Underground Leviathans.
The Mining Multinationals in the Americas, 1901-1971
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“Titan held the world on his shoulders, so the legend goes.”- proclaimed Senator Frank Church, a Democrat from Idaho, before the center for studies of Democratic Institutions in Houston, March 2nd of 1973. “Britain and Spain divide it by the weight of their gold and the power of their navies. France ushered in the age of mercantilism; Britain, the Industrial Revolution. The Meiji restoration in Japan wed the nation-state to the massive national enterprise, and the United States romanticized capitalism as a way of life.”- He continued. He was the Chairman of the Subcommittee on Multinational Corporations, which started an investigation on the role of transnational firms in the political instability of Chile. “Is the multinational corporation the device which will bring the barriers down, integrate the economy of the world, and usher in a new order? Is this, indeed, to be the age of multinational corporation?¹

“The ITT is a variable nation, a gigantic conglomeration of interests throughout the world. The ITT is like the British Empire was: the Sun never sets in its domains.”- Said Jack Anderson in March 27th of 1972 on an interview in Chilean Television.² One week earlier he revealed, on The Washington Post, a series of documents by the International Telephone and Telegraph which implicated the firm in a plot to stop the election of Salvador Allende in 1970. The director of the firm, John McCone, had been the head of the Central Intelligence Agency and had pushed the CIA and other corporations into boycotting the presidency after the victory of the socialist. The American corporations in the region had meetings trying to resolve the support of the military to take power before the official ceremony in November. Part of the strategy was to bring economic chaos to the country relied on the rupture of the intra-firm chains of value in the region. “Companies should drag their feet in sending money, making deliveries, in shipping spare parts, etc.”³- listed one of the memos recovered by Anderson from the Vice-president of ITT, a list of instructions negotiated with the representative of the CIA.

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¹ Multinational corporations and United States foreign policy. Hearings, Ninety-third Congress [Ninety-fourth Congress, second session], Volumen 4, Parts 1-2, Pg. 517
² CIA Archives, CIA-RDP74B00415R000300020011-1
³ CIA Archives, CIA-RDP74B00415R000300020013-9
After Allende took power, the corporations-maintained pressure over the Chilean government. Besides the nationalization of the Telephone industry, one of the main interests affected in the Southern Cone were the two largest copper mines in the region, El Teniente, from Kennecott Corporation, and Chuquicamata, of Anaconda Company. Top Executives of mining corporations promoted the formation of a lobby to “keep the pressure on Kissinger and the White House and to get frequent speeches in the Congressional Record calling attention to the seriousness of the problem in Chile and Latin America generally.” The Ad Hoc Committee would meet regularly with the staff of Kissinger and representatives of the CIA, having breakfast and interchanging “informally,” impressions over the Chilean situation. The lobby accomplished, soon enough, to cut all aid form the U.S. to Chile, even to universities. “It was inappropriate for the U.S. Government to be awarding in the country which had expropriated the assets of American Citizens in Chile.” Defended Ralph Mecham, the vice president of Anaconda during the congressional hearings. The citizens were, to be clear, the corporations, not their owners.

Four years later Alfred Chandler Jr. published its seminal study on corporations, The Visible Hand. His model of the emergence of modern multidivisional firms in America did not take by example the mining or infrastructure companies, so relevant in the previous years. Instead, he related the growth of multidivisional corporations to the growth in mass distribution of goods. The revolution of distribution by the new communication structures transformed the organizational features of firms, from the traditional familial enterprise to the corporation ruled by managers. Organizational innovation preceded technical improvements, which implied that the internalization of activities in multidivisional firms was a process not led by technological design but by the bureaucratical takeover. The decision-making process in the big corporations of mass marketers (food, tobacco, rubber, transportation items and fuel products) started in the factory and quickly conquered some industries of raw materials and the costumer’s networks for mass consumption. Neither in agriculture, construction or mining corporations the large multidivisional firm could have emerged, as, Chandler theorized, they could not profit economies of scale. “Working of mines involved little more than having small teams of men doing much the same thing in different parts of the mine. Until the twentieth century, the workers in these industries relied largely on hand tools.” In contrast, the mass marketers’ industries built

4 Multinational corporations and United States ... pt.1. United States, pg. 265.
5 Multinational corporations and United States ... pt.1. United States. Pg. 267
a national scale of operations, not local, and became “the most influential institution in the American economy.”

Despite this apparent irrelevance, the metallic and mining industries were one of the first, if not the first, to establish not only national but a multinational American model of business. In the list that Chandler uses for mapping the most influential corporations in the country, the value of the mining and metallic corporations exceeds the value of firms in petroleum, gas, coal (and their products), transportation equipment, food, and rubber combined. Seven of the metallic and mining companies ranked among the top 20 most valuable firms in 1917, and they were the first to establish a continental multinational system. In the middle of the Great Depression, a single firm, the United States Company, produced 7% of the gold, 7% of the lead and 13% of the zinc extracted in the U.S., besides mining over 50% of the gold and 30% of the silver in Mexico, equivalent to 13% of the global production of the white metal. The relevance of these giants shrunk in the next years, but still, the Anaconda and Kennecott properties share, in 1960, went over 90% of the copper in Chile, around 11% worldwide. By then, four copper corporations controlled 90% of the American market.

