

## ZINC.

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Early in the European war the larger part of the zinc-smelting capacity of Europe was either destroyed or in the hands of the Teutonic belligerents. About 75 per cent of the spelter output of Europe in 1913 was produced by Belgium, Germany, and Austria. Both the zinc smelters and the zinc deposits of Germany are in the Rhenish-Westphalian and Silesian districts. The Belgian smelters were soon captured by the Teutonic allies. Under these circumstances the entente allies had to depend for spelter almost wholly upon the zinc smelters of the United States.

For some time before the war zinc-smelting capacity in the United States had been increasing faster than the consumption, as shown by the increase in spelter stocks at smelters, there being 40,659 tons in stock at the beginning of 1914 and 64,039 tons at the middle of the year, just before the war began. These stocks and the excess smelting capacity were immediately available to supply foreign demands, and at once the smelters began large exports of spelter and sheet zinc to Europe.

Except for a short flurry after the declaration of war the price of spelter during the remainder of 1914 was not much higher than it had been during the first half. As a consequence there was little increase in production or smelting capacity, the number of retorts being 111,458 at the end of 1913 and 115,114 at the end of 1914, with 10,192 retorts in process of building or contemplated. During the first half of 1915 the spelter stocks at smelters became exhausted and, the demand exceeding the production, the scarcity was manifested in rising prices, which culminated June 5 at 26.5 cents for prime western spelter and a correspondingly higher price for high-grade spelter. Then began a period of feverish activity in smelter building and renovating. Small, old, abandoned, coal-fired zinc smelters in Missouri and Kansas were rebuilt and fired up, and several gas smelters in Kansas, practically abandoned from lack of fuel, obtained small warm-weather supplies of gas and started smelting. New gas

smelters were built in record time in Oklahoma, new producer-gas smelters were rapidly constructed in Pennsylvania and Illinois, and additions were made to smelters already in existence. The number of retorts at the end of 1915 was 156,568, besides 49,612 under construction or contemplated, and in addition a daily capacity of approximately 200 tons for electrolytic spelter was in operation, under construction, or planned. By the middle of 1915 the spelter capacity of the country had been developed to a point where it supplied current needs and allowed the accumulation of what the entente allies considered to be ample supplies of munitions for the military operations of that year. This condition, together with the coordination of purchasing agencies for the allies whereby they no longer competed with one another in the purchase of spelter, caused a great decline in the price, which dropped from 26 cents to less than 12 cents in one month.

The experience of 1915 showed, however, that the reserves of munitions were nowhere near sufficient—in fact, it is reported that the principal offensive operation was cut short by their exhaustion. Preparations were therefore begun to lay in an adequate supply for the drive of 1916 and for reserves along the extended battle line. Meantime, many less advantageously situated plants found spelter making unprofitable at 12 cents under war conditions and were closed wholly or in part. Under these circumstances the price of spelter gradually rose again and in February, 1916, reached 21 cents. This rise stimulated more smelter building and by the middle of 1916 the total number of retorts had risen to 196,640, besides 24,812 retorts under construction or contemplated. In the meantime other countries had been increasing their zinc-smelting capacity, notably England and Japan. Early in 1916 the price of spelter began to weaken, and between the middle of April and the middle of July it had fallen from around 19 cents to about 9 cents. Through the last half of 1916 and the first five months of 1917 the price of spelter ranged between 8 and 13 cents. In spite of the decline in prices smelter building kept up, and the number of retorts at the end of 1916 was 219,418, and about 18,000 additional retorts were in process of building or contemplated.

