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OTTAWA

*THE COAL MINING INDUSTRY  
OF POLAND*

T. W. WLODEK

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THE COAL MINING INDUSTRY OF POLAND

by

T. W. Wlodek\*

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ABSTRACT

This report supplies details, judged to be of interest to the parallel Canadian industries, on the history, resources, management and administration, safety programs, labour status and other facets of the mining industry of Poland, which has been reorganized, mechanized and expanded, under government ownership, since 1945. With an estimated 16 billion tons of mineable coal available and an annual output of some 127 million tons--a fourfold increase in 20 years--in 1966 Poland ranked fourth in Europe and seventh in the world as a coal supplier.

New mining methods, new mining machinery, comparisons of production and efficiency attained underground, new trends and applications for the future, safety programs, and the special status of the Polish miner are all discussed and illustrated.

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L'EXTRACTION DE LA HOUILLE EN POLOGNE

par

T. W. Wlodek\*

RÉSUMÉ

Dans le but de renseigner l'industrie minière canadienne, ce rapport renferme des détails intéressants sur l'histoire, les ressources, la gestion, l'administration, les programmes de sécurité, le statut de l'ouvrier et d'autres facettes de l'industrie houillère en Pologne, qui a été réorganisée, mécanisée et développée depuis 1945 en tant qu'entreprise nationalisée. Avec des réserves évaluées à 16 milliards de tonnes et une production annuelle de quelque 127 millions de tonnes (qui a quadruplé en 20 ans), la Pologne occupait, en 1966, le quatrième rang des fournisseurs européens et le septième rang des fournisseurs mondiaux de charbon.

Ce rapport explique et illustre les nouvelles méthodes d'extraction et le matériel nouveau; il donne les comparaisons sur l'efficacité de l'exploitation souterraine, il précise les tendances et les applications nouvelles pour l'avenir; enfin, il traite des programmes de sécurité et du statut spécial du mineur polonais.

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## GENERAL INTRODUCTION

In Poland, coal mining and the coal industries in general are regarded as of great importance nationally, and much attention is paid toward their further development, improvement and modernization.

In Europe, Poland is classified as one of the leading coal producers, being exceeded only by the U.S.S.R., the United Kingdom and West Germany. (The United States, the Soviet Union, the United Kingdom, West Germany, Poland and China produce more than 80 per cent of the world output.)

The total resources of bituminous coal in Poland are estimated at 85,000 million tons up to a depth of 1,000 metres, 112,000 million up to 1,800 metres, and 135,000 million tons up to 2,000 metres. From these total figures, 11,000 to 12,800 million tons up to 1,000 metres deep are easily mined. About 15,500 million up to 1,800 metres in Upper Silesia, and similarly 400 to 800 million in Lower Silesia, totalling up to about 16,000 million of coal is at present economically mineable in Poland.

The beginnings of Polish coal mining can be traced as far back as the fifteenth century, and mining on an industrial scale began about 1760. Long years of tradition in Polish coal mining have built up the basis for the successful present development of the industry. The rapid mechanization and reorganization since 1945, and the achievement of a high degree of safety in the mines, have contributed to a bituminous coal output in 1966 of over 122 million tons.

Rich and thick deposits of coal, together with a good geographical location, have made mining operations economical and competitive. A steady improvement in the quality of the extracted coal, an increase of the calorific value of graded coal, and a reduction of contamination in exported coal are generally recognized. Because of the high quality of Polish coals, especially coking coal, other countries are interested in importing them.

Coal, being a basic source of energy, is responsible for a multiple increase of the chemical, building, transportation and agricultural industries. It is noteworthy that in Poland the importance of coal is growing steadily, whereas in various other countries including Canada, during recent years, the share of coal in the energy balance has been diminishing in favour of oil and natural gas.

Over 95 per cent of Poland's electrical energy is derived from bituminous and brown coal. The demand for energy, because of a steady increase of industrial requirements, has necessitated a greatly enlarged production of (a) cheap fuel coal to satisfy the demands for electric power; (b) coking coal required by the iron and steel industries and growing export trade; and (c) coal for the chemical industries, which produce pigments, drugs, plastics, artificial fibres, etc. According to estimates, by 1985 this demand for energy in Poland will increase by about two and a half times, and bituminous coal production by about 75 per cent. It is planned to meet these large expected future requirements by the reconstruction and modernization of old bituminous mines, by the development of new, modern mine complexes and by a tremendous build-up of brown-coal mines in conjunction with electricity-generating plants.

In 1945, after the German invasion, the Polish government took over the coal mines, which were in a devastated condition. The Polish mines that had been owned and exploited by foreign capital had been neglected as to modernization of mining technique, and required major investment. (The last horse-drawn coal cars were removed from coal mines after the nationalization of the coal industry in 1945.) Means of transportation were disorganized, greatly needed supplies were lacking, and, above all, the available manpower had been reduced by about 25 per cent through enemy action and atrocities. These tremendous losses in population were a great handicap in the restoration of the coal industry and other industries in Poland. Figure 1, a diagram of frequency distribution of population as at 1965, illustrates these tragic effects on manpower. The direct effect of the war is well illustrated by the drop between the ages of 45 and 55 years, and the indirect effect by the population drop between the ages of 16 and 25 years.