After Chandler, the studies on copper, lead, and zinc industries are part of a romanticized history of tyrannical tycoons at the turn of the 20th century, and never in the chart of the modern firms. The exception for the trend are the recent studies on tin and aluminum in the Norwegian University of Science and Technology and the excellent monographs on Asarco and Anaconda of Isaac Marcosson, thirty years before the Visible Hand. This paper offers a general analysis of the structure of the non-ferrous metallic mining industries between 1901 and 1971 in the Americas. Technology and design were the most vital part of the development of these corporations in their multinational scale, in many cases more than the consumer products industries analyzed as the first modern corporations. While meat companies in Chicago killed

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7 Chandler, Visible hand, 289
8 See Appendix A, Chandler, Visible Hand, pp. 503-512
10 Comisión Chilena del Cobre, Estadísticas. World Metal Statistics
cows by hand, American multinationals in Chile operated high technology smelters and established research and development units; and long before Ford installed the assembly line on Highland Park, silver cyanidation plants in Mexico used concentration and refining chains and fluxes. The high technological development of mining implied that mining engineers, geologists, and a chemist were the main actors on the construction of the companies. Some investors had a role in the formation of the corporations, namely the Guggenheim and the Rockefeller families, but middle and top engineers were responsible for the design of the technological and organizational features of the leviathans. In the next pages we will not find the characters of Snow White using hand tools to extract the fruits from the ground, but modern firms, complex networks of products and continuous technological advances in three sections: production, distribution and internal communication.

1. The Revolution of Production

“Any approximate accurate history of the state of Montana must be in large part a story of modern feudalism." Jerre Murphy said in one of the first paragraphs of this history of the emergence of the state and the influence of Big Business in its early political arena. The feud between the three “Copper Kings” in Montana over the political control of Montana had made news at the end of 19th century. Economic competition between William A. Clark, Marcus Daly, and F. Augustus Heinze, the directors of the main copper producers of the state, had translated into a dispute for the capital of the state and races for the government. The power the three businessmen displayed shocked the American West and preceded the scandals of the Standard Oil Company in the early 1910s. “A devils vote” was, in the eyes of Christopher Connolly the involvement of the copper kings into the democratic process in the state, interlinking the economic, political and symbolic power of the kings in the West. "By his example, he has so

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14 See Murphy, Jerre C. The comical history of Montana : a serious story for free people : being an account of the conquest of America's treasure state by alien corporate combine, the confiscation of its resources, the subjugation of its people, and the corruption of free government to the uses of lawless enterprise and organized greed employed in "big business", San Diego, Scofield, 1912, p. 2
excused, and so sweetened corruption that in Montana it no longer has an offensive smell.” – wrote Mark Twain after dinner in New York with the then Senator Willliam Clark.

The dispute between Daly, Clark, and Heinze only finished with a shot of corporate consolidation. In 1899 Henry H. Rogers and William Rockefeller absorbed the Anaconda Copper Company of Marcus Daly into a giant holding, the Amalgamated Copper Company. Six years later, the Anaconda reabsorbed most of the holdings of the Amalgamated and, acquired the assets of the competitor Heinze, and Clark’s company rather rapidly sold their remaining properties. Other titans in the metallic business born in the same years, as a response of competition between prominent companies in the same years, most of them with the same set of actors. Henry Rogers Leonard Lewisohn founded the American Smelting, Refining and Mining Company (Asarco) as a holding of sixteen metal smelters in 1899. The next year, the new corporation merged with some of the properties of the Guggenheim family. Asarco absorbed Guggenheim’s properties as the business family took control of the company.

As Montana before, at the beginning of the 20th century, Utah was a hub of the most significant mining interests in the country. The rich copper lead and zinc deposits of the Bingham canyon were exploited finally on an industrial scale, and their ores cemented more than one big corporation, as the result of the consolidation of smaller companies. In 1896, Samuel Newhouse organized the Utah Consolidated Company as the merging of several mines around the Highland Boy property in the canyon. Three years later, Newhouse sold its interests to the Amalgamated Company, which started the construction of a smelter in the Jordan River, in the limits of the Oquirrh Mountains and the Salt Lake Valley. Albert F. Holden, a Harvard and MIT Alumni and the son of the manager of a mining company in Utah, formed a company in 1899 named United States Mining Company. The company was the result of decades of consolidation of small mines in the canyon, first producing silver but later readjusted to the extraction of copper and lead. Holden model, like Roger’s and Jackling, consisted of the interaction between the Boston shares market, the New York metals market and the West mines.

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In 1901, the United States Mining Company started the construction of a modern high furnace smelter in the Jordan River, in the junction of the Bingham Canyon. Earlier that year the Asarco had inaugurated its Murray Smelter, a few miles from the U.S. Company construction site. In 1903, Victor Clement and Daniel C. Jackling founded the Utah Copper Company for the exploitation of porphyry copper in the Bingham Canyon of Utah, next to the Salt Lake Valley. Two years later, the Guggenheim Exploration Company acquired most of the shares of the Utah Copper and began the construction of a new smelter in the Garfield beach of the Salt Lake. In 1910, the Utah Consolidated transformed into the International Smelting Company, building a smelter in Tooele, to the West of the Valley.

Big corporations were not only rushing into Utah but to other states in the West and south of the border. American companies acquired, in the last years of the 19th century and the beginning of the 20th century, firms in the historic mining districts in Mexico. In 1890 Samuel Newhouse and the Guggenheim brothers negotiated with Mexican dictator, Porfirio Diaz, the establishment of two smelter plants in Mexico. One would be in Aguascalientes, processing the silver, gold, copper and lead metals located in the center of the country, and the other on Monterrey, treating the ferrous metals from the northern and east. The furnaces treated ores from small mines in the country, but rapidly the Guggenheim Exploration Company acquired small copper mines around. At the beginning of the 20th century, other big mining corporations followed and established big companies and plants shipping metal to the New York Market. In 1906 the Amalgamated Copper Company acquired the Cananea Consolidated Copper Company from colonel William C. Greene, taking total control of the company in February of the next year.

