# MINERAL PRODUCTION IN IOWA IN 1923 AND 1924

BY

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# MINERAL PRODUCTION IN IOWA IN 1923

1921

| Products | Unit | Quantity | Value |
|---|---|---|---|
| Cement | Bbl. of 376 lb. | 4,151,439 | $ 7,439,983 |
| Clay products | ..... | ..... | 5,711,583 |
| Coal | short tons | 4,531,392 | 17,256,800 |
| Gypsum | short tons | 301,587 | 2,922,700 |
| Mineral waters | gallons | 21,100 | 2,105 |
| Natural gas | M cubic feet | 700 | 300 |
| Sand and gravel | short tons | 2,641,982 | 1,726,958 |
| Stone and lime | short tons | 423,279 | 563,427 |
| | | | $35,625,170 |

1922

| | | | |
|---|---|---|---|
| Cement | Bbl. of 376 lb. | 4,475,074 | $ 7,709,313 |
| Clay products | ..... | ..... | 5,739,449 |
| Coal | short tons | 4,335,161 | 16,119,000 |
| Gypsum | short tons | 452,451 | 4,146,182 |
| Mineral waters | gallons | 25,561 | 3,788 |
| Natural gas | M cubic feet | 460 | 230 |
| Sand and gravel | short tons | 2,690,798 | 1,752,233 |
| Stone and lime | short tons | 627,443 | 719,203 |
| | | | $36,189,398 |

1923

| | | | |
|---|---|---|---|
| Cement | Bbl. of 376 lb. | 5,570,675 | $10,351,971 |
| Clay products | ..... | ..... | 7,033,924 |
| Coal | short tons | 5,710,735 | 20,517,000 |
| Gypsum | short tons | 566,724 | 5,368,532 |
| Mineral waters | gallons | 258,831 | 8,907 |
| Natural gas | M cubic feet | 80 | 172 |
| Sand and gravel | short tons | 3,597,160 | 2,181,881 |
| Stone and lime | short tons | 611,866 | 775,134 |
| | | | $46,237,521 |

The output of minerals and mineral products in Iowa during 1923 had a higher value than that of any preceding year in the history of the state with the exception of the abnormal year 1920, when the value of the state's mineral output shot up twenty millions of dollars in one year, after which it dropped back twenty-two millions the next year. The production in 1923 seems to represent a healthy growth and a natural reaction from the de-

[1] The statistics for 1923 were collected by the Iowa Geological Survey in coöperation with the United States Geological Survey, with the exception of data on clay products, which were compiled by the Bureau of the Census.

pression of the two preceding years. It is noteworthy that the increase in value and quantity of output was not limited to one item but was shared by all the major branches of the mineral industry. This increase amounted to $10,048,123 over the output of the preceding year. Perhaps the most striking increase was that of nearly three millions of dollars in the value of the cement shipments, although the increase in the output of gypsum products of $1,222,350 is also worthy of note.

The following table shows the value of the mineral production in Iowa during the ten years ending 1923.

*Production of minerals from 1914 to 1923*

| Year | Coal | Clay wares | Gypsum | Cement | Other (a) | Total |
|---|---|---|---|---|---|---|
| 1914 | $13,364,070 | $ 6,405,995 | $1,321,457 | $ 4,008,915 | $1,201,428 | $26,301,865 |
| 1915 | 13,577,608 | 6,749,088 | 1,278,128 | 4,119,952 | 1,338,174 | 27,062,950 |
| 1916 | 13,530,383 | 7,383,289 | 1,496,795 | 5,063,647 | 1,692,367 | 30,210,284 |
| 1917 | 21,096,408 | 7,540,213 | 2,041,997 | 6,870,863 | 1,663,206 | 39,336,372 |
| 1918 | 24,703,237 | 5,315,143 | 1,946,414 | 5,423,926 | 1,353,289 | 38,742,009 |
| 1919 | 17,352,620 | 8,125,324 | 2,634,444 | 7,798,347 | 1,977,048 | 37,882,183 |
| 1920 | 30,793,847 | 10,489,232 | 4,422,965 | 8,742,854 | 2,837,694 | 57,250,317 |
| 1921 | 17,256,800 | 5,711,583 | 2,922,700 | 7,439,983 | 2,294,104 | 35,625,170 |
| 1922 | 16,119,000 | 5,739,449 | 4,146,182 | 7,709,313 | 2,475,454 | 36,189,398 |
| 1923 | 20,517,000 | 7,033,924 | 5,368,532 | 10,351,971 | 2,966,094 | 46,237,521 |

(a) Includes iron ore, lead and zinc, mineral waters, natural gas, potash, sand and gravel, stone and lime, ferroalloys.

## COAL.

The production of coal showed a gratifying increase in 1923 over that of the preceding year, insofar as total tonnage and total value were concerned, as the former showed an increase of over one and a third millions of tons and the latter one of over four million dollars. However, the average value per ton at the mines declined from $3.72 in 1922 to $3.59 in 1923, a drop of thirteen cents. It may be noted that the larger output was made by a smaller number of mines, as there were forty-three fewer operators in 1923 than in the preceding year. Also the number of miners was less by 1,409 in 1923. But to offset these decreases the average number of days worked was fifty more in 1923 than in 1922 and hence the output might well be considerably larger.

Monroe county, with only nine producers operating fourteen mines, was in the lead, in both tonnage recovered and value received. In contrast with mining conditions in Monroe was the case of Appanoose county, the second in rank, in which forty-

two companies operated fifty-four mines. The next largest producers in order of their output were Marion, Lucas, Polk, Dallas, Boone and Jasper. The tonnage of the Lucas county mines was somewhat larger than that of the mines in Polk county but the value was slightly less, owing to the higher price per ton received by the Polk county operators.

The appended table will show by counties the coal production of 1923 with a comparison of the totals with those for 1922.

*Coal Production in 1923 by Counties*

| County | Producers | Loaded at mine for shipment | Sold to local trade and used by employees | Used at mine for steam and heat | Total | | Average value per ton | Number of employees | | | Average number of days worked |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Short tons | Short tons | Short tons | Short tons | Value | | Underground | Surface | Total | |
| Appanoose | 42 | 863,671 | 48,737 | 19,259 | 931,667 | $ 3,464,000 | $3.72 | 2852 | 248 | 3,100 | 146 |
| Boone | 5 | 216,092 | 46,235 | 2,107 | 264,434 | 1,222,000 | 4.62 | 617 | 51 | 668 | 178 |
| Dallas | 5 | 527,520 | 14,430 | 3,911 | 545,861 | 1,915,000 | 3.51 | 918 | 90 | 1,008 | 213 |
| Guthrie(1), Jefferson(1), Keokuk(1) | 3 | ..... | 6,449 | ..... | 6,449 | 20,000 | 3.01, 3.00, 3.33 | 20 | 1 | 21 | 100, 183, 120 |
| Jasper | 3 | 81,852 | 15,223 | 6,316 | 103,391 | 363,000 | 3.51 | 192 | 27 | 219 | 142 |
| Lucas(2), Warren(3) | 5 | 725,001 | 6,700 | 23,788 | 755,499 | 2,612,000 | 3.45, 3.60 | 909 | 86 | 995 | 192, 174 |
| Mahaska | 8 | Incl. in "Local trade" | 37,411 | Incl. in "Local trade" | 37,411 | 130,000 | 3.47 | 84 | 7 | 91 | 169 |
| Marion | 16 | 675,054 | 42,686 | 22,577 | 740,317 | 2,478,000 | 3.35 | 1,187 | 111 | 1,298 | 203 |
| Monroe | 9 | 1,490,213 | 32,536 | 35,033 | 1,557,782 | 5,510,000 | 3.53 | 2,231 | 180 | 2,411 | 198 |
| Page(2), Taylor(1) | 3 | 9,954 | 18,685 | ..... | 28,639 | 136,000 | 4.57, 5.00 | 71 | 6 | 77 | 212, 230 |
| Polk | 15 | 380,606 | 274,802 | 12,423 | 667,831 | 2,428,000 | 3.63 | 1,249 | 122 | 1,371 | 191 |
| Van Buren(2), Wayne(2) | 4 | 21,927 | 7,710 | ..... | 29,637 | 105,000 | 2.63, 3.95 | 99 | 7 | 106 | 231, 181 |
| Wapello | 10 | Incl. in "Local trade" | 33,067 | Incl. in "Local trade" | 33,067 | 108,000 | 3.27 | 77 | 6 | 83 | 146 |
| Small mines | 14 | 8,750 | ..... | ..... | 8,750 | 26,000 | 3.00 | ..... | ..... | ..... | ..... |
| | 142 | 5,027,502 | 556,180 | 127,053 | 5,710,735 | 20,517,000 | 3.59 | 10,506 | 942 | 11,448 | 181 |
| Production in 1922 | 185 | 3,653,352 | 579,907 | 101,902 | 4,335,161 | 16,119,000 | 3.72 | 11,846 | 1,011 | 12,857 | 131 |
| Difference in 1923 | —43 | +1,374,150 | — 23,727 | + 25,151 | +1,375,574 | +4,398,000 | — .13 | — 1,340 | — 69 | — 1,409 | + 50 |

The following is the list of operators during 1923 and 1924:

*Adams County*
Joe Aukeny, Villisca
Bixler Coal Co., Corning
Pleasant Valley Coal Co., Nodaway
Ruth Coal Co., Carbon

*Appanoose County*
Acken Coal Co., Mystic
Appanoose Coal & Fuel Co., Mystic
Armstrong Coal Co., Commerce Bldg., Kansas City, Mo.
Barrett Coal Co., Mystic
Beggs Coal Co., Mystic
Big Three Coal Co., Centerville
Bradshaw Coal Co., Dean
Brazil Coal Co., Brazil
Caldwell Coal Co., Exline
Carbon Fuel Co., Centerville
Center Coal Co., Centerville
Centerville Block Coal Co., Centerville
Citizens Coal Co., Centerville
Clark Coal Co., Daniel Clark, Centerville
Diamond Block Coal Co. (Lodwick Bros.), Mystic
Domestic Coal Co., Cincinnati
Duff Coal Co., Mystic
Eagle Coal Co., Centerville
Egypt Coal Co., Mystic
Farmers Coal Co., Mystic
Fisher Coal Co., R. No. 1, Plano
Fowler & Wilson Coal Co., Ottumwa
Gillispie & Lovendusky Coal Co., Mystic
Gott Coal Co., Centerville
Grandon & Anders Coal Co., Plano
Harkes Coal Co., Keith & Perry Bldg., Kansas City, Mo.
Hawkeye Coal Co., Mystic
Helman Bros. Coal Co., Plano
High Test Coal Co., Centerville
Hooten Bros. Coal Co., C. P. Houser, Seymour
Hunt Bros. Coal Co., Mystic
Interurban Coal Co., Mystic
Iowa Block Coal Co., Exline
J. A. Koontz, Centerville
Lee & Jones Coal Co., Mystic
Liberty Coal Co., Mystic
Livingood Coal Co., Centerville
Allen Long Coal Co., Mystic
W. W. Lowe, Brazil
McConville Coal Co., Centerville
Midway Coal Co., Centerville
Monitor Coal Co., Centerville
Murray & Askern Coal Co., R. No. 1, Mystic
Mystic Coal Co., Mystic
National Coal Mining Co., Lincoln, Nebr.
New Oriental Coal & Mining Co., Centerville
New Phoenix Coal Co., Brazil
North Hill Coal Co., Centerville
Peacock Coal Co., Brazil
Potier Coal Co., Mystic
Prairie Coal Co., Centerville
Rinehart Coal Co., Plano
Roach Coal Co., R. No. 1, Plano
Rosebrook Coal Co., Mystic
Ryals-Yagzy Coal Co., Dean
Shamrock Coal Co., Rathbun
Star Coal Co., Mystic
Sterling Coal Co., Centerville
Sunshine Coal Co., Centerville
Thistle Coal Co., Cincinnati
United States Coal Co., Centerville
Winifred Coal Co., Mystic
Woodland Coal Co., 16 West Washington St., Centerville

*Boone County*
Black Diamond Coal Co., c/o A. Johnson, Boone
Boone Coal Co., Boone
McCaskey Coal Co., Pilot Mound
Ogden Coal Co., Boone
Sayre Coal Co., 201—7th St., Des Moines
Scandia Coal Co., 606 Grand Ave., Des Moines
South Side Coal Co., Fraser

*Dallas County*
Dallas Coal Co., 326 Liberty Bldg., Des Moines
Norwood-White Coal Co., Des Moines
Radiant Coal Mining Co., Ottumwa
Scandia Coal Co., Des Moines
Shuler Coal Co., Des Moines

*Greene County*
Buckeye Coal Co., Rippey
Carpenter Coal Co., Moingona

*Guthrie County*
W. H. Scott, Guthrie Center, R. R. No. 5

*Jasper County*
Acme Coal Co., Prairie City
Colfax Consolidated Coal Co., Colfax
Newton Coal Co., Newton
Sunny Brook Coal Co., Colfax

*Jefferson County*
W. F. Faulkner Coal Co., Fairfield
C. S. Henness, Fairfield
O. S. Sedgwick Coal Co., Fairfield
Jos. Voight Coal Co., Batavia

*Keokuk County*
Big Four Coal Co., What Cheer
Carson Bros., What Cheer
Newcomb Bros. Coal Co., What Cheer

*Lucas County*
Central Iowa Fuel Co., Des Moines
Iowa-Nebraska Coal Co., Des Moines

