

# Bubble Force Makes Billions

Fortunes Extracted Daily From Froth by Treatment of Low-Grade Ores.

## GREAT SAVING OF COPPER

Knowledge of Colloid and Organic Chemistry Necessary for the Flotation Millman—Skillful Work for a Profit.

New York.—Billions are being added to the world's wealth by the forces at work in the soap bubble. The flotation method of mineral separation, by which every day in the year fortunes are literally extracted from froth, is now exercising so powerful an influence on mining operations in this and other countries that, according to Columbia university authorities, the future of copper production, and therefore of the electrical industry, largely hinges on bubbles.

The process of ore concentration has always been considered important in mining engineering schools and the flotation process is a leading factor in laboratory practice at Columbia, where the ore dressing laboratory is now undergoing considerable expansion.

According to both Dean George B. Pagram of the Columbia School of Mines, Engineering and Chemistry, and Arthur F. Taggart, professor of ore dressing, the advent of flotation has worked a revolution in mining methods.

"The word 'bubble' used in connection with mining properties formerly referred to a kind of financial management which could hardly be tolerated in these dry and sober days, but in the last few years bubbles have taken on a new and more important significance for the larger part of the mining industry," said Dean Pagram. "The most important problem of the mining engineers is usually how to concentrate the mineral in low-grade ore to such an extent that the working of the ore will be profitable. A process has been developed which applies particularly to all sulphide ores, and these include most of the copper, zinc and lead ores, in which the ores may be beautifully concentrated by the action of fine bubbles of air attaching themselves to the particles of mineral, finely ground and mixed with water.

**Separate Sand and Froth.**  
"The bubbles with the sulphide mineral then rise to the top as a thick froth, while the sand and other worthless material sink to the bottom of the vessel. This flotation process has not only made much more profitable the working of the better grade of copper, zinc and lead ore, but has also made very profitable the working of ores which previously could not have been handled without actual loss.

"The whole secret of the bubbles of air gathering up the mineral particles and leaving the sand depends upon treating the finely crushed ore in water with one of various chemical substances, among them oleic acid and pine oil. Only a very small amount of the oil is necessary, less than 1 per cent by weight of the amount of mineral that is in the ore.

"After the proper reagent has been added to the water and the finely crushed ore, air is introduced into it either by heating it in with a stirrer or by forcing it in through fine pores in the bottom of the vessel, or any way in which to bring fine bubbles of the air into intimate contact with the fine particles of the ore. The separation is marvelously complete, the mineral going to the top in bubbles, forming a thick froth, which is collected by suitable arrangements, while the sand and other gangue material settles quite clean of any valuable mineral to the bottom of the vessel.

"Of course the process is made to run continuously, and in some mills as much as 4,000 tons of mineral in froth is separated each day. Altogether in 1918 there were 60,000,000 tons of ore treated by the flotation process.

"It may truly be said that the future

of copper production, and therefore of the electrical industry, is very largely dependent on the same forces that are at work in the soap bubble."

Professor Taggart declared that the demand for specialists in ore dressing with expert knowledge of the design and operation of the bewildering array of machinery now employed has become so insistent that school curricula must be altered to offer the necessary preparatory courses.

"Ore dressing is an indispensable link between mining and metallurgy in present-day practice in the extraction of metals from the earth," said Professor Taggart. "It consists in non-chemical concentration of the valuable part of an ore into a bulk much smaller than that of the original ore, and at the same time rejection as waste of the worthless portion.

"Until about fifteen years ago most mills were small as compared with present-day standards and the ores were relatively high grade. The ore treatment problem was a simple one, and as a result the technical as well as the executive direction of the ore dressing plant could be and was incidental to the direction with which the concentrator was built.

"The services of a specialist in concentration were considered unnecessary. With the development of the large, low-grade, disseminated copper deposits, the importance of ore dressing took a sudden jump. These deposits contain only from twenty to forty pounds of copper per ton of ore. The ore bodies as originally discovered contained from 20,000,000 to 100,000,000 tons each of such ore. For economical working of such deposits elaborate concentrating plants, capable of handling from 5,000 to 40,000 tons of ore per day were necessary.