Setting an example probably unparalleled in the history of coal mining, Polish engineers and miners rebuilt, reorganized and modernized the whole Polish coal mining industry in the twenty-year period 1945 to 1965. Modernization, reconstruction, and extension of existing mines and construction of twelve new mines resulted in an increase of yearly production from 47.3 million tons in 1946 to 122 million tons in 1966. This nearly threefold increase in total output was achieved through effective central planning of the industry, sacrifices by the miners, technical pressure exerted by the requirement of coal for industrial purposes and a desire to increase exports in order to pay for imports of urgently needed material and equipment.



The importance and the influence of the mining industries -- particularly coal mining -- in Poland are underlined by the fact that the Professional Union of Miners has over 565,000 members, some 320,000 of whom are employed in coal mines; membership in the Association of Mining Engineers and Technicians amounted to 25,528 in 1965. The national saturation of coal is also revealed by the fact that about 32 per cent of all railway transportation within the country is taken up by coal movements; 15,000 railway cars are loaded daily with Polish bituminous coal. Underground, the length of transportation tunnels amounts to 3,800 kilometres; of this, 1,850 kilometres are with locomotive traction.

#### ADMINISTRATION AND MANAGEMENT

Government ownership of the coal industries since 1945 has brought all coal mines under one Central Planning Bureau which is under the Department of Mining and Energy. This department also administers the oil and gas industries and the generation and distribution of electricity and gas. Other mining activities in Poland, not related to the coal mining and coke-oven industries, are under the Department of Heavy Industry.

In the Polish Department of Mines and Energy, the coal mines are divided into seven managerial divisions each of which is responsible for about twelve coal mines. These coal divisions (Zjednoczenia) form semi-independent government companies responsible for economical production, contact and representation with other government organizations and supervision of the fulfilment of production and investment plans approved by the Department. Each division controls its member mines with respect to production quotas, costs and applications for new capital. It is government policy to leave as much as possible of economic independence to the coal divisions.

There are about eighty producing coal mines in Poland. Each mine management in the division is responsible for provision of investment and operational capital, and for the transfer of internal profits to its corresponding management division. Each is regarded as a legal unit, acts on behalf of the mine in outside dealings, and submits regularly its balances and reports on earning and losses to the corresponding management divisions.

Parallel with technical improvements and modernization of old coal mines, a proper degree of attention has been directed toward improvements in safety and hygiene and in the comfort of working conditions for the Polish miners.

During the first twenty years of the modernization of the old mines, in places and phases where production was held up by "bottle-necks", the complete reconstruction, based on scientific research, of 36 old coal

mines was undertaken with a view to maximum return on money invested. This was to be achieved by use of harmograms and by study of the optimal conditions of mining production to be embodied into the complete modernization and rebuilding program.

About 70 per cent of the available investment funds have been used for expansion and modernization of these old mines. The construction and preparation for exploitation of 78 new mining levels was undertaken, and these now contribute over 200,000 tons of coal per day. These new mining levels, modernized and mechanized, which have resulted in a more intensive production from existing mines, are credited with an increased production of about 33 per cent. A great deal of attention was directed toward the mechanization and electrification of the old coal mines in order to increase the percentage of mechanical mining and loading of coal. In 1965, about 38 per cent of coal came from mining safety pillars left under sites particularly liable to deformation in heavily populated and industrialized areas. It was estimated that between 4,350 and 3,200 million tons of coal was left in pillars, and a large percentage of this coal will be recovered. About 40 per cent of this coal has been extracted using sand fill, about 10 per cent with solid stowing, and the rest by the caving system. The yearly volume of sand used for hydraulic fill amounts to about 42 million cubic metres or about 200,000 tons daily, which requires 200 trains, each pulling 50 twenty-ton-capacity cars.

In addition, the Central Planning Bureau has completed the designs of modern and new deep coal mines. In these designs mechanization has been based on scientific and experimental investigations, using Polish-developed types of mining machines and Polish-made handling machines, cutters, coal combines, coal ploughs, conveyors, mine locomotives and modern underground installations. A modern approach is also shown in the design of surface buildings and auxiliary installations required for efficient and economical operations of mines as a unit. Of these completely new mines, twelve are in operation and two more are under construction.

In all mines, the trend to replace energy supplied from steam and compressed air with the more economical electrical energy is constantly pursued. Also, large investments have been set aside for mechanical sorting and cleaning installations which have resulted in improving the quality of the coal.

Very special attention has been directed towards increasing the production of the most valuable grades of coking coal in the Rybnik district, for this type of coal is in great demand by the steel industries in Poland, and for export. The Rybnik district, some 1,500 square kilometres in area, located in the southwestern part of the Upper Silesian Basin, is, at present, the most dynamically developing centre of the coal industry in Poland. At present, in the district, there are nine old mines and four

new mines in operation, and three mines are under construction. The total yearly output, currently 20 million tons from this area, should, according to planning, increase to 40 million tons, 70 per cent of which would be coking coal.