The following table shows the increase in spelter production and in exports of zinc and brass and their manufactures by six-month periods during the war. The first war demands were for spelter and sheet zinc, the exports of which averaged between 10,000 and 13,000 tons a month up to the middle of 1916. During the last half of 1916 and the first three months of 1917 the exports were nearly doubled, averaging over 21,000 tons monthly. The exports of brass grew rapidly, being four times as large in the last six months as they were

in the first six months of 1915, and almost doubling the monthly rate, in the first three months of 1917. The exports of manufactures of zinc and brass and also of cartridges grew rapidly, being now about seven times as great as in the first six months of 1915. The startling quantities of munitions exported in recent months were doubtless required in preparation for the offensive now in progress. It is reported that relatively three or four times as much heavy ammunition is being used on the western front this year as was used in the Somme offensive in 1916. The fact that this great consumption of munitions has had no more effect on the price of spelter than to raise it to 13 cents for a short time in November and December, 1916, seems to indicate that the zinc-smelting capacity has been brought up to the point where it is able to meet every demand. In fact, it has been suggested that there has been some overproduction of spelter and that stocks have probably accumulated. Be that as it may, it is not likely that there can, under present conditions, be any further material decline in the price of spelter, for that would probably so reduce the output of sphalerite concentrates from the sheet ground of the Joplin region as to react upon the price of spelter, causing it to rise again.

*Spelter produced in United States and zinc and brass exported, 1914-1917.*

	Spelter produced (short tons).	Exports.					
		Spelter and sheets, domestic, foreign, and drawback (short tons).	Zinc dross (short tons).	Brass (short tons).	Old brass (short tons).	Value of manufactures of zinc and brass, including cartridges.	Total value of exports of zinc and brass.
1914.							
January-June.....	175,058	2,878	286	1,542	6,774	\$3,841,237	\$6,337,416
July-December.....	177,991	72,490	2,249	2,015	3,552	6,712,225	17,162,383
1915.							
January-June.....	216,532	70,326	2,932	13,126	4,331	25,070,587	44,088,252
July-December.....	272,987	61,306	1,235	15,010	456	43,154,056	70,479,204
1916.							
January-June.....	316,452	78,204	23	51,543	1,234	123,135,226	177,343,769
July-December.....	351,004	128,163	20	70,723	2,194	174,210,117	253,456,204
1917.							
January-March.....		64,049	1,909	63,464	1,252	83,821,780	138,670,854

Soon after the beginning of the war the United States Geological Survey made the statement<sup>1</sup> that the United States would have "the opportunity to furnish the major part of 222,000 tons of spelter a year as long as the war lasts." Though part of the zinc exported has been in the form of brass, the total exports of zinc in all forms for the first three years of the war will be found to average about 220,000 tons a

<sup>1</sup> U. S. Geol. Survey Press Bull. 181, August, 1914.

year. This quantity is exclusive of the zinc in manufactures of zinc and brass, including cartridges, which in value have averaged nearly \$200,000,000 a year but whose zinc content is not known. At the rate of increase shown in the last half of 1916 and since maintained the exports for the remainder of the war promise to be much larger.

The zinc reserves of the country have shown themselves to be equal to all demands made upon them. In fact, the production of zinc ore has been so large that further decline in ore prices with resultant demoralization of the domestic zinc-mining industry can be prevented only by a material increase in the demands for spelter or by a lessened supply of foreign ore. An increase in the demand for spelter seems probable, as has been indicated above, and imports of zinc ore may decrease also, if shipments from Spain and Australia are interfered with by submarines, or if the Australian concentrates are diverted elsewhere, or if shipments of zinc ore from Mexico are prevented. The zinc content of zinc ore imported in 1915 amounted to 57,669 short tons and in 1916 to 148,147 tons. Mexico and Australia each furnished about one-third of the imports. The imports of zinc ore for the first four months of 1917 indicate a falling off of 40 per cent from the average monthly imports in 1916.

The chief zinc-producing regions in the United States are the Joplin district of Missouri, Kansas, and Oklahoma, furnishing about one-fourth of the country's zinc output; the Franklin Furnace district of New Jersey, and the Butte district of Montana, each yielding about one-fifth of the total supply; the upper Mississippi Valley district of Wisconsin, Iowa, and Illinois; the Leadville district of Colorado, and the Coeur d'Alene district of Idaho, each producing between one-tenth and one-twentieth of the total.