**CONVERSE STEEL BELT CONVEYOR**

For Quick Handling of  
SAND-GRAVEL-CRUSHED STONE  
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The Belt is made of  
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BELT  
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Start a Business of Your Own.

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Adhere tightly to iron, steel, wood, glass, stone or concrete, make an elastic joint—tight yet definitely flexible, preventing glass from cracking.

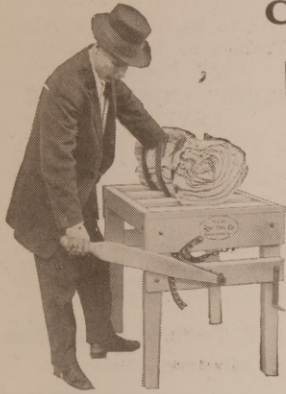
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WE WILL SEND IT WITHOUT CHARGE**

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**CONCRETE FOR PERMANENCE.**

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—and profit most from  
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Investigate. Prices on request.

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The X-L All Face Down Block Machine is the only Foot Lever Machine on the market.

The X-L-All has stood the test for 16 years. Over 4,000 now in use.

The X-L-All Block Machine is made with either foot or hand lever.

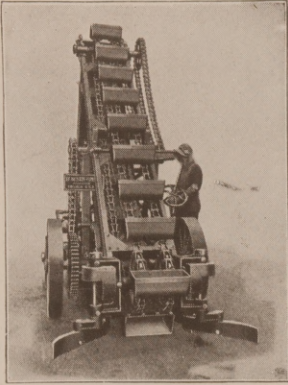
We furnish a complete outfit with each machine for making Rock or Plain face blocks.

Our Prices will surprise you. Send for Catalogue today.

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Not a so-called self-feeding loader, but a real labor saver for rapid and efficient

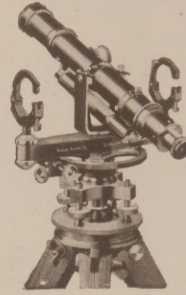
handling of material in concrete road and building construction, excavation work, quarry, storage and reclaiming plants and coal and material yards.

Note the steel feeding arms. In the view they are extended to outside radius of 6 ft. They dig into the material, gather it up and pull it into the elevator buckets. They cut a swath wide enough for the machine to pass through.

### F. C. AUSTIN MACHINERY CO.

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can afford to be without a reliable **Transit or Level**. Our 1920 Model "**STERLING**" CONVERTIBLE LEVEL

may cost a little more at the start, but its special features will save enough valuable time to more than repay the additional outlay. **Free examination privilege**. Easy payment plan.

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**WARREN-KNIGHT CO., 136 N. Twelfth St, Philadelphia**

Vest Pocket Manual of Adjustments Free.

### Wet Mix Concrete Men, Attention!

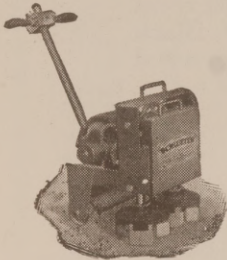
"McAdamite" is something new. Nothing like it on the market. Absolutely prevents cement from sticking to the forms and product comes out with a smooth, glossy surface, resembling the work of a trowel. Saves more than the price of other oils in labor. Gallon lots \$1.25 per gallon. Five gallons or more, \$1.90 per gallon. Money back if not satisfied.

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will surface *right up to the wall or baseboard* with out the use of Edge Roller. Just the machine you would want for surfacing all kinds of floors, whether old or new. Will smooth down rapidly and easily all oints or warped edges. **Perfect results guaranteed.** More than 20,000 in use.

Send for our free trial offer.

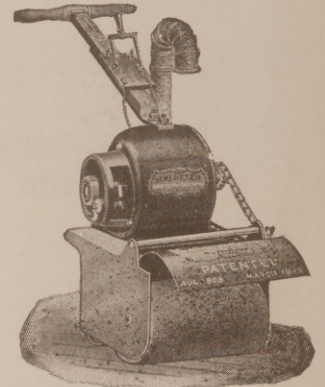
**M. L. SCHLUETER**

221 W. Illinois St.

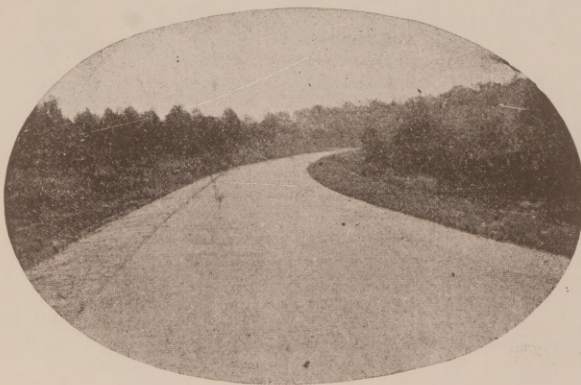
CHICAGO, ILL.

Phone Main 2349

Several sizes. Extra 2-disc attachment can be removed making a 2-disc machine.



Made in several sizes.



### Dustless—Non-Slippery—Always Serviceable—Lowest Maintenance

The use of concrete for road and street construction is increasing rapidly throughout the country.

The experience of those communities which have built concrete highways has proven beyond question that concrete not only gives the most substantial construction, but also solves the perplexing question of maintenance because

**Concrete Practically Eliminates Maintenance.**

With sand and gravel or crushed rock available locally throughout the South, and Portland Cement—manufactured here at home, the cost of Concrete roads is very low. Concrete roads are an INVESTMENT—not an EXPENDITURE.

Send for our Booklet, "CONCRETE HIGHWAYS." Free on request.

### Standard Portland Cement Company

J. I. McCANTS, Sales Mgr.  
Birmingham, Ala.  
CONCRETE FOR PERMANENCE



## WINTERPROOF!

Winter's rough weather—rain, hail, sleet, snow—a freeze one day, a thaw the next—makes no impression on buildings and businesses protected by

**The Starks Line**  
**CONCRETE**  
**WATERPROOFING CEMENT**  
**BRICK**  
**STUCCO**

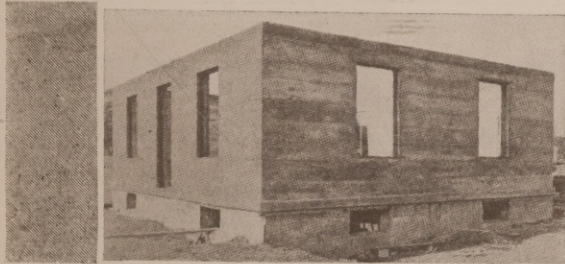
Write or Wire for Prices.

We Want Wide-Awake Jobbers.

**The Starks Manufacturing Co.**

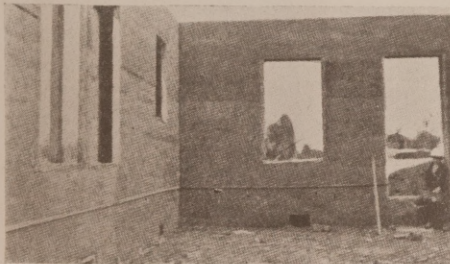
First and Main Sts.

Kansas City, Mo.



# ACME

## Hollow Wall System

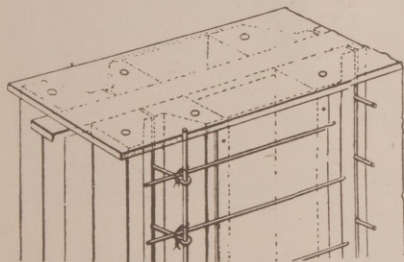


Speed and low-cost in building hollow walls—your bid low enough to get the business—high enough to make good money—and the speed gets you away to the next job in a hurry. That's how the Acme System works.

In building the one-story house (shown above) at Phillipsburg, N. J., on the Ingersoll-Rand property, 3 men erected all the form work in one day, and 5 men poured the entire walls above grade in 9 hours, carrying the concrete in buckets up a ladder.

With this system, simple wood forms are built 12 ft. high or higher. Ribs inside the airspace in the wall give strength—they act as pilasters.

*Write for full details and explanation of other Acme advantages.*



**Acme Hollow Wall Co.,**

**Madera, Calif**

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PHILADELPHIA NEW YORK EDDYSTONE

ENGINEERS—CONTRACTORS—EXPORTERS

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COMPLETE INDUSTRIAL BUILDINGS

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CABLE ADDRESS  
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fire letter addition.

Illustrated catalog in English, French and Spanish  
mailed on request.

Complete Warehouse Stock of Structural Shapes and  
Plates for Immediate Shipment.

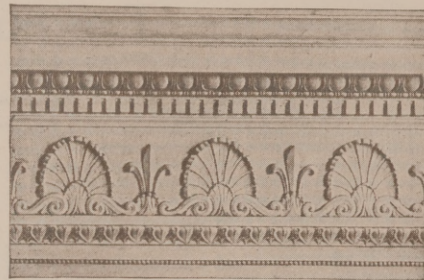
## Pipe Couplings

We will buy your couplings in any quantity,  
large or small. Write us what you have.

### A. & J. Manufacturing Co.

557 West Lake Street,  
Chicago, Ill.

## REFINEMENT IN DETAIL



NATIONAL PLASTIC RELIEF CO.  
330 Main Street, CINCINNATI, OHIO

As here shown, will be found in all of our moldings and ornaments. Let us estimate on all your plastic relief and composition work. Let us lay before you more clearly the character of our work.

## Multiple Oval Cores allow use of Wet Mixed Concrete

We are the originators of the core method whereby the small oval openings in block guarantee against collapse. Thus wet material can be employed. Simplest and best method for production in various lengths of block.

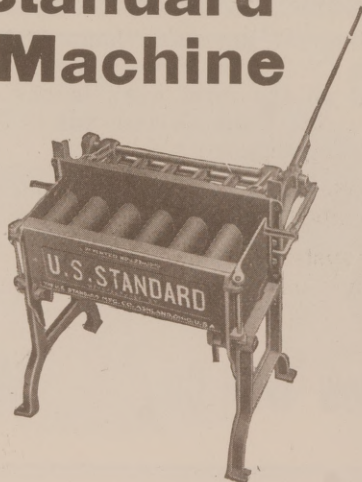
Our coring system allows for plenty of wall ventilation giving air space from top to bottom of wall.

Machine makes hollow or outside blocks and thin blocks for veneer and inside partitions.

U. S. Standard block are made face-down and are dense, strong and waterproof.

## U. S. Standard Block Machine

Ask for details about this—one of the oldest and most widely used block machines on the market.



U. S. Standard  
Manufacturing  
Co.

Formerly of Ashland, O.

Columbiana,  
Ohio

## STOCK FIRE PROOF DOORS

Metal  
Covered

Standard  
Sizes in Stock  
of all Designs,  
with Frames  
and Trim

Write for  
Booklets and  
Price List



A. C. Chesley Co.  
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279 Rider Ave., New York, N. Y.

# THE CONCRETE AGE

Vol. XXXIV.

DALTON and Atlanta GEORGIA, May, 1921

No. 2

## THE CONCRETE AGE

PUBLISHED MONTHLY

Devoted to Modern Permanent Construction.

CONCRETE AGE PUBLISHING CO.

### SUBSCRIPTION RATES.

In the United States and Possessions (Hawaii, Philippine Islands and Canal Zone), Mexico and Cuba, \$1.00 per year. Canada, \$1.50. All other foreign countries, \$2.00 per year.

Advertising rates given upon application.

Entered as second-class matter October 18, 1905, at the Post-office at Atlanta, Ga., under the Act of Congress of March 3, 1879.

The Editor solicits correspondence from readers on matters pertaining to the concrete industry. Descriptions of concrete work done anywhere that is of general interest accompanied by clear, sharp photographs and going into details as to methods employed will be published and paid for if found acceptable.

### TO OUR ADVERTISERS.

*Our advertisers are requested to have copy and cuts for changes for advertisements in this office not later than the 10th preceding the month for publication.*

*We cannot be responsible for changes not made, when copy and cuts are received later, or submit proof.*

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### Eleven Business Maxims.

THE president of London Chamber of Commerce gives these eleven rules which he has tested through years of business experience:

1. Have a definite aim.
2. Go straight for it.
3. Master all details.
4. Always know more than you are expected to know.
5. Remember that difficulties are only made to be overcome.
6. Treat failures as stepping-stones to further effort.
7. Never put your hand out farther than you can draw it back.
8. At times be bold; always, be prudent.
9. Make good use of other men's brains.
10. Listen well; answer cautiously; decide promptly.
11. Preserve, by all means in your power "a sound mind in a sound body."

### Public Operation Again Fails.

About eighteen months or more ago the people of one of our far western cities decided that they could make a better job of running the street railways than the private corporation that built the roads and had been operating them for years. The people did not believe the private company when it said it was operating at a loss and unless it were allowed larger returns it would become bankrupt. So they bought the system and set about a thorough test of the blessings to be derived from public ownership and operation.

The government of that city now confesses that the old owners were right. They were actually losing money, and the system has been operating at a constant loss ever since it passed into the control of the city. Even after being relieved of taxes and certain extra-ordinary charges, public operation did not make as good a financial showing as private operation.

The system got into practical politics, the inevitable course of all publicly owned and operated activities in this country, and in most other countries. The council yielded to all sorts of

impractical demands on the part of the people, and yielded as always, for the purpose of influencing votes.

From the postoffice service down to the smallest village lighting plant, we doubt if there is a publicly owned and managed activity in this country that is being operated as efficiently and as economically as it would be under private operation. The instance cited is simply another example of what seems to be an established fact, that we cannot mix business economic matters with practical politics, either nationally or locally, and make them pay.

### Build Roads.

Several counties have proposed to the governor to build their own roads. They are able to build on terms within reason. Undoubtedly their action will bring other factors in the road situation into line. However that may be, road building ought to be pressed without waiting for a general surrender. We may pay for the work more than we think we ought, but we shall pay less than the roads are worth to the people. The efforts to disclose and break up combinations of profiteers should be pushed energetically, but in the meantime let the road program go forward wherever there is an approach to fair conditions.

Work is needed by thousands of men. The railroads are lacking traffic and should be given the road material to carry now instead of later when other commodities may need all their facilities. The money spent on road building will thus serve a double purpose, employing workless men, giving aid to industries now at a standstill.