**Skillful Work for Profit.**  
"These plants required the most skillful direction possible if a profit was to be made from their operation, and a demand for specialists in concentration immediately arose. Within the last seven years the successful application of processes of froth flotation to the treatment of these low-grade ores has resulted in the saving of four to six pounds more copper per ton than was formerly possible.

"The advent of flotation called for a mill man of much broader scientific education than the old concentration processes required. A flotation mill man needs a working knowledge of the newest branch of physical chemistry, viz., colloid chemistry, and should also have some acquaintance with organic chemistry. Coincident with the advent of flotation in milling there has been a revolution in the methods of grinding ores preparatory to concentration. In the old concentration processes it was impossible to treat very finely ground ore economically.

"Hence all grinding was done with the end in view of producing as little slime as possible. Flotation, however, works best on finely pulverized ore. Hence it was necessary, on the introduction of flotation, to devise methods of grinding different from those at that time in use, such methods being aimed at producing slime. This resulted in the introduction of grinding machinery of an entirely different type. In connection with the new grinding and flotation machinery there was necessarily

## DANGERS OF DUST SHOWN

One-Reel Motion Picture Used by Agricultural Department in Educational Campaign.

Why dust is dangerous is shown conclusively in a one-reel motion picture, "Explosive Dusts," recently issued by the United States department of agriculture, in co-operation with the United States grain corporation. The picture is a popular presentation of a subject that was covered more technically and at greater length in a previous two-reel subject, "Grain-Dust Explosions in Mills and Elevators," which traveled all over the United States and into Canada and did yeoman service in helping to stop the disasters that threatened America's bread supply during the war.

The old two-reel picture is being retained for the use of workers in the bureau of chemistry. The new one-reel is especially designed for showing in high schools and other scholastic institutions, as well as before grain and milling men, fire prevention and insurance associations, and others directly interested in the subject.

Requests for the loan of the film should be made through some field worker of the department of agriculture, or they may be sent directly to the department. Arrangements also have been made enabling outside persons and institutions to buy prints of the film at the cost of manufacture.

## MAKING CANNED SPEECH



Senator Warren G. Harding, Republican presidential nominee, dictating his first speech for a phonograph record. His subject is Americanism and the record will be used in the campaign.

developed also machinery for sizing and dewatering the finely ground product.

"The men who will successfully handle this work must understand the physical principles underlying the operations of ore concentration, and must have, in addition, the collateral engineering knowledge essential to the designing of structures and the installation of machinery, sufficient grasp of the principles of economics and business to be able to judge results from a commercial standpoint, sufficient knowledge of mining to understand how ores are produced to the surface of the ground, and, finally, sufficient knowledge of metallurgy to understand the demands of the metallurgist as to the character of concentrate produced.

"The instruction of such men in college then should consist in a foundation of the fundamental sciences and a firm grounding in the use of the English language to express ideas and to present results and conclusions; in other words, such basic instruction as is essential to the training of all engineers.

"On this foundation should be built a superstructure composed of courses leading to a thorough knowledge of the properties and occurrences of minerals, to an understanding of the principles and simpler details of the design of structures, the generation and transmission of power, the methods of mining, the general principles of metallurgy and the principles of economics and business finance and accounting.

"Finally, following some elementary instruction in ore dressing, the student should be assigned a definite, fairly difficult problem in that subject, which he is expected to carry through to a conclusion largely by his own efforts and initiative.

"In connection with this problem there should be time in the curriculum to allow the student to elect one or more courses in some other department, preferably in chemistry, physics or metallurgy, such courses being along the line of the problem under investigation."

## 'DRY' LICENSES EXCEED 57,000

Nearly 16,000 Physicians Have Received Permits to Write Prescriptions.

## DRUGGISTS IN BIG NUMBERS

Only 238 Permits for the Manufacture of Intoxicants Have Been Issued, One-fourth of Them Being From California.