Simultaneously, the United States Company reorganized as the United States Smelting, Refining, and Mining Company, to raise funds to buy the historic silver mine in Mexico, the Compañía de Real del Monte y Pachuca. In the next years, the United States Company concentrated the properties of the whole mining district in Pachuca and started growing in the country through its exploration Company. The U.S. Smelting Exploration Company oversaw

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20 Salt Lake Herald, “Save him”, 26 March 1886, p. 4; Salt Lake Herald, 2 October 1896, p.8; NMC, Report of the proceedings; USSRMco, Smelting History; Salt Lake Tribune, “University Notes”, 20 April 1891, p.8; Salt Lake Tribune 5 February 1897, p. 8, Ogden Standard, “Death notices”, 27 August 1913
22 Marcosson, Metal Magic, p. 53
searching, evaluating, developing and acquiring new properties. Less than 30 years after it first incursion in Mexico, the United States Company, through this subsidiary, owned over 13 thousand mining claims in nine states of Mexico. The U.S. company also expanded into small properties in Honduras and Peru, but in the next years, it mostly focused on being the biggest player in Mexico. In the 1910s, the Asarco and Phelps Dodge increased their investments in the northern states of Chihuahua, Coahuila, and Sonora, but the U.S. Company cemented itself as the larges mining player in the country in the next years. From Mexico, the Exploration division started to examine and develop small mines in Peru and Honduras, but the rest of the Titans had their eyes further south.24

In 1904 William Burford Braden organized the Braden Copper Company in Maine, in order to develop the El Teniente mine, in the north of Chile. One year before, Braden’s friend, Marco Chiapponi, had alerted him of the property and the high-grade copper deposits there located. Braden Copper started the development of the property with no little technical difficulties and searched for new investors. In 1909 Braden Copper was reorganized in Delaware, with big participation of Guggenex which was, by that time, more interested in that long strain of metalized ore in the Pacific. In 1910 Albert C. Burrage, one of the organizers of the Amalgamated Copper, came back from a trip to Chile. He had obtained options on the territory of Chuquicamata, in northern Chile, form the government and some British companies. Two years later, the Guggenheim organized the Chile Exploration Company in New Jersey, later reorganized in Maine, to take over the Burrage concessions. The venture was one of the biggest projects form the family and depended on extensive coordination with technicians across Ecuador. In the next years, nonetheless, the expenses and the drop in the price of copper pushed the Guggenheims to sell one of their copper properties. The interest of the Guggenheim, by that time, was in the development of nitrate in the Anglo-Chilean Nitrate and Railway Corporation. By then, Braden had sold all its shares for the El Teniente mine and started working for Anaconda in the search for more copper in the south. He had helped to establish the first Anaconda property in the region, the mine of Potrerillos, but remained in the search for the sale of Chuquicamata. In 1924, finally, Anaconda negotiated the purchase of most of the shares of the

24 AHCRIMyP, FN, JD, Actas e informes, vol. 3, exp. 16; AHCRIMyP, FN, JD, Actas e informes, vol. 1, exp. 2; FN, Jurídico, Representación, asociación y constitución, Compañías, asociaciones y negociaciones. vol 1, exp. 2; AHCRIMyP, Jurídico, Propiedades, contratos y denuncias; denuncias y concesiones, vol. 1, exp. 4
Chile Exploration Company, and five years later, the giant form Montana took the rest of the shares still owned by the Guggenheims.\footnote{Hawley, Charles Caldwell. \textit{A Kennecott Story: Three Mines, Four Men, and One Hundred Years, 1887-1997.} University of Utah Press, 2015, pg. 102-108; Marcossou, Anaconda, pp. 194-201; O’Brien, Thomas. “Copper Kings of the Americas—The Guggenheim Brothers.” \textit{Mining Tycoons in the Age of Empire, 1870–1945.} Routledge, 2016. 211-230.}

The seller of the Chuquicamata mine to Anaconda was no longer the Guggenheim Exploration Company, but the Kennecott Copper Corporation, born in Alaska. In 1900, a native guided Clarence Warner and Jack Smith to a copper deposit in the east to the Kennicott Glacier. The deposit had exposed copper of 70\% of purity, in the Bonanza Mine Outcrop. Stephen Birch heard of the discovery and started to acquire options in the slope. As every other entrepreneur in the mining sector, he quickly searched for buyers. In the next years, he involved the Havemeyer family, J.P. Morgan and Daniel Guggenheim. They organized the Alaska Syndicate Company, which started the development of the mines. The Syndicate started to mine the copper in 1911 and four years later transformed into the Kennecott Copper Corporation. The new corporation became so powerful that it absorbed some other of the Guggenheims properties, as the El Teniente and Chuquicamata mines and the Utah Copper Company in Utah.\footnote{Hawley, Kennecott, pp. 49-60}

Kennecott was by far the most significant player in the farthest north territory of America, but it was not the only one. In the early 20th century hundreds of rushers arrived at Alaska in the search for quick fortune in the placer mines. As any other rush, big corporations followed the decaying concessions in the next years. John Hays Hammond, the Midas King of the Guggenheim, started to sell dredges to small miners in the territory and to analyze stronger options. In 1912 he founded the Yukon Gold company, property of Guggenex, as a result of the consolidation of several placer mines in interior Alaska, close to Kenai River. Wendel P. Hammon, as Hammond, started to sell small dredges to rushers since 1907 and started small operations in the 1910s on the Seward Peninsula. In that year, with Daniel C. Jackling the founder of the Utah Copper Company, he operated the Alaska-Gatineau mine in Juneau. In 1919, Hammon decided to try his luck on Nome using cold water to melt the permafrost. In 1922 he founded the Hammon Consolidated Gold Fields Company and acquired most of the properties in the City of Nome, in the Seward Peninsula. The next year he duplicated its capital with the investment of a giant form Utah, the United States Company. The U.S. Co had acquired in 1913 the Ebner mine in Juneau, an abandoned open-pit silver mine. After years of development had
not seen results and the exploration in the territory was fruitless. Hammon innovation fall in their lap and they fully supported the expansion of the firm. In the summer of 1924, Hammon founded, exclusively with U.S. Company capital, the Fairbanks Exploration Company. As in Nome, they acquired most of the small placer properties of old rushers the rest of the year. After the first push, like other engineers, Hammon sold the rest of its shares and ceded the technical and entrepreneurial initiative. The officers of the corporation expanded its operations and installed the infrastructure needed for the functioning of the mines. Only in 1928, the company employed, either in the dredges or construction, 80% of the population in the town, and became the cores of the towns of Fairbanks and Nome.27