**A good road is always a bargain.** Illinois is in need of many. Whatever we put into them will return with compound interest.—Chicago Tribune editorial.

### Bidding on Public Work.

On April 5 contract for about \$50,000 of street paving will be awarded at Jackson, Miss. This is not a large paving contract, as paving contracts go, although it is well worth going after. The Jackson Daily News publishes an article regarding this approaching public improvement, and in this connection says:

“Judging from the number of applications for plans and specifications, there will be some lively bidding for the contract to lay paving from Magnolia street to the corporate limits, to be awarded by the municipal commission on April 5 at 10 A. M. Plans for the work have been completed by City Engineer Culley, and they provide for the highest type of construction work, a concrete base with surface asphalt, concrete or vitrified brick,

the commission to determine the type to be adopted after plans are considered.”

Leading contractors from several Southern cities bid on a \$165,000 bridge contract awarded in Columbus, Ga., last week.

Seventeen contractors submitted bids on a paving contract recently let in a South Carolina city.

A year ago county and city authorities were complaining that it was difficult to get spirited bidding on work, and in some cases it was actually impossible to secure bids at all—so abnormal were conditions, and so difficult was it for contractors to figure their costs with anything like accuracy.

But the situation is different now; bids aplenty can be had. Contractors can get material, labor and transportation without trouble. And they need the work. Wherefore the hearts of public officials should be happy.

### Tests of Concrete Floor Treatments.

A mimeograph circular has been issued by the U. S. Bureau of Standards, Washington, D. C., describing endurance tests of various treatments for concrete floors. In addition to this work, experiments have been started to determine the effect of various methods of applying a few of the common treatments used for preventing dust and excess wear on floors of this type. The object of the work is to determine if simpler or more effective methods can be discovered for applying these treatments.

### Cement “Trust” Indicted.

Indictments have been handed down by the special Federal Grand jury in New York city investigating an alleged building material combine against 74 corporations and 46 individuals comprising an alleged “cement trust.” The indictment contained two counts charging violation of the Sherman Anti-Trust law one alleging combination and restraint of trade, and the other monopolies and attempts to monopolize.

Among the corporations named are some of the largest cement concerns in the country. The indictments were returned as the results of evidence presented to the grand jury by assistant United States General William Rand and Ben A. Matthews.

It is the Government’s contention, Mr. Rand said, that the combination “has so effectually maintained uniformity of price, divided territories, limited output, and regulated the class and character of customers who might buy cement, and the purpose to which cement might be applied, as in effect to exclude cement from the ordinary channels of trade and commerce.”



## News of Street and Road Building Activity in the South Briefly Told

**N**EVER before in the history of the country has the South seen such active preparations being made and now underway in some parts for permanent road building of all sorts. For years the South has lagged in this respect, but the people or now speaking in no unmistakable terms, through the ballot, that they must have bond issues to carry on the good work.

This magazine is giving as briefly as it can the news of this activity, strictly confining itself to the South, though all states in all parts of the country are waking up.

### Road and Street Construction.

Birmingham, Ala.—Jefferson County will grade and surface one-half mi. Flat Creek Rd. to county line; 4 mi. Flat Creek Rd. to Praco; 2 mi. Green Springs Rd. to Montgomery Highway; bids until May 3; C. J. Rogers, County Highway Engr.

Livingston, Ala.—Sumter County will sell \$55,000 bonds for road construction; E. F. Allison, Prest. Board of Revenue.

Mobile, Ala.—Mobile County will gravel road from Union Church to Grand Bay; will invite bids; John D. Hagan, Prest. Board of Revenue and Road Commsr.

Montgomery, Ala.—Will construct 18,500 sq. yds. paving; Portland cement, concrete, brick sheet asphalt, asphaltic concrete or bitulithic; bids until Apr. 21; W. A. Smith, City Clk.

Tuscumbia, Ala.—Let contract to Mitchell Bros., Oneonta, Ala., for paving 4 blocks street; concrete; \$30,000. Address The Mayor.

Bradentown, Fla.—Will pave streets; \$24,000; Harry Wadham, Commr. Public Works.

Kissimmee, Fla.—Osceola County will construct 8 mi. Sebastian-to-Fellsmere highway; \$20,000; construction by county; contract to Greynolds & Monroe, West Palm Beach, Fla., for hauling and spreading rock. Address County Commsrs.

Kissimmee, Fla.—Osceola County will construct 6 mi. hard-surface road in Special Road and Bridge Dist. No. 4; bids until May 7; J. L. Overstreet, Clk. County Commsr.

Kissimmee, Fla.—Osceola County will construct road and bridges across Jane Green Swamp; bids until Apr. 23; J. L. Overstreet, Clk. County Commsr.

Sebring, Fla.—Will improve streets, electric light and water-works; voted \$250,000 bonds. Address The Mayor.

South Jacksonville, Fla.—Will construct 35,000 sq. yds. asphalt block or brick paving; 36,000

lin. ft. concrete curb and gutter or granite curb; bids until May; R. M. Rogero, City Clk.

Tavares, Fla.—Lake County may construct 58 mi. roads and reconstruct 123 mi. roads; vote May 10 on \$600,000 bonds. Address County Commsr.

Marietta, Ga.—Will pave 7 mi. streets; voted bonds. Address The Mayor.

Sylvania, Ga.—State Highway Dept. will construct 11 mi. road between Newington and Sylvania; \$40,000.

Sylvester, Ga.—Worth County let contract to Nicholls Contracting Co., Atlanta, Ga., for 4½ mi. gravel road; Federal-aid Project No. 213; O. H. Lang, Engr., Moultrie, Ga.

Prestonsburg, Ky.—Will pave streets and construct sewers; bids until Apr. 15; W. C. Goble, City Clk. Lately noted invited bids Mch. 15.

Abbeville, La.—Vermilion Parish Road Dist. No. 1 will construct 26 mi. earth and 21 mi. gravel-surfaced roads; bridges; \$350,000 available; bids until May 21; T. H. Mandell, Engr., Lake Charles, La.

Jena, La.—Highway Dept. Board State Engrs., 332 Maison Blanche Annex, New Orleans, La., will construct 14.52 mi. Jena-Alexandria highway, La Salle Parish; bids until May 10; Duncan Buie, State Highway Engr.

Fredrick, Md.—State Roads Comsn., 601 Garrett Bldg., Baltimore, will construct 5 mi. State highway, from end Contract F-7B extended at Bartonville road along Fredrick pike to New Market; concrete shoulders; Fredrick County Contract F-7C; bids until April 26.

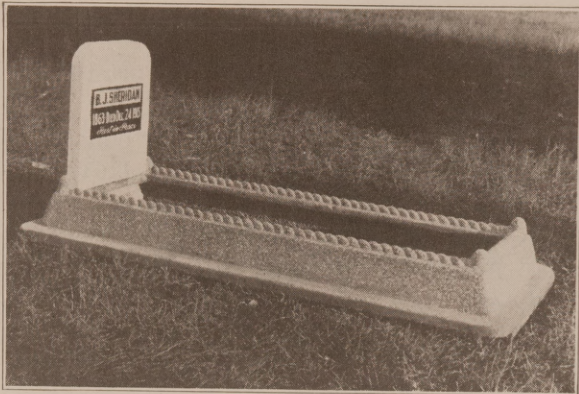
Rockville, Md.—State Roads Comsn., 601 Garrett Bldg., Baltimore, will construct 2.86 mi. State highway from State road at Gaithersburg to Laytonsville road; concrete; Montgomery County, Contract M-24; bids until Apr. 26.

Sailsbury, Md.—State Roads Comsn., 601 Garrett Bldg., Baltimore, will construct 3.72 mi. State Highway end Contract WI-13 to beginning of Contract 522, near Royal Oak; concrete; Wycomico County, Contract WI-14; bids until Apr. 26.

Towson, Md.—State Roads Comsn., 601 Garrett Bldg., Baltimore, Will construct 2 mi. State highway from end of Contract 490 along North Point road toward Eastern Ave.; concrete; Baltimore County, Contract B-43; bids until Apr. 26.

Upper Marlboro, Md.—State Roads Comsn., 601 Garrett Bldg., Baltimore, will construct 1 mi. State highway from end Contract P-16A toward Lanham; concrete; Prince George's County, Contract P-22; also 1 mi. State highway from end Contract P-17 along Central Ave. toward Halls

## Grave Marker and Coping Molds



Patent Pending.

Our molds make money fast for concrete products manufacturers. The products sell readily and give excellent satisfaction.

Central Cemetery Co., Cook Co., Ill.: "Your base protection is a splend'd idea."

Mrs. L. Truska, Blue Island, Ill.: "The concrete monument and 5 copings are more than satisfactory."

Write for catalog of molds for making tombstones, grave-coping and other ornamental products.

KEMPER GRANITE MOLD CO.

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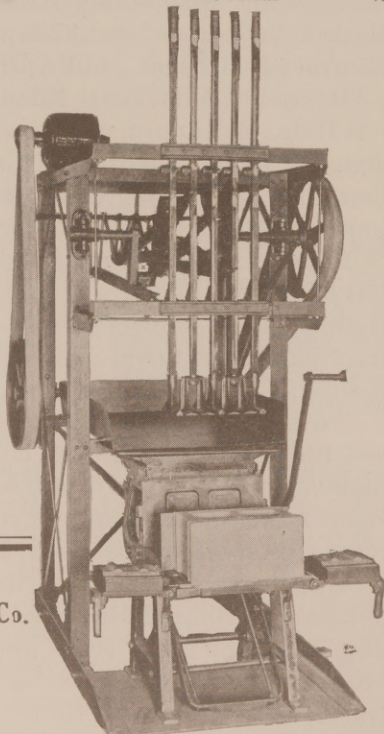
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Station; concrete; Prince George's County, Contract P-23; bids until Apr. 26.

Charleston, Miss.—Tallahatchie County will construct highway between Charleston and Philippi; sold \$200,000 bonds. Address County Comms.

Columbus, Miss.—Lowndes County let contracts for Jackson highway, connecting Mississippi road with Alabama road into Lamar County and connecting highway with Noxubee County rock road. Address County Comms.

Forest, Miss.—Scott County will sell \$110,000 bonds for road construction; B. R. Nichols, Clk.

Jackson, Miss.—Let contract to John Gerkins, Pascagoula, Miss., at \$45,000, for paving 15,000 sq. yds. W. Capital Ct.; concrete; A. J. Johnson, City Clk.

Jackson, Miss.—Hinds County will construct 5.8 mi. State trunk road between Jackson and Clinton; Federal-aid Project No. 115; 55,554 sq. yds. paving; bids until May 10; H. C. Dietzer, State Engr., Jackson, Miss.

Vicksburg, Miss.—Warren County will sell \$50,000 bonds of Dist. 3 for road construction; Alex. Fitzhugh, Chmn. County Highway Comms.

Forsyth, Mo.—State Highway Dept., Jefferson City, may invite bids on 2.27 mi. road through Branson Dist. and 1.83 mi. road in Hollister-Kirbyville Road Dist., Taney County; \$27,779; H. P. Moberly, Div. Engr., Jefferson City.

Grant City, Mo.—State Highway Dept., Jefferson City, Mo., will construct 1.04 mi. State road from Grant City; Federal-aid Project S 20.20; \$26,096.50; bids until April 26; A. C. Singley, Div. Engr., St. Joseph, Mo.

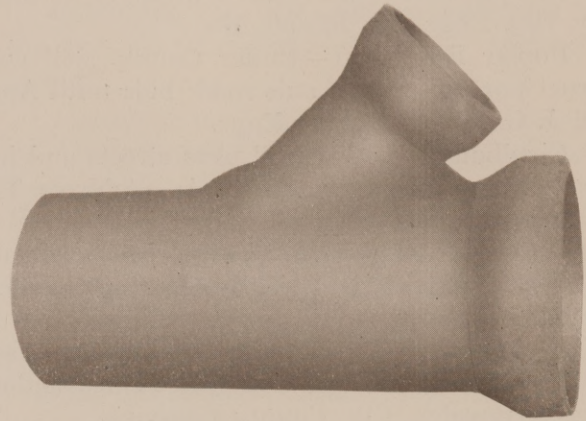
Kansas City, Mo.—Will pave Lexington Ave. and Central St.; bituminous concrete; 39th and 48th Sts.; sheet asphalt; Charlotte St.; concrete. Address Board Public Works.

Liberty, Mo.—State Highway Dept., Jefferson City, Mo., will construct 11.93 mi. Federal Air Project 6, Section B; bituminous macadam; \$204,875.37; 10.6 mi. Federal Aid Project 99; \$51,550.48; both Clay County; bids until Apr. 25; A. C. Singley, Div. Engr., St. Joseph, Mo.

New Madrid, Mo.—State Highway Dept., Jefferson City, Mo., let contract to A. Manegold, St. Louis, Mo., at \$17,730.60 for 3,918 mi. Federal-aid Project No. 120; width 24 ft.; 36,855 sq. yds. novaculite gravel pavement; also 4 bridges; M. S. Murray, Div. Engr., Silktion, Mo.

New Madrid, Mo.—State Highway Dept., Jefferson City, Mo., let contract to W. D. Lonergan at \$237,351.89 for 19.81 mi. Federal-aid Project No. 40; width 24 ft.; 186,658 sq. Yds.; 16-ft. gravel-surfaced pavement; also 4 bridges; M. S. Murray, Div. Engr., Sikeston, Mo.

Plattsburg, Mo.—State Dept., Jefferson City,



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**Waterloo, Iowa.**

Mo., let contract to Cook & O'Brien, Kansas City, Mo., at \$25,608.72 for 2.17 mi. State road from Plattsburg; State-aid Project S 20.23; A. C. Singley, Div. Engr., St. Joseph, Mo.

Poplar Bluff, Mo.—Butler County will construct portion of St. Louis road; bids until April 30; J. C. Nickey County Engr.

Chadborn, N. C.—Will pave streets and improve water-works; voted bonds. Address The Mayor.

Elkins, N. C.—Will pave streets; cement; \$100,000; invites bids; H. T. Brown, Engr. Lately noted.