*Mahaska County*
Jay Beadle Coal Co., Beacon

Bloes & Gyttes Coal Co., Beacon
Davis & Sons, Beacon
Rosser Davis Coal Co., Beacon
Douds & Seams Coal Co., Oskaloosa
Edwards Bros. Coal Co., Beacon
Equality Coal Co., Albia
Fedro Coal Co., R. F. D., Givin
Fisher Coal Co., Evans
Frehn & Cons Coal Co., Oskaloosa
Givin Coal Co., Givin
William Griffiths Coal Co., Oskaloosa
Griffiths & Lloyd Coal Co., Beacon
Herbig Coal Co., Oskaloosa
Hynick Coal Co., Given, R. R. No. 1
Larson Coal Co., Beacon
Lee & Kuntz Coal Co., What Cheer
Nelson & Knight Coal Co., Rose Hill
Nelson Bros., Oskaloosa
O'Brien & Evans Coal Co., Evans
Reese & Ellis Coal Co., R. F. D., Givin
Williams Coal Co., New Sharon
Dennis Wymore Coal Co., New Haven

*Marion County*

George Anderson Coal Co., Knoxville
Black Diamond Coal Co., Dallas
Perry Brown Coal Co., Knoxville
Geo. L. Burt Coal Co., Knoxville
Capitol City Coal Co., Cordova
Consolidated Ind. Coal Co., 139 West Van Buren St., Chicago, Ill.
Des Camp Bros. Coal Co., Flagler
Dunreath Coal & Mining Co., Des Moines
A. C. Geery, Harvey
Gold Goose Coal & Mining Co., Albia
Hayes Bros. Coal Co., Knoxville
Honey Creek Coal Co., Knoxville
Horse Shoe Coal Co., (Dupont & Villont) Bussey
Knox Coal Co., Knoxville
McCagg Coal & Mining Co., Central Life Bldg., Des Moines
Melcher Coal Co., Melcher
Midland Coal Co., R. F. D., Knoxville
Mulkey & Thomas, Knoxville
Pershing Coal Co., Des Moines
Red Rock Coal Co., Des Moines
Success Coal Co., Otley
Vernon Coal Co., Dallas

*Monroe County*

Albia Coal Co., Ottumwa
Central Coal Co., Oskaloosa
Consolidation Coal Co., Bucknell
Crescent Coal Co., Oskaloosa
Graham Coal Co., Avery
Head Coal Co., Albia
Hocking Coal Co., Hocking
Larson Air Line Coal Co., Albia
Maple Coal Co., Des Moines
Mashak & Willard Coal Co., Lovilia
Rex Fuel Co., Lovilia
Sheriff Coal Co., Oskaloosa
Smoky Hollow Coal Co., Albia

*Page County*

City Fuel Co. (Evans Coal Co.), Clarinda
Pearson Coal Co., Clarinda

*Polk County*

Acme Coal Mining Co., Des Moines
Adelphi Coal & Mining Co., 2300 East 24th St., Des Moines
Beck Coal & Mining Co., Des Moines
Bennett Bros. Coal Co., Des Moines
Bloomfield Coal & Mining Co., Des Moines
Des Moines Coal Co., 910 West Grand Ave., Des Moines
Des Moines Ice & Fuel Co., Des Moines
Diamond Block Coal Co., 307 Polk Bldg., Des Moines
Diamond Joe Coal Co., Runnells
Economy Coal Co., Des Moines
Liberty Coal Mining Co., 807 Locust St., Des Moines
Norwood-White Coal Co., Des Moines
Saylor Coal Co., 606 Grand Ave., Des Moines
Sprague Coal & Mining Co., Berwick
Urbandale Coal Co., Des Moines
Wright Coal Co., 606 Grand Ave., Des Moines
X. L. Coal Co., Des Moines

*Taylor County*

Bean Coal Co., New Market
New Market Coal Co., New Market

*Van Buren County*

Blue Jacket Coal Co., (A. L. Cahill) Farmington
J. Daniels & Sons, Douds
B. F. Donrad Coal Co., R. F. D., Mount Zion
Hugh Findlay Coal Co., Douds
Fletcher Coal Co., Stockport
Albert Gardner Coal Co., Bonaparte
H. M. Kirby Coal Co., Farmington
James Tweedy Coal Co., Douds
Moses Tweedy Coal Co., Fairfield

*Wapello County*

Charles Akers Coal Co., Ottumwa
W. J. Box Coal Co., Eldon
R. E. Cooper Coal Co., Ottumwa
H. H. Davis Coal Co., R. F. D., Ottumwa
W. O. Donaldson Coal Co., Ottumwa
Joe Genochio Coal Co., Ottumwa
Gibbs Bros. Coal Co., R. F. D., Ottumwa
Glendale Coal Co., 1317 Castle St., Ottumwa
Glenn Bros. Coal Co., R. F. D., Ottumwa
Griffiths Bros. Coal Co., Roger Griffiths, Beacon
Hazeltine Coal Co., Ottumwa
Wm. Henry, Eldon

Louis Kellar Coal Co., Eldon
Clarence Lambert Coal Co., Eldon
Geo. Latchem Coal Co., R. F. D., Ottumwa
Wm. McIntosh, Jr., Coal Co., Eldon
Mat Mier Coal Co., 914 E. 4th St., Ottumwa
Mier Coal Co., (Wm. Mier) R. R. No. 8, Ottumwa
Herb Orr Coal Co., Eldon
Howell Price Coal Co., Ottumwa
Ramsey Coal Co., Ottumwa
Richard Reese Coal Co., Ottumwa
Rutledge Coal Co., R. R. No. 3, Ottumwa
Seigel-Smith Coal Co., Ottumwa
George Simmer Coal Co., Ottumwa
Simpson Bros. & Howard, Ottumwa
Sinsky Bros., Blakesburg
Speer Bros. Coal Co., R. F. D., Ottumwa
Swartz Coal Co., Ottumwa
Union Coal Co., Ottumwa
Valley Coal Co., Ottumwa
Wapello Fuel Co., Eddyville
Homer Weist Coal Co., Eldon
J. M. Welch Coal Co., Ottumwa
Wickam Coal Co., Ottumwa

*Warren County*

Des Moines Ice & Fuel Co., Des Moines
Hartford Coal & Mining Co., Runnells

*Wayne County*

Rissler & Yocum, Melrose
Seymour Coal Co., Seymour

*Webster County*

Lehigh Coal Co., Lehigh

## CLAY WARES.

The production of clay wares showed a fine increase in 1923, amounting to $1,294,475 over the output of 1922. This increase prevailed in every important branch of the industry, for although the tonnage of drain tile made in 1923 was slightly less than that of the year before the price realized was a little greater. The sewer pipe sold increased from 38,359 tons valued at $681,233 in 1922 to 54,828 tons valued at $865,676 in 1923. Hollow building tile for walls, including partition, load-bearing, back-up, blocks, furring, book tile, was made in 1923 to the amount of 297,253 tons with a value of $2,197,515. Other kinds of tile, including floor arch, silo tile, corn-crib tile, conduits, radial chimney blocks, fireproofing and roofing tile, were made to the value of $216,938. The quantity of vitrified brick sold for paving and other purposes was 31,523,000, with a value of $513,684. The pottery at Bellevue continued the manufacture of flower pots and other red earthenware, and there was a large increase in the output of miscellaneous wares over the state as compared with that of the previous year.

The table following will show the production by counties, so far as this may be revealed, and a comparison with the previous year.

*Production of Clay Wares by Counties in 1923*

| Counties | Producers | Common brick | | Face brick | | Hollow building tile | | Drain Tile | | Other Products(1) | Total Value |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *Thousands* | *Value* | *Thousands* | *Value* | *Tons* | *Value* | *Tons* | *Value* | *Value* | |
| Appanoose(1), Audubon(2), Benton(4) | 7 | 3,842 | $ 42,496 | | | 1,107 | $ 9,260 | 1,824 | 17,440 | (a)(b) | $ 89,596 |
| Boone(2), Cerro Gordo(3) | 5 | 7,587 | 121,737 | 5,330 | $ 96,938 | 158,714 | 1,208,351 | 49,754 | 410,124 | (b) | 1,849,154 |
| Dallas | 5 | 637 | 9,881 | * | * | 45,494 | 335,935 | 8,923 | 48,619 | | 410,695 |
| Clinton(1), Dubuque (1), Fayette(1), Floyd(1), Franklin(1) | 5 | 4,733 | 59,314 | 1,975 | 43,138 | 12,747 | 89,229 | 22,373 | 190,237 | | 381,918 |
| Guthrie(1), Hamilton(1), Hardin(3), Henry(2) | 7 | 116 | 1,886 | | | 2,290 | 16,937 | 20,349 | 209,361 | 35,495(a)(c)(d) | 263,679 |
| Jackson(1), Jasper(2), Jefferson(1), Johnson(2) | 6 | 648 | 11,732 | | | 1,321 | 9,793 | 2,927 | 21,010 | (d) | 73,106 |
| Jones(2), Marion(2), Marshall(1), Page(1) | 6 | 1,227 | 18,342 | | | 14,762 | 87,639 | 3,715 | 31,468 | | 137,449 |
| Keokuk(3), Mahaska(2) | 5 | 4,464 | 55,420 | * | * | 1,448 | 9,729 | 11,320 | 115,192 | (a)(c) | 359,057 |
| Polk | 7 | 7,881 | 110,327 | 13,162 | 256,034 | 22,249 | 174,266 | 8,498 | 84,637 | 569,346(a)(b)(c)(d) | 1,194,610 |
| Pottawattamie(1), Poweshiek(1), Sac(1), Scott(2) Story(2), Tama(3), | 5 | 640 | 9,852 | | | 9,713 | 71,208 | 4,490 | 40,393 | | 121,453 |
| Union(1) | 6 | 1,638 | 23,496 | 1,003 | 19,848 | 4,000 | 28,005 | 3,996 | 26,249 | 1,810(d) | 99,408 |
| Wapello(1), Warren(1), Washington(3) | 5 | 8,103 | 106,048 | † | † | 25,780 | 189,131 | 6,298 | 44,047 | | 339,226 |
| Webster | 8 | 4,478 | 59,739 | 1,812 | 40,237 | 26,209 | 184,970 | 29,211 | 270,059 | 701,090(a)(b)(c)(d) | 1,256,095 |
| Woodbury | 3 | 26,813 | 299,060 | * | * | | | | | (d) | 458,475 |
| Counties with less than three producers | | | | 6,064 | 133,996 | | | | | 290,940 | |
| | 79 | 72,558 | 921,853 | 29,346 | 590,191 | 325,834 | 2,414,453 | 173,678 | 1,508,836 | 1,598,591 | 7,033,924 |
| Production in 1922 | 69 | 56,030 | 728,508 | 18,510 | 354,041 | 308,366 | 2,170,368 | 176,894 | 1,495,116 | 991,416 | 5,739,449 |
| Difference in 1923 | + 10 | + 16,528 | + 193,345 | + 10,836 | + 236,150 | + 17,468 | + 244,085 | — 3,216 | + 13,720 | +607,175 | +1,294,475 |

* Included with Counties with less than three producers.
† Included with Common brick for these counties.
(1) Includes: (a) Fancy brick, stove lining and miscellaneous brick and tile products, $105,643; (b) Vitrified brick, $513,684; (c) Sewer pipe, $865,676; (d) Pottery, raw clay sold, other clay products, $113,588.

The report of the Bureau of the Census on Clay Products Industries shows that in 1923 there were 2,287 establishments producing clay wares and that the persons engaged numbered 152,623. The total value of the products including pottery was $448,834,938. This represented an increase of 60.8 per cent over the output in 1921, which was valued at $279,749,086. Cost of materials used in 1923 was $136,917,435, including 10,605,860 tons of coal. The value of the output in the leading states of the Union is given in the table shown herewith.

| State | Brick, tile, &c. | Pottery |
|---|---|---|
| Pennsylvania | $ 65,500,819 | $ 7,852,092 |
| Ohio | 57,034,856 | 42,716,233 |
| Illinois | 31,537,522 | 4,562,677 |
| New Jersey | 22,184,989 | 23,831,737 |
| New York | 19,388,572 | 6,349,393 |
| Missouri | 18,509,934 | 94,985 |
| California | 17,488,167 | 3,691,325 |
| Indiana | 13,631,536 | 2,860,200 |
| Kentucky | 7,480,512 | |
| Iowa | 7,033,924 | |
| U. S. | $312,813,459 | $114,951,067 |

Other nonclay products valued at $21,070,412 bring the total value for the year to the value given above.

The output of different classes of ware in 1923 is shown in the following list.

| *Class* | *Quantity* | *Value* | *Average value per unit* |
|---|---|---|---|
| Common brick, M | 7,282,181 | $ 94,472,666 | $12.97 |
| Vitrified brick | 699,269 | 15,569,670 | 22.27 |
| for paving, M | 538,658 | 13,032,341 | 24.19 |
| other uses, M | 160,611 | 2,537,329 | 15.80 |
| Face brick, M | 1,931,175 | 38,891,834 | 20.14 |
| Fancy brick, M | 12,879 | 252,323 | 19.59 |
| Enameled brick, M | 19,502 | 1,670,852 | 85.68 |
| Terra cotta, tons | 138,462 | 16,486,039 | 119.07 |
| Hollow building tile, tons | 3,764,744 | 28,274,801 | 7.51 |
| Roofing tile, squares | 231,462 | 4,021,722 | 17.38 |
| Other tile, square feet | 62,462,615 | 19,781,435 | |
| Drain tile, tons | 615,640 | 5,099,955 | 8.28 |
| Sewer pipe, tons | 1,777,584 | 29,102,511 | 16.37 |
| Stove lining, tons | 54,684 | 1,218,970 | 22.31 |
| Fire brick, thousands | 1,134,233 | 46,676,637 | |
| Other clay products | | 8,111,146 | |
| Clay sold, tons | 647,768 | 3,181,898 | 4.91 |
| Pottery | | 114,951,067 | |

The United States Geological Survey also reported sales of raw clay amounting to 3,434,660 tons valued at $11,188,913.