In the verge of the Great Depression, five companies dominated the non-ferrous metals in the whole continent, from the Bering strain to the Chilean Desert. The U.S. Company operated the largest silver mine in the world, in Mexico, and the largest gold deposits in Alaska; Kennecott Corporation owned the El Teniente mine and the Kennicott deposits; Asarco controlled dozens of smelters in North America; Anaconda controlled copper production in Montana and owned the Chuquicamata mine. Their operations in Utah were a microcosmos of their continental empire and their technical organization. They all exploited the copper lead deposits in the Bingham Canyon and installed high furnaces in the Salt Lake Valley. The basic structure was rather simple. Large low-grade mines sent their ores to big technological plants. The economies in the processing of rocks translated into industrial exploitation of the mines. The minerals in the mountains built these titans, but they were only the base of a much more complex Leviathan in the continent.

2. The revolution of Distribution

“It appears that the ‘real thing’ is not the Amalgamated Copper Company, but the United Metals Selling Company,” said the Mining Reporter in 1901.28 The United Metals Selling was incorporated in 1900, while the Amalgamated, in order to take over the business of Lewisohn Bros. Metals selling agency. According to the Mining Reporter, the mining company was designed to be “milked” by the selling firm. Even if they had no formal relation, as the United

27 AMHF, “Wendell Hammon”; USSRMco, Annual Report, 1911-1930
28 Mining Reporter, October 23, 1901, p. 334.
Metals was not a part of the Amalgamated Corporation, they worked together. In 1911, as the International Smelting was finishing the Tooele plant, the Amalgamated acquired the shares of the United Metals Selling company, by then concentrated again into the selling agency.\textsuperscript{29} In any case, the arrangement with subsidiaries in the East complemented with the free speculative activities of the United Metals Selling Company. Ernest Richter calculated that this corporation controlled over half of the market of copper in the first decade of the 20th century.\textsuperscript{31}

Intermediating and not producing had been, for years, the main business of many of the companies before reaching an integrated chain of value. This type of alliances was common in the era, as the control of prices of the metals fueled the mergers of smelters. The project of the American Smelting Company was to dominate the market rather than to integrate the productive units. The 23 smelters searched for the construction of a metallic concentration outside the interests of the Guggenheim’s and the Montana ladders. Even after the company started to transform from trust and a holding to a coherent mining corporation, the chief officers and directors remained in New York.\textsuperscript{32} In the next years, the Asarco expanded into the smelting business, but still tried to depend on buying for small miners and sell to an oligopoly can market. As the United Metals with Amalgamated, the first relation of Asarco with Utah Copper and Kennecott, once the Guggenheim took most of the shares, was one of preeminence. Moreover, so, the main offices and directors of the corporation ruled the company from New York. The sales department of Asarco effectively acted as the Sales department of Utah Copper and Kennecott, but in 1922, the corporations finally differentiated themselves. The Asarco stopped the long-term contracts with the copper firms, and they established sales departments in New York.\textsuperscript{33}

In any case, the selling companies were a fundamental instrument for the holdings as the last stage in the circulation of their capital. In that last stage, the companies could also manipulate the offer, bargain prices and organize in cartels. Over the next years, the selling divisions of the corporations transformed integrated into the rest of the holding. The International Metals Selling Companies was a division of the United States Company, specialized in the commercialization of the concentrates, bullions and refined metals of the different divisions. The

\textsuperscript{29} Salt Lake Evening Telegram, 02/10/1910
\textsuperscript{32} American Smelting Company, Report to stockholders, 1905-1913.
\textsuperscript{33} American Smelting Company, Report to stockholders, 1922.
subsidiary, located in New York, analyzed prices and made projections to maximize the revenues obtained by the metals, consulting the divisions on the best moments to send their products. The divisions in Mexico, the West and Alaska would sell, formally, their stocks to the International Metals, Free on Board, and a competitive basis to the price in the Engineering and Mining Journal. The International would, with the divisions of the United States Company and the private costumers, ask for an intermediation fee, but would decide to the moments of selling. In any case, all these selling subsidiaries between the beginning of the century and the end started to become more and more dependents of the metallic mining divisions of the holding. The divisions as the United Metals Selling lost power over time against the mines and smelters, and later became departments of the holding. By 1930, and after several reorganizations, the International Metals Selling transformed into the Metal Sales Department of the United States Company.

The Selling agency not only concentrated in selling the metals of the Amalgamated, coming from the West but started to process them in the industrial area of New Jersey. The United Metals acquired the shares of the Raritan Copper Works, a copper refinery in Perth Amboy. Refineries grew in those years as a missing link between the sales agencies in New York and the West and South Mines. Refineries, like mines, organized in clusters in the metal cartels. New Jersey grew in those years with copper refineries. The first refinery of the Guggenheim Exploration Company, later absorbed into the Asarco properties, was built in Perth Amboy, New Jersey in 1894. The primary objective was to treat the concentrates from the smelter in Aguascalientes, which traveled by railway to the Tampico port, in Tamaulipas, and the traveled by ship through the east coast. In 1904, the United States Metals Refining Company installed a copper refinery in Chrome, New Jersey, six miles north from the Asarco and Amalgamated plants.