Kenasville, N. C.—Duplin County will sell \$300,000 bonds for road and bridge construction; Jas. J. Bowden, Clk. County Commrs.

Louisburg, N. C.—Franklin County will sell \$10,000 bonds of Cypress Creek Township for road construction. A. E. Spivy, Secy. Road Comsn.

Mebane, N. C.—Will sell \$155,000 bonds for street improvements; W. S. Crawford, Mayor.

Sailsbury, N. C.—Will improve W. Liberty, W. Harrison, W. Horah and other streets; issue \$485,000 bonds; W. T. Rainey, City Clk.

Sanford, N. C.—Will sell \$200,000 bonds for street improvements, Address The Mayor.

Smithfield, N. C. Johnson County will sell \$40,000 bonds for road construction; D. B. Oliver, Chrmn. County Commrs.

Wentworth, N. C.—Rockingham County will construct 5 mi. hard-surfaced road from boulevard through Spray and Draper. Address County Commrs.

Wentworth, N. C.—Rockingham County will construct 5 mi. hard-surfaced road from boulevard through Spray and Draper. Address County commrs.

Atlas, Okla.—State Highway Dept., Oklahoma City, Okla., let contract to Anderson, Howland & McCoy, Perry Okla., at \$46,338, for 1 mi. concrete road in Jackson County.

Cushing, Okla.—Will pave 20,000 sq. yds. streets; \$80,000 available; bids about May 1; Clarence A. Wood, Engr., Stillwater, Okla.

Duncan, Okla.—Will pave 100 blocks in Dist. 2 to 7; 130,000 sq. yds. asphaltic concrete; \$850,000; bids until Apr. 19; J. F. Ewell, City Mgr.; Benham & Mullergren, Conslt. Engrs., Firestone Bldg., Kansas City, Mo. Lately noted.

Muskogee, Okla.—State Highway Dept., Oklahoma City, Okla., let contract to Healy Construction Co., Muskogee, at \$262,171, for 23 mi. gravel road in Muskogee, County.

Stillwater, Okla.—Will pave 6000 sq. yds. street; \$20,000 available; Clarence A. Wood, Engr.

Wagoner, Okla.—State Highway Dept., Oklahoma City, will probably let contract to Froebe-Briscoe Construction Co., Muskogee, Okla., for

17 mi. hard-surface road in Wagner County at \$206,194.20.

Wilson, Okla.—Let contract to J. T. Taylor and J. Max Stone for 8 mi. sidewalks; \$60,000 available; have under construction \$200,000 paving; G. V. Pardue, Mayor.

Yale, Okla.—Let contract to Fuller & Co., Tulsa, Okla., for 20,000 sq. yds. paving; \$120,000 available; Clarence A. Wood, Engr., Stillwater, Okla.

Columbia, S. C.—Richland County let contract to Elliott & Sons, Spartanburg, S. C., at \$28,116.05 for 6½ mi. Columbia-Newberry Rd.; J. Roy Pennell, Engr., 1202½ Main St., Columbia.

Dillon, S. C.—Dillon County will construct 19.767 mi. Marion-Dillon-Bennettsville Rd.; Sections A, B and C; Federal-aid Project 50; bids until Apr. 20.

Laurens, S. C.—Laurens County will complete connection between Owing Station and Fountain Inn; voted \$30,000 bonds. Address County Commrs.

Newberry, S. C.—Newberry County will construct 18 to 20 mi. road from Newberry to Chappells and Whitmire; sell \$400,000 bonds. Address County Comsn.

Athens, Tenn.—Will construct 22,365 sq. yds. paving in Dists. 1, 2, 3 and 4; bids until May 2; Fred Stephenson, City Recorder.

Clarksville, Tenn.—Let contract to Municipal Paving & Construction Co., Bristol, Va., and William Leftwich Co., Nashville, Tenn., at \$200,000 for 50,000 sq. yds. pavement, 8000 ft. concrete curb and gutter, etc.; S. R. Alexander, City Engr.

Cleveland, Tenn.—Will construct 56,610 sq. yds. paving; 23,895 lin. ft. curbing; 6990 sq. yds. sidewalk; storm sewers; etc.; bids until May 5; L. L. Woollen, Chrmn. Commrs. Improvement Dists. 6 to 15.

Jackson, Tenn.—Madison County may improve gravel roads; plans issuing \$100,000 bonds. Address County Commrs.

Jackson, Tenn.—Department Highways, State of Tennessee, Nashville, Tenn., let contract to E. D. Harvey & Co., Memphis, Tenn., at \$198,780.32 for 56¼ mi. state highway, Madison County; W. P. Moore, Ch. Engr., Nashville.

Sparta, Tenn.—Department Highways, State of Tennessee, Nashville, Tenn., let contract to A. F. Beardon, Birmingham, at \$354.52 for 13½ mi. State Highway No. 1, White County; W. P. Moore, Ch. Engr., Nashville.

Abilene, Tex.—Will improve streets; \$150,000 available. Address The Mayor.

Brady, Tex.—McCullough County will construct 1.5 mi. Mason road, State Highway No. 9; gravel surfaced; bids until Apr. 27; Evans J. Adkins, County Judge. Lately noted.

Brenham, Tex.—Washington County will con-

struct 33 mi. Federal-aid Project 236; \$1,500,000 available; bids about May 15; G. A. Breacher, Engr.

Crowell, Tex.—Foard County will construct roads; vote May 7 on \$100,000 bonds; G. L. Burk, County Judge; L. Noland, County Engr.

Dallas, Tex.—Dallas County will construct 18.2 mi. Garland road; \$881,000 available; bids until May 16; Chas E. Cross, County Auditor.

Dallas, Tex.—Let contract to Texas Bitulithic Co., at \$16,325.76 for paving Boll St.; Hal Moseley, Commr. Streets.

Fort Worth, Tex.—Let contract to Texas Bitulithic Co., Dallas, Tex., for paving Shaw St., and Worth Construction Co. for Paving E. Bluff St.; D. L. Lewis, City Engr.

Greenville, Tex.—Hunt County will improve 8.71 mi. Greenville-Sulphur Springs road; State Highway No. 11; bids until Apr. John L. English, County Auditor.

Haskell, Tex.—Will pave public square, extend watermains, etc.; vote on \$50,000 bonds. Address The Mayor.

Junction, Tex.—Kimble County applied for \$135,000 aid to complete 31.8 mi. State Highway No. 27; \$270,111; W. H. Baker, County Judge, Junction; W. E. Simpson, County Engr., Hicks Bldg., San Antonio, Tex.

Laredo, Tex.—Webb County will construct 35.4 mi. State Highway No. 2; surface with gravel; bids until Apr. 30; A. Winslow, County Judge.

Liberty, Tex.—Liberty County will construct roads; vote Apr. 23 on \$300,000 bonds; S. H. Crin, County Judge.

Mason, Tex.—Mason County will construct 27 mi. roads in Dist. 1 and 2; voted \$46,000 bonds; John T. Banks, County Judge.

McKenney, Tex.—Let contract to Southern Construction Co., Dallas, Tex., for \$150,000 street improvement. Address The Mayor.

Waxahachie, Tex.—Ellis County will grade, drain and gravel surface  $8\frac{1}{2}$  mi. Ennis-Waxahachie road; bids until Apr. 22; G. G. Edwards, Engr., Ennis, Tex.

Waxahachie, Tex.—Will construct 23,090 sq. yds. pavement; bitulithic, rock asphalt, asphaltic concrete or vertical fiber brick; 15,875 lin. ft. combined curb and gutter; will invite bids; H. R. F. Helland, City Engr.

Wichita Falls, Tex.—Wichita County, 17.6 mi. 18-ft. concrete paved road on State Highway No. 5; \$722,438; J. P. Jones, County Judge; J. M. Isbell, County Engr.

Wichita Falls, Tex.—Wichita County will sell

\$1,450,000 bonds for road construction; W. W. Murphy, County Auditor.

Falmouth, Va.—Let contract for 2114 ft. curbing and 400 ft. concrete sidewalk. Address The Mayor.

Jonesville, Va.—Virginia State Highway Comsn., 116 S. Third St., Richmond, Va., will construct 5 mi. water-bound macadam road on State Road No. 10, Lee County; Virginia Project No. 60; bids until May 3; G. P. Coleman, State Highway Commr., Richmond.

Leesburg, Va.—Virginia State Highway Comsn., 116 S. Third St., Richmond, Va., will construct 7.48 mi. bituminous macadam road on State Road No. 6, Loudoun County; Virginia Project S-64; bids until May 3; G. P. Coleman State Highway Commr., Richmond.

Newport News, Va.—Will construct 3400 lin. ft. concrete curb and gutter on 26th St.; 1300 lin. ft. concrete curb and gutter on 35th St.; 1997 sq. yds. concrete on 35th St.; 1527 sq. yds. concrete on 42d St.; 1527 sq. yds. bituminous macadam on 34th St.; 1527 sq. yds. bituminous macadam on 27th St.; bids until May 2; J. L. Ficklen, City Clk.

Palmyra, Va.—Virginia State Highway Commission, 116 S. Third St., Richmond, Va., will construct 3.67 mi. soil road and 1.05 mi. bituminous macadam road on State Road No. 2, Fluvanna County; Virginia Project No. 89; bids until May 3; G. P. Coleman, State Highway Commr., Richmond.

Richmond, Va.—Will pave streets with sheet asphalt, asphaltic concrete, bitulithic, Willite process, vitrified brick, durax block and granite spalls; \$250,000; bids until Apr. 26; Allen J. Saville, Director Public Works.

Stuart, Va.—Will improve streets; vote Apr. 19 on \$20,000 bonds; F. P. Burton, Mayor.

Williamsburg, Va.—Virginia State Highway Comsn., 116 S. Third St., Richmond, Va., will construct 3.17 hi. concrete and bituminous concrete road on State Road No. 9; Virginia Projects S-93, 117-A and 117-B; bids until May 3; G. P. Coleman, State Highway Commr., Richmond.

Wytheville, Va.—Virginia State Highway Comsn., 116 S. Third St., Richmond, Va., will construct 9.04 mi. water-bound macadam road on State Road No. 10, Wythe County; Virginia Project No. 100; bids until May 3; G. P. Coleman, State Highway Commr., Richmond.

Clarksburg, W. Va.—Harrison County will grade and place drainage structures on 6.5 mi. roads, Sections A to D; bids until May 12; Clair N. Parrish, Clk. County Court.

Charleston, W. Va.—Will pave Virginia St.;

5800 sq. yds.; bids until Apr. 16; Ernest Bruce, City Engr.

Fayetteville, W. Va.—Fayette County will pave 7 mi. country road from Beckwith to Kanawha Falls; bituminous macadam; bids until May 2; J. K. McGrath, Road Eng.

Huntington, W. Va.—Let paving contract as follows: Amos Trainer, at \$4415, Six-and-a-half alley; Harrison & Dean, at \$7444, First St.; \$36,-153, Jackson Ave.; Geo. Henkle, at \$9346, Eight-and-a-half alley; Lucien Bias, at \$5801, 30th St.; \$10,263, 4th Ave.; Gershaw & McGinnis, at \$26,-707, Caldwell St.; Mat Miser, Commr. Streets and Sewers.

### Concrete Arbor Resembles Wood.

So clever was the work of the builder of this arbor that it is only when one gets out his pocket knife to do some carving of it and approaches to close range that he discovers it to be of concrete and not of wood. Each section was molded individually and hand finished in imitation of bark, the cores being gas pipe wrapped with poultry netting. The weather has turned the surface to a gray and green shade suggestive of tree trunks and vines climbing have not only added a touch of nature and living vegetation but have had a part in the coloring of the surface.

## Importance of Correct Consistency

By George H. Hill, Division Engineer West Virginia State Road Commission, Charleston, W. Va.

### Importance of Correct Consistency.

OUR State and other testing laboratories are called upon to determine the quality of the various aggregates entering into concrete road construction, so that we may know fairly well what to expect from each one. We must, however, use care in mixing and placing the concrete; also while much has been said as to the proper consistency of the mixture, the importance of this subject warrants calling attention to it frequently.

Laboratory tests have shown that certain percentages of water should be used to obtain the best results. No fixed percentage can be given in the specifications, however, without knowing the character of the aggregates to be used on each particular job. Pebbles absorb practically no water, limestone only a small amount, but sandstones which are coming into use throughout West Virginia and other states do absorb a considerable amount. Sufficient water must be used with the sandstone aggregate to provide for the hydration of the cement in addition to that which will be absorbed by the sandstone.

The specifications usually have left the consistency of the mix to the will of the engineer, and while this is proper, he and his inspector should give very careful and particular attention to this part of the work. Too often the result of the consistency clause is too wet a mix. A dense concrete made up of well graded aggregates is desirable and this is obtained only by careful attention to the addition of water in mixing and to thoroughly tamping or rolling the resulting concrete after it is placed on the subgrade. The roller too often serves only for exhibition purposes. In that respect it is like the 10-ton roller supposed to be used on the subgrade but which is sometimes conveniently "forgotten." If the mix is too wet, the roller cannot be used as intended unless the crown be rolled out of the pavement.

Concrete roads are subject to the action of heat and cold as well as to the alternate wetting and drying of rain and sun. The denser the concrete, the better its resistance to these conditions. Recent specifications call for tests on consistency to be made on the work by filling a cylinder 6 inches in diameter and 12 inches high with the concrete as it comes from the mixer and noting the reduction in height of the concrete cylinder when the form is removed. This reduction is usually specified as not to exceed 4 inches. A more satisfactory slump test has been devised during the past season, which is done with a truncated cone 12 inches high, 8 inches across at the bottom and 4 inches at the top. The maximum reduction in height, upon removal of the form is specified as 1 inch for the proper consistency. It has been found that this latter test is more accurate, and is more easily performed in the field. The whole object of these tests is to insure the proper density of the resulting concrete, so it will successfully resist the destructive elements mentioned above.

No hard and fast rule can govern every problem which the contractor, or inspecting engineer will meet. These tests, when carefully conducted, will remove from a vital stage of the operation one source of uncertainty. It is imperative, however, that every ounce of "gray matter" be used in the interpretation of the specifications, considering always the conditions peculiar to each particular piece of work.

