

**Fort Smith Glass Plant to Add \$25,000 in Equipment.**

Special to the Gazette.  
Fort Smith, April 16.—New equipment and repairs amounting to more than \$25,000 will be added to the Harding Glass Company's plant here within the next three months, it is announced by C. H. Harding president. The plant was closed yesterday and plans call for a reopening in July.

Two more machines for drawing glass will be added to the four units now in operation increasing the capacity of the plant approximately 50 per cent. Last year, machinery was installed at a cost of \$300,000 increasing the plant capacity about 60 per cent. A crew of 150 men has been kept at work on the plant through the winter and many of them will be used on the repair and installment crews.

# Millions in Potential Vast Stretch of "Rocks" Fr Awaiting Call of Capital Glass Not Only Outlet for Products of Arkansas' Possessions of Sand

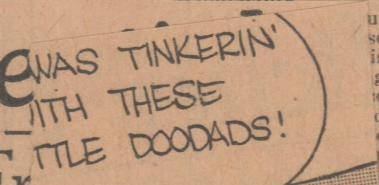
By WILLIAM JOHNSON.  
In counting up the natural riches of Arkansas we have been overlooking an item that deserves high rank. It is the huge sandstone deposits that extend across much of the northern part of the state, occurring in great sheets and bluffs from Lawrence and Randolph counties on the east to Benton and Washington counties on the west. Agriculturally these rolling uplands with their picturesque variety of ledges, turrets and towers, called "hoodoo rocks," aren't the best part of Arkansas soil. In fact some spots grade so poor that it is said the corn tassels out at two feet high because the land is too weak to hold the tassels back. However in fairness it should be added that others charge this defect to the great strength of the land, explaining that it shoves the tassels up through the stalks before they can make their normal growth.

Anyhow, Arkansas with its wealth of fertile farm lands, can spare some of that sand region for other uses, and there are plenty to which it may be put. You have only to take a scientific and imaginative view of those white or tawny steeps and undulations to see in them enormous possibilities of industrial production. For that far reach of sand is not merely misplaced material for bathing beaches, but is potential glass, needing only the magic touch of fire and chemistry and manufacturing skill to transform it into the host of necessities and luxuries that glass is now made to yield. Windows to light countless homes, tumblers and pitchers to shed their mellow gleam on innumerable tables, bottles and cans and carboys for druggists, canners and beverage-makers, retorts and lenses of telescopes and microscopes for scientists, eyeglasses for failing vision and mirrors for human pride—all these and myriad other conveniences and necessities are contained in that Arkansas sand, waiting the call of industry to come forth and add millions of dollars annually to the wealth of the state.

This opportunity seemed to George C. Branner, state geologist, to be knocking at Arkansas industrial door with both hands. Accordingly he has had a study made of that sand area, by Dr. Albert W. Giles, professor of geology at the University of Arkansas. The results will be published shortly in a bulletin, a bulletin quite lucidly and helpfully different from the usual type of such documents, in that the whole subject is to be rounded up in a discussion of just what the region offers manufacturers and how and where they can best capitalize the prospects. Beginning with the technical matters of chemical analysis, screen tests, angularity, absorption and other such essential points to the glassmaker, Mr. Branner has gone on to investigate the industrial requirements and costs of glass production and the market possibilities for Arkansas plants and for this purpose has engaged the services of E. E. Bonevits, Little Rock engineer. If the bulletin leaves out anything of vital importance it will have to be something that has bobbed up since the survey was made.

An arresting feature of this study is the advantages it reveals for glass-making in Arkansas—advantages over other states in which the industry has developed far. Summing up these aids and nourishments the report will point out, the practically inexhaustible supply of high grade sand. In places the deposits are 200 feet thick, and in composition, in purity, in the size and shape of the grains, they rank right up with most of the glass sands being used in other states. With this fair start, Arkansas plants would have the business edge on a good many competitors by reason of being nearer to other raw materials needed, to power, fuel and a large consuming population, and thus having lower freight rates.

Three Types of Sand. There are three types of sand in the northern Arkansas district, St. Peter, Calico Rock and Kings River. The names seem to be more important



There is a plant in St. Louis that manufactures most of these lines, but the production cost in Arkansas would be so much less that it could sell in St. Louis as cheaply as the plant there sells. It could also compete with a plant in Okmulgee, Okla., and sell southward to Shreveport. The disadvantage of such an Arkansas plant would be the small consumption in its territory compared to that in Illinois, Indiana or Ohio.