In the next years, the big corporations started the construction of lead refineries in East Chicago, Indiana, as the southwest of the Michigan lake was transforming into a metal manufacture cluster. In 1905, the United States Metals Refining Company, a subsidiary of the U.S. Company, started the construction of a Lead Refinery in the area. The United States Steel

34 AHCRMYP, FN, AED, Venta de Metales, Vol. 89, exp. 72
35 Richter, Amalgamated Copper
36 Marcosson, Metal Magic, p. 53: Ax-I-Dent-Ax, Julio, 1929, 15
37 Ax-I-Dent-Ax, Julio, 1929, p. 5; Ax-I-Dent-Ax, Abril, 1921, p. 17
Company had similar plans in the same region, often known as Calumet. In 1908, the United Metals started similar plans. Lewisohn maintained the position as the General Manager of United Metals in the next years and was one of the main actors in the reorganization of the company now as an Anaconda subsidiary. In 1908 the executives of several divisions of the Amalgamated and Lewisohn of United Metals confirmed the International Smelting Company, who was to erect a smelter in Tooele, Utah, to process the ores from the Utah Consolidated Company (from the Amalgamated). The International bought all the shares of the refinery in Perth Amboy, for copper, and started the construction of a Lead Refinery in East Chicago, Indiana. The new plant was said to be the largest lead producer in the world.\textsuperscript{38} By 1912, the American Smelting Refining and Mining Company had acquired a refinery also in the South of Chicago, the National plant, American Smelting & Refining Co.\textsuperscript{39}

The refineries in East Chicago reflected the changing nature of the metal market and the plasticity of the metallic mining corporations to adapt to the evolving prices and concentrations in their ores. In the a920s, the Refinery of the United States Company in East Chicago installed a plant for the manufacture of sodium arsenite. In the last two decades, the company in Utah had to install baghouses to collect some of the particles discharge into the atmosphere of the smelting process, and arsenates started to be collected, sent to Indiana for then being sold as pesticides. After the crisis in 1929, the United States Lead Refinery installed a new plant of treatment of gold and silver, to extract more of the concentrates from the subsidiaries of the United States Company in Park City and Fairbanks, by then making the heavy lifting in the profits of the company.\textsuperscript{40}

In one word, refineries integrated deeply into the West and East relation, as a hinge in the interaction between a big and technological plant (wither smelter, cyanidation or flotation) and significant extensions of claims in centralized mines. Refineries could transform the (not so) raw products form the smelters into the variety of concentration and products required by the manufacture companies in the east and Midwest, and the international markets in New York. That was, nonetheless, not enough to build a company. Most of the metals extracted had to travel East to the industrial complexes or Europe, and so communications between the several divisions and the market were a priority of the metallic mining holdings of the era.

\textsuperscript{38} Richter, “Amalgamated”, p. 400: \textit{Calumet region historical guide}, p. 56
\textsuperscript{39} \textit{The Mining American}, 1912, volume 65, p. 349
\textsuperscript{40} USSRMco, \textit{Annual Report}, 1918-1936, Ax-I-Dent-Ax, September 1931, p. 17
The initial growth of the big mining multinational corporations in the Americas would have been possible without the development of continental railroad systems. The arrival of the railway to Utah unchained the first rush into the Bingham Canyon in the 1870s. The integration of the Mexican railroad in the 1890s fueled the investments of big American corporations in North and Central Mexico. The inauguration of the railroad from Seward to Fairbanks in 1923 was vital in the development of the Fairbanks Exploration Company in the next years.\footnote{Willis, Roxanne. \emph{Alaska's place in the West: From the last frontier to the last great wilderness}. University of Kansas Press, 2010. pp. 91-105}

Corporations also intervened in the construction of some lines, and in many cases, the infrastructure in communication survived the mines. In 1891 the Butte, Anaconda & Pacific Railway was founded with capital from the Anaconda Copper “Mining Company, in order to better communicate the works of the corporation and reduce the power of the railroad to Butte. Two years later, the new railway company opened its first lines, not only providing freight to metallic mines but transporting passengers and coal. The company grew in the next years in Montana, controlling all the lines to Anaconda and extending to the connections to Colorado and Seattle. In the first decades of the 20th century, the BA&P electrified some of its lines and increased the charge. After the First World War and the end of the Second World War, BA&P remained mainly serving the needs of Anaconda Copper, but it could adapt to the changes in metal production.\footnote{Mutschler, Charles V. \emph{Wired for Success: The Butte, Anaconda & Pacific Railway, 1892-1985}. Washington State University, 2002.}

In 1907, the Alaska Syndicate started the construction of a line from Kennicott to Cordova, on 196 miles, transporting concentrates treated in a small plant in the glacial. The Copper River and Northwestern Railway Company, one of the late subsidiaries of Kennecott Corporation, built and operated the railroad. Additionally, in 1909 the Alaska Syndicate bought the Alaska Steamship Company, the Northwestern Steamship Company, and the Northwestern Fisheries companies, merging them and increasing their fleet. The Alaska Syndicate, later part of the Kennecott Corporation, controlled most of the transportation routes to Alaska and the most prominent mining exploitation for years. The railway was the base for the operation of the mines, and it was the technical model for the railroad to Fairbanks. The rest of the mining companies
depended on the transportation system of the Alaska Steamship Company for most of the next years, even after the close of the Kennecott mine in 1938.\textsuperscript{43}