### Reduction at Norfolk.

The Norfolk Builders and Contractors Association announce that a reduction of 10 per cent. in wages had been accepted by carpenters, plasterers, electricians, cement finishers and iron workers employed there.

# Insulation of Concrete Walls

Nolan D. Mitchell, Structural Engineer, Supervising Architect's Office, U. S. Treasury Department, Washington, D. C.

SINCE the dawn of civilization man has made houses to protect family and cattles from the weather and depreciation. With succeeding generations better and better protection has been afforded.

In view of the many improvements that are being made in all our arts we can readily imagine great forward strides in house building in the near future. Certainly some forward movement is needed when the loss by fire is now approximately \$300,000,000 in money and hundreds of lives each year. And to this must be added the upkeep cost of our large standing army of insurance and fire protection forces. The fire-fighter comes after the fire starts to limit it to as small space as possible and the insurance man comes later to distribute a part of the money loss to the more fortunate, taking no inconsiderable amount in fees for his services.

Another phase of the situation is the growing scarcity of fuels. We have been, and are still, very prodigal of them. Now is the time to consider in an economic way what we can do to conserve our supply. If we can make houses that do not require so much fuel for heating we should at least investigate their possibilities.

One cannot deny that our better constructed wooden houses have been comfortable and, except against fire, have afforded reasonable protection at a low first cost. While our lumber resources are by no means exhausted, it is becoming more and more uneconomical to build wooden houses. In making the change from the wooden house to types of more permanent construction we must select some kind that will provide as much or more comfort for the occupants. Americans will accept no less.

The unfortunate thing that we realize at once is that our common fire resisting materials of construction have a high rate of heat conductivity as compared to the more combustible kinds. The cold walls resulting from the use of these has had no small influence in retarding the change from the wooden house.

The maintenance of an even temperature in a house resolves itself into provision of adequate heating apparatus and a construction that will satisfactorily prevent rapid dissipation of heat through floors, walls and ceilings. It is just another phase of the problem that refrigerating engineers have found to be of such importance in their work, namely, insulation.

There is plenty of evidence that many builders realize the necessity of insulation against heat transference, but we are not so sure that an altogether satisfactory solution has been found.

Let us look briefly into what has been done and the results. Wood furring with lath and plaster on the inside was probably the first effort to avoid penetration of dampness and the condensation of moisture on the inside of the wall. The result as far as insulating against the heat loss through an eight inch wall was an improvement of approximately 15%. Where the wall block absorbed dampness from the weather the result was not so good for in general any porous material in moist or damp condition transmits heat much more readily.

The hollow block was another development in the right direction. The total result was probably not so very different from the wood furring except that it provided no lodgement for vermin and no runway for fire. The chances for dampness showing on the plaster were much higher however, and there is no doubt that passage of dampness through the whites of hollow blocks is responsible for a large part of the long fight that advocates of concrete house construction have had to make to keep in the business.

Other builders realize that dampness cannot travel by capillary action across a space bridged only by thin metal ties adopted that system and at the same time realize an improvement of about 20% over an 8-inch solid plastered wall. Hollow monolithic walls give about the same or perhaps a little better protection. The matter of detail of construction of the hollow wall is apparently more troublesome, yet with some builders they are still favorites.

A system, not so much in vogue, has been the building of solid walls of lean cinder concrete facing it with stucco on the exterior and plastering the inner face, or where the temperatures justify it, furring has been applied.

Another use of cinder concrete has been in making furring blocks to face the inside of the walls. I have not been able to find any data on the relative merit of these. One recent system embeds the porous block in the center of a monolithic wall so that the inner shell may serve as the supporting wall for floors and ceilings and thereby not break the continuity of the insulating course.

Other developments such as multiple cell blocks with offset withes, various forms of opening to allow freer circulation, etc., have been improvements in both insulating value and saving of materials.

A very popular building block is one made solid with projections on the rear face to bond with like projections on the blocks laid up to form the opposite face of the wall. This gives a good bond and is a simple arrangement easily cast allowing a wetter

mix than that generally used in block construction.

All these efforts have made an appreciable improvement over the solid wall type, but generally the air spaces provided have been unnecessarily large and allow convection current within the closed space.

A comparison of the results obtained by some of the above with the results of refrigeration insulating has led to investigation in a general way as to what might be done by using concrete as the structural member of the wall and combining with it an efficient insulating material.

As a basis a monolithic concrete wall 4 inches thick with 1 inch of corkboard insulation has been considered. It is not the intention to say that either the 4-inch concrete or the 1-inch corkboard is an ideal. In actual practice the thinnest concrete that will give adequate service and any insulating materials of the requisite qualities for the work should be used. There are many insulating materials on the market and if a demand is created for still different ones we may be sure that some resourceful manufacturer will soon be able to meet it.

There is no perfect insulating material. Of the more common ones the heat transmission factor varies very closely in proportion to the density of the structure. The cellular ones such as wood, pith, cork, wool, etc., are best for house insulation. Any of these materials must be kept dry to give the best service.

The following table from "Mechanical Refrigeration" by Prof. Macintire of the University of Washington, gives the heat conductivity of some of our common materials. The table indicates heat conductivity per square foot per inch thickness per degree difference in temperature per hour.

1" Common brick .....	4.66
1" Concrete (1:3:5) .....	4.29
1" to 4" Hollow tile .....	0.625
7/8" Lumber (tongued and grooved) ....	0.83
Air space (from 1" to 6" thick) .....	1.66
1" mineral wool .....	0.67
1" builders paper .....	0.30
1" pitch .....	0.79
1" shavings (dry) .....	0.67
1" granulated cork .....	0.48
1" cork board (all cork, compressed) ..	0.26
1" cork board (artificial binder) ....	0.28
1" hair felt .....	0.31
1" indurated fibre board .....	0.42
1" compressed mineral wool board ....	0.33

For thickness of insulating materials up to 8 inches the conductivity is in almost inverse proportion to thickness. The effect of change of temperature an conductivity is very slight through the range of temperature required in house heating.

As a comparison of the 4-inch insulated wall with the two usual types of furred concrete walls the fol-

lowing is submitted from Heat Transmission Table compiled by Wm. R. Jones of the University of Pennsylvania. The heat transmission factors are:

- (1) 8 inch solid concrete wall with 2" terra cotta or wood furring and plaster ..... .53
- (2) 8 inch hollow concrete wall (two 4" thickness of concrete) center air space and furring as above ..... .38

From Pelelets formula the transmission factor of—

- (3) 4 inch concrete wall with 1 inch cork board .18

Assuming that we have a house 26 by 26 feet in plan, two stories high with 1,450 sq. ft. net wall area, and average difference in temperature of 35% for 20 hours per day would show the following amounts of coal burned to make up for heat losses:

- (1) 53.65 pounds per day.
- (2) 38.57 pounds per day.
- (3) 18.27 pounds per day.

Thus it is seen that the thin insulated wall would show a saving over the other types of 35.38 and 20.30 pounds of coal per day respectively.

Assuming that the condition as above continue for an average of 150 days each winter and that coal will cost \$12 per long ton the savings capitalized at 6% for a 30-year period would justify expenditures of \$400 and \$228 respectively for the insulated wall over the other types. Or to come back to the square foot unit, 27½ cents and 15.7 cents respectively.

The saving of materials in the thin wall and the space saved by using them can be computed readily. If the same outside dimensions are maintained in the floor space for the thin wall type would be approximately 11% more than with the usual types.

The matter of increased comfort to tenant has not been given a money value, but it would be safe to assume that from a commercial standpoint, this would be far more than any of the preceding. Once a builder has established a reputation for making a safe, satisfactory, comfortable house, economical in maintenance, he can be assured that his services will be in constant demand and his profits can be larger as a consequence.

Considerable progress was made in Europe before the war in insulating dwelling houses and in this country a number of houses had been built using different types of the better insulating materials.

There are a number of insulating boards on the market now, several of which could be adapted to use in dwellings but for general excellence and suitability, when the cost of installation and insulating service rendered are considered the cork board will rank near if not at the top of the list.

The objection of expense may be raised at once



but that cannot be so very much, if any, above our usual types of construction. Cork boards are selling at this time (February 19, 1921), for approximately 13½ cents per board foot in quantities. When it is considered that it replaces at once the inside furring at least half the cost of the material is offset. In the example given above the concrete saved would offset the other half of first cost.

#### Weller With Lakewood Engineering.

Mr. Robert C. Weller has been appointed General Sales Manager of The Lakewood Engineering Company with headquarters at Cleveland. Mr. Weller is in full charge of sales work.

Effective March 1st, Mr. Carlton R. Dodge is appointed Western Sales Manager of The Lakewood Engineering Company, with headquarters at 1215 Lumber Exchange Bldg., Chicago.

## Concrete Bridges Eliminate Repairs

TWO convincing examples of concrete's freedom from repair and maintenance charges are found in the arch bridge in Eden Park, Cincinnati, built in the winter of 1894-95, and the multiple-arch bridge carrying an electric railway over the Maumee river near Waterville, Ohio, built in 1907. Not a dollar has ever been spent on either of these concrete structures for repair or maintenance, although the former carries heavy city parkway traffic and the latter has been subjected to severe flood and ice jams in addition to the tests of traffic.

The Eden Park bridge was designed and built after the Melan system. The arch has a span of 70 feet, a rise of 10 feet and a total width of 32 feet 6 inches, including the railings and two 5-foot sidewalks. The arch ring is 15 inches thick at the crown and 48 inches at the haunches. Spandrel walls were made of 1:3:6 concrete, rammed in 6-inch layers behind 2 inches of yellow-colored face mortar of a 1:1½ mixture. The remainder of the exterior has a similar mortar coat, but no coloring matter. The arch ring was made of 1:2:4 concrete. Copings and ornamental pieces are of pre-cast concrete stone of the same mixture as the face mortar. Sand and crushed limestone were obtained near the bridge site. Construction was begun in November, 1894, and completed during the following winter. The contract price for the bridge was \$7,130, while bids based on alternate plans for a stone arch averaged about \$12,000. Although under present conditions the cost of such structures would be much higher, these figures may be considered as representing the ratio of cost between the two types of construction.

The Eden Park bridge carries one of the park drives across Park avenue. In a letter dated December 5, 1919, F. S. Krug, Chief Engineer, Engineering Department, Cincinnati, says:

"The condition of the bridge today is apparently the same as in 1917 when I wrote you. Outside of a few cracks at the haunches and some hair and weather cracks, the bridge appears as good as ever. It has

given excellent satisfaction and to my knowledge nothing has ever been spent for repairs."

As the bridge has suffered practically no deterioration in its twentyfive years of service, its first cost represents its only cost to the city. The minor defects mentioned are in no way detrimental to the integrity of the structure, and are no more than might be expected from the knowledge then prevailing with respect to reinforced concrete design.

The Maumee river bridge consists of twelve reinforced concrete arches varying in clear span from 75 to 90 feet, with a roadway of 1 feet in the clear between copings. Solid spandrel walls retain the earth fill over the arches. The bridge is about 1,180 feet long, and contains 9,200 cubic yards of concrete and 100 tons of reinforcing steel.

This bridge has a remarkable record of performance. J. H. Sundmaker, Chief Engineer, Ohio Electric Railway, Springfield, Ohio, in a letter dated December 17, 1919, states that it withstood without damage the excessive flood of 1913, several periods of high water and swift current every year since its construction, and several very heavy ice gorges. To date no maintenance charges appear against the structure proper, there are no indications of deterioration, and no defects have appeared which are in any manner detrimental to its strength.

Full consideration should be given to the fact that this structure is a railway bridge and has already given thirteen years of service under the most severe tests of flood and ice. Railway officials may obtain abundant food for thought in the chief engineer's statement that no maintenance expenditures have been required. The lesson is one that should not be lost, in view of the enormous annual maintenance expenditures made by our railways.

The Maumee river bridge was built by the National Concrete Company of Indianapolis at a contract price of \$77,000. At the time of its construction it was said to be the longest reinforced concrete railway structure in existence.

# Ninth Convention Good Roads Association

THE ninth annual convention of the United States Good Roads Association was held at Greensboro, N. C. from April 18th to 22nd, inclusive when delegates from twenty-four states were in attendance.

After a spirited contest, Phoenix, Ariz., was selected as the 1922 convention city. Other cities who contended for the honor were New Orleans, Chattanooga, Fort Worth, and Greenville, S. C.

Gov. Morris of North Carolina, who was to have delivered the address of welcome, was unable to attend, having been taken suddenly ill on the train while en route to Greensboro. Gov. Brough of Arkansas, president of the Association, also was detained because of illness.

In the absence of Gov. Brough, the initial session was presided over by J. A. Rountree of Birmingham, Ala., director general of the association, while Frank P. Hobgood of Greensboro, welcomed the delegates. Judge E. P. Toney of Arkansas, personal representative of Gov. Brough, was introduced as the man who built the longest stretch of hard surface road in the country, ending 200 miles without a break.

Benehan Cameron, president of the Bankhead Highway Association meeting with the United States Good Roads Association, in an address referred to North Carolina's progress in road building, declaring "that we have gone from five million to fifty million in six years and that is making some progress."

Senator Heflin, of Alabama, was a speaker, also Mrs. Wallace B. Edmundson of Arkansas, who pleaded for roads as a right of the country Woman.

Governor D. W. Davis of Idaho, E. F. Morgan of West Virginia, M. C. Mechem of New Mexico, Alf Taylor of Tennessee and John M. Parker of Louisiana, sent greetings to the convention. The Idaho governor urged the convention to go to Congress for big appropriations and said "national highways can be best built under state control."

J. A. Rountree, director general, read his annual report, declaring much progress has been made during the past year.

Senator Heflin declared good roads make for good morals, religion and citizenship.

"But there is going to be," continued the Senator, "a movement to stop this co-operative building. I think I scent it in the air. They are talking about holding up this work until a survey can be made. I call you to pass the strongest resolutions here calling not only for \$75,000,000, but \$100,000,000. I want to tell you that we have a majority in the House and the Senate. But there are some opponents of this plan in both parties."

Mr. Heflin declared that not a moment should be lost in a survey. He said he feared that this device would interrupt the work and kill the co-operative scheme by putting the road building under a commission.