A good deal of glass sand is now mined in Arkansas and shipped elsewhere to be manufactured. It has given such good results that St. Peter sand is known widely as a high grade article for the glassmaker's use. Yet for all of that and the other favoring factors discussed above, Arkansas has only two glass plants, and in value of glass production is placed by an authoritative statistician below 12 other states, being grouped with all the remaining states which had a total glass output in 1925 valued at only \$9,716,674. In contrast, Pennsylvania alone had a glass production for the same year of \$80,479,752, while Ohio's output was valued at \$35,240,877, and Indiana's at \$30,106,652. The first two of these are, of course, manufacturing states with long training in industry, much capital and skilled labor for it—an industrial-minded population. Arkansas probably could not hope to hop into glass production and equal their performance very quickly. But it is difficult to see why Arkansas could not soon be doing as well as Indiana, which was almost wholly an agricultural state just a short time back. That would add a nice sum to Arkansas income, a wholesome bit of balancing to our agricultural production—helping on the urban growth which supplies the markets that agriculture needs in order to prosper its best and buy full measure of city goods.

**Glass Not Only Outlet.**

But glass is not the only outlet for Arkansas' rich possessions of sand. There are scores of other uses. In structural work sand has a large place. It is used in cement, in bricks, in plaster and mortar, and in laying asphalt. Large quantities are required by industries which employ heat at high temperatures, as for molding, annealing, lining furnaces and the like. Sand is also much used as an abrasive, for grinding, boring, cleaning the exteriors of buildings, and in the manufacture of tooth pastes, scouring soaps and metal polishes. Various chemical arts call for a good deal of sand, as in making water glass, silicon alloys and various chemical compounds. Pottery manufacture takes quite a lot of sand, and it enters into the making of crucibles and retorts. Sand is used as a filler in fertilizer, paper, rubber, soap, linoleum and certain paints. And for all these and numerous other purposes Arkansas sand is in every way a suitable product.

At present only one plant in the state is actively mining and marketing the vast deposits of St. Peter sandstone. That plant is the Silica Products Company, Inc., at Guion, in southern Izard County on White River. The product is shipped for the most part to glass-makers.

The most favorable area for development at present appears to be on the north side of the White River on the Missouri Pacific Railroad. The proximity of the railroad to the sandstone bluffs which overlook both the river and the railroad, permits a gravity haul from the mine to the cars. The Silica Products Company has a large operation at Guion and holds extensive leases along White river. The sandstone there is 100 to 150 feet thick, with almost continuous outcrop on the railroad and up the sides of the valleys of Rocky Bayou, Hidden Creek, Lyon's Creek and Twin Creeks.

Though the Silica Company's mine has been in operation for a number of years and has marketed a large output, the resources of sand are essentially untouched and undeveloped. (Con. on Page 3, Magazine Section.)

They represent an almost inexhaustible wealth for the future. The sand is fully equal to the St. Peter sand of Missouri and Illinois, which has been so long exploited and sold annually to the amount of an enormous tonnage.

**An Early Geologic Times.**

It is fascinating to hear. Dr. Giles discuss the formation of those sand deposits away back in early Ordovician times. That must have been a tumultuous period. Repeatedly the ocean broke through into this interior region of the United States, laying down sandy beaches. Rivers added to the beaches with sand brought from the mountains and hills. More sand was blown in by prevailing westerly winds—you can still see the winds at that playful sport any spring time in Kansas. Often the air will be gray with flying sand. Thus through long centuries the wearing elements built up those great sheets and rises of sandstone in the northern Arkansas counties, to provide the people of an indefinite future with glasses, mirrors, stained windows, microscopes, baking dishes, light globes and countless other needs and refinements of living. Truly this is a wonderful world, and anyone who has let himself be filled with skepticism about it should stroll up to the State Capitol building and let Mr. Branner unfold for him some of the romances of Arkansas said. But that will all appear in the bulletin which he will have ready soon.

The development of the glass industry is another romance to pair with the formation of the sand it uses. Like so many far-reaching affairs, glass manufacture took its rise from the feminine desire for adornment. Beads were the first article of glass manufacture, having been made in the remotest times, first from obsidian, a kind of volcanic glass, and then from true glass as we know it now. The

Egyptians learned how to make and work glass more than 4,000 years ago, and some of the articles they contrived from it were exquisitely wrought—though not quite at that early time.