The list given herewith shows the operators who reported production in 1923 and 1924 together with the kinds of clayware which they produced, according to the following schedule: 1, common brick; 2, face brick; 3, fancy brick; 4, building tile; 5, vitrified brick; 6, drain tile; 7, sewerpipe; 8, other products; 9, pottery; 10, raw clay sold. It may be seen from this list that there are a few discrepancies in the table given above. The Iowa Clay Products Company, with offices at Washington, has four plants, two in Keokuk county, one in Washington county and one in Wapello county, but in the table the output of all these is combined under Keokuk county. The Capital City Clay Company of Des Moines has two plants at Des Moines. The Gethmann Brick Company, of Gladbrook, Tama county, has one plant at that town and one at Reinbeck in Grundy county, but the output of both is credited to Tama county.

The Survey wishes to acknowledge the assistance of Mr. A. L. Urick, State Labor Commissioner, in making more complete the list of clay producers in Iowa. A number of names were added from his report on manufactories which were not in the Survey's list. These are indicated by stars opposite the names.

*Allamakee County*
Postville Mfg. Co., Postville, office Minneapolis, Minn.
*Appanoose County*
Centerville, Centerville Brick Co., 1
*Audubon County*
Audubon, Audubon Brick & Tile Works, 1, 4, 6
Kimballton, Crystal Springs Clay Works, 1, 3, 6
*Benton County*
*Atkins, Rinderknecht Bros.
Belle Plaine, Buckeye Clay Products Co., 4, 5
Garrison, Garrison Brick & Tile Works, 1, 4, 6
Norway, Norway Tile Factory (Mose Trojovsky), 6
Vinton, Aikley Brick & Tile Works, 1, 6
*Black Hawk County*
*Waterloo, Art Novelty Pottery (William Raab), 9
*Waterloo, Waterloo Granite Brick Co., 1
*Boone County*
Boone, Boone Brick & Tile & Paving Co., office Des Moines, 1, 2, 5
Boone, Boone Clay Works Company, 1, 2
Fraser, McHose Sand & Tile Co., 1, 4, 6
*Buena Vista County*
Linn Grove, Linn Grove Brick & Tile Co., 1, 4, 6
*Sioux Rapids, Sioux Rapids Drain Tile Works, 1, 4, 6
*Cass County*
Atlantic, Atlantic Building Supply Co., 1, 4, 6

*Cedar County*
*Tipton, Tipton Brick & Tile Works, 1, 4, 6
*Cerro Gordo County*
Mason City, Mason City Brick & Tile Company, 1, 2, 4, 6
Mason City, National Clay Works, 1, 2, 4, 6
Mason City, North Iowa Brick & Tile Co., 4, 6
*Clayton County*
*Clayton, Clayton Brick and Tile Co., 1, 4
*Clinton County*
Dewitt, DeWitt Brick & Tile Works (Brown & Churchill), 1, 6
*Dallas County*
Adel, Adel Clay Products Co., 1, 2, 4, 6
DeSoto, DeSoto Brick & Tile Co., 1, 2, 6
Redfield, Redfield Brick & Tile Company, 1, 4, 6
Van Meter, Platt Company, Inc., 1, 4, 6
Woodward, Dallas County Clay Co., 4, 6
*Dubuque County*
*Dubuque, Frank Beutin, 1
*Dubuque, Clayton Brick & Tile Co., 1, 4, 6
Dubuque, John L. Heim & Son, 1
*Fayette County*
Clermont, Clermont Brick & Sand Co., 1, 2, 4
*Floyd County*
Rockford, Rockford Brick & Tile Company, 1, 2, 4, 6
*Franklin County*
*Sheffield, Sheffield Brick & Tile Co., 1, 4, 6
Sheffield, Sheffield Tile Company, 1, 2, 4, 6
*Sheffield, Smith Brick & Tile Co., 1, 4, 6
*Grundy County*
*Reinbeck, Gethmann Brick Co., office Gladbrook, 2
*Guthrie County*
Glendon, Glendon Brick & Tile Co. (Robert Goodwin, Jr.), office Menlo, 1, 4, 6
*Hamilton County*
Webster City, National Sewer Pipe Co., 6, 7, 8
Also has clay pit at Nevada, Story Co., 10
*Webster City, Therm-A-Jug Co., 9
*Hardin County*
Eldora, Eldora Pipe & Tile Co., 4, 6, 10
*Eldora, Eldora Sand Co., 10
*Eldora, Estate of Henry L. Huff, 10
*Henry County*
Mount Pleasant, Mount Pleasant Brick & Tile Mfg. Co., 1, 4, 6
Winfield, Winfield Brick & Tile Works (J. E. Pierce), 1, 4, 6
*Howard County*
*Cresco, (Cresco Brick & Tile Works) C. A. Marshall, 1, 4, 6
*Jackson County*
Bellevue, Bellevue Clay Products Company, 1, 4, 6, 9
*Jasper County*
Lynnville, Lynnville Brick & Tile Works (C. H. Newby), 4, 6
Newton, Newton Clay Products Co., 1, 4, 6
*Jefferson County*
*Batavia, Batavia Brick and Tile Co., 1, 4, 6
Packwood, S. F. Steigleder & Son, 6
*Johnson County*
Iowa City, Ferd. Goss Brick Yard, 1
Tiffin, Tiffin Tile Company, 1, 6
*Jones County*
Monticello, Monticello Clay Works (Frank D'Autremont), 6
Center Jct., Center Junction Brick & Tile Co., 6
*Keokuk County*
Hedrick, Hedrick Tile Works, 1, 4, 6
*Keota, Iowa Clay Products Co., office Washington, 1, 4, 6

Keswick, Keswick Brick & Tile Company, 6
*Richland, Iowa Clay Products Co., office Washington, 1, 4, 6
*What Cheer, Nelson Bros. & Lundberg, 1, 9
What Cheer, What Cheer Clay Products Co., 4, 6, 7, 8
*Lee County*
*Fort Madison, Julius Reichelt, 1
*Mahaska County*
Barnes City, Wilson & Morrow, 1, 4, 6
New Sharon, Peter Meyer, 1, 6, 8
*New Sharon, Cecil Bros., 1, 4, 6
Oskaloosa, Standard Clay Products Co., 1, 2
*Marion County*
Harvey, Standard Clay Products Co., office Oskaloosa, 4, 6
Knoxville, Knox Clay Products Co., Inc., 1, 4, 6
*Marshall County*
Marshalltown, Sieg Brick & Tile Company, 1, 4
*Muscatine County*
*Muscatine, Charles Stark, clay pipes
*Page County*
Shenandoah, Lake & Cottrill Brick & Tile Company, 1, 4
*Palo Alto County*
*Graettinger, Graettinger Tile Works, 6
*Polk County*
Des Moines, The Capital Clay Company, 1, 2
Des Moines, Des Moines Clay Company (2 plants), 1, 2, 4
Des Moines, Des Moines Brick & Tile Co., 4, 6, 10
Des Moines, Flint Brick Company, 1, 5
Des Moines, Goodwin Tile & Brick Co., 4, 6
Des Moines, Iowa Pipe & Tile Co., 6, 7, 8
*Des Moines, James Maine & Co., 1
Des Moines, Star Brick Yard, 1
*Pottawattamie County*
Council Bluffs, Wickham Brothers, 1
*Poweshiek County*
Deep River, Deep River Brick & Tile Co., 1, 4, 6
Grinnell, Grinnell Clay Products Co., 1, 4, 6
*Sac County*
Auburn, Auburn Brick & Tile Company, 4, 6
*Scott County*
Buffalo, Davenport Brick & Tile Co., office Davenport, 4
LeClaire, W. E. Martin & Sons, Inc., 1, 4, 6
*Pleasant Valley, Martin & Sons, 1, 4, 6
*Story County*
Nevada, Nevada Brick & Tile Works, 1, 4, 6
*Nevada, National Sewer Pipe Co. (T. J. Lyman), 10
*Tama County*
Dysart, Dysart Brick & Tile Company, 1, 6
Gladbrook, The Gethmann Brick Co., 2
Also has plant at Reinbeck, Grundy Co., 2
Gladbrook, Gladbrook Press Brick & Tile Co., 1, 2, 6
*Tama, Tama Brick & Tile Co., 1, 4, 6
Toledo, Toledo Brick & Tile Co., 1, 4, 6
*Union County*
Creston, Creston Brick & Tile Works, 1, 2, 4, 6
*Wapello County*
*Eldon, Iowa Clay Products Co., office Washington, 1, 4, 6
Ottumwa, Morey Clay Products Co., 1, 2, 4, 6
*Ottumwa, Ostdeik Brick Works, 1, 4, 6
*Warren County*
Carlisle, Carlisle Clay Products Co., Inc., 4, 6
*Washington County*
Crawfordsville, Crawfordsville Brick & Tile Co., 6

Kalona, Kalona Clay Co., Inc., 1, 4, 6
Washington, Washington Brick & Tile Works, 1, 4, 6
Wellman, Iowa Clay Products Company, office Washington, 1, 4, 6
*Webster County*
Clayworks, Johnson Clay Works Inc., 1, 2, 4
Fort Dodge, Bradshaw & Company, 1, 2, 4, 6
*Fort Dodge, Coats Mfg. Co., 4
Fort Dodge, Fort Dodge Brick & Tile Co., 1, 4
Fort Dodge, Plymouth Clay Products Co., 6, 7, 8
Fort Dodge, Vincent Clay Products Co., 4, 6
Lehigh, Lehigh Sewer Pipe & Tile Co., office Fort Dodge, 6, 7, 8
*Lehigh, George F. Drain, 10
Otho, Kalo Brick & Tile Company, office Ft. Dodge, 1, 2, 4, 5, 6
*Woodbury County*
*Correctionville, Woodbury County Tile Plant, 6
Sergeant Bluff, Ballou Brick Company, office Kansas City, Mo., 1, 2
*Sioux City, Lehigh Sewer Pipe & Tile Co., 6, 7
Sioux City, Tom Green Brick Company, 1
Sioux City, Sioux City Brick & Tile Co., 1, 2, 8
*Sioux City, Sioux City Crockery Co., 9
*Wright County*
Goldfield, Goldfield Brick & Tile Works, 1, 4, 6

## CEMENT.

The upward trend in production and shipment of Portland cement which was noted in the report for 1922 continued and was accentuated during 1923. Production rose 34 per cent and shipments 24 per cent in quantity during the later year. These conditions seem to be the result of increased building and road construction activity and were shared in by the country at large, although some districts reported a decrease in construction work as reflected by sales of cement. The magnitude of construction work in the United States is shown by the figures showing value of contracts awarded in the district including Illinois, Indiana, Iowa, Wisconsin, Michigan, Missouri, Kansas, Nebraska and Oklahoma, which amounted to $1,006,422,000 in 1923.

The statistics showing the condition of the industry in Iowa may be summarized in the following table:

*Production of Cement in Iowa, 1921 to 1923*

| | 1921 | 1922 | 1923 |
|---|---|---|---|
| Production, bbls. | 4,590,920 | 4,272,432 | 5,732,470 |
| Stock, Dec. 31, bbls. | 993,090 | 790,447 | 952,242 |
| Shipments, bbls. | 4,151,439 | 4,475,074 | 5,570,675 |
| Shipments, value | $7,439,983 | $7,709,313 | $10,351,971 |
| Average factory price per bbl. | $1.79 | $1.72 | $1.86 |
| Consumption, bbls. | 3,118,469 | 3,242,436 | 3,624,857 |
| Population, estimated | 2,440,948 | 2,459,411 | 2.477,874 |
| Consumption per capita, bbl. | 1.28 | 1.32 | 1.46 |
| Surplus production | 1,032,970 | 1,228,638 | 1,945,818 |
| Coal used during year, tons | | | 589,117 |
| Annual finished cement capacity of plants, bbls. | 5,350,000 | 5,650,000 | 6,785,000 |

The following operators had plants in operation in Iowa in 1923:

Gilmore Portland Cement Co., Gilmore City
Hawkeye Portland Cement Co., Des Moines
Lehigh Portland Cement Co., Mason City
Northwestern States Portland Cement Co., Mason City
Pyramid Portland Cement Co., Valley Junction.

The Pyramid Portland Cement Company of Des Moines opened a new plant at Valley Junction, at the west margin of Des Moines, on August 15, 1923. This adds two kilns to the capacity of the state's plants. Each kiln is 240 feet long and 10 to 11 1/3 feet in diameter. At the close of the year the plants in operation in the state had a total of twenty-eight kilns. The Pyramid and Hawkeye plants use the wet process, the others use the dry process. All the plants use limestone and clay shale and burn the clinker with coal.

Cement production in the leading states of the Union is shown in the table below. It will be seen that Iowa occupies eighth place in both production and shipments.

| State | Plants | Production | Shipments | | Average factory price per bbl. | Consumption | |
|---|---|---|---|---|---|---|---|
| | | *bbls.* | *bbls.* | *Value* | | *bbls.* | *per capita* |
| Pennsylvania | 22 | 38,157,482 | 38,610,852 | $ 69,792,343 | $1.81 | 11,281,290 | 1.23 |
| California | 9 | 11,001,910 | 10,882,802 | 26,022,156 | 2.39 | 10,373,163 | 2.69 |
| Michigan | 14 | 7,619,792 | 7,466,283 | 14,038,322 | 1.88 | 7,531,664 | 1.87 |
| Missouri | 5 | 7,305,997 | 7,143,883 | 13,237,141 | 1.85 | 3,492,453 | 1.01 |
| Illinois | 4 | 7,147,906 | 7,129,208 | 12,550,100 | 1.76 | 12,237,478 | 1.79 |
| New York | 9 | 6,990,174 | 6,853,062 | 12,834,471 | 1.87 | 15,881,436 | 1.46 |
| Kansas | 7 | 6,025,657 | 5,878,839 | 10,868,590 | 1.85 | 2,613,070 | 1.45 |
| Iowa | 5 | 5,732,470 | 5,570,675 | 10,351,971 | 1.86 | 3,624,857 | 1.46 |
| Ohio | 6 | 4,188,755 | 4,003,321 | 7,615,741 | 1.90 | 8,843,641 | 1.43 |
| Texas | 5 | 4,178,895 | 4,091,284 | 8,011,226 | 1.96 | 3,328,619 | 0.67 |
| U.S. | 126 | 137,460,238 | 135,912,118 | 257,684,424 | 1.90 | 134,703,313 | 1.21 |

The increase in the quantity shipped in 1923 in the various producing states ranged from 8 per cent in Washington to 46 per cent in Alabama and averaged 15 per cent for the country in general. California is again far in the lead in per capita consumption and Iowa ties with New York for tenth place although our state ranks tenth in total consumption while New York ranks

first. Wisconsin occupies the unique position of standing third in per capita use and eighth in total consumption, with shipments of 5,064,000 barrels, although no cement is made in the state. Portland cement was made in twenty-seven states in 1923.