He pleaded for roads as the remedy for Bolshevism, anarchy and Socialism. "The purest American spirit is on the farms," he said. "The red flag of anarchy is never seen on the farms."

Resolutions were adopted indorsing the federal and state co-operative plan of road building now in practice and urging upon Congress "the importance and necessity of continuing this work and avoiding a national calamity." The resolution also urged Congress to appropriate \$100,000,000 a year to provide that money collected on loans made to the allied nations during the war "shall constitute the road fund and shall be used as Congress shall direct in building and improving post roads and public highways in the United States."

Appointment of a committee to present the resolutions to Congress and the President was authorized.

A. G. Batchdelor of Washington, executive chairman of the American Automobile Association, spoke on "the present day needs of interstate roads."

The afternoon session was given over largely to highway engineers representing many states who described road development in their states.

Ex-Gov. Charles H. Brough of Arkansas was chosen president of the United States Good Roads Association and the following were named vice Presidents: Governors Lee Russell of Mississippi, O. A. Larrazola of New Mexico, R. M. Hubbard of Texas and N. L. Miller of New York and Judge E. P. Toney of Arkansas. J. A. Rountree of Birmingham succeeds himself as director general.

The Bankhead National Highway Association directors met to-day and took steps looking toward keeping unsightly objects away from its highway across the continent.

The greater part of Thursday 21, was devoted to an automobile parade—more than three miles long—from Greensboro to High Point followed by a barbecue at the Greensboro fair grounds, attended by about 2,000 people.

The women attending the convention at a session denounced the use of highways for advertising purposes. Benenan Cameron, of Stagville, N. C., president of the Bankhead Association, will appoint a woman commissioner in every state, it was announced.

Senator Charles E. Townsend of Michigan and Representative W. B. Bankhead of Alabama spoke

in favor of federal co-operative road building plan on Friday, at the final session. Both speakers dwelt upon the necessity of good roads as aids to industrial development and national defense. Senator Townsend declared that he favored a commission of five to study roads.

"It is possible to spend money even from a depleted treasury in such a way as to be economical," he said, "but it would be a crime against America for this country to vote money which would be wasted."

He asserted that he had discussed the road question with president Harding and knew the President's attitude. "I visited Mr. Harding," said the Senator, "about ten days at Marion during the campaign. It was necessary for us to go out to meet engagements and to drive very rapidly in order to do so. And sometimes we took our lives in our own hands when we went over some of those patches which had been built with federal aid." Discussing what he termed the futility of appropriating money which will be prorated among counties without a federal system, he declared: "Never will another dollar be voted" with his consent "unless the national system is uppermost.

"It is not the place of the government to build country roads," he said. "You of the South who always have believed in states' rights wish to preserve some of rights of the state in road building. And I am with you in that. I do not think we should appropriate a dollar from the national treasury which does not do a dollar's worth of good toward building the national system."

The Michigan senator declared "there never shall be a return to the pork barrel system."

Congressman Bankhead declared that the federal road system which the associations are undertaking to advance deserves the nation's help because the farmer is so disadvantaged by tariff costs as to be put out of the running.

Countess Constance deCaen of France spoke in the afternoon. She told of the excellent roads in France, declaring that the good roads "saved us as they did at Verdun."

#### Concrete for Residences.

Concrete houses are in their infancy, and are comparatively untried. There have been many experiments—some successful and others decided failures. There seems to be no reason why concrete should not prove an admirable building material for the small house. It has proved its worth in many fields. Factories, garages, bridges and stadia have been made to fulfill all their requirements when built almost entirely of concrete. One of the finest examples is the Harvard Stadium—a structure which

is a modern architectural monument. Why not more concrete houses?

There have been difficult problems to overcome in adapting concrete to housework. Forms are expensive as ordinarily used, and the bracing necessary for holding floor forms in rigid position until after the initial set of the concrete is considerable. Water-proofing has been another difficult problem.

While the practical construction of concrete houses must still be considered as in the experimental state, there are conclusions which may lead to a perfect solution of the inexpensive house.

A combination of concrete walls throughout with common wooden joist construction of floors and wooden roof rafters does away with the expensive floor slab work which requires a steel reinforcement and expensive forms.

The outside walls should have an air-space—for example, a seven-inch wall made of two solid three-inch concrete walls and a one-inch air-space. This air-space insures dryness and is the most effective and cheapest damp-proofing. It also helps to keep cold out and heat in. With the air-space as described, plaster can be applied directly onto the inside of the concrete without danger of stains from seeping moisture.

The use of a very dry mixture, so that forms can be moved and used again only a few hours after the concrete has been poured into them, saves wood. Every saving in lumber in form-work is a great stride, with lumber at its present cost and the probable future shortage.

There is a splendid house in Boston where concrete has been used almost entirely. The architraves around windows and doors, all floors and practically all ornamental details are of concrete. The house is a decided success architecturally, but it was very expensive. This house, while its system of construction is not practical and could not be economically adapted to small-house work, does prove that concrete need be neither cold, ugly nor barren. The house is rich in its detail, pleasing in color, and the interior (due in a large measure, to be sure, to furnishings) is warm and homelike.

As precedent for designing concrete houses the architect can look to the domestic work of any country and find inspiration. Wherever plaster has been used on masonry, the problem has been similar.—E. B. Goodell, Jr., Architect, in *House Beautiful*.

#### New Mixer Catalog.

The American Cement Machine Co., Inc., sends us a very handsome catalogue of their "Builders' Mixers." These machines are illustrated with clear, large cuts and details, with descriptive text and specifications. A liberal use of silver bronze adds to the attractiveness of the booklet.

# National Convention Asphalt Association

THE second annual Convention of The Asphalt Association, held at the association headquarters in New York, April 13, marked important general advances in the road-building and street-paving field. The association, which is the national organization of asphalt producers, Machinery Manufacturers and Contractors, took the lead in advocating measures which, if adopted, will go far toward placing the road-building and street-paving industry on a higher plane and a sounder footing and will not only create more wholesome competition but eliminate waste and extravagance in highway construction.

The annual address of the president, Joseph R. Draney, of the United States Asphalt Refining Co., New York, developed the need of many men for work during the highway construction period now opening. Mr. Draney reported that the asphalt industry, on the whole and despite present conditions, is in a sound condition with prospects for the production of enough oil to assure an adequate supply of asphalt for years to come.

President Draney predicted that, unless reactionary pessimism grips the nation, 700,000 men will be needed in the building of the 35,000 miles of new highways contemplated this year under the billion dollar road program outlined by the Federal government and the state and counties. Three hundred thousand more men, he said, will be needed in the quarries, gravel-pits, cement, brick and asphalt plants and factories devoted to the manufacture of road machinery. The road-building boom, he thought, will work great benefit to the railroads by bringing into service one hundred thousand idle freight cars to transport one hundred million tons of road materials.

"To set a great army of one million men, now for the most part unemployed," said President Draney, "at building highways is to solve in part not only the acute unemployment problem facing the nation but also part of the rail troubles. Furthermore, money in plentiful quantities would be released for local circulation through wages to local labor and in payments to local producers of stone, gravel, sand and other materials, thus easing the pressure brought about by the reductions in the price and demand for agricultural products. Stimulation in the production of trucks, machinery and raw materials and in engineering and the employment of labor can positively be accomplished with an untrammelled road-building program. At the same time we would be reducing the dangers to travel by abolishing railroad grade crossings, more adequately bridging rivers and smaller streams, putting the outlying districts closer to medical and hospital aid and

would bring farmer and his market in closer touch."

Taking the stand that efficient engineering and executive management are essential to the improvement of the nation's highways; that highway expenditure should be proportioned to traffic importance; that advantage should be taken of every opportunity to benefit by the road-building experience of other nations; that the unemployed of the nation should receive employment as quickly and extensively as possible, and that a vigorous public association adopted resolutions as follows:

1. Urging Congress to pass the Federal aid appropriation of \$100,000,000, thus assuring a continuance of roadbuilding under the supervision of skilled state and Federal Engineers.
2. Urging the highway management be divorced from politics and all materials and methods entering into highway construction be placed in open competition.
3. Declaring that every highway be required to show traffic justification for its construction, thus guarding against waste and extravagance.
4. Memorializing Congress to authorize the United States to join the Permanent International Association of Road Congresses made up of the highway departments of all nations.
5. Urging the Interstate Commerce Commission to authorize a reduction in freight rates for road materials, thus stimulating the road-building program.
6. Recommending that public officials carry forward road-building programs to the extent permitted by appropriations available, thus giving employment to many hundred thousand men now out of work and utilizing tens of thousands of idle open top freight cars.

A new board of directors was elected to consist of the following men: Henry Fisher, Standard Oil Co., of New York; Herbert Spencer, Standard Oil Co., of New Jersey; J. R. Draney, U. S. Asphalt Refining Co.; F. A. Hogan, Imperial Oil, Ltd.; J. S. Helm, Standard Oil Co., of Louisiana; E. J. Morrison, Hastings Pavement Co.; F. J. Allen, Standard Oil Co., of Indiana; L. M. Law, New Orleans Refining Co.; H. B. Pullar, Pioneer Asphalt Co.; G. H. Perkins, Warren Brothers Co.; W. T. Headley, Headley Good Roads Co.; J. E. Clark, Standard Oil Co., of Kentucky; Richard Pebworth, Cressy Road Sprayer Mfg. Co.; B. F. Richardson, Union Paving Co., of Philadelphia, and Michael White, White Paving Co., of Chicago.

The directors elected F. P. Allen of the Standard Oil Co., of Indiana, Chicago, Ill., as vice-president to succeed J. M. Woodruff of the Sinclair Re-

fining Co., Chicago, and re-elected J. E. Penny-backer, secretary.

#### New Cement Products Plant.

Fort Lauderdale, Fla.—J. J. Kelley will establish plant for manufacture of concrete building blocks, ornamental tile, cornices, etc.

Bradentown, Fla.—S. P. Harris and C. L. Shannon will establish plant for manufacturing concrete blocks, brick and ornamental flower pots.

Alabama City, Ala.—Birmingham Slag Co., Birmingham, Ala., reported establish brick and tile plant.

Catlettsburg Ky.—W. A. Patton will establish plant for mfre. concrete blocks, tile, etc.; mchy. purchased.

Tulsa, Okla.—Double Strength Concrete Block Co., capital \$10,000, incptd. by L. L. Mixon, G. A. Cairns, Everett Petry.

Castroville, Tex.—Gulf Portland Cement Assn., capital \$300,000, incptd. by John J. Shorp, L. C. Ihnken, both Castroville; W. S. Campbell, San Antonio, Tex.; plans to erect plant for mfre. of cement.

Miami, Fla.—Dexter-Geare Corp. has purchased site to establish plant for mfre. of monolithic concrete wall tile, roofing tile and bricks; also erect machine shop for marine and stationary work.

Dallas, Tex.—Texas-McCracken Concrete Pipe Co., capital \$50,000, incptd. by C. R. Nichols, Ben. Fell, H. E. Johnson.

New Martinsville, W. Va.—Universal Concrete Products Co., have under construction 70x120-ft. building for mfre. of concrete pipe, bricks, blocks, etc.; bids open for mchy.; Hector Eschenbrenner, Engr.

Lawton, Okla.—Lawton Concrete Brick Co., capital \$5000, incptd. by L. H. and H. Ensley, S. Sprague.

Morgantown, W. Va.—Concrete Block & Cement Co., capital \$25,000, incptd. by Jerry B. Noud, R. P. Posten, Chas. G. Baker.

Miami, Fla.—Standard Poured Brick Co., incorporated with \$100,000 capital stock, to manufacture cement products, bricks, tile, roofing tile, etc. L. R. Nordquist, president; Hugo C. Endstrom, vice-president; J. L. Holmberg, secretary and treasurer.

Silverhill, Md.—Silver Hill Sand & Cement Products Co., capital \$25,000, organized with John Campbell, Prest.; Robt. H. Alcorn, V.-P.; W. W. Keeler, Secy.; Frank Bell, Mgr., will erect 12x12, 14x50 and 10x16-ft. buildings; construction by owners; mfre. structural tile, caps, sills, steps, etc.

Hattiesburg, Miss.—The Nelsen Concrete Culverts Co., has been organized to manufacture pre-cast reinforced concrete culverts. This company

was recently incorporated, with \$100,000 capital stock, and now has buildings in which to conduct its manufacturing operations. W. J. Butler, Pontiac, Ill., is president, and F. L. Miller, Hattiesburg, is manager.

#### Insulation of Concrete Walls.

In a paper presented at the National Conference on Concrete House Construction, Chicago, February 17-19, Nolan D. Mitchell, Structural Engineer of the Supervising Architect's office, U. S. Treasury Department lays much stress on Insulation. He says:

It is unfortunate that our common fire resisting materials of construction have a high rate of heat conductivity as compared to the more combustible kinds. The cold walls resulting from the use of these has had no small influence in retarding the change from the wooden house to the concrete house. The maintenance of an even temperature in a house resolves itself into the provision of adequate heating apparatus and a construction that will satisfactorily prevent rapid dissipation of heat through floors, walls and ceilings. It is just another phase of the problem that refrigerating engineers have found to be of such importance in their work, namely, insulation.

There is plenty of evidence that many builders realize the necessity of insulation against heat transference, but we are not so sure that an altogether satisfactory solution has been found. Let us look briefly into what has been done.

Wood furring with lath and plaster on the inside was probably the first to avoid penetration of dampness and the condensation of moisture on the inside of the wall. The result as far as insulating against the heat loss through an 8-inch wall is concerned was an improvement of approximately 15 per cent. Where the wall block absorbed dampness from the weather, the result was not so good, for in general any porous material in moist or damp condition transmits heat much more readily.

#### Anniston Plans for Big Paving.

The Anniston, Ala., city council, at a meeting authorized the mayor to have surveys made preparatory to drawing up an ordinance providing for \$750,000 worth of street paving in this city. The city will pay one-third of the cost and the property owners the remainder. Persistent appeals from the property holders on the east side of the city resulted in the council's action. Paving costing approximately \$135,000 is being laid at present.