The United States Company also invested in communications for its properties in Utah. In 1913 they acquired the Consolidated Coal Company, which had an infrastructure of railroads in the Carbon County and to Provo. In the next years, the U.S. Company divided the firm into two subsidiaries, the U.S. Fuel Company, and Utah Railway, which operated independently. While the U.S. Fuel remained a rather lousy investment for the corporation, the Utah Railway freight charges were stable and could transport several other merchandises in the 1920s. Rather than competing with other companies, the Utah Railway improved the relations of the U.S. corporation with the Denver and the Rio Grande company, establishing long alliances for the renovation of their common lines.\textsuperscript{44} The mines of El Teniente and Chuquicamata required the construction of large railroads communicating the isolated desert of Chile. The company sent already processed copper to the port of Antofagasta, 165 miles distant. At the beginning of the operations, the corporation acquired the Chiles Steamship Company but transitioned in the next decades to established steamship lines.\textsuperscript{45}

3. The revolution of communication

In any case, while the corporations had interests in gaining authority over communications, antitrust laws limited their participation in long distances. Nonetheless, the corporation all established departments to control and manage the transport of their charges centrally. By the 1920s, most of the multinational mining corporation had Traffic Departments. They concentrated the information about rates in the United States and South, for different types of freight and distances. They would then purchase and pay for the shipping’s, track the merchandises, take care of delays, and build agreements with the communication companies. It was a centralized department for the holding companies, but its agents were widespread in the territory, from


\textsuperscript{45} Marcosson, \textit{Anaconda}, p. 205.
Seattle to Laredo, and from New York to Valparaiso. Traffic Departments not only controlled the metal shipping from the smelters to the markets, but some of the internal traffic, as of concentrates to plants and refineries, the shipment of supplies and technology, the payment of taxes for each of the flowing merchandises, and even the transportation of staffers between divisions. The officers of the department oversaw audit the movements of the technical staff of the company and arrange their migration status when crossing international lines. All of these functions required a high degree of specialization and technical expertise. Only the Traffic Department of the United States Company, only operating in the United States, Alaska, and Mexico, concentrated information about 600 different tariffs for transporting since heavy machinery to letters and personnel packages.\footnote{Ax-I-Dent-Ax, March 1919, p. 23; September 1931, p. 15; June 1929, pp. 1-11; January 1930, p. 29; September 1930, p. 6}

The coordination of the different divisions of the company through these departments was crucial in several moments. The Traffic Departments had to ship and take care of the railroad routes themselves in Mexico between 1911 and 1914, as railways were a frequent target for the different factions of Mexican Revolutionaries. During the First World War, these departments had to negotiate directly with the federal government of the United States, as they took control over the railways and increased the rates generalized. As with the private companies, Traffic offices offered leverage for the multinational corporations to minimize their expenses in transportation, while observing the antitrust regulations. Moreover, the departments of the different multinational corporations often acted together. In 1922, Anaconda, Asarco and U.S. Company departments pushed the Southern Pacific Railway Company to rehabilitate their freight lines in the West and the state of Sonora. After the common negotiation, the company not only improved their lines, affected by the Mexican Revolution, but connected Arizona with Nogales through Hermosillo.\footnote{Knight, Alan. The Mexican Revolution: counter-revolution and reconstruction. Vol. 2. U of Nebraska Press, 1990, p. 374; USSRMco, Annual Report, 1914; ACHRMP, FN, JD, Actas e informes, Vol. 1, Exp. 2; ACHRMyP, Norteamericano, Dirección General, Correspondencia D.S. Calland, Vol. 9, Exp. 13. 12-18-1914; ACHRMyP, Otras Compañías, vol. 119, folder 111}

To be sure, the Traffic Departments connected the different divisions of the company but also the communication with external agents, as governments, railroad firms, and other mining corporations. Internal and external communication among the firms conforming the holdings of the multinational was key in the homologation of their technologies and the integrations of their
productive chains. It was, nonetheless, not the only one. The corporations also integrated their divisions through the centralization of their supply chain in many levels. Smelters of big mining corporations usually depended in small subsidiaries of the parent company for their supplies of coal, useful in the high furnace process. The U.S. Fuel Company for the U.S. Company, the Coal Department of Anaconda Copper, and the Peabody Coal Company of Kennecott fueled the heat transforming the metal.\textsuperscript{48} Lime and timber departments of subsidiaries were frequent in Montana and Utah, used in the mines and the smelters, and could also sell the input to smaller companies around.

Nonetheless, more important were the supplies of more specialized chemicals and machines, generally supplied by divisions or departments specialized in acquiring mining equipment. In 1904 the United States Company acquired the Bingham Mercantile Company, a small store in the Bingham Canyon in Utah, to provide some mining equipment for the local mines and consumer goods for workers. Soon, the firm transformed into the United States Stores Company, which was an intermediary of all the divisions for the purchase of materials, profiting from centralized knowledge of prices in different industrial cities in the United States, as well as of transportation fees and time requirements. Combined with the Traffic Department of the parent company, the U.S. Stores had agents all over the United States, Alaska, and Mexico. The department reduced prices through consolidation, allowed the parent company to control the expenses of the divisions, at the same time unifying the subsidiaries technologically.

Map 2. Purchase orders of the United States Stores Company, 1923-1939

Map 1 shows the complex internal circulations of products made by the United States Stores in the 1920s and 1930s. For the most part, the U.S. Stores provided with top technology, spare parts and specialized materials from the industrialized East and Midwest, but one of the significant functions it fulfilled was the homologation of consuming practices among engineers. Alongside gold drags, cranes and seven-thousand-gallon pumps, the company officials asked the United States Stores Company for the shipping of needles and thread, lady’s wristwatches, radios, tennis rackets, electric heaters, motorcycle supplies, cans of Paraguay tea and house furniture among others. The case was not an exception in the mining titans of the era, the Mountain Trading Company, of Anaconda Copper, and the Phelps-Dodge Mercantile Store. The maintaining of a familiar bubble was, in this way, not only company policy but a self-designed blueprint by the company officials.