## GYPSUM.

The gypsum industry reached the highest point in its history in 1923, both as to the amount of crude gypsum mined and as to the value of the finished product. The improvement which was evident in 1922 continued during 1923 in sales of crude gypsum as well as in those of finished plasters and manufactured products. The following table shows the figures of production during 1923, with those for 1922 in comparison.

*Production of Gypsum in 1922 and 1923.*

| | 1922 | | 1923 | |
|---|---|---|---|---|
| | *Tons* | *Value* | *Tons* | *Value* |
| Crude gypsum mined | 536,905 | | 685,041 | |
| Sold crude | | | | |
| to Portland cement mills | 80,452 | $223,187 | 134,566 | $383,322 |
| agricultural gypsum | 45,062 | 136,451 | 329 | 1,961 |
| Total sold crude | 125,514 | 359,638 | 134,895 | 385,283 |
| Sold calcined | | | | |
| as stucco | 11,691 | 98,608 | 17,681 | 120,130 |
| as mixed wall plaster | 260,167 | 2,272,290 | 315,435 | 2,505,183 |
| as plaster of Paris, molding, &c. | 3,263 | 33,341 | 1,937 | 21,366 |
| as Keenes cement, dental plaster, &c. | 3,927 | 75,635 | 6,085 | 97,677 |
| as plaster board and wall board | 23,720 | 862,061 | 44,183 | 1,583,681 |
| As tile and block | 24,169 | 444,509 | 46,508 | 665,212 |
| Total sold calcined | 326,937 | 3,786,544 | 431,829 | 4,983,249 |
| Total sold | 452,451 | 4,146,182 | 566,724 | 5,368,532 |

The following table will show the growth of the gypsum industry in Iowa during the last ten years.

| Year | Mined | Sold crude | | Sold calcined | | Total sold | |
|---|---|---|---|---|---|---|---|
| | *Tons* | *Tons* | *Value* | *Tons* | *Value* | *Tons* | *Value* |
| 1914 | 480,404 | 65,185 | $60,486 | 335,065 | $1,260,971 | 400,250 | $1,321,457 |
| 1915 | 495,860 | 71,909 | 59,930 | 335,057 | 1,218,198 | 406,966 | 1,278,128 |
| 1916 | 522,293 | 60,846 | 59,297 | 373,416 | 1,437,498 | 434,262 | 1,496,795 |
| 1917 | 461,864 | 65,012 | 110,741 | 322,198 | 1,931,256 | 387,210 | 2,041,997 |
| 1918 | 327,927 | 57,719 | 160,148 | 218,178 | 1,786,266 | 275,897 | 1,946,414 |
| 1919 | 421,279 | 69,024 | 231,432 | 264,656 | 2,403,012 | 333,680 | 2,634,444 |
| 1920 | 571,895 | 110,839 | 414,431 | 321,400 | 4,008,534 | 432,239 | 4,422,965 |
| 1921 | 350,247 | 84,659 | 234,038 | 216,930 | 2,688,662 | 301,587 | 2,922,700 |
| 1922 | 536,905 | 125,514 | 359,638 | 326,937 | 3,786,544 | 452,451 | 4,146,182 |
| 1923 | 685,041 | 134,895 | 385,283 | 431,829 | 4.983,249 | 566,724 | 5,368,532 |

The gypsum industry the country over seemed to share in the prosperity enjoyed by the Iowa operators for the total quantity mined in 1923 exceeded that of the previous year by 26 per cent and the value of sales increased by $5,527,004, or 19 per cent. Iowa was well in the lead for second place, being excelled by New York alone, with Ohio in third position. These states have held these relative positions most of the time for a number of years. The following table summarizes the industry in the United States.

*Gypsum production in the United States in 1923*

| State | Plants | Total mined | Sold crude | | Sold calcined | | Total value |
|---|---|---|---|---|---|---|---|
| | | *Tons* | *Tons* | *Value* | *Tons* | *Value* | |
| California | 3 | 111,832 | *a* | *a* | 24,936 | $374,040 | $670,495 |
| Iowa | 7 | 685,041 | 134,895 | $385,283 | 431,829 | 4,983,249 | 5,368,532 |
| Kansas | 3 | 135,019 | *a* | *a* | 71,349 | 700,490 | 842,740 |
| Michigan | 6 | 586,978 | 135,616 | 355,067 | 341,746 | 2,897,926 | 3,252,993 |
| Nevada | 4 | 298,390 | *a* | *a* | 226,753 | 1,891,639 | 1,952,007 |
| New York | 8 | 1,361,116 | 230,080 | 717,999 | 823,241 | 9,626,746 | 10,344,745 |
| Ohio | 3 | 526,861 | *a* | *a* | 432,511 | 4,919,375 | 4,981,542 |
| Oklahoma | 4 | 290,121 | 47,041 | 125,182 | 202,323 | 2,123,713 | 2,248,895 |
| Texas | 4 | 344,104 | ---- | ---- | 254,512 | 2,177,983 | 2,237,024 |
| Utah | 3 | 44,531 | *a* | *a* | 33,520 | 269,148 | 286,957 |
| Wyoming | 4 | ---- | ---- | ---- | 27,945 | 176,791 | 176,791 |
| Others (b) | 16 | 335,802 | c299,610 | c993,905 | 230,713 | 2,169,619 | 2,525,434 |
| U.S. | 65 | 4,753,448 | 847,242 | 2,577,436 | 3,101,378 | 32,310,719 | 34,888,155 |

*a* Included under Others.
b Alaska, Colorado, Montana, Oregon, South Dakota, Virginia and New Mexico.
c These figures include also output of states entered under *a*.

The following Iowa plants were operated in 1923:

Centerville Gypsum Co., Centerville, Appanoose Co.

Beaver Products Co., Fort Dodge, Webster Co.
Universal Gypsum Co., operating the Iowana and Plymouth plants, Fort Dodge
Wasem Plaster Co., Fort Dodge
Cardiff Gypsum Co., Fort Dodge
United States Gypsum Co., Fort Dodge.

## SAND AND GRAVEL.

The sand and gravel industry continued the upward trend which had been maintained in 1922 and the total tonnage and total value were materially larger in 1923, the tonnage increasing 955,178 tons and the value by $454,923, or 36 per cent and 26 per cent respectively. These increases were spread over nearly all branches of the business, the only decreases being in the tonnage of filter sand and the tonnage and value of unclassified sands sold. Perhaps the most notable increase in the industry was in the gravel used as railroad ballast. Probably the rise in the figures for this item is due in part to a special canvass of the railroads which was made by the United States Geological Survey in 1923 to obtain more complete returns as to the non-commercial material used by them. The increase is shown also in the figures for the nation as a whole.

The production and uses of sand and gravel during 1922 and 1923 are summarized in the table below.

*Production of sand and gravel in Iowa by uses.*

| Class | 1922 | | 1923 | |
|---|---|---|---|---|
| | Tons | Value | Tons | Value |
| *Sand* | | | | |
| Molding | 29,809 | $ 32,613 | 35,654 | $ 40,238 |
| Building | 842,254 | 466,326 | 1,004,261 | 512,413 |
| Grinding and polishing | 6,225 | 6,961 | 17,225 | 36,288 |
| Engine | 59,778 | 27,568 | 61,680 | 37,627 |
| Paving | 286,303 | 146,030 | 670,181 | 310,750 |
| Filter | 12,255 | 4,682 | 11,968 | 7,505 |
| Other | 76,700 | 36,835 | 31,364 | 20,455 |
| Total | 1,313,324 | 721,015 | 1,832,333 | 965,276 |
| *Gravel* | | | | |
| Building | 328,297 | 314,541 | 343,078 | 331,045 |
| Paving | 757,329 | 629,549 | 837,558 | 634,020 |
| Railroad | 291,848 | 87,128 | 584,191 | 251,540 |
| Total | 1,377,474 | 1,031,218 | 1,764,827 | 1,216,605 |
| Sand and gravel | 2,690,798 | 1,752,233 | 3,597,160 | 2,181,881 |

The output by counties and its distribution among the different classes of these materials are shown in the table appended.

*Production of Sand and Gravel in 1923*

| County | Producers | Building sand | Paving sand | Other sand (a) | Gravel | Total Tons | Total Value |
|---|---|---|---|---|---|---|---|
| Black Hawk(2), Boone(2) | 4 | $30,968 | * | (3) | $101,057 | 200,953 | $143,187 |
| Bremer(1), Buena Vista(1), Butler(2), Cerro Gordo(1) | 5 | 15,900 | * | (3) | 61,983 | 218,444 | 87,883 |
| Cherokee(4), Clay(2) | 6 | 43,207 | * | (5) | 216,556 | 506,304 | 273,812 |
| Clayton(2), Clinton(4) | 6 | * | * | (1)(2) | 28,744 | 91,816 | 75,069 |
| Dallas(1), Des Moines(1), Dickinson(1), Dubuque(2) | 5 | 9,669 | * | (3)(5) | 41,431 | 103,660 | 60,663 |
| Emmet(1), Fayette(2), Floyd(1), Franklin(1) | 5 | 13,177 | ..... | (1) | * | 31,716 | 25,811 |
| Fremont(1), Hardin(2), Humboldt(1), Ida(2) | 6 | 17,828 | * | $5,941(3)(5) | * | 85,421 | 61,177 |
| Jackson | 3 | 5,529 | * | (3) | 30,353 | 49,776 | 37,016 |
| Johnson(2), Jones(1), Kossuth(1), Lee(2) | 6 | 21,324 | $16,605 | ..... | 8,461 | 76,597 | 46,390 |
| Linn(5), Lyon(2) Mahaska(1) | 8 | 47,118 | 34,491 | ..... | 23,545 | 184,571 | 105,154 |
| Marion(1), Marshall(1), Monroe(1), O'Brien(1), Osceola(2) | 6 | 12,437 | * | (3) | 7,637 | 51,105 | 25,639 |
| Muscatine | 5 | 40,810 | * | 66,403(2)(3)(4)(5) | 124,371 | 354,433 | 260,586 |
| Palo Alto(1), Plymouth(2), Sac(2) | 5 | * | * | (5) | 128,935 | 377,959 | 149,073 |
| Polk | 13 | 80,211 | 84,197 | 9,931(1)(3)(4)(5) | 266,739 | 669,129 | 441,078 |
| Scott(2), Story(1), Wapello(3) | 6 | 94,156 | * | (1)(3)(4)(5) | 23,795 | 203,825 | 144,275 |
| Sioux | 8 | 37,144 | * | (4) | 25,725 | 189,647 | 80,871 |
| Webster(2), Woodbury(2), Wright(2) | 6 | 17,337 | 57,016 | (5) | 81,104 | 200,963 | 155,516 |
| Winneshiek | 6 | 1,080 | * | ..... | 7,601 | 5,829 | 8,681 |
| Counties with less than three producers | | 24,518 | 118,441 | 59,838 | 44,558 | | |
| | 109 | 512,413 | 310,750 | 142,113 | 1,216,605 | 3,597,160 | 2,181,881 |
| Production in 1922 | 102 | 466,326 | 146,030 | 108,659 | 1,031,218 | 2,690,798 | 1,752,233 |
| Difference in 1923 | +7 | +46,087 | +164,720 | +33,454 | +185,387 | +906,362 | +429,648 |

* Included in: Counties with less than three producers.
(a) Includes: (1) molding, $40,238; (2) grinding and polishing, $36,288; (3) engine, $37,627; (4) filter, $7,505; not specified, $20,455.

Preliminary figures for the industry over the entire country show that there was an increase of 48 per cent in quantity and 41 per cent in value over the figures for 1922. The increase shown in use of railroad ballast amounted to 146 per cent and there was a large increase also in the amount of sand and gravel sold for construction of buildings and pavements. The figures for 1923 include returns from 2,428 sand and gravel plants, which is 443 more than the number represented by the returns for 1922. The

table below will show the quantity and value of the different grades sold in these two years.