# Recommended Practice Concrete House Construction

AT the convention of the American Concrete Institute last month the Committee on Concrete Houses, of which Emile G. Perrot is chairman, submitted as its report a tentative draft of recommended practice for concrete house construction. The report is confined to a consideration of the monolithic, unit constructed and plastered types. It probably will be revised before its final presentation and adoption by the Institute. The main features of the report follow.

This recommended practice shall apply to the construction of house not over three stories in height and not exceeding 30 ft. in height between top of first floor and under side of third floor ceiling.

(a) Basement and foundation walls of monolithic concrete shall be not less than 6 in. in thickness and shall be supported on a concrete footing or basement floor sufficient to prevent settlement of the building. The design of these footings shall be based on the ability of the foundation soil to carry loads and the monolithic character of the concrete wall and footing or basement floor shall be considered in determining the required bearing area on the soil. Basement walls shall be designed to resist the horizontal pressure of the earth in contact with the exterior of the wall.

(b) Basement walls of precast units bonded together by registering or interlocking projections or depressions, grouted in place, or by reinforcing bars across joints embedded in cement mortar, shall have a minimum thickness of 7 in., or not less than the minimum thickness of exterior bearing wall of superstructure. The precast units shall conform in strength, quality and absorption to the requirements of Recommended Specifications and Building Regulations presented by the Committee on Concrete Products of the American Concrete Institute.

Note 1.—Allowing a total of 50 lb. per square foot roof load, 75 lb. per square foot for second and third floors, and 100 lb. per square foot for first floor, including weight of walls, the unit compressive stress per square inch on a 6-in. basement wall would be slightly in excess of 100 lb. The unit stress produced by the overturning effect of the wind on the side of the house would not materially increase this. The effect of the pressure on earth filling against the house is in a majority of cases small as compared with the verticle load of the superstructure and cannot materially affect the stability of a monolithic or properly bonded precast unit wall.

## Walls.

(a) The thickness of single exterior bearing walls of plain concrete shall be not less than 4 in. thick, but when reinforcing in excess of 2 to 1

per cent is used, the thickness shall be determined by the usual method of reinforced concrete design for verticle loads and for a uniform wind load of 30 lb. per square foot on exposed surface.

(b) The thickness of the bearing wall, of double or triple concrete walls shall conform to paragraph (a), this section, except that the thickness required to carry the loads may be reduced by the actual working shear value of ties between the walls.

(c) Exterior walls which act merely as curtain walls between reinforced concrete columns or studs shall be designed to withstand a wind pressure of 30 lb. per square foot on the exposed surface. Reinforced concrete curtain walls may be constructed by plastering and back plastering on expanded metal or wire mesh reinforcement, or shot with a cement gun or by other mechanical means of placing concrete or stucco.

(d) Exterior walls of precast units bonded together by registering or interlocking projections, grouted in place shall conform in thickness to the schedule of wall thickness provided for concrete block, brick, tile and architectural trimstone of the Recommended Building Regulations presented by the Committee on Concrete Products of the American Concrete Institute, except that large or small reinforced concrete units connected on two opposite ends to structural members designed to carry all loads to foundations originating from the weight of the building or from wind pressure or which in themselves act as structural members may have a thickness determined by the bending stresses produced by wind pressure of 30 lb. per square foot to the exposed surface.

(e) Solid concrete exterior walls shall be furnished with furring on the inside so as to produce an insulating air space between the interior finish and the concrete walls. Double exterior concrete walls, providing a dead air space between, may be finished without further provision for insulation.

## Floors.

Reinforced concrete floors shall be designed to carry a live load of 40 lb. per square foot uniformly distributed. The advantage of continuity in reinforced concrete floors shall not be assumed unless the concrete is placed continuously over intermediate supports for the entire length of the floor, with appropriate reinforcing to take care of negative moments.

## Roofs.

(a) Flat concrete roofs shall be designed to carry the dead weight of the roof and 20 lb. per square foot additional for houses constructed in climates subject to heavy snowfall. Sloping roofs shall be designed for 30 lb. per square foot on the

vertical projections of the roof surface exposed to the wind.

(b) Concrete roofs without other covering shall be constructed of non-porous aggregates so graded as to produce a dense, impervious concrete. For additional assurance of watertight construction, waterproofing compounds may be used. Reinforcement to the amount of .2 of 1 per cent shall be placed in the top portion of the roof slab to resist temperature stresses.

#### Materials.

(a) Only standard portland cement, which meets the requirements of the Standard Specifications for Cement of the American Society for Testing Materials, in effect as of Jan. 1, 1912, shall be used in the construction of houses.

(b) All aggregates shall be clean material, free from dust, ashes, lumps of coal, vegetable loam and organic matter.

(c) Cinders may be used as coarse aggregate for portions and for exterior walls, providing tests shows the resulting concrete will average a compressive strength of 10 times the loads to which it will be subjected. Cinders shall be composed of hard, clean, vitreous clinkers, free from sulphides, unburned coal or ashes.

(d) Slag used for coarse aggregate shall be clean, dense, air-cooled blast furnace slag containing not more than 1.3 per cent of sulphur and shall weigh not less than 70 lb. per cubic foot when loosely packed.

(e) Rods and bars used for reinforcing shall conform to the requirements of the Specifications of the American Society for Testing Materials for Concrete Reinforcing Bars in effect Jan. 1, 1921. Cold drawn steel wire, made from billets, may be used in floor and roof slabs, column hooping and for temperature and shrinkage stresses. Wire mesh or expanded metal may be used for its full cross-sectional value to resist stresses, providing its component parts meet the requirements for tests for concrete enforcement bars of the American Society for Testing Materials.

(f) The water used in mixing concrete shall be free from oil, acid, alkalies or organic matter.

#### Design.

The design of floors, roofs, beams, girders and columns shall be governed by Section 4, "Design," of the American Concrete Institute Standard Specification No. 23.

#### Construction.

(a) Reinforcement shall be properly located and secured against displacement during the placing of the concrete.

(b) Machine mixing is to be preferred, but where it is necessary to mix by hand, all ingredients shall be turned together until the mass is homogenous in appearance and color. Hand-

mixing shall be done without an appreciable amount of mortar. A small batch mixer is most satisfactory.

(c) Only enough water shall be used to produce a consistency such that the concrete will flow sluggishly into the forms and around the reinforcements without separation of aggregates from mortar. Concrete shall be protected against rapid drying out and shall be protected against freezing until it has hardened for at least 10 days in a temperature not less than 35° F. Concrete shall be deposited in the forms not more than 30 minutes after mixing.

(d) Forms shall be substantial and sufficiently tight to prevent leakage of more than 1 per cent of the mortar. They shall not be removed until the concrete has hardened sufficiently to sustain without injury to the concrete the loads that will come upon it. Window and door frames may be set in the forms and the concrete cast around them. Wooden frames should be well primed and should be anchored to the concrete by means of long spikes or bolts. They should be braced against distortion from the pressure of fresh concrete.

#### Suggestions on Designing of Forms for Concrete Work.

Better designing of forms was the subject of a paper presented February 17 by Mr. T. Trueman Black, Construction Engineer, Toronto, Ont., before the Toronto branch of the Engineering Institute of Canada. An abstract of the paper follows:

Forms are to be designed so as to (1) keep the semifluid concrete in position; (2) give the concrete such surface as is required by the specifications; (3) support the steel reinforcing; (4) be easily removable without destroying or injuring the concrete surfaces; (5) be cheaply built, erected and removed and (6) be in shape for reuse.

There are certain well known theories and principles underlying the design of forms; but there is a number of other factors depending upon local conditions which will determine the success of failure of the work. For instance, concrete will at one time flow easily, filling the forms completely. At another time, however, due to changes in humidity or temperature, or to slight changes in the aggregate, the concrete seems to have developed a large internal friction, flows through the chutes very sluggishly at the same time sets soon after leaving the mixer. In this case the tamping and spading required to fill the forms brings on them stresses which can only be guessed at. The concrete not being spaded

evenly throughout the forms, brings uneven loading on them.

To meet some of these conditions the engineer has to make a study of:

Type of structure, whether mass work or other walls. In mass work the forms are heavy, coarser aggregate is used requiring fewer cross-ties. In thin walls, beams, etc., cross-ties can be placed frequently, great strength in the forms is not required on account of the small unsupported spans.

Surfaces. Contractors concede that it is cheaper to make smooth exposed surfaces by using forms with finished surfaces, than by smoothing the concrete after the forms are removed.

Advisability of designing forms so as to be able to re-use them.

The action of cement, whether it is slow or quick, whether it throws the surplus water quickly or not, will make a difference in the pressure against the forms. A quick setting cement has a tendency to produce water streaks upon the surface of the concrete. If the form is tight this effect will be more marked. This is especially evident in steel forms. A slight leakage in the form will improve this defect.

In warm weather the tendency for the cement is to set quicker, causing more streaks upon the surface. The atmospheric conditions may change the flowability of the concrete.

The choice of materials for forms is governed by the number of times it is possible to use them. Timber forms the best used in a structure where only a few repetitions can be made. Steel forms are economical when there is a large number of repetitions in the structure.

Some designers give plans of forms. This is of advantage in arranging construction joints in buildings where high stresses are used. The designer has many chances of saving in cost of formwork by slight modifications in his design. A careful study of formwork will have the tendency to eliminate expensive and difficult form building.

In removing the forms it must be remembered that wooden forms have a tendency to swell, while the concrete shrinks in the process of setting. For the easy removal of forms wedging strips are necessary. It is best to allow a drawing piece for each 10 or 12 ft. of form not free to move longitudinally, if the forms are to be removed in sections.

The question of forms is a building question and the method is optional with the builder as long as the forms fulfill their purpose and maintain the structure true to line and free from construction stresses. It is best, however, to give more complete specifications for formwork to

relieve the builder from responsibility after the concrete is placed.

#### Is Branching Out.

The Georgia Cement & Stone Co., successors to the former Empire Cement & Limestone Co., is now actively carrying out the progressive plans formulated by the new interests that took over this substantial manufacturing property.

The Georgia Cement & Stone Co. is under the same management as the National Cement Co. of Birmingham, Ala., manufacturers of the widely known and popular "Coosa" Portland cement. The officers of both companies are:

George E. Nicholson, of Kansas City, Mo., president; Ralph E. Nicholson, of Birmingham, Ala., vice-president; Geo. A. Nicholson, of Kansas City, Mo., secretary and treasurer; W. Jess Brown, of Atlanta, sales and traffic manager.

Messrs. Nicholson are successful business men of means and progressive ideas, who have become interested in the Southeast and have made substantial investments in this section of the country. They first acquired the "Coosa" cement plant near Ragland, Ala., and subsequently the plant of the Empire Cement & Limestone Co. near Rockmart, Ga. Mr. Brown, the sales and traffic manager for both companies, has a wide personal and business acquaintance throughout the Southeast, and his new connection is of cordial interest to many friends. He became particularly well known over the territory during the years that he was cement salesman, in which capacity he made an exceptionally fine record. He is well qualified for the responsible duties of the position to which he was recently elected.

The two companies are maintaining offices as follows:

National Cement Co.—1105 Empire Bldg., Birmingham, Ala.

Georgia Cement & Stone Co.—314 Healy Bldg., Atlanta, Ga.

The new management is prepared to furnish the contractors and builders of this territory with the highest grade limestone aggregates and Portland cement.

#### Concrete Bridge Construction in Georgia.

The construction of concrete bridges is being undertaken on an extensive scale in Richmond county, Georgia. On the Savannah road at Spirit Creek a long, narrow wooden bridge has been replaced by an attractive concrete structure and a narrow, dangerous curve in the road eliminated. The bridge proper is 160 feet long by 20 feet wide, and it the longest and largest structure of this type in the vicinity. Convict labor was employed, and the cost was slightly under \$12,000. Construction was under the general supervision of



William Greenslade, tenth district engineer of the State Highway Department, and J. L. Fulghum, county road superintendent, was in direct charge; both are of Augusta. Frank H. Turner of Augusta is chairman of the Roads and Bridges Committee.

It is stated that a concrete bridge will be erected over Little Spirit Creek, near the structure just completed; another over Little McBean Creek, and a third over McBean Creek. The latter will be on the boundry line of Richmond and Burke counties, and the commissioners of the two counties are co-operating.

It is expected that all of this work will be completed during the present year. There will then be no wooden bridges between Augusta and the boundry line of Burke county. Some time ago a concrete bridge was built over Butler Creek, and several years ago Double Branches was spanned by concrete structures.

**Oxy-Acetylene in Breaking Up Concrete.**

In a building under construction in Cleveland, Ohio, considerable concrete work was put in through an architect's error. It was found necessary to remove the misplaced structure, and a crew of laborers assigned to the task attacked the concrete with sledges and drills. At the end of three days the progress made was so small that other and more rapid means or removal became imperative.

In the emergency a practical gas welder was called in to determine what could be done with the oxy-acetylene torch. A demonstration proved the feasibility of speeding up the work with the torch and the job was thereafter turned over to a local welding firm.

The method employed consisted of heating along the line of the desired fracture with an ordinary welding torch, using a long bushy flame. The concrete was not raised to a great heat, as measured in terms of oxy-acetylene, but the heat was confined as much as possible along the proposed line of fracture. When so heated the concrete yielded to a heavy blow of the sledge, breaking off in the predetermined form of bulk.

This is not a new application of the oxy-acetylene torch, but, as it is a bit outside of its ordinary field, which is essentially the welding and cutting of metals, it is well to keep it in mind for emergency cases of the type noted. There are doubtless many other places where the torch might be advantageously applied in wrecking concrete, especially when for any reason the use of chipping or drilling is impracticable.

**Concrete Products Association.**

The Concrete Products Association held a very successful convention March 28, 29 and 30 and much constructive work was done. By-laws were revised as will be reported later.

A board of directors of 11 members was elected and the board empowered to elect a president, two vice presidents, a secretary and a treasurer. It was also decided that the president and secretaries of local chapters and state branches constitute a national advisory committee. The following directors were elected:

- Wallace R. Harris -----Chicago, Ill.
- H. G. Krum -----St. Paul, Minn.
- C. B. Dutton -----Chicago, Ill.
- S. H. Wightman -----Chicago, Ill.
- J. K. Harridge -----Chicago, Ill.
- E. G. Barnett -----Cleveland, O.
- C. A. Steward -----Plano, Ill.
- J. H. Gildner -----Los Angeles, Calif.
- A. G. Swanson -----Omaha, Nebraska.
- G. J. Wolf -----Hammond, Ind.
- J. C. Donaldson -----Des Moines.