Glass has been one of the most useful aids to the advance of industry, art and science. All three depend on it for a thousand utilities which have been suggested in previous paragraphs. Nor should we forget the historical significance of glass. Very largely the country we now enjoy was traded out of the Indians for glass beads—and so, to a considerable extent, is a debt in turn to the feminine pride which led to bead manufacture. In Venice 300 years ago, bead making for the ladies and for bartering with the Indians, was an outstanding industry. Over 500 kinds were made by 20 manufacturers.

Glass making has been elaborated into a wide field of utility since then, and in all probability will continue to expand. It figures heavily in the production of luxuries, and with the country's growing wealth luxuries will have a wider and wider market. Very clearly Providence intended that Arkansas should play an important part in supplying that demand. It gave us everything needed except the actual manufacturing plants, and surely Arkansas enterprise must soon provide them.

# Fine Glass Sand Is Shipped From Guion

By TOM SHIRAS.

Passengers who glance out of Missouri Pacific train windows at Guion may notice an oval-shaped white mountain with numerous black openings, which give it the appearance of an Eskimo igloo. The average passenger naturally sees no connection between that mountain and the window pane through which he looks.

Yet, the chances are that if the window pane was made in any of the Southern factories, the glass sand from which it was manufactured came from one of those black openings in the oval mountain.

The mountain is made up of glass sand, which is utilized by most of the plants in the South in the manufacture of sheet and other kinds of glass. When business conditions are normal, thousands of tons are shipped monthly, and the industry supplies the principal payroll of Guion.

To the average man sand is just sand, but to the persons who know sand, there are as many or more different kinds as there are base metals. Glass can be made from any kind of sand, but it takes good sand to make good glass, and glass makers are as fussy about their sand as good housewives are about their favorite flour and baking powder.

Some of them demand a very fine sand because it melts quicker in the tank, while others want a coarser grain claiming that it leaves fewer imperfections in the glass, which causes less waste. The Silica Products Company which operates the quarries or mines and reduction plant here gives it to them any way they want it.

Glass is made from sand, ground limestone and soda ash, the sand consisting of 90 per cent of the mix. Sand for glass making has to run high in silica values, with no or few impurities, and uniform in quality. This is the reason that sand for glass making, or by far the largest part of it, is crushed from sandstone, rather than taken from sandbars in the river or deposits of loose sand found in the valleys or uplands. Each rain or rise in the river carries impurities into loose sand deposits, and the analysis is never the same.

Glass sand produced at Guion runs something over 99 per cent pure silica with few impurities and is especially adapted to sheet glass manufacture. The sand used in the manufacture of fine cut glass and other expensive glass-

ware is derived from quartz. The quartz is pulverized into a flour before it goes into the reduction tank. The difference between the quartz which goes into this high-class stuff and ordinary glass sand is that it is more highly crystallized and harder.

Sand, in the minds of most people, is associated with a sandbar or a pile of loose sand. The preparation of sand for glass making, however, is a very intricate process requiring both quarrying and milling processes.

The quarry at Guion was opened shortly after the Missouri Pacific railroad constructed the White River Division, and it changed hands numerous times before the present concern got hold of it and worked out successful methods of handling it. For many years the sandstone deposit was worked as an open quarry and hundreds of thousands of tons were quarried. By prospecting it was found that better sand could be obtained at greater depths in the mountain, and mining methods rather than quarry methods were applied to get it out. Immense tunnels were started into the face of the mountain, and some of these are now in as far as a quarter of a mile. The sandstone is shot down from large faces, as ore is mined.

The chunk sandstone is taken from the mines in cars to the mill. It first passes through a big jaw crusher, then through heavy iron rolls, which reduces it to a coarse flour. From the rolls it goes through screens and is sized to the size grains the customer demands. After this operation it passes into a huge rotary drier which removes all the moisture, and then it is ready for shipment.

The troubles of the producer are not over yet. Sand flows like water, and the boxcars in which it is shipped have to be made tight before it is loaded. This gives a market to another Arkansas product; as the cars have to be lined with paper as far up on the sides and ends as the sand reaches when the car is loaded. Big losses in shipment have been made by improper lining. Three or four small holes will let several tons escape from the car, especially on a long haul, and some of the sand from Guion goes as far as Monterey, Mexico.