*Sand and gravel sold in the United States in 1922 and 1923.*

| Class | 1922 | | 1923 | |
|---|---|---|---|---|
| | Short tons | Value | Short tons | Value |
| Sand: | | | | |
| Glass | 1,768,549 | $ 2,866,366 | 2,034,958 | $ 3,751,778 |
| Molding | 3,839,116 | 4,478,405 | 5,559,644 | 6,730,417 |
| Building | 29,375,466 | 17,574,579 | 39,234,762 | 23,751,244 |
| Paving | 10,669,772 | 6,481,601 | 15,632,419 | 9,187,468 |
| Grinding and polishing | 1,183,161 | 1,732,469 | 1,456,039 | 2,361,695 |
| Fire or furnace | 237,065 | 336,085 | 307,794 | 445,479 |
| Engine | 1,685,712 | 1,288,022 | 2,033,494 | 1,535,638 |
| Filter | 71,728 | 142,692 | 116,520 | 139,671 |
| Other | 864,354 | 569,701 | 989,641 | 570,175 |
| Total | 49,694,923 | 35,469,920 | 67,365,271 | 48,473,565 |
| Gravel: | | | | |
| Building | 18,686,176 | 14,541,169 | 24,145,463 | 18,367,713 |
| Paving | 17,432,445 | 11,373,712 | 26,174,112 | 17,716,779 |
| Railroad ballast | 9,053,502 | 3,232,863 | 22,247,307 | 6,345,597 |
| Total | 45,172,123 | 29,147,744 | 72,566,882 | 42,430,089 |
| Grand total | 94,867,046 | 64,617,664 | 139,932,153 | 90,903,654 |

Sand and gravel are produced in Iowa by the following firms:

*Black Hawk County*
Cedar River Sand & Material Co., 908 L. & J. Bldg., Waterloo
Iowa Sand Co., H. C. Matthias, 1721 Franklin St., Waterloo
Waterloo Dredging Co., Waterloo

*Boone County*
McHose Sand & Tile Co., Frazer; office at Boone
Northwestern Gravel Co., office at Des Moines

*Bremer County*
H. S. Bunth, Waverly

*Buena Vista County*
Chicago & North Western Ry. Co., Sioux Rapids

*Butler County*
Aplington Cement Tile & Block Works, Chas. Willeke, Aplington
Waverly Gravel & Tile Co., Shellrock; office at Waverly

*Carroll County*
Chicago Great Western R. R. Co., Lanesboro

*Cerro Gordo County*
Ideal Sand & Gravel Co., Mason City
Chicago, Milwaukee & St. Paul Ry. Co., Plymouth; office at Chicago, Ill.

*Cherokee County*
M. J. Gillease Co., Cherokee
E. L. Halford & Son, Cherokee
Illinois Central Ry. Co., Cherokee
Northwestern Gravel Co., Quimby

*Clay County*
John Stolley, Spencer
Spencer Washed Sand & Gravel Co., Spencer

*Clayton County*
Clayton White Sand Co., Clayton
Langworthy Silica Co., Clayton; office at 902 Federal Bank Bldg., Dubuque

*Clinton County*
Clinton Sand & Gravel Co., 604 Wilson Bldg., Clinton
W. J. McAllister, DeWitt; office at 2103 E. 11th St., Davenport
Ed. Jenner, DeWitt; office at 629 E. Central Park Ave., Davenport
A. F. Barber, R. D. No. 2, Grand Mound
John Sampson, Grand Mound
*Dallas County*
Portland Cement Sand & Gravel Co., Booneville, office at 513 Youngerman Bldg., Des Moines
*Des Moines County*
Mississippi Sand & Gravel Co., Burlington
*Dickinson County*
Chicago, Milwaukee & St. Paul Ry. Co., Milford
*Dubuque County*
Frank Beutin, Garfield-Kniest Sts., Dubuque
Chicago, Milwaukee & St. Paul Ry. Co., Dubuque
Molo Sand & Gravel Co., Dubuque
*Emmet County*
Cement Products Co., Estherville
*Fayette County*
Clermont Brick & Sand Co., Clermont
L. S. Cooley, West Union
*Floyd County*
Iowa Foundry Sand Co., Floyd
Chicago, Rock Island & Pacific Ry. Co., Marble Rock
*Franklin County*
U. S. Keystone Silo Co., 628 McKnight Bldg., Minneapolis, Minn.
W. C. Nolte, Sheffield
*Fremont County*
Nebraska-Iowa Sand & Gravel Co., Crosby; office at Nebraska City, Nebr.
*Hardin County*
Chicago & North Western Ry. Co., Gifford
Northwestern Gravel Co., Gifford
Eldora Sand Co., Steamboat Rock; office at Eldora
*Humboldt County*
Humboldt Gravel & Tile Co., Humboldt
*Ida County*
Leonard Christenson, Ida Grove
Concrete Stone Works, Ida Grove
*Jackson County*
F. H. C. Habich, Bellevue; office at Galena, Ill.
Bellevue Sand & Gravel Co., Bellevue; office at Koss Construction Co., 5th & I. U. Ry. Tracks, Des Moines
Sabula Sand & Gravel Co., Sabula
Chicago, Milwaukee & St. Paul Ry. Co., Smiths
*Johnson County*
Hills Sand & Gravel Co., Hills
City Sand Co., N. Madison St., Iowa City
E. D. Porter, River Junction
*Jones County*
Chicago, Milwaukee & St. Paul Ry. Co., Monticello
N. B. Lathrop, Oxford Mills
*Kossuth County*
C. J. Lenander, Bancroft
*Lee County*
Jos. Jaeger, Fort Madison: office at Montrose
Keokuk Sand Co., Foot of Bank St., Keokuk
*Linn County*
Kings Crown Plaster Co., 98 First Ave. W., Cedar Rapids
Larimer & Shaffer, 931 North 1st St. W., Cedar Rapids
John Hoge, Springville
Hadwin Williams, Springville; office at Mount Vernon
Mrs. Rozella Corbett, Viola

*Lyon County*
Miller Sand & Gravel Co., Box 101, Doon
Chicago, Rock Island & Pacific Ry. Co., Granite
*Mahaska County*
Iowa Sand & Gravel Co., Tracey; office at Oskaloosa
*Marion County*
Harvey Sand & Gravel Co., Harvey
*Marshall County*
Empire Sand & Material Co., Marietta; office at Lock Box 467, Marshalltown
Hawkins Sand Co., 1110 N. 3rd Ave., Marshalltown
*Monroe County*
E. J. Erickson, Melrose
*Muscatine County*
Chicago, Rock Island & Pacific Ry. Co., Fruitland
Automatic Gravel Products Co., Box 34, Muscatine
The Hahn Muscatine Co., 301-302 Amer. Bank Bldg., Muscatine
Muscatine Sand & Gravel Co., Conrad Koehler, Prop., Muscatine
Northern Gravel Co., Muscatine
Pearl City Gravel Co., Ed. L. Hahn, Muscatine
*O'Brien County*
Paullina Construction Tile Factory, Paullina
*Osceola County*
Chicago, Rock Island & Pacific Ry. Co., Sibley
Sibley Cement Co., Sibley
Town of Sibley, Sibley
*Palo Alto County*
Chicago, Rock Island & Pacific Ry. Co., Graettinger
Graettinger Tile Works, Graettinger
*Plymouth County*
Big Sioux Gravel Co., Akron
Albert A. Wenzel, Pierson; office at Kingsley
J. J. Kemp, Oyens
*Polk County*
Chicago, Rock Island & Pacific Ry. Co., Avon and Commerce
Commerce Sand & Gravel Co., G. N. Doty, Pres., Commerce
Capital City Sand Co., Lovington; office at 308 W. Fifth St., Des Moines
Central Sand & Gravel Co., 504 Hubbell Bldg., Des Moines
Consumers Ice Co., 8th & N. Y. Ave., Des Moines
Coon River Sand Co., 308 9th St., Des Moines
The Des Moines Sand & Fuel Co., 510 Grand Ave., Des Moines
Eaton Sand Co., Des Moines
Service Sand Co., 901 S. E. 6th St., Des Moines
N. Leon Harris, R. R. No. 4, Lock Box 507, Des Moines
Independent Sand & Gravel Co., S. W. 7th & Tuttle Sts., Des Moines
Iowa Sand Co., J. C. Stevens, 20 Fulton Drive, Des Moines
Oak Park Sand Co., C. G. Cain, Sec., Des Moines
Reliance Gravel & Sand Co., Box 63, E. 28th St., C. B. & Q. tracks, Des Moines
Flint Crushed Gravel Co., Herrold; office at Des Moines
Commercial Sand Co., 513 Youngerman Bldg., Des Moines
Hawkeye Sand & Gravel Co., 906 Walnut St., Des Moines
*Sac County*
Chicago & North Western Ry. Co., Lake View
Northwestern Gravel Co., Lake View
Sac County, Office of Engr., Sac City
*Scott County*
W. G. Block Co., Box 528, Davenport
Builders Sand & Gravel Co., Nahant
*Sioux County*
D. A. Sorgdrager, R. D. No. 1, Alton
Alton Cement Works, Alton
S. R. Cooper, Hawarden
French & Briggs, Hawarden
C. A. Oehlerking, Hawarden

LeMars Gravel Co., Rock Valley and Hawarden
Schemmer Sand & Gravel Co., Rock Valley
Rock Valley Sand & Gravel Co., Rock Valley

*Story County*
Iowa State College, Ames
Story County Board of Supervisors, Ames; office at Nevada

*Wapello County*
Eddyville Sand & Gravel Co., Eddyville
Ottumwa Sand Co., Ottumwa
Wapello Sand & Building Material Co., 317-19 Church St., Ottumwa

*Webster County*
Johnston Bros., Clay Works
Chas. Larrabee, 1222 Sixth Ave., Ft. Dodge
Earl Wright, Ft. Dodge

*Winneshiek County*
Bernatz Bros., Decorah
Decorah Stone Products Co., R. Bucknell, Secy., Decorah
Geo. Wm. Higgins, Decorah
Wm. McNamara, Decorah
John T. Nolan, Decorah
J. H. Rosenthal, Decorah

*Woodbury County*
Woodbury County Gravel Plant, Correctionville
Remsen Sand & Gravel Co., Correctionville; office at Remsen

*Wright County*
Belmond Cement Mfg. Co., Belmond
Luick Gravel Co., Belmond
Chicago, Rock Island & Pacific Ry. Co., Belmond
Chicago Great Western R. R. Co., Belmond

## STONE AND LIME.

In general the stone industry showed an improvement similar to that noted in other lines of the mineral industry. The total value of the stone and lime sold in 1923 exceeded that of the preceding year by $55,931 although the total tonnage was less by 15,567. This increase was not shared by all parts of the stone trade, for the output of dimension stone, including building, rubble and riprap, fell short of that of the preceding year by $71,600 and stone was used in agriculture to a less extent than during 1922, as was the case also with agricultural gypsum. The increases came in crushed stone in its various uses and here the gain was quite marked. The tonnages of the various classes of stone produced in 1922 and 1923 are shown in the following table:

*Tonnages of stone and lime produced in Iowa*

| Uses | 1922 | 1923 |
|---|---|---|
| Building | 5,560 | 2,910 |
| Rubble and riprap | 117,950 | 44,560 |
| Concrete and road metal | 417,550 | 449,760 |
| Agriculture | 59,720 | 50,810 |
| Sugar factories | 8,100 | 12,000 |
| Railroad ballast and flux | 11,830 | 43,510 |
| Lime and sandstone | 6,733 | 8,326 |
| | 627,443 | 611,876 |

It is evident from the table that the various industries which use crushed stone, particularly concrete and road constructions, are the ones on which the stone industry in Iowa depends very largely. In 1923 these used all but 55,796 tons of the total tonnage of 611,876. The limestone sold to sugar factories is used for refining sugar at the beet sugar factories at Mason City and Belmond.

The following table shows the value of the output of the different stone producing counties in the state so far as these may be given without revealing the business of individual producers. It also gives a summary of the business of 1922 by way of comparison with 1923. The value of the output increased in eleven counties in 1923 and decreased in ten counties. But the diminution in the ten counties amounted to only $73,278, while the increase in the eleven counties was $129,209. The great decreases were in Allamakee county, where extensive government work on Mississippi river used much stone in 1922 while none was used in 1923; in Des Moines county, where a large output in 1922 was followed by none in 1923; and in Dubuque county, which dropped nearly twenty thousand dollars in 1923.

Scott county is by far the largest producer, with an output for 1923 valued at $296,968, and Black Hawk county is second in rank. Lee comes third with $76,431 to its credit and Dubuque ranks fourth, with a production of $69,401, which is made possible to a considerable extent by the lime burning industry. Jackson county is fifth in rank, due also very largely to the lime made at Hurstville.

*Production of stone and lime in 1923*

| County | No. of Producers | Building, rubble and riprap | Concrete and road metal | Agriculture | Other uses(a) | Total Tons | Total Value |
|---|---|---|---|---|---|---|---|
| Allamakee(1), Appanoose(1), Black Hawk(2), Cerro Gordo(2) | 6 | $ 2,781 | $ 89,328 | $ 5,255 | (3) | 86,325 | $115,484 |
| Clayton(2), Clinton(1), Dubuque(4) | 7 | 12,250 | 49,955 | * | (2)(4) | 58,530 | 85,466 |
| Hardin(1), Howard(1), Jackson(1), Johnson(1) | 4 | ---------- | 58,889 | ---------- | (2)(4) | 57,382 | 117,554 |
| Jones | 3 | 15,433 | 8,242 | 1,466 | ---------- | 20,773 | 25,141 |
| Lee(3), Madison(1) | 4 | * | 57,257 | 7,260 | (1) | 65,958 | 89,225 |
| Linn(2), Marshall(2) | 4 | * | 25,211 | * | ---------- | 18,069 | 26,025 |
| Mitchell(1), Pocahontas(1), Scott(3) | 5 | 11,812 | 242,144 | * | (1)(2)(3) | 304,850 | 316,239 |
| Counties with less than three producers | | 17,458 | | 22,016 | 148,309 | | |
| | 33 | 59,802 | 531,026 | 35,997 | 148,309 | 611,876 | 775,134 |
| Production in 1922 | 34 | 131,402 | 451,943 | 49,226 | 86,632 | 627,443 | 719,203 |
| Differences in 1923 | —1 | —71,600 | +79,083 | —13,229 | +61,677 | —15,567 | +55,931 |

* Included under Counties with less than three producers.
(a) Includes: (1) Railroad ballast, $30,144; (2) flux, $19,110; (3) sold to sugar factories, $22,128; (4) lime and sandstone, $76,927.
"Other uses" in 1922 included: Railroad ballast and flux, $12,885; sold to sugar factories, $11,670; lime and sandstone, $62,047.

The output of limestone in the entire United States was 30 per cent greater in 1923 than in 1922. This increase was spread over all the important lines of the industry. The following table will show the comparative figures for the two years.