Washington.—More than 57,000 druggists, retail and wholesale, and manufacturers of proprietary medicines, flavoring extracts, sirups, etc., have been licensed in the United States and its consular possessions to date, under the national prohibition act, according to statistics just compiled in the office of the prohibition commissioner, John H. Kramer.

The records of the internal revenue bureau also show that nearly 16,000 physicians in the United States, Hawaii and Porto Rico have received permits to write prescriptions calling for the dispensation of intoxicating liquors for medicinal purpose and that additional permits at the rate of 1,000 a month are being issued to physicians.

Tabulation by states of the physicians licensed up to June 25 show that the prohibition director for Massachusetts has issued more than 15 per cent of the number of such permits distributed. New York state has another 15 per cent.

### Massachusetts Leads.

The exact figures are: Massachusetts, 2,450; New York, 2,421; Pennsylvania, 1,525; Ohio, 1,450; Maryland, 1,225; Missouri, 1,150; Minnesota, 693. In states such as Illinois, Kansas and Indiana, where state codes will not permit of the use of such permits, no physicians have been licensed by the government so to prescribe.

Porto Rican physicians, apparently, are awake to their opportunities under prohibition, 176 licenses to physicians to prescribe intoxicating liquors having been issued in that territory, or more than have been issued in Missis-

## Camel Meat Is Put on Sale in Paris



The zoo in Paris was unable longer to feed many of its animals, and the camels were sold to a butcher, who slaughtered them and offered the meat to his customers as a substitute for beef.

issippi, Arkansas, New Mexico, Nevada, North Dakota, South Dakota, West Virginia, Georgia, Florida and Maine combined.

New York state is far in the van in number of retail and wholesale druggists, manufacturers of proprietary medicines, extracts and other products requiring the use of intoxicating liquor as an ingredient. Permits for these dispensers of products containing considerable quantities of intoxicants have been issued to 16,000 in New York state alone, or about 28 per cent of the total in the country.

Pennsylvania ranks second with about 12,800 such permits issued up to June 25, Illinois is third with nearly 3,000, Massachusetts is fourth with about 1,800 and Ohio is less than a hundred behind in fifth place.

More than twice as many permits for the sale alone of liquors have been issued in Pennsylvania as in any other state. There are 602 issued in

the Keystone state out of 3,243 for the entire country. These are issued principally to distillers and others, having intoxicating stuff in bond, but some wholesale liquor dealers and possibly some druggists may be found in this class.

### Permits for Manufacture.

Only 238 permits for the manufacture of intoxicants have been issued, and more than a fourth of these, or 64, have gone to the wineries of California. Two permits of this class have been issued to distillers of whisky, both in Pennsylvania, according to enforcement officials.

Thirty-five of the sixty rectifiers' license have been granted to firms in New York state.

Ohio's state prohibition director has issued more permits for the transportation of intoxicating liquor than any other, with 350. Kentucky is second with 251 and Pennsylvania third with 199. Massachusetts ranks fourth with 147, California fifth with 140, New York sixth with 128, Connecticut seventh with 112 and Missouri eighth with 99.

All other classes of permits for the use in any way of intoxicating liquor, in its importation or exportation, for manufacture or use of intoxicating cider for conversion into vinegar, and for the sale or purchase of alcoholic preparations, sirups and beverages of more than half of 1 per cent alcoholic contents are issued direct from the prohibition commissioner's office, as also are permits to operate denolizing plants and rectification establishments.

Permits "H" for the use of intoxicating liquors—in the manufacture of medicinal preparations, extracts, sirups, etc.—have been issued up to the number of 45,808 and permits "I" for the "use and sale" of such liquors have been issued up to the number of 11,370. These two classes of permits take in both wholesalers and retailers of intoxicants—always with the qualification "for medicinal purposes"—and because of the confusion resulting from these similar classifications, "H" and "I" permits now are being consolidated in many instances so that druggists, for instance, may not only dispense whisky, etc., on prescription, but may also use it in concocting medicinal preparations of more than one half of 1 per cent alcoholic content.