Everyone tries to keep sand out of his eyes, but it can't be done, unless the American people go back to greased paper for window glass, for every time you look through a window pane, you get an eyeful of high-grade sand.

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SILICA SAND IN  
NORTH ARKANSAS

Inexhaustible Supply Available for Making Glass and Other Purposes.

Arkansas has in the northern part of the state an almost inexhaustible supply of high grade silica sand, used for making glass and for many other purposes which should furnish a constant source of income for many generations, it is said in a new publication to be issued soon by the Arkansas Geological Survey.

The new book, "St. Peter and Older Ordovician Sandstones of Northern Arkansas" was written by Albert W. Giles, professor of the Geological Department at the University of Arkansas, following a survey begun in 1927. He was assisted in the study of the region by Bryan Parks and Eugene Brewster.

In addition to the technical study of the sandstones, written by E. E. Bonewits.

In a letter of transmittal to the governor, G. C. Branner, state geologist, said in part:

750 Square Miles in Area.

"It has long been known that there are in northern Arkansas widespread deposits of relatively soft silica sandstones of high purity. These deposits are exposed over an area of approximately 750 square miles and have a maximum thickness of about 200 feet. Up to the present time information concerning their distribution, geology, physical and chemical characteristics and their economic possibilities has been more or less incomplete. Both in Missouri and Illinois, their quarrying constitutes an industry of some magnitude and especially for this reason it was believed advisable to make a detailed report on the geology and economic possibilities of these sandstones in Arkansas.

"Dr. Giles undertook the study of these sandstones in the summer of 1927 with the assistance of Bryan Parks and Eugene Brewster. His work constitutes a valuable contribution to the knowledge of these formations in northern Arkansas, particularly the St. Peter sandstone, which has a wide distribution in Missouri, Illinois, Wisconsin, Minnesota and Iowa. The mapping of a new member of the Everton formation which Dr. Giles has named the Calico Rock sandstone, is important economically and is an addition to the knowledge of the stratigraphy of the north Arkansas region. From a more general geologic standpoint, this report is a contribution to the knowledge of the Ordovician sandstones of central United States."

In an introductory abstract, Dr. Giles said:

Are Similar Chemically.

"Chemically the three sandstones Kings River, Calico Rock and St. Peter, are remarkably similar and significantly high in silica. Lime and magnesia are either absent or are present in scarcely more than traces.

"The purity, high silica content, cleanness, toughness, and durability of the St. Peter, Calico Rock, and Kings River sands recommend them for utilization in the manufacture of high grade glass products, for metallurgical and chemical uses and for uses where high temperatures are encountered, particularly for steel molding purposes, for facing and annealing and for furnace lining. Their toughness, degree of angularity, and durability make the sands very satisfactory for friction and abrasive purposes. The average effective size and uniformity coefficient bring the Arkansas sands well within the range of sands successfully employed for filtration purposes. The sands can also be successfully used in paving and construction where a high grade, fine-textured sand is desirable. And, finally, the sands are adapted to the many minor uses where high silica, clean and durable sands are employed.

"As a resource the Kings River and Calico Rock sandstones are untouched, and the St. Peter is being actively exploited in only one locality. Each of the sandstones over large areas possesses a thickness that is commercially inviting, but, unfortunately, transportation facilities are unavailable in large parts of the region. There are, however a number of localities near or on railroads, where the sandstones are thick and extensively developed, that are recommended with a view to exploitation. It is apparent that Arkansas has an almost inexhaustible resource of high grade sand the exploitation of which should furnish a constant source of income for generations to come."

Arkansas Sand Deposits

By H. U. KELLEY.

The sand used most extensively in the United States for glass-making comes from two principal sources. One deposit, known as the Oriskany sand is found in Eastern states and the other, called the St. Peter sandstone, is in the Mississippi river valley. Both sands are almost pure silica. The chief difference between the two seems to be in the shape of their grains. The grains of the Oriskany sand are angular, more like the grains of sugar, while the grains of the St. Peter sand have been worn by wind and water until they are almost round.

This sand is found as a rock, sometimes forming a massive cliff which raises its head many feet above the valley floor. At another place it may occur in a solid formation a few feet below the surface of the earth.