The officers were elected as follows:

- W. R. Harris, President -----Chicago, Ill.
- H. G. Krum, First Vice President --St. Paul, Minn.
- G. J. Walf, Second Vice President, Hammond, Ind.
- J. E. Montgomery, Secretary -----Chicago, Ill.
- J. K. Harridge, Treasury -----Chicago, Ill.

**Engineering Advertisers Elect Officers.**

The Engineering Advertisers' Association at its recent annual meeting at the Great Northern Hotel, Chicago, elected the following officers for the ensuing year: President, Keith J. Evans, advertising manager Jos. T. Ryson & Son; vice-president, Julius Holl, advertising manager Link-Belt Company; secretary, D. T. Eastman, advertising manager Eagle-Picher Lead Co.; treasurer, J. B. Patterson, district manager P. H. & F. M. Roots Co.; W. F. Leggett, advertising manager Webster Manufacturing Co.; Benjamin Brooks of the Clay Products Association; Guy S. Hamilton, advertising manager Conveyors Corporation of America, and Edward I. Pratt, advertising manager Kellogg Switchboard & Supply Co., were elected active directors, and E. R. Shaw, president of Power Plant Engineering, was elected associate director.

**New Cement Company Formed.**

W. S. Campbell of San Antonio, L. C. Ihnken and John J. Shorp of Castroville have formed the Gulf Portland Association and filed a declaration of trust for a capitalization of \$300,000. It is planned by the association to build a large plant at Castroville, Tex., for the manufacture of cement. According to Mr. Campbell, who is a con-

struction engineer and has been identified with the cement industry for many years, the deposit which the association is to develop near here is one of the largest in the United States. In outlining the plans of the association Mr. Campbell said:

"The Gulf Portland Association has acquired one of the largest deposits of raw material in the country. The supply seems to be almost unlimited, and our engineering reports show it to be far in excess of the 25 years usually stipulated in investments of this character. This material is unusually favorable as to its softness, location, gravity installation features for the plants and transportation. These deposits are about a mile and one-half to two miles out of Castroville and within there and one-half miles of the Southern Pacific Railroad. The plant will put in its own spur.

"I estimate, from a survey I have just completed of these properties, that we can produce a fine grade of Portland cement at our plant at Castroville for a little in excess of 50 per cent of what it now costs the average Portland cement plant to produce it. There are several reasons why we can do this.

"One is that we have this deposit in a hill with a level spot ideally situated at the base for our plant. This will enable us to utilize gravity throughout the entire operation. We also have a soft formation, and it is not overlaid with earth to any extent, but comes right to the surface. We can handle our entire output of raw materials with steam shovels. Where a plant in the hard limestone country would require about 150 men, with large sums for powder, drilling, etc., we can operate our shovels with about 15 men."

## National Cement Company

MANUFACTURERS OF

### High Grade Portland Cement

Output 50,000 barrels monthly.  
No old contracts on our books,  
hence prompt shipments.

SALES DEPARTMENT

Empire Bldg. - Birmingham, Ala.

PLANT

Ragland - - - Alabama

### Mixers Elect Officers.

At the annual election of officers of the Concrete Mixer association of the United States recently held in Chicago, Clifford F. Messinger, General Sales Manager of Chain Belt Company, Milwaukee, was elected President for the coming year. W. B. Knickerbocker of the Knickerbocker Company, Jackson Michigan, was elected vice president. A. T. Scannell of the Archer Iron Works, Chicago, Illinois, was elected Treasurer. H. E. Smith, President of the T. L. Smith Company, Milwaukee, Wisconsin, was made Chairman of the executive committee while P. A. Koehring, Secretary of the Koehring Machine Company, Milwaukee, and Z. W. Carter Sales Director of the Austin Machinery Corporation, Chicago, Ill., were elected members of the same committee. The installation of officers took place at a dinner given by the Association at the Atlantic Hotel, Chicago, on Friday evening, January 28th.

## SNEAD ARCHITECTURAL IRON WORKS LOUISVILLE, KY.

Structural Steel and Ornamental Iron. Large Stock of Standard and Bethlehem Shapes.  
Immediate Shipments Plain or Fabricated Materials.

## CONCRETE Blocks, Bricks, Building Trim, Posts, Ornamental Work, etc. WHEN FACED WITH MICASPAR CRYSTALS



## IS CHANGED INTO SPARKLING GRANITE

BEAUTIFUL, ARTISTIC and EVERLASTING  
Adds to your product a selling value five times greater than the facing cost.  
Made in six scientifically milled sizes, extremely hard, sharp and free from dust. Insures strength and beauty. Booklet, "Micaspar and How to Use It," with free samples, mailed on request.

Crown Point Spar Company, Inc.  
663-665 Broadway, New York

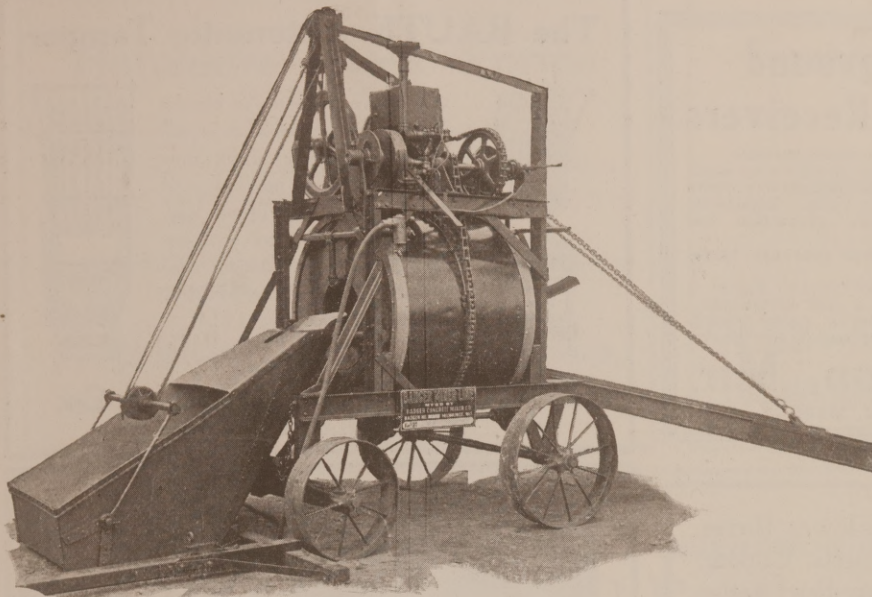
## BADGER MIXERS AND BADGER PAVERS

Badger No. 15 Overhead power short wheel base—only five ft. A perfect mixer for curbs, gutters, sidewalks, foundations, construction work, abutments, bridges, alley paving, street and highway paving. One Mixer for all jobs.

All steel construction, strong and durable. Nothing to break and little to wear out. Light weight. Always dependable. Eight years of service proves their success. The mixers for the successful contractors.

A complete line of mixers.

*Some desirable agency territory still available*



### The ~ Badger ~ Mixer Line



**BADGER CONCRETE MIXER CO., 221 Grand Ave., Milwaukee, Wis.**

Fox Bros. & Co., New York City.

*Our Export and New York Agents*

### KIRKPATRICK SAND AND CEMENT CO.

BIRMINGHAM, ALABAMA

All Grades of Sand and Gravel for construction and foundry purposes.

CAPACITY ONE HUNDRED CARS DAILY.

### COOK & LAURIE GRAVEL COMPANY

Capacity 15 Cars Per Day

Washed and Screened gravel and Sand for all purposes. Concrete Gravel, Roofing Gravel, Reinforced Concrete Gravel (thoroughly tested and proved superior to granite in fire resisting qualities), Pea Gravel, Screened Sand, Concrete Sand, Marble Sand (finest for sawing marble). Used throughout Georgia and Alabama.

91/2 Madison Ave. : MONTGOMERY, ALA.  
GRAVEL PIT, COOK'S, ALA.

C. A. P. Turner, M. Am. Soc. C. E.  
Consulting Engineer  
816 Phoenix Bldg.,  
MINNEAPOLIS, MINN.

Bridges, Buildings, Concrete-Steel Construction.

### EAGLE "MIKADO" Pencil No. 174



For Sale at your Dealer

Made in five grades

ASK FOR THE YELLOW PENCIL WITH THE RED BAND  
**EAGLE MIKADO**

**EAGLE PENCIL COMPANY, NEW YORK**

### MR. CONTRACTOR!

With our experience we here present just what you have been long looking for. That a mortar box built of No. 16 galvanized stock and angle bound, heavy angles, in two sizes 8 and 9 feet long. They are perfectly smooth inside and water-tight. We manufacture WALL TIES in large quantities and can quote attractive prices. Let us have your inquiries. Ask for Bulletin 100 R. It tells all about them.

**EMPIRE METAL TANK WORKS, THE QUICK SHIPPERS EAST ROCHESTER, N. Y.**

**THE STEPHENSON**  
LYNN MASS. REG. U.S. PAT. OFF.



## Underground Garbage Receivers

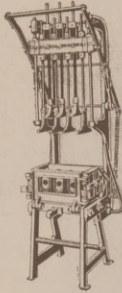
The sanitary way to store garbage. That filthy garbage pail shows up again this Spring. We have had fifteen years experience eliminating them. Thousands of satisfied customers appreciate the change.

Our Truck will wheel your ash barrel up or down steps.

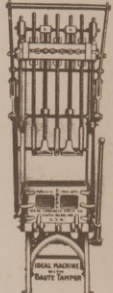
Our Spiral Truss Ribbed Ash Barrel is lighter and stronger, a real investment. Send for catalogue on each. Goods sold direct. Look for our Trade Marks.

**C. H. Stephenson, Mfr.**  
31 Farrar St. LYNN, MASS.

## The BAUTE Automatic Tamper



will make 50% more blocks a day with ease and is adjustable to any block machine on the market. It works on the Ideal machine to perfection with an attachment for making sectional blocks. Price \$76.50. Patented June 30, 1914.



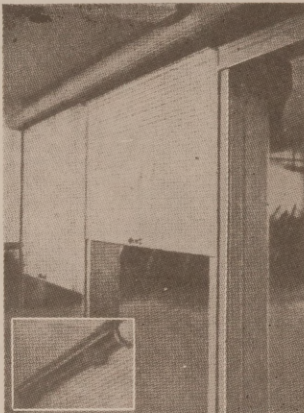
**Baute Concrete Machinery Co.**  
BENTON HARBOR, MICH.

We have molds for Vases, Flower Boxes, Spindles, Caps, Bases, Sills, Lintels, Coping, Lawn Seats, Pedestals, Columns, Bird baths, Jardinieres, Ball molds, Lighting Standards, Sun dials, Pier blocks, in fact a mold for every purpose.



Send for folder A.

**Artisan Cement Mold Works**  
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## ROLLING PARTITIONS

for Hospitals, Schools, etc. Wherever Division of Rooms is Required. Also

## STEEL SHUTTERS

for Windows, Doors, Driveways, etc.

**SWEDISH VENETIAN BLIND CO.**  
1265 Broadway, New York  
Branches in Principal Cities

CONCRETE ————— FOR ————— PERMANENCE

# GIANT PORTLAND CEMENT

wants energetic, wide-awake dealers. Drop us a card and we will tell you all about our Cement.



**GIANT PORTLAND CEMENT CO.**

603-610 Pennsylvania Bldg., PHILADELPHIA      30 Church Street, NEW YORK      101 Milk Street, BOSTON

Works at Egypt and Lesley, Pa., and Norfolk, Va.

## This Vault Mold Will Save You Hundreds of Dollars

### It Is Adjustable to Seven Sizes of Vault



You cannot make a success in the vault business, if you can furnish only one size of vault. The demand requires several sizes.

The adjustable feature of the Automatic Mold saves your buying a separate mold for every size vault you have to make—the saving amounts to hundreds of dollars. One Automatic Mold makes seven standard vault sizes.

Let us send you complete description of this mold and the vault it makes.

**AUTOMATIC SEALING VAULT CO.**  
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## Hotchkiss Steel Forms

Use modern methods and save labor.

Use the Hotchkiss Steel Forms for Roadways, curbs and gutters, ridge culverts and open sluiceways, Concrete walls, Concrete fence posts, etc.

Curb and Gutters—same side-rails used as for curbs or walks, Rails 4" to 12" wide.

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153 W. Kinzie St., B CHICAGO

EVERY BARREL DEPENDABLE

EVERY BARREL GUARANTEED

For Every Class of Construction in the South

## CLINCHFIELD Portland Cement

Is being used by the leading engineers and architects, city and county engineers, railroad engineers, general contractors and the U. S. Government.

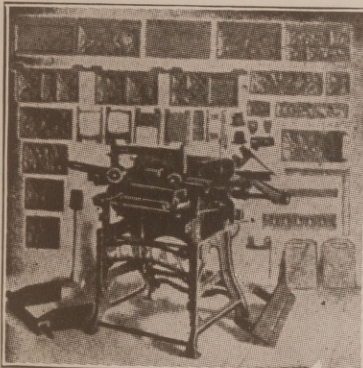
In every case where Clinchfield has been used it has met every test and has given complete satisfaction.

Every thought of the manufacturing, technical and selling forces of the company is devoted solely to studying the needs of cement users and dealers in the South.

The main sales and traffic offices of the company are located at the plant. This enables the managers of these departments to give immediate attention to all orders received.

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Office and Mills: KINGSPORT, TENN.



IF you are in the market for a Block Machine or Mixer send for our catalog; we make a line of machines that you should investigate before placing your order; for variety of product and quickness of operation they are unrivaled.

Wichita Concrete Machinery Co.

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## LIBERTY

The most desired and prized possession on earth. are sometimes the alternates to be faced.

This is particularly true where sanitation is neglected—epidemic among your employes brings business congestion and consequent financial loss to your mill, and death among your employes.