The mining operations in Rybnik district are hampered by the presence of methane, with consequent danger of explosions. This requires the application of intense de-methanization installations. High gas content in mines favours the application of compressed air-driven mine equipment. With intensive de-methanization and ventilation, and automatic measurements of methane content, it is possible to use electric power directly in gaseous mines. The electric power is six times cheaper than compressed air power. If the methane content exceeds the safe range of one per cent, the electric power supply is automatically cut off and warning signals are transmitted from the gallery to the despatcher of the mine.

#### BROWN COAL

The brown coal mining industry is new in Poland, having been built up extensively only during the past twenty years to supplement bituminous coal in filling the huge demand for electrical energy which has resulted from the rapid growth of the various other industries. In 1945 the existent pre-war brown coal mining installations were technically outmoded; most of them had been damaged during the war. Only one brown coal mine, in Turow, had some industrial significance. Now, brown coal is mined extensively in central and southwestern Poland.

As planned, the percentage of electricity generated from brown coal has risen from 1.5 per cent in 1950 to 29.0 per cent in 1965, and is expected to reach about 55 per cent in 1980. In order to meet these requirements, Polish planners are rapidly developing open-pit mining of brown coal in a few selected areas, namely, at Konin, Patnow, Adamow, Turow, Belchatow and Legnica, where built-up electrical generating plants will, in 1980, reach a total capacity of 15,000 megawatts. These plants will produce about 60 per cent of the total required electrical energy, which represents about 80 per cent of the planned increase and leaves only 20 per cent of the expected increase in production of electricity to be derived from hard coal, oil, natural gas and hydro power resources. Electrical energy, generated at or near the brown coal mining sites, feeds the Polish grid at 400 kV grid tension and is distributed to the important industrial centres. Where possible, the exhaust steam from the large turbines is used to heat neighbouring towns and villages.

This new industry has required a speeding-up of training of technical personnel and the transfer of labour force from other fields; an increase of geological drillings to establish existing resources; and much organizational work by the Central Mine Planning Bureau. This Bureau,

in Wroclaw, employing about 1,900 persons, works in close cooperation with other research centres and technical organizations. It plans the mining programs and designs the underground, open-pit and surface installations for both brown and bituminous coals.

The designing and construction of new centres for brown coal open-pit mining, combined with electrical plants, involves such centres and planned electrical capacities as: Konin district, with 600 megawatts installed, completed in 1965; Patnow, 1,200 MW; Adamow, 625 MW, and Turow, 2,000 MW, to be completed in 1970; Belchatow, 6,000 MW, and Legnica, 2,500 MW, planned for 1980. The whole plan foresees the total output of electrical plants using brown coal as 4,425 MW for 1970, increasing to 7,425 MW in 1975, and finally to 12,925 MW in 1980. These figures, in comparison with a total of 165 MW installed in 1960, vividly demonstrate the basic changes that are taking place in the energy field in Poland.

At present, there exists a trend to build large generating units of 125 MW and 200 MW capacity grouped in separate block-units composed of steam boiler, turbine and generator, forming independent installations which would have the most economical thermal efficiency. The ultimate plan to increase the total installed electrical generator capacity to 12,925 MW would require a tremendous increase in the volume of brown coal mined in Poland. Brown coal mining reached 23 million tons per year in 1965, and further expansion is planned to reach 113 million tons annually by 1980, along with some 132 million tons of bituminous coal by 1970.

#### MINING MACHINES

The expansion of the coal mining industry has required a large increase in the production of mining machines in Poland. An increase from 57,000 tons in 1950 to 233,000 tons in 1966 is recorded. At present the importation of mining machines amounts to 2 to 3 per cent of total requirements. Mining machines are manufactured in 16 special plants, and, in addition, four other steel plants are manufacturing related accessories, forming the union of the industry of mining machines, "Polmag", with its head office in Katowice. Further some special mining machines are manufactured also by steel plants subordinated to the Ministry of Heavy Industry.

The trend to concentration of mining operations has produced a new requirement of increased output from mining machines. They should achieve a daily output of over 1,000 tons from the longwall face in thin seams up to one metre thick, and over 2,500 tons in seams up to 2.5 metres thick. To meet these requirements, the Shearer Loader, type KWB-2A, shown in Figure 2, was designed for coal cutting and power-loading on long-wall faces. The flame-proof design of its electric equipment (60 kW) is for use in gassy mines. The range of diameters of worm-type cutters is from 80 to 140 centimetres and gives an output of about 120 tons per hour.

Figure 3 shows a Shearer-Loader Combine, type KWB-2A (moving on a steel conveyor of a type shown in Figure 8) in operation on a longwall exploitation of a coal seam. To obtain a high output, even in seams that are difficult to cut, the installed power is increased; for example, a 170 kW motor is used in a hydraulic ranging shearer-loader, type KWH-1, shown in Figure 4, and in new two-sided cutting machines, type KBW-3RS, with alternatively lifted and lowered drums.

For mechanical winning of coal in inclined seams up to about 60°, a shearer-loader