*Limestone sold and used in the United States, by uses.*

| Use | 1922 Quantity | 1922 Value | 1923 Quantity | 1923 Value |
|---|---|---|---|---|
| | *Tons* | | *Tons* | |
| Building | 995,540 | $12,418,873 | 1,105,990 | $16,267,925 |
| Rubble | 286,340 | 470,264 | 327,180 | 484,771 |
| Riprap | 1,010,850 | 925,760 | 1,536,570 | 1,451,670 |
| Crushed | 32,786,300 | 33,224,879 | 41,386,550 | 42,540,754 |
| Flux | 18,690,270 | 14,208,457 | 25,562,140 | 20,333,939 |
| Sugar factories | 371,430 | 634,511 | 474,530 | 875,774 |
| Glass factories | 166,070 | 291,854 | 197,380 | 301,403 |
| Paper mills | 149,430 | 264,130 | 206,740 | 326,054 |
| Agriculture | 1,195,000 | 2,150,435 | 1,278,770 | 2,160,249 |
| Other | 3,317,430 | 3,808,764 | 4,625,510 | 4,877,468 |
| Total sold | 58,928,660 | 68,397,927 | 76,701,360 | 89,620,007 |
| Portland cement | 30,070,000 | | 34,722,000 | |
| Natural cement | 148,000 | | 212,000 | |
| Lime | 7,280,000 | | 8,140,000 | |
| Total used | 96,426,660 | | 119,775,360 | |

The amount of crushed stone used for road metal and concrete was 33,382,210 tons with an average value of $1.08 per ton, and the amount used for railroad ballast was 8,004,340 tons with an average value of $0.83 per ton. Iowa ranked twenty-fourth in value of limestone produced in 1923. The following list gives the Iowa operators of limestone quarries. Sandstone and lime producers are indicated in the list.

*Allamakee County*
U. S. Engineer's Office, Lansing; office at LaCrosse, Wis.
Wilkes Williams, R. D. No. 1, Postville
*Appanoose County*
Wm. B. Swan, Plano
*Black Hawk County*
Hawkeye Quarries Co., La Porte City; office at Cedar Rapids
A. Bartlett, 1165 E. Fourth St., Waterloo
*Bremer County*
Waverly Stone & Gravel Co., office at Fowler Bldg., Waterloo
*Cerro Gordo County*
Henry Kuppinger, Mason City
Ideal Sand & Gravel Co., Mason City
Quinby Stone Co., 24 13th St. N. E., Mason City
*Clayton County*
H. D. Kregel, Garnavillo, sandstone
Geo. Kohler, Guttenberg
Marquette Stone Products Co., McGregor
*Clinton County*
C. T. Hanrahan, Charlotte
*Des Moines County*
W. J. Welsh, Burlington; office at Potosi, Wis.
*Dubuque County*
Wm. Becker, 1333 Kaufman Ave., Dubuque
Fred W. Faldorf, 1155 Grand View Ave., Dubuque
Eagle Point Lime Works, Dubuque, also lime
Thos. R. Welsh, 202 W. Locust St., Dubuque
B. N. Arquitt, Farley
*Hardin County*
Hale Roberts Stone Co., Alden
*Howard County*
Cresco Stone & Concrete Co., Cresco
*Jackson County*
A. A. Hurst, Hurstville; office at Maquoketa; also lime
*Johnson County*
River Products Co., Coralville; office at 218 Johnson County Savings Bank Bldg., Iowa City
*Jones County*
The Reformatory, Anamosa
Geo. B. Shaler, Stone City
H. Dearborn's Sons, Stone City
*Keokuk County*
Russell B. Boyce, Sigourney
*Lee County*
McManus Quarries Co., Inc., Ballinger Sta.; office at Box 93, Keokuk
Keokuk Quarry & Construction Co., 1325 Main St., Keokuk,
Burlington Quarry Co., Montrose; office at 17 S. Seventh St., Keokuk
*Linn County*
Ellis Park Stone Co., Cedar Rapids
J. E. Colton, Mount Vernon

*Madison County*
Peru Stone & Cement Co., Peru; office at 308 West 5th Street, Des Moines
*Marshall County*
County Engineer, Marshalltown
*Mitchell County*
Belzer & Brenden, Osage
Osage Stone Co. (H. L. Wilson), Osage
*Pocahontas County*
Gilmore Portland Cement Corp., Gilmore City
*Scott County*
Otto Thompson, Bettendorf Stone Co., Bettendorf; office at 820 Kirkwood Blvd., Davenport
J. A. Shaw, Big Rock
Dolese Bros. Co., Buffalo; office at 337 W. Madison St., Chicago, Ill.
Linwood Cement Co., 713 Kahl Bldg., Davenport
*Van Buren County*
Chequest Quarries, W. H. Swank, Mgr., Keosauqua

## MINERAL WATERS.

The mineral water industry shared in the general improvement of business during 1923, for the amount sold was 76 per cent larger and the value of sales was 135 per cent larger than in 1922. The sales of medicinal and table waters aggregated 45,072 gallons, with a value of $8,907, an average price of about twenty cents per gallon. The actual prices ranged from five cents in bulk at wholesale to fifty-five cents for retail sales. The Colfax operators complained of restrictions due to high freight and express rates and special taxes. Fry's well at Colfax and the Colfax Mineral Spring also use a large amount of water for making carbonated drinks. The Grand Hotel at Colfax maintains a bathing establishment which served sixty-eight patrons during the year. The Hygeia well at Sioux City uses all its water for carbonated drinks as does also the Lime Rock Spring at Dubuque. The amount used for soft drinks at the various wells was 213,759 gallons, making a total reported use of mineral water in the state of 258,831 gallons. This does not represent nearly all the water used for soft drinks in Iowa, as there are a number of bottling establishments which do not report.

## NATURAL GAS.

A small amount of gas was used in 1923. This was derived as in previous years from shallow pockets in the glacial drift. The amount reported did not exceed 100,000 cubic feet with a value of about $172. Probably more gas is used than these figures would indicate, for since these gas pockets are usually found during well drilling operations their presence is not always reported to this department and no record is made of their use.

## MINERAL PRODUCTION IN IOWA IN 1924*

| Products | Unit | Quantity | Value |
|---|---|---|---|
| Cement | Bbl. of 376 lb. | 4,881,613 | $ 8,811,587 |
| Clay products | | | 5,692,147 |
| Coal | Short ton | 5,468,450 | 18,097,000 |
| Gypsum | short ton | 640,953 | 5,657,339 |
| *Mineral waters* | *no census* | | |
| Natural gas | M. cu. ft. | 575 | 300 |
| Sand and gravel | short ton | 2,427,626 | 1,473,066 |
| Stone and lime | short ton | 610,408 | 739,632 |
| | | | $40,470,971 |

* Figures compiled by the Iowa Geological Survey in cooperation with the United States Geological Survey and the Bureau of the Census. Acknowledgment is made of the use of tables and other data published by these organizations.

The mineral industry in 1924 did not bring to fulfilment the prophecy which the upward trend of 1923 seemed to show. In contrast with the output of mineral products during 1923, valued at $46,237,521, which had increased from $36,189,398 in 1922, the output in 1924 declined to $40,470,971, a drop of $5,766,550. This decline was shared by all lines of production except that of gypsum, which enjoyed an increase in nearly every branch of the industry. The decrease in other products would seem to be the result of diminished activity in the building trades as well as unfavorable agricultural conditions. Similar conditions seem likely to persist in 1925 and may perhaps be accentuated during that year. Production in the United States fell from $5,998,800,000 in 1923 to $5,318,000,000 in 1924, a drop of 11 per cent, a fact which indicates that Iowa was not alone in the experience of general depression. The following table will be of interest in showing the amount and increase of mineral production in the country as a whole.

*Mineral production in the United States*

| Year | Value | Percentage of increase or decrease |
|---|---|---|
| 1880–1913 | $35,295,900,000 | ---------- |
| 1914 | 2,111,172,000 | —13 |
| 1915 | 2,394,644,000 | +13 |
| 1916 | 3,508,439,000 | +47 |
| 1917 | 4,992,496,000 | +42 |
| 1918 | 5,540,708,000 | +11 |
| 1919 | 4,595,770,000 | —17 |
| 1920 | 6,981,340,000 | +52 |
| 1921 | 4,138,500,000 | —41 |
| 1922 | 4,647,290,000 | +12 |
| 1923 | 5,998,800,000 | +29 |
| 1924 | 5,318,000,000 | —11 |
| Total | 85,523,059,000 | |

To this total metallic minerals contributed $29,636,510,000, non-metallic minerals $55,787,402,000 and unclassified minerals $99,147,000. Iowa occupied twenty-fourth place among the states of the Union in value of mineral produced in 1923.

## CEMENT

Sales of Portland cement manufactured in Iowa declined from a total value of $10,351,971 in 1923 to that of $8,811,587 in 1924, a drop of $1,540,384 or nearly 15 per cent. However, the 1924 output still exceeded in value those of 1921 and 1922 and even that of 1920, which latter, valued at $8,742,854, had been the peak production up to 1923, so that perhaps the figures for 1924 should be compared with those for the years immediately preceding 1923, rather than with the latter year. The following table will show the state of the industry during 1922 to 1924.

*Production of Cement in Iowa, 1922 to 1924*

| | 1922 | 1923 | 1924 |
|---|---|---|---|
| Production, bbls. | 4,272,432 | 5,732,470 | 5,624,466 |
| Stock, Dec. 31, bbls. | 790,447 | 952,242 | 1,695,093 |
| Shipments, bbls. | 4,475,074 | 5,570,675 | 4,881,613 |
| Shipments, value | $7,709,313 | $10,351,971 | $8,811,587 |
| Average factory price per bbl. | $1.72 | $1.86 | $1.81 |
| Consumption, bbls. | 3,242,436 | 3,624,857 | |
| Population, est. | 2,459,411 | 2,477,874 | |
| Consumption per capita, bbl. | 1.32 | 1.46 | |
| Surplus production | 1,228,638 | 1,945,818 | |
| Coal used during year, tons | | 589,117 | |
| Annual finished cement capacity of plants, bbls. | 5,650,000 | 6,875,000 | 6,685,000 |
| Daily clinker capacity, bbls. | | | 20,300 |

In the United States as a whole both production and shipments were larger in 1924 than in 1923 and the number of active factories increased from 126 in 1923 to 132 in 1924. The commercial district which includes eastern Missouri, Iowa, Minnesota and South Dakota produced in 1924, 14,851,000 barrels and shipped 13,982,000 barrels, valued at $19,224,000. Wisconsin and South Dakota each began production of cement in 1924. The following table giving statistics for 1924 may be compared with a similar table for 1923. Note that Iowa ranks eighth in production and ninth in shipments. Alabama came up from eleventh place in shipments in 1923 to a rank above Iowa in 1924.

*Portland cement in the United States, 1924*

| State | Plants | Production | Shipments | |
|---|---|---|---|---|
| | | bbls. | bbls. | value |
| Pennsylvania | 22 | 40,468,000 | 39,847,000 | $69,993,000 |
| California | 10 | 11,615,000 | 11,502,000 | 25,649,000 |
| Michigan | 15 | 9,162,000 | 8,993,000 | 16,367,000 |
| Missouri | 5 | 7,900,000 | 7,710,000 | 13,801,000 |
| New York | 9 | 7,547,000 | 7,450,000 | 13,708,000 |
| Illinois | 4 | 7,005,000 | 6,956,000 | 12,243,000 |
| Kansas | 7 | 5,894,000 | 5,817,000 | 10,122,000 |
| Alabama | 5 | 5,541,000 | 5,543,000 | 9,091,000 |
| Iowa | 5 | 5,624,466 | 4,881,613 | 8,811,587 |
| Texas | 5 | 4,566,000 | 4,488,000 | 8,482,000 |
| Ohio | 7 | 4,599,000 | 4,298,000 | 7,865,000 |
| Washington | 4 | 1,845,000 | 1,793,000 | 4,339,000 |
| Other states | 34 | 37,093,000 | 36,468,000 | 66,670,000 |
| | 132 | 137,460,238 | 145,747,000 | 267,319,000 |

## CLAY PRODUCTS.

The value of the clay wares produced in Iowa during 1924 fell $1,263,962 below the figure of $6,956,109 which represented the value of the production of 1923. This decrease affected nearly every branch of the industry and was the combined result of a diminution in output and lower prices per unit. The following table will give a summary of the industry in 1923 and 1924.

*Production of clay wares by classes in 1923 and 1924*

| Class | Plants | | Quantity | | Value | | Av. unit value | |
|---|---|---|---|---|---|---|---|---|
| | 1923 | 1924 | 1923 | 1924 | 1923 | 1924 | 1923 | 1924 |
| | | | *thous.* | *thous.* | | | | |
| Common brick | 52 | 51 | 72,558 | 62,070 | $ 921,853 | $ 737,898 | $12.71 | $11.88 |
| Vitrified brick | | 4 | 31,523 | 6,507 | 513,684 | 129,314 | | 19.87 |
| Face brick | 22 | 19 | 29,346 | 23,785 | 590,191 | 451,136 | 20.11 | 18.96 |
| | | | *tons* | *tons* | | | | |
| Hollow bld. tile (a) | 44 | 37 | 297,253 | 243,712 | 2,197,515 | 1,740,296 | 7.39 | 7.14 |
| Hollow bld. tile (b) | 8 | 16 | 26,073 | 53,412 | 195,006 | 446,246 | 7.48 | 8.35 |
| Drain tile | 54 | 54 | 173,678 | 147,499 | 1,508,836 | 1,266,586 | 8.69 | 8.58 |
| Sewer pipe | 5 | 5 | 54,828 | 52,998 | 805,676 | 793,840 | 15.79 | 14.98 |
| Other products (c) | | | | | | 154,379 | | |
| | 64 | 69 | | | | 5,692,147 | | |

(a) Includes partition, load-bearing, furring, book tile.
(b) Includes floor-arch, silo and corncrib tile; conduits; radial chimney blocks.
(c) Includes products not elsewhere specified, raw clay sold, pottery. Value of raw clay not included in state total.