Equip your Standard Septic Outfits and liberty from these dangers and responsibilities is yours.

Write for the proof—

Standard Cement Construction Co.

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## Contractors' Machinery.

Supplies and repairs. Steam and Gasoline Engines. Boilers, Tanks, Stacks and Pipe. Boiler-Flues. Fittings. Concrete bars and Binders. Chain hoist. Rope. Cable and Blocks. Barrows. Shovels. Beams.

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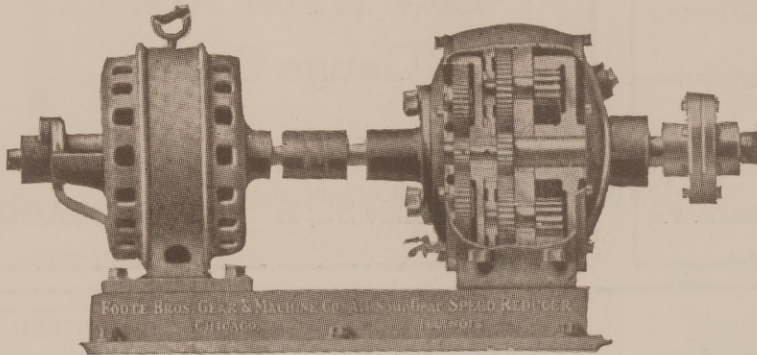
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MADE IN ANY RATIO AND HORSE POWER TO SUIT YOUR REQUIREMENTS

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The Gears in this Transmission  
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We specialize on Hardened Steel Gears for all purposes and make Cut Gears of all kinds up to 12 ft. diameter.

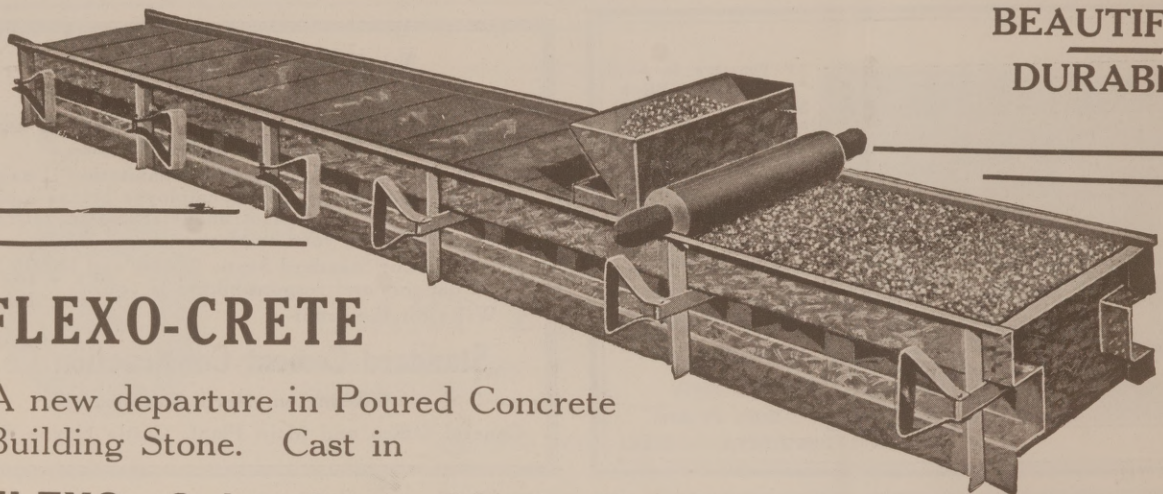
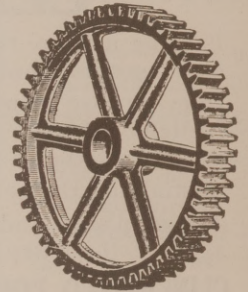
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**BEAUTIFUL  
DURABLE**

## FLEXPAC

A new departure in Poured Concrete  
Building Stone. Cast in

### FLEXPAC Galvanized Steel Moulds

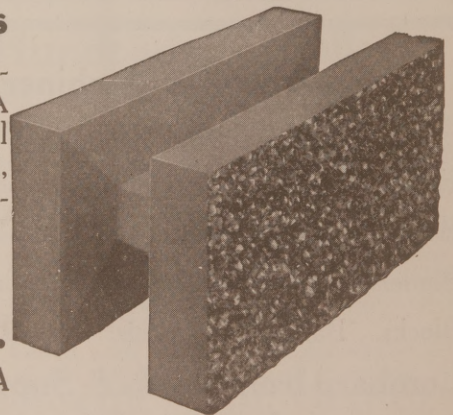
Economy—Speed—Durability and Beauty are four outstanding features of the FLEXPAC process. A thousand beautiful faces can be obtained without additional cost. These moulds are simple, substantial, easily handled, self squaring. The resilient cores fall out when stone is removed. All parts are interchangeable and cannot rust.

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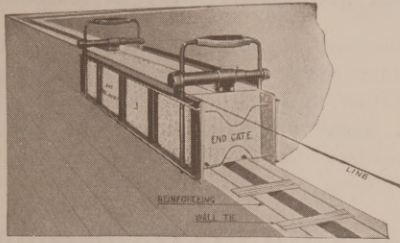
## FLEXPAC CONCRETE MOULD CO.

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For 50% **Build the Hollow Wall Way** 50% For



Like a thermos bottle—warmest in winter—coolest in summer. Fire-proof—everlasting.

Cheapest, best and most perfect way known to the building world.

The reason the most wall can be built for the least money with our forms is—because they are **STRONGEST—LIGHTEST—SIMPLEST** and **MOST PERFECT**, and the price of a complete set can be saved on one small job. Send for literature.

**The Universal Cement Mold Co.**  
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The demand for Ohio Concrete Roofing Tile is greater than ever this year. The man who is equipped to meet this demand in his locality will control a highly profitable and clean cut business of his own.

A single 2 machine unit of Ohio Tile Machines will manufacture all the regular and special shapes required for any roof,—and with a net profit of over \$50 a day for you!

Write at once if you want information.

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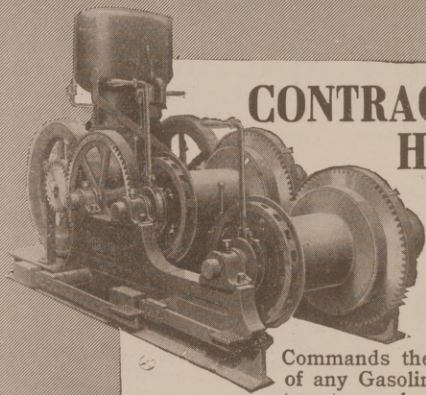
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  - BEARINGS GUARANTEED FOR LIFE OF MIXER**—Hyatt Roller Bearings—save 17% power—70% of oil.
- Built in sizes to fit all jobs; 1/2, 1, 2, 3, 4 Bag Capacities; Gas, Steam, Electric.
- \$325.00 Buys Our 1/2 Bag Low Charger**  
WITH NOV O ENGINE  
One of the many real bargains in our big catalog.



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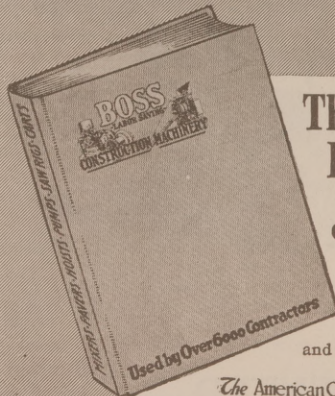
With Hyatt Roller Bearings

Commands the Largest Sales of any Gasoline Hoist. Over twenty car loads sold in one order shipped to France.

Widely used for MATERIAL ELEVATORS, PILE DRIVING, EXCAVATING, DRAG LINES, CONCRETE TOWERS, GENERAL CONSTRUCTION WORK.

BUILT IN 7 SIZES—Single or Double Drum—Reversing or Two Speed if Wanted.

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## The Nation's Price Maker on Construction Machinery

Write for Your Copy Today and New 1920 Prices and Terms.

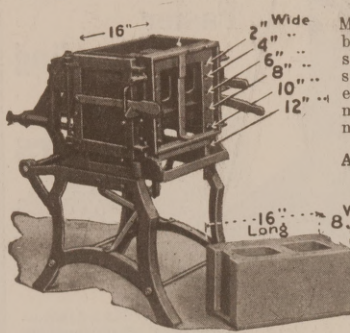
The American Cement Machine Co Inc

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THE 30000 HP ELECTRIC CITY

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## MONARCH— King of Block Machines

Notice the Wide Range of Adjustment!



This means that the Monarch will make any size block you may want from silo blocks to foundation stones. Simple, strong, inexpensive. This is the machine for your equipment.

ARE YOU INTERESTED?

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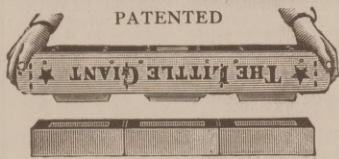
## Concrete Septic Tanks —an Independent Business

Install Sanitary Septic-Tanks. Every home outside of a sanitary sewer district needs it. A one piece Tank Installed in Place; Self-Cleaning Vault. No Chemicals. Large profits, quick returns. Every customer advertises the Septic Tank for you. Only a small investment required. Patented by

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## MAKE BRICK

Make your own concrete brick. Keep you men busy at odd times. Help meet the pay roll with the profits on

### The Little Giant BRICK MACHINE

It makes good, strong, dense brick and saves one-fifth of the material. No pallets required. Discharge the product onto any level surface. The price of the machine will surprise you.

La Grange Specialty Co., La Grange, Ind.

For Ornamental Concrete Work, Granolithic Floors, Sidewalks, Blocks, Sewer and Culvert Pipe and Heavy Concrete

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Will produce Fine or Coarse material at will

**SO FINE**

85% will pass through 10 mesh screen

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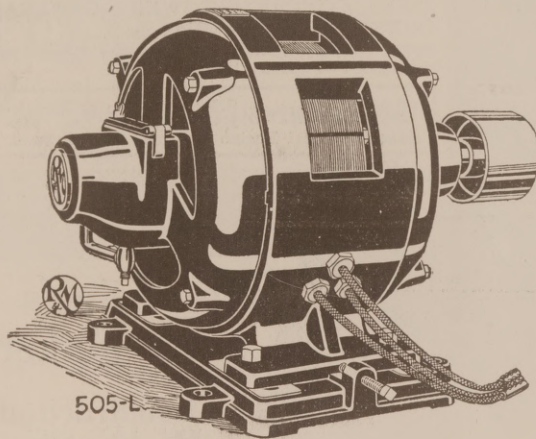
enough for the heaviest concrete work

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Electric Light, Power, Telephone and Bell Wiring for Residence, Stores and Factories.

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All kinds of new and used Electrical Machinery bought, sold and exchanged.

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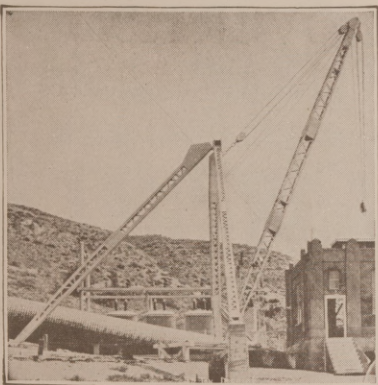
## Circular Concrete Construction

*We Contract Grain Storages.*

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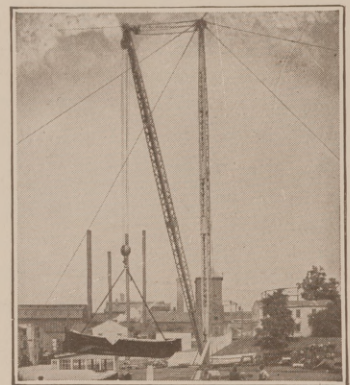
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**Terry Manufacturing Co.**

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NEW YORK CITY

Works: Harrison, N. J. Cable: Terryco New York  
Successors to the Manufacturing Department of  
Terry & Tench, Inc., Builders for 20 years of  
the highest type of Derricks and Cranes.

—“EQUIPMENT THAT LASTS”—



### SINGER CHIMNEY CO

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Engineers and Builders of

Radial Brick — Common Brick — Reinforced  
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MINNEAPOLIS, MINN., Metropolitan Life Bldg.

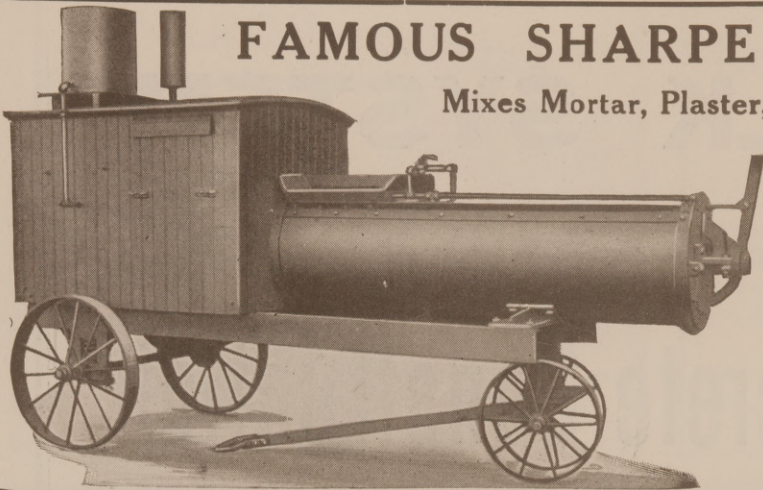
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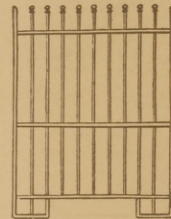
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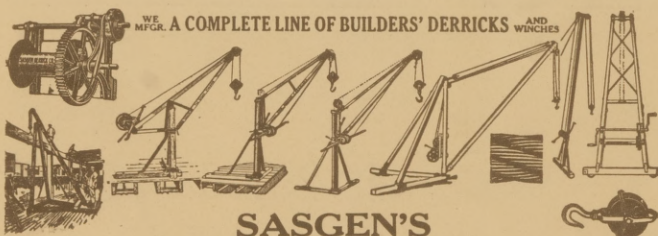
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