This sand rock is soft and easily broken. A stream of water will break the softest formations into its natural grains. Other formations are broken into small pieces by blasting and these pieces are run through a machine which crushes them.

After it is broken up into its natural grains the sand is run over screens, which remove all the dust and impurities. After it passes through another machine to be dried it is ready for shipment to the glass factories.

Glass-making is an old art, so old that its origin is uncertain. Improvements in the methods of manufacture have been slow. It is only in recent years that machines have been used successfully to replace hand labor.

The process before the era of the machine was for workmen, called "blowers," equipped with short lengths of pipe, to dip one end of the pipe into the molten glass in the same manner that one dips a bubble pipe into strong suds. The pipe was placed to the mouth of the workman and he began to blow a bubble of glass. This glass is very tough; in a way it resembles wax.

Originally our window panes were blown in the form of large cylinders. These cylinders were heated until they became soft, then cut open and flattened out so they could be cut into desired sizes.

The high grade plate glass in show windows, expensive cabinets and windshields, still is made by what may be termed a hand process.

The purest sand makes the best glass. Optical glass used in spectacles, field glasses, telescopes and microscopes, is made in a manner similar to plate glass and only the purest materials are used. In bottles, fruit jars, and similar articles, coloring matter may be added, or the presence in the sand of some impurity, such as iron, may give color to the glass.

Within the past few years, machines have come into use which "draw" window glass in flat sheets. Bottles and fruit jars are blown by compressed air. This process is many times faster than the old hand method, consequently the small factory which could not obtain machines was forced to close.

The northern half of Arkansas is fortunate in having the most southerly outcrop of St. Peter sandstone. These deposits, of which there are many, do not run so uniform in grain size as the Ottawa (Ill.) or the Klondike (Mo.) sands, but improvements in separation should permit the economical handling of this material. Practically all of it is of sufficient purity for any kind of glass-making, foundry purposes, or reducing to silica flour.

Arkansas has failed to develop these deposits as she should. She has the gas for the glass factories but has never had any large factories. Just over the line in Louisiana is one of the largest if not the largest glass factory in the Southwest.

"Old Man River" Gives Up His Treasures

Gazette 4-11-37



Pictured are the steam tow boat and dredge boat of the Big Rock Stone and Material Company, equipped with a complete washing and grading plant for the production of quality sand. For each 10 tons of sand secured it is necessary to pump 100 tons of water. Mud and other objectionable matter is discharged into the river when it comes from the washing and grading plant, while the clean, graded sand goes into a steel barge.

"Old Man River" deposits sand in his sand banks . . . but when man wants to "draw it out" he must go to the river bed for it.

Preparation of clean, fine sand for building and construction work is an interesting and elaborate procedure, contrary to the general belief of the layman.

The modern equipment used for removing sand from the bed of the Arkansas river and the further complicated processes for refining and grading the sand are of sufficient interest to attract many curious sight-seers to the banks of the Arkansas river frequently to watch the Big Rock Stone and Material Company crew at work.

The river equipment includes a

steam tow boat, a pump or dredge boat equipped with washing and grading plant, and several steel barges for transporting the sand to unloading points. The average depth of the river bed from which sand is taken is twenty feet; however, constantly changing river conditions make special equipment, necessary and it often is necessary to cover large areas in locating suitable deposits.

Contrary to the opinion of most persons, sand is not just "sand". There are many grades and sizes, and many manufacturing processes must be resorted to in the production of a quality product. On the average, it is necessary to pump one

hundred tons of water for each ten tons of sand secured.

The presence of dirt and quicksand in building sand is very objectionable, making almost impossible the production of a mortar that can be relied upon for strength and waterproofing qualities essential for first class work. Furthermore, when sand with dirt in it is used for plastering, sweating walls cause the dirt to bleed through and ruin wall decorations. It is for these and other reasons that the Big Rock Stone and Material Company has made a large investment in equipment that guarantees the production of highest quality, carefully graded sand for every purpose.

Malvern Sand and Gravel Company, a Delaware corporation, filed notice of entry into the state, listing assets and liabilities at \$10,500. John L. Sullivan of Little Rock was named agent. Arkansas offices of the company will be at Malvern, where approximately \$1,000 will be invested. Gazette 6-9-37