A comparison of the figures given in this table with those for 1923 leads to the conclusion that there must have been a decided

slowing down in building operations and in other civic improvements wherein clay products are used, as well as in land improvement represented by drainage and similar work. Insofar as construction of extensive drainage systems is concerned this let-down may be a distinct benefit.

The production of clay wares by counties is shown in as much detail as possible in the table given below.

*Production of Clay Wares in Iowa in 1924*

| County | No. Producers | Common brick | | Hollow building tile or block | | Drain tile | | Other products (a) | Total value |
|---|---|---|---|---|---|---|---|---|---|
| | | *thous.* | *value* | *tons* | *value* | *tons* | *value* | *value* | |
| Allamakee (1), Appanoose (1), Audubon (2) | 4 | 1,526 | $ 17,103 | 2,642 | $ 15,742 | 1,607 | $ 9,663 | | $ 42,508 |
| Benton (1), Boone (1), Buena Vista (1), Cass (1), Cedar (1) | 5 | 2,829 | 35,550 | | (b) | 1,492 | 13,168 | $50,419(2)(3)(4) | 99,137 |
| Cerro Gordo | 3 | 3,130 | 46,022 | 144,181 | 1,100,189 | 40,805 | 328,028 | * | 1,487,179 |
| Dallas | 3 | 1,325 | 19,861 | 29,295 | 197,413 | 11,923 | 88,444 | *(2)(3) | 363,545 |
| Dubuque (1), Fayette (1), Floyd (1), Franklin (1) | 4 | 4,354 | 58,212 | 11,925 | 76,175 | 19,968 | 164,475 | 34,113(3) | 332,975 |
| Grundy (1), Guthrie (1), Hamilton (1), Hardin (2), Henry (2) | 7 | 289 | 3,776 | 1,531 | 14,221 | 16,590 | 191,195 | 56,911(3)(6)(7) | 266,103 |
| Howard (1), Jackson (1), Jasper (2) | 4 | | (b) | | (b) | 1,201 | 9,779 | 26,195(1)(4)(7) | 35,974 |
| Johnson (2), Jones (2) | 4 | 591 | 8,913 | | | 2,338 | 19,300 | | 27,213 |
| Keokuk(3), Mahaska(2) | 5 | 2,838 | 31,285 | | (b) | 8,222 | 72,076 | 188,137(3)(4)(6)(7) | 291,498 |
| Marion (1), Marshall (1), Poweshiek (2) | 4 | 342 | 3,051 | 3,270 | 20,684 | 2,597 | 18,433 | | 42,168 |
| Polk | 6 | | (b) | 24,057 | 164,025 | 6,289 | 65,390 | 594,760(1)(2)(3)(6)(7) | 824,175 |
| Story (2), Tama (3) | 5 | 1,193 | 16,846 | 2,023 | 8,553 | 1,339 | 8,618 | 15,945(3)(7) | 49,962 |
| Union (1), Wapello (1), Warren (1) | 3 | 6,081 | 65,683 | 32,404 | 209,531 | 7,177 | 48,226 | * | 341,299 |
| Washington (4), Woodbury (2), Wright (1) | 7 | 26,960 | 289,808 | 6,064 | 44,273 | 1,989 | 16,096 | * | 459,923 |
| Webster | 8 | 3,676 | 45,487 | 33,261 | 299,152 | 23,962 | 213,695 | 496,801(3)(6)(7) | 1,055,135 |
| Counties or groups of counties having less than three producers | | | | | | | | 198,705 | |
| Totals | 72 | 62,070 | $737,898 | 297,124 | $2,186,542 | 147,499 | $1,266,586 | $1,501,122 | $5,692,147 |

* Included with counties having less than three producers.

(a) Includes: (1) common brick from Howard, Johnson, Jasper and Polk counties; (2) vitrified brick, 6,507,000, valued at $129,314, from Boone, Dallas and Polk counties; (3) face brick, 23,785,000, value $451,136, including 1,580,000, valued at $32,873, from Webster county; (4) hollow building tile or block from Benton, Cass, Howard, Jasper, Jones, Keokuk and Mahaska counties; (6) sewer pipe, 52,998 tons, value $793,840, from Hamilton, Keokuk, Polk and Webster counties; (7) miscellaneous products, such as wall coping, flue lining, pottery, raw clay. The value of the latter is included in county totals but is excluded from state totals.

(b) Included in other products.

Production was reported from thirty-nine counties in the state. Cerro Gordo was the leading county, although this county has only three producers. Over a million dollars' worth of hollow building tile was made in this county, fully one-half the product of the entire state. It is interesting to note the change in the production of clay ware in Cerro Gordo county during the past ten years. The data for 1914 show that the output, valued at $1,555,944, was distributed—$39,976 for common brick, $990,993 for drain tile, and $525,035 for other products, including hollow tile and minor items. The total output of the county has not changed greatly but the emphasis has shifted decidedly. This shift is quite marked as regards the whole state. Until 1920 drain tile was much the most important item in the clay industry, but since that year it has declined steadily in value. On the other hand hollow building ware has been gaining in importance until its value exceeds that of drain tile although it has never been as high as was that of drain tile during its peak years.

The next county in importance is Webster, whose output is distributed chiefly among hollow ware, drain tile and, especially, sewer pipe, in which it is by far the leading county. Other important counties in order are Polk, Woodbury and Dallas.

Iowa ranks twenty-fourth in value of common brick, ninth in value of vitrified brick, seventeenth in value of face brick, third in value of hollow ware, second in value of drain tile, eighth in value of sewer pipe and tenth in value of unspecified products. All products exclusive of pottery made in the United States reached a total value of $299,583,393. This represented a decrease of 4.2 per cent as compared with 1923. Pottery products made in 1924 were valued at $118,014,985, an increase of 2.7 per cent over 1923.

## COAL

The production of coal from Iowa mines in 1924 reached a total tonnage of 5,468,450. This showed some decline from the output of 5,710,735 tons in 1923 but still was ahead of the output during 1922, which was only 4,335,161 tons, the smallest output, by the way, since 1896. The tonnages recovered during the present decade have failed for the most part to equal those of the two preceding decades, since Iowa's output first reached the five mil-

lion ton mark in 1899. A tabulation of the figures will help to show the stages through which the industry has passed during those years.

*Production of coal in Iowa, 1900 to 1924*

| Year | tons | value | year | tons | value |
|---|---|---|---|---|---|
| 1899 | 5,177,479 | $6,397,338 | 1912 | 7,289,529 | $13,152,088 |
| 1900 | 5,202,939 | 7,155,341 | 1913 | 7,525,936 | 13,496,710 |
| 1901 | 5,617,499 | 7,822,805 | 1914 | 7,451,022 | 13,364,070 |
| 1902 | 5,904,766 | 8,660,287 | 1915 | 7,614,143 | 13,577,608 |
| 1903 | 6,419,811 | 10,563,910 | 1916 | 7,260,800 | 13,530,383 |
| 1904 | 6,519,933 | 10,504,406 | 1917 | 8,965,830 | 21,096,408 |
| 1905 | 6,798,609 | 10,586,381 | 1918 | 8,192,195 | 24,703,237 |
| 1906 | 7,266,224 | 11,619,455 | 1919 | 5,624,692 | 17,352,620 |
| 1907 | 7,574,322 | 12,258,012 | 1920 | 7,813,916 | 30,793,847 |
| 1908 | 7,149,517 | 11,706,402 | 1921 | 4,531,392 | 17,256,800 |
| 1909 | 7,757,762 | 12,793,628 | 1922 | 4,335,161 | 16,119,000 |
| 1910 | 7,928,120 | 13,903,913 | 1923 | 5,710,735 | 20,517,000 |
| 1911 | 7,331,648 | 12,663,507 | 1924 | 5,468,450 | 18,097,000 |

The table shows not only the decline in recent years but also the fluctuation in production and the abrupt rise in unit value achieved during the war period and maintained to some extent ever since. A table giving the tonnage produced each year from 1840 to 1918 is given in the report of mineral production in volume XXVIII of these reports.

A table giving details of production in 1924 which follows shows that Monroe county maintained her usual lead, owing to the fact that the mines of the county though few in number, seventeen in 1924, are for the most part large and are prepared to produce large tonnages. Polk county, with twenty-three mines, came up to second place in both tonnage and value, a place which has been held for several years by Appanoose, which in 1924 took third rank, with seventy-one mines.

The thin Nodaway seam, which is utilized by nine mines in Adams, Page and Taylor counties, yielded in 1924, 40,097 tons, valued at $179,000. Iowa stood twelfth in tonnage in 1923 among

*Production of coal by counties in 1924*

| Counties | No. Producers | Loaded at mines for shipment | Sold to local trade and used by employees | Used at mine for steam and heat | Total | | Average value per ton | Number of Employees | | | Average number of days worked |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *tons* | *tons* | *tons* | *tons* | *value* | | Underground | Surface | Total | |
| Adams | 5 | ---------- | 7,799 | ---------- | 7,799 | $ 33,000 | $4.19 | 36 | 5 | 41 | 171 |
| Appanoose | 61 | 711,641 | 88,128 | 14,031 | 813,800 | 2,860,000 | 3.52 | 2,891 | 240 | 3,131 | 134 |
| Boone | 9 | 227,799 | 63,727 | 3,568 | 295,094 | 1,189,000 | 4.03 | 679 | 49 | 728 | 176 |
| Dallas | 5 | 516,011 | 14,534 | 4,306 | 534,851 | 1,772,000 | 3.31 | 868 | 87 | 955 | 196 |
| Greene | 3 | ---------- | 3,156 | ---------- | 3,156 | 16,000 | 5.07 | 18 | 3 | 21 | 114 |
| Davis(1) Jefferson(2) | 3 | ---------- | 3,433 | ---------- | 3,433 | 11,000 | 3.84, 3.15 | 15 | 3 | 18 | 100, 154 |
| Guthrie | 5 | ---------- | 5,148 | ---------- | 5,148 | 25,000 | 4.86 | 28 | 3 | 31 | 137 |
| Jasper | 9 | with "Local" | 102,956 | 6,682 | 109,638 | 377,000 | 3.44 | 192 | 34 | 226 | 154 |
| Keokuk | 6 | | 9,673 | 562 | 10,235 | 32,000 | 3.13 | 23 | 7 | 30 | 126 |
| Lucas | 4 | 618,073 | 2,538 | 20,161 | 640,772 | 1,886,000 | 2.94 | 653 | 73 | 726 | 189 |
| Mahaska | 30 | with "Local" | 56,937 | 513 | 57,450 | 175,000 | 3.05 | 177 | 35 | 212 | 105 |
| Marion | 21 | 767,102 | 744,150 | 24,389 | 835,641 | 2,525,000 | 3.02 | 1,145 | 114 | 1,259 | 195 |
| Monroe | 12 | 992,828 | 63,544 | 29,511 | 1,085,883 | 3,549,000 | 3.27 | 2,237 | 152 | 2,389 | 151 |
| Page(2), Taylor (2) | 4 | with "Local" | 32,298 | with "Local" | 32,298 | 146,000 | 4.41, 4.72 | 72 | 9 | 81 | 218, 200 |
| Polk | 19 | 400,538 | 478,612 | 13,932 | 893,082 | 3,028,000 | 3.39 | 1,614 | 174 | 1,788 | 176 |
| Story(1), Warren (2) Webster(1) | 4 | with "Local" | 28,096 | 3,800 | 31,896 | 97,000 | 4.12, 2.80, 4.03 | 99 | 15 | 114 | 240, 129, 200 |
| Van Buren | 6 | with "Local" | 8,645 | with "Local" | 8,645 | 27,000 | 3.12 | 23 | 5 | 28 | 142 |
| Wapello | 26 | with "Local" | 71,197 | 1,213 | 72,410 | 255,000 | 3.52 | 181 | 27 | 208 | 154 |
| Wayne | 4 | with "Local" | 27,219 | with "Local" | 27,219 | 94,000 | 3.44 | 108 | 9 | 117 | 128 |
| | 236 | 4,351,252 | 993,393 | 123,805 | 5,468,450 | 18,097,000 | 3.31 | 11,059 | 1,042 | 12,101 | 161 |

the coal producing states and eleventh in value. Estimates show that she held eleventh place in tonnage in 1924. The following figures give final data for 1923, including returns for wagon mines, and estimates for tonnage of 1924.

*Coal produced in the United States in 1923 and 1924*

| State | 1923 | | 1924 | |
|---|---|---|---|---|
| | tons | value | tons | value |
| Pennsylvania | 171,879,913 | $472,217,000 | 123,530,000 | |
| West Virginia | 107,899,941 | 285,481,000 | 110,000,000 | |
| Illinois | 79,310,075 | 198,388,000 | 67,880,000 | |
| Kentucky | 44,777,317 | 113,542,000 | 45,000,000 | |
| Ohio | 40,546,443 | 98,610,000 | 29,200,000 | |
| Indiana | 26,229,099 | 65,046,000 | 22,340,000 | |
| Alabama | 20,457,649 | 51,624,000 | 19,490,000 | |
| Virginia | 11,761,643 | 32,468,000 | 10,900,000 | |
| Colorado | 10,346,218 | 33,299,000 | 9,840,000 | |
| Wyoming | 7,575,031 | 20,916,000 | 6,850,000 | |
| Tennessee | 6,040,268 | 16,575,000 | 4,800,000 | |
| Iowa | 5,710,735 | 20,517,000 | 5,468,450 | 18,097,000 |
| Total bituminous | 564,156,917 | 1,513,327,000 | 483,280,000 | |
| Penn. anthracite | 93,339,009 | 506,786,768 | 90,214,000 | |
| Total U. S. | 657,495,926 | 2,020,114,000 | 573,494,000 | |

## GYPSUM

Production in the gypsum industry exceeded the high record made in 1923, thus setting a new mark in crude gypsum mined, in the amount sold crude, in the amount and value of plaster sold, in amount and value of wall and plaster board sold and in total amount and value of sales. Perhaps the most remarkable feature of this record is the fact that it was made while every other branch of the mineral industry in Iowa was experiencing a reverse. The table given below shows the details of the industry during the past two years.