At the present rate of withdrawal from bond it will take only five years for the available supply of whisky in the United States to be consumed.

## FEUDS KILL TOWN OF 1,000

Ferguson, Okla., Dies Fighting—Had No Church and but Small School.

Oklahoma City, Okla.—Hate killed Ferguson. Fifteen years ago a town of 1,000 people, having a large salt factory, a gypsum plant and shipping facilities, Ferguson today is dead. By order of the post office department the office has been closed, and soon the railroad will be discontinued, with trains running only to Hitchcock.

Ferguson is said to have died fighting as it had lived. Main street fights were common. West of town alleged outlaws "Yeager" and "Black," had their rendezvous, from where they are said to have stolen horses and cattle of farmers and citizens.

Ferguson never had a church, nor talk of a church. The only schoolhouse in its history would not seat more than twenty-five children.

## To Flog Profiteers Is Aim of This Bill

Budapest.—In deference to urgent requests of the national assembly the Hungarian government has drafted a bill prescribing corporal punishment for profiteers.

### Create Civilian Unions.

Brussels.—Most of the large cities of Belgium, following the examples given in France and Switzerland, are creating civilian unions, whose chief aim is to combat political strikes and assure the working of public services.

## German People Eager to Work

Lack of Food and Materials Prevents Their Working With Old-Time Vigor.

## HAVE NO HATE FOR AMERICANS

Hope to Establish Friendship Between Two Countries, Says German Agent—Country at Present Has Nothing for Export.

New York.—The German people are eager to work and readjust themselves and pay their war indemnities, but they cannot do so until they have help in the way of food and materials, according to Otto J. Marum, the German agent for an American leather company in Milwaukee, who recently arrived from Germany. He says that the German workman is so underfed that he cannot possibly do a proper day's work, and that the high prices for all the necessities there, combined with the pay of the laborer with the mark at its present low rate of value, is causing hardships and great suffering among the working classes that can scarcely be realized.

"The visitors who come to Germany, put up at the best hotels where there is plenty of good food, and make a superficial inspection of some of the more accessible districts, cannot judge of the lack of food throughout the country," said Mr. Marum. "Deformed children are seen everywhere where the working people live, but one fails to take into consideration that their whole organism is undermined and that they will always bear the marks of what they have suffered in the last few years.

### Nothing for Export.

"There is nothing at present for export, partly because of the great dearth of coal for factories and manufacturing purposes, and also because there are so few raw materials. The raw materials now available fill only a very small percentage of the domestic needs. The people are striving to attain their old-time efficiency, but living costs must go down in order that wages may be reduced for profitable production.

"The same general problems that confront other countries now are present in Germany in a more aggravated form. For instance, the housing problem had reached a much more acute state than here. The government made an effort to adjust this by obliging those with more rooms in their residences than were actually needed for their own families to take others into their homes—as renters, of course—but since they are allowed the use of the kitchens and laundries and other parts of the houses the arrangement has made for great confusion and much discontent.

"The high prices for all building materials and the high wages for workmen have made it almost impos-

## Modern Sampson Unhurt By Toppling Building

Sampson was pretty good at handling buildings but he could boast of no superiority over John Pettibone, a New York city laborer.

After a two-story frame building had toppled over on Pettibone, and the employees, whose lives he had saved by his shout of warning, together with a detail of police and two fire companies had dug him out, Pettibone walked disdainfully home, leaving the ambulance and pulmotor crews rubbing their eyes.

### Gray Timber Wolf Killed.

Richmond, Ind.—A gray timber wolf, weighing 60 pounds or more, was killed the other day by James Kees, who lives east of this city, in a woods adjoining the golf links of the Richmond Country club. The animal had been preying on poultry in the vicinity for several days. Kees killed the animal with a rifle after several shots.



Just to show that the disturbance recently enacted at the opening of her show in London is deeply regretted, the English theater going public, is now tendering to Laurette Taylor many demonstrations of their approval. At a performance a week ago, she was presented with a beautiful wreath of flowers, and the boys' band from one of the orphan homes near London played for her.