The subsidiaries and departments specialized in technology, and consumer goods for staffers reveal another dimension of the corporations: their technicians. The productive features of the corporation were a composition of industrial mines, big and advanced plants and efficient

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49 *The Magazine of Wall Street and Business Analyst*, Volume 32, 1923, p. 52
railroad systems. These productive units extracted ores from the ground produced mineral concentrates from the ore, refined bullions from the concentrates, transported metals into the markets and provided supplies back to the productive units. More than a hierarchical relation, a technical blueprint of the company organized this material circuit. The transit and stores departments showed the internal communication and the network economies of the multinational corporations at that time, the scale in the transmission of information and the role of planning. These technical processes were neither entirely decided by the divisions, only relating to the holding as an alliance of capital, neither entirely imposed by the parent company, replicating the blueprints of a centralized model. On the contrary, the central departments show a complex interaction between several subsidiaries and departments. Moreover, technicians in rotation mediated the relations between the different organizations inside the corporations.

Salt Lake City was a center of research for several companies. The Midvale Laboratory was, after Cambridge, the most important research center for the United States Company. American Smelting Company, additionally, also installed their central laboratory in their plant in Murray, in the Salt Lake Valley. In particular, they dealt with demands for smelter gases in the Salt Lake Valley, Asarco had an office specialized in the research in the effects of the Sulphur dioxide and heavy metals expulsion into the atmosphere. Utah Copper, and later Kennecott, located the laboratory in its smelter in Garfield, Anaconda located its central labs in Butte, Montana, but the Research and Development were coordinate with similar departments in every division. Finally, the research departments of the companies related to universities to pursue their objectives. The Central Laboratories of the United States Company were in the Massachusetts Institute of Technology, the Alma Mater of the founder Albert F. Holden. The company offered, on top, two scholarships every year for investigation in their labs. The U.S. Company, the Kennecott and the Anaconda offered similar fellowships to engineering students in the University of Utah and the mining students, and in 1952 the Kennecott transferred their central research center to the University of Utah.50

The limits between control and coordination were very thin, and assistance and auditing were often combined. Technical officers in the central research departments provided to the

subsidiaries with valuable technical advice to better profit the ores in the several spaces. The Kennecott Research Center controlled and expanded the research on the four western mining division. The Director of Research coordinated, form the central laboratory, experiments in the recovery of copper, gold, and molybdenum in the different divisions of the metallic giant. Founded in 1917, the Research Department of the U.S. Company had four main laboratories, the central at the MIT, the Alma Mater of Holden, and three more in Utah, Alaska, and Mexico, employing around 30 different scientists. Thirty years later, the department employed around 50 technicians in 9 different locations. This international organization researched the metallurgic values, industrial processes, and mining engineering in all the divisions, and evaluated the innovations created in all of them. The department coordinated the invention of portable conveyor belts in Alaska, the use of liquid oxygen as explosive in Pachuca, the design of a pneumatic press for the Midvale forge, and the experimentation on differential flotation on California, Hidalgo, and Utah, among others.  

One way of this cooperation took the form of General Officers. Asarco, United States Company, Anaconda, and Kennecott had all the middle step between the division’s management and the Executive Committee, the General Officers. The importance of that step was not an organ of direct authority. The division managers in the 1920s and 1930s participated in the Vice-presidents Board, which decided the general strategy of all the divisions. That organ, along with the Board of Directors and the Executive Committee, represented the classical scheme of Chandler: authority and hierarchy as a pyramid, but this existed only in the beginning of the corporations, after the first mergers. Trustees, directors and general officers had, mostly, regulatory obligations. In contrast, in the 1910s and 1920s, officers, instead, operated more as consultants than as authorities with the different departments of divisions. Geologists, chemist, engineers, and agronomist of the general Officers interchanged information with divisions, evaluated new properties, innovation in processes and changes in the organization of the productive units.  

Nonetheless, the ultimate mechanism of control and coordination of the multinational corporation was the flux of experts and technicians among the parent company and different divisions. Some of the transits were temporary, commanding experts to outside consulting to the subsidies in specific problems, sometimes experts consulted regularly the divisions. Usually, top staffers of the corporation held several obligations in different divisions, obligating them to maintain coherence among regional subsidiaries. Finally, long-term employees usually followed mobile paths in their careers, circulating between the several divisions of the company. The corporation was, in this way, not only a hierarchical structure but one that facilitated horizontal relations between the technicians and managers. The subsidiaries benefited from these transfers by accessing to highly trained staff without recurring to the market. Managers of the divisions played corporate politics to employ promising officials already into the circuit of the United States Company, competing with other departments of the company for the best technicians. The Mexican and Alaskan operations, located far from the technical and financial headquarters, had to offer better conditions for the staff. When the Mexican division wanted to hire Kein W. Emerson, an employee at the Boston headquarters, they consulted the vide director of the foreign division, S.B. Douglas, letting him know that they planned to offer Emerson a salary 33% higher. Douglas counseled the Mexican manager to double the increased offer. “I see no purpose in having him go to Pachuca unless he feels that by so doing, he is being promoted and that the salary is entirely satisfactory” - he argued.