*Production of gypsum in 1923 and 1924*

| | 1923 | | 1924 | |
|---|---|---|---|---|
| | tons | value | tons | value |
| Crude gypsum mined | 685,041 | | 727,385 | |
| Sold crude—to cement mills | 134,566 | $ 383,322 | 149,972 | $ 371,331 |
| agriculture and others | 329 | 1,961 | 1,236 | 8,098 |
| Total sold crude | 134,895 | 385,283 | 151,208 | 379,429 |
| Sold calcined—as stucco | 17,681 | 120,130 | 68,280 | 459,044 |
| as other wall plaster | 315,435 | 2,505,183 | 314,751 | 2,462,304 |
| as plaster of Paris, molding, casting plaster | 1,937 | 21,366 | 5,503 | 55,626 |
| as Keene's cement, dental plaster, plate glass works | 6,085 | 97,677 | 3,660 | 31,770 |
| as plaster board and wall board | 44,183 | 1,583,681 | 55,486 | 1,719,322 |
| as tile and block and for other purposes | 46,508 | 665,212 | 42,065 | 549,844 |
| Total sold calcined | 431,829 | 4,983,249 | 489,745 | 5,277,910 |
| Total sold | 566,724 | 5,368,532 | 640,953 | 5,657,339 |

Most of the plaster grouped under the head of Keenes cement, etc., is sold to plate glass works for bedding glass in molding. Likewise much the greater part of the plaster sold in board form is made into wall board, which is the finished form, ready for tinting or other details to make a complete wall. Most of the plaster used in making tile and block goes into partition tile, the value of which in 1924 was $339,000. The rest was roof tile and special forms. Nearly a hundred thousand dollars worth of plaster was sold for miscellaneous uses in 1924. The same plants were in operation during 1924 as during previous years. The Acme Cement Plaster Company of Centerville and the Hawkeye Gypsum Products Company of Fort Dodge are listed as "not yet in operation".

The amount of crude gypsum produced in the United States in 1924 was 5,042,629 tons and the value of crude and calcined gypsum sold was $42,724,507.

## STONE AND LIME

There was a slight decline in the production of limestone and lime in 1924, in both tonnage and value. The chief reduction was in the output of crushed stone for concrete and road work and in

the manufacture of lime, while some branches of the industry showed an increase. The total value of the output was $739,632 as compared with $775,134 in 1923, a decline of $35,502. As in previous years much the greater part of the stone quarried in Iowa is crushed for various uses, as detailed in the tables below. Less than fifty thousand tons is used as dimension stone while the remainder is used in smaller form. The distribution of stone among its various uses is shown in the summary given herewith.

*Tonnages of stone and lime produced in Iowa*

| Uses | 1922 | 1923 | 1924 |
|---|---|---|---|
| Building | 5,560 | 2,910 | 3,290 |
| Rubble and riprap | 117,950 | 44,560 | 46,530 |
| Concrete and road work | 417,550 | 449,760 | 434,460 |
| Agriculture | 59,720 | 50,810 | 57,520 |
| Sugar factories | 8,100 | 12,000 | 14,050 |
| Railroad ballast and flux | 11,830 | 43,510 | 49,640 |
| Lime, sandstone, other | 6,733 | 8,326 | 4,918 |
| | 627,443 | 611,876 | 610,408 |

Scott county continued to be the leader in production, with Dubuque as second and Black Hawk as third in rank. Hardin and Johnson, with one producer each, are among the important counties of the state, and Lee holds a place next to that of Black Hawk. The latter county produces over eighty thousand dollars' worth of stone annually while Lee's output is worth about sixty thousand dollars.

The following table gives in as much detail as possible the production of stone in 1924.

*Limestone and lime production in 1924*

| Counties | Producers | Building, rubble, riprap (a) | | Concrete, road metal | | Agriculture | | Other uses (b) | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *tons* | *value* | *tons* | *value* | *tons* | *value* | *tons* | *value* | *tons* | *value* |
| Allamakee(1), Black Hawk(2), Clayton(2) | 5 | 4,634 | $ 8,612 | 64,100 | $ 83,103 | 6,210 | $ 4,202 | ..... | ..... | 74,944 | $ 95,917 |
| Cerro Gordo(2), Mitchell(2), Pocahontas (1) | 5 | with "Other uses" | | 37,670 | 44,112 | with "Other uses" | | 14,550 | $24,289 | 52,220 | 68,401 |
| Clinton(1), Linn(1), Johnson(1), Jackson(1) | 4 | with "Other uses" | | 40,105 | 53,932 | 6,194 | 13,906 | 3,100 | 4,540 | 49,399 | 72,378 |
| Dubuque | 6 | 9,683 | 11,502 | 56,910 | 90,320 | with "Concrete" | | 4,164 | 20,436 | 70,757 | 122,258 |
| Jones | 3 | 15,308 | 16,944 | 5,831 | 5,897 | with "Concrete" | | ..... | ..... | 21,139 | 22,841 |
| Henry(1), Lee(3) | 4 | with "Other uses" | | 33,093 | 52,763 | 3,821 | 3,617 | 9,960 | 12,739 | 46,874 | 69,119 |
| Hardin(1), Madison(1), Marshall(1) | 3 | ..... | ..... | 65,844 | 71,922 | 15,211 | 9,717 | with "Concrete" | | 81,055 | 81,639 |
| Scott | 3 | 10,464 | 13,752 | 142,479 | 140,063 | with "Other uses" | | 61,074 | 53,264 | 214,017 | 207,079 |
| Totals | 33 | 49,820 | 63,938 | 434,460 | 533,500 | 57,520 | 43,169 | 68,608 | 99,025 | 610,408 | 739,632 |

(a) Includes: Building, 3,290 tons, value $8,281; rubble and riprap, 46,530 tons, value $55,657.
(b) Includes: R. R. ballast, 38940 tons, value $33,415; flux, 10,700 tons, value $12,480; sugar factories, 14,050 tons, value $23,589; lime and miscellaneous, 4,918 tons, value $29,541.

Lime was burned at Dubuque and at Hurstville, near Maquoketa, as in former years. The value of the product is included in the figures for Dubuque and Jackson counties.

## SAND AND GRAVEL

The production of sand and gravel suffered a rather serious decline in 1924 as compared with conditions in the previous year. This condition prevailed in every branch of the industry, in both sand and gravel production. It was in marked contrast with the rise in production which had occurred in 1923, a rise which brought the value from $1,752,233 in 1922 to $2,181,881 in 1923. The decline to $1,473,066 in 1924 doubtless is to be attributed to a falling off in building and road improvement. The table given herewith shows some phases of the industry not set forth in the table of production by counties.

*Summary of sand and gravel production*

| Kind of material | 1923 | | 1924 | |
|---|---|---|---|---|
| | tons | value | tons | value |
| Sand: | | | | |
| Molding | 35,654 | $ 40,238 | 22,397 | $ 24,209 |
| Building | 1,004,261 | 512,413 | 653,031 | 317,068 |
| Paving | 670,181 | 310,750 | 575,835 | 234,966 |
| Cutting and grinding | 17,225 | 36,288 | with | filter sand |
| Engine | 61,680 | 37,627 | 47,607 | 24,661 |
| Filter | 11,968 | 7,505 | 15,681 | 32,922 |
| Other | 31,364 | 20,435 | 10,879 | 3,954 |
| Total sand | 1,832,333 | 965,276 | 1,325,430 | 637,780 |
| Gravel: | | | | |
| Building | 343,078 | 331,045 | 311,558 | 289,584 |
| Paving | 837,558 | 634,020 | 563,776 | 483,003 |
| Railroad | 584,191 | 251,540 | 226,862 | 62,699 |
| Total gravel | 1,764,827 | 1,216,605 | 1,102,196 | 835,286 |
| Total production | 3,597,160 | 2,181,881 | 2,427,626 | 1,473,066 |

Sand and gravel were produced in forty-three counties in 1924, and the leading counties in order of value were Polk, Muscatine, Cerro Gordo, Cherokee, Sac, Linn, Hardin, Boone, Black Hawk and Wapello. As several of these counties had less than three producers each their production can not be revealed in detail. These ten counties, however, produced in 1924 material valued at

$1,141,900, much the largest part of the state's output. It may be noted that several of these counties—namely Cerro Gordo, Cherokee, Polk, Sac, Hardin and Boone — are in the central part of the state, in the area covered by what is known as the Wisconsin glacial drift. This drift sheet contains great amounts of sand and gravel, both incorporated in the body of the drift and as masses of nearly clean sand or gravel. These latter are all ready for the shovel of the excavator, as in Cherokee, Cerro Gordo and Sac counties, and the former yields its store to the streams, from which it may be readily dredged, as is the case in Polk county. The other important counties are located on large streams—the Mississippi, the Cedar and the Des Moines—which have gathered their stores from the glacial drift across which they flow.

The following table shows the production in 1924 by counties and a summary of production in 1923.

*Production of sand and gravel in 1924*

| County | Operators | Building sand | | Paving sand | | Other sand (a) | | Gravel | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | *tons* | *value* | *tons* | value | *tons* | *value* | *tons* | *value* | *tons* | *value* |
| Black Hawk(2), Bremer(1), Fayette(1) | 4 | 28,979 | $ 15,221 | 40,000 | $ 20,000 | (3) with | "Paving" | 26,600 | $ 25,400 | 95,579 | 60,621 |
| Boone(2), Story(2) | 4 | 15,419 | 8,017 | with | "Building" | ..... | ..... | 68,846 | 41,222 | 84,299 | 49,256 |
| Butler(2), Franklin(1), Wright(2) | 5 | 1,640 | 840 | ..... | ..... | ..... | ..... | 37,259 | 10,496 | 38,899 | 11,336 |
| Cerro Gordo(2), Emmet(1), Kossuth(1) | 4 | 47,072 | 25,243 | 15,000 | 8,000 | (3) with | "Paving" | 57,786 | 87,250 | 119,858 | 120,493 |
| Cherokee(4), Clay(1) | 5 | 43,381 | 15,238 | 28,415 | 9,126 | ..... | ..... | 102,232 | 62,268 | 174,028 | 86,632 |
| Clayton (2) Winneshiek(3) | 5 | 4,272 | 8,200 | ..... | ..... | 20,364 | 20,364(1) | 424 | 163 | 25,060 | 28,727 |
| Clinton(3), Lee(1), Scott(3) | 7 | 85,610 | 35,646 | with | "Building" | ..... | ..... | 35,951 | 28,236 | 121,561 | 63,882 |
| Dickinson(1), Osceola(2), O'Brien(2) | 5 | 2,163 | 1,767 | ..... | ..... | (3) with | "Building" | 10,080 | 1,521 | 12,243 | 3,288 |
| Dubuque(2), Jackson(2), Jones(1) | 5 | 27,056 | 7,115 | 16,527 | 6,179 | (3) with | "Paving" | 57,170 | 32,715 | 100,753 | 46,009 |
| Fremont(1), Humboldt(1), Webster(2) | 4 | 50,440 | 21,437 | 17,913 | 9,115 | (5) with | "Paving" | 20,773 | 25,844 | 89,126 | 56,396 |
| Hardin(3), Marshall(1) | 4 | with | "Paving" | 20,594 | 7,067 | (5) with | "Paving" | 88,107 | 42,494 | 108,691 | 49,561 |
| Ida(1), Sac(3), | 4 | 22,168 | 10,730 | with | "Building" | ..... | ..... | 86,764 | 48,953 | 108,952 | 59,683 |
| Johnson(2), Linn(5) | 7 | 57,606 | 33,470 | 54,255 | 28,873 | ..... | ..... | 4,631 | 3,340 | 114,492 | 65,683 |
| Lyon(2), Sioux(6) | 8 | 25,283 | 14,050 | 12,692 | 5,069 | ..... | ..... | 15,039 | 6,221 | 53,014 | 25,340 |
| Mahaska (1), Marion(1), Wapello(2) | 4 | 38,724 | 16,533 | 66,516 | 29,021 | (1)(5) with | "Paving" | 18,037 | 21,364 | 123,277 | 66,918 |
| Muscatine | 5 | 53,006 | 32,418 | 90,382 | 18,406 | 32,889 | 47,553(2)(3)(4)(5) | 162,476 | 141,026 | 338,753 | 239,403 |
| Palo Alto(1), Plymouth(2), Woodbury(1) | 4 | 29,056 | 11,726 | ..... | ..... | (5) with | "Building" | 105,565 | 20,913 | 134,821 | 32,639 |
| Polk | 11 | 138,846 | 66,533 | 226,187 | 99,182 | 14,896 | 5,620(3) | 204,481 | 235,567 | 584,410 | 406,902 |
| Totals | 95 | 653,031 | 317,068 | 575,835 | 234,966 | 96,564 | 85,746(a) | 1,102,196 | 835,286 | 2,427,626 | 1,473,066 |
| Totals for 1923 | | 1,004,261 | $512,413 | 670,181 | $310,750 | 157,891 | $142,113 | 1,764,827 | $1,216,605 | 3,597,160 | $2,181,881 |

(a) Includes: (1) molding sand, 22,397 tons, value $24,209; (2), (4) grinding sand, filter sand, 15,681 tons, value $32,922; (3) engine sand, 47,607 tons, value $24,661; (5) other sands, 10,879 tons, value $3,954.

### NATURAL GAS

The output of natural gas continued in 1924 in a small way, as in previous years. The amount consumed amounted to about 575,000 cubic feet, with a value at points of consumption of $300. The producing wells are located near Herndon in Guthrie county and near Letts in Louisa county.

Some wells were being drilled for oil but no commercial quantities had been found during the year.

### MINERAL WATERS

Owing to lack of funds the collection of data regarding use of mineral waters has been discontinued.