The migration inside the United States Company provides an image of the western expansion of mining corporations. At the beginning of the XX century, the company engineers were usually educated in the East Coast, being hired by the headquarters in New York and Boston, and migrating to the west for promised positions. Gradually, west trained technicians could enter into the global transfer system of the company, expanding to Mexico and Alaska. In general, the transfers to Alaska and Mexico had an implicit or explicit promise of return into the central structure of the company. This pushing of the corporate boundaries into the north and south followed the expansion of the frontier, this time of eastern corporations and their experts. An analysis of the movements of the top officials reveals the highly centralized and multinational

53 AHMCRMyp, Administración oficina Boston, vol 58, folder 9; AHCMRyp, Relaciones Laborales, vol 123, files 8, 15,30.
system of global officials in the United States Company during the 40 years of its international operation. Map 1 shows transfers among organizations and spaces. As we can observe, the primary circuit connected the Mexican division, the West operations, and the East headquarters. The map also presents a hard interaction between the small companies into the occident, stronger than the relations between Alaska and Mexico, for example. In short, the map illustrates an international corporate structure of mobile engineers with two centers: Boston and Salt Lake City.

Map 2. Mobility among divisions of the U.S. Company, 1908-1950

This circulation implied that the company centralized the hiring of their professionals, suppressing, de facto, the market for engineers at a local level. Several studies have highlighted the social and organizational functions of corporate transfers. The trade-off between promotions and geographical mobility created a bound of sacrifice-reward among the mandated officials in the local enterprises.\(^{55}\) Transfers could also prevent excessive integration into local societies, and

the loss of internally formed human resources into other companies. The preservation of the bubble and the coded information by these transfers, nonetheless, limited the capability of the company to absorb staffers from the local level. Protecting the technology and information inside the corporation implied the exclusion of external actors, especially local technicians. In any case, the network was not only a managerial decision, but a technical map. It was a blueprint of technicians, not a pyramid of hierarchy.

Conclusions

On September 11th, 1973, Allende was overthrown and died inside the Palace of Government. The CIA had supported a military coup in favor of general Augusto Pinochet. In the next months, nonetheless, Codelco did not disappear. The mining corporations were not profitable enough for them to keep in operation, and they had stopped investment in their Chilean divisions years before. Kennecott and Asarco had pushed the CIA and the Chilean government for an increase in the price of the divisions, not a reverse in the decision to expropriate. All of their solid power melted into the air. American Smelting sold their Aguascalientes Smelter in 1930; Phelps Dodge closed its Nacozari plan, in Sonora, in 1931. In 1947 the United States Company sold their Mexican division to NAFINSA, a development agency of the Mexican government which held some other small enterprises, and their Canadian division to local capitals. In 1971, Anaconda sold the biggest copper mine in Mexico, Cananea, to the Mexican government.

The multinational system they had implemented was destroyed, and it was next to impossible for them to regain relevance on a domestic level. In that contraction, public policies were just as important as corporate decisions. The increase in scope and further integration of activities but on a national level did not modernize or improved their organizations but destroyed them. They never recovered the profitability even when manufacturing consumer goods and they could not disrupt the market of established actors in the energy business. Once they started that road, they could only go further, and only Phelps Dodge, the oldest of them, did not change of management.

They were at the same time newcomers and early comers to the Chandlerian firms. The extraction of “raw” materials implied technological and material fluxes in a complex Global Value Chain. The multinational corporations served as a link of disconnected economies of scale, between the buyers and the producers of metals. The first step was the consolidation of the local firms and then the integration into a global corporation. First, they manage to revolutionalize the extraction methods of metals, which allowed them to consolidate mining properties. The growing need for new ores implied, also, the growth of the companies from the East to the West, to the North and to the South. The most mineralized territories, soon, became hubs of multinationals with industrial mines and modern smelters.

The transformation of production altered the dynamics of the distribution chains, and the growing market fueled further product developments. The selling agencies in the east integrated into the productive structure of the mining companies, absorbing refineries to process the metals from the west in the industrial environment of Chicago and New Jersey. Nonetheless, further consolidation implied their subordination as departments instead of subsidiaries, and dependent on communication from the mining and metallic divisions. In any case, as the company consolidated its operations, divisions became more dependent on each other to be profitable and transformed into departments. Railroads, selling departments, supplies divisions, and research laboratories operated as successive layers in the divisions and holding of the mining multinationals.

Internal communication and circulation became one of the essential features of the multinational firms and operated not in a single hierarchical ladder, form the Board of Directors to the division managers, but on a layered technical organization. The organization of the multinational was less a hierarchical pyramid and more a set of technical blueprints, with points for contact in every division, department, and product. Materials, technology, and technics flowed into the map of the corporations, and so the model of the companies was led by engineers and not managers. By the 1930s they successfully operated an internal flux of inputs, concentrates, technology, technicians, refined metals, and some consumer products. All of the systems of the corporation was the result of thoughtful design and not managerial adventures. That is also the reason why the shifting economy of the continent, from a highly integrated regional value chain to a national centered market, was lethal for most of them.
The restriction to a national operation was the preamble of the final decay of these Underground Leviathans. In the after-war period, fighting with the low tendency in the prices of metals, they had diversified and integrated their operations. Anaconda, Phelps Dodge, Kennecott and U.S. Company by the 1960s had divisions manufacturing copper and lead products, especially for electrical equipment. The new divisions changed the nature of their exploitation, and some of the companies had organizational reforms: U.S. company transformed into U.V Industries and Phelps Dodge changed to Phelps Dodge Industries, manufacturing in the West coast. Kennecott and U.S. Company also invested in oil in Texas, especially in joint ventures, and Phelps Dodge invested in Uranium in the Southwest. In the next years, they experienced takeovers attempts from new shareholders, but finally were absorbed by new firms. In 1965 a Mexican firm, Grupo Mexico, acquired 49% of the shares in the American Smelting company, effectively taking control of the Executive Committee. In 1977, Atlantic Richfield Company absorbed Anaconda Copper, and the next year Sharon Steel Corporation acquired the U.S. Company, by then named UVI Inc. Phelps Dodge and Kennecott had to shut down most of their plants, in the verge of bankruptcy, and ten years later British Petroleum took control of the rest of Kennecott’s holdings. They had survived Allende, but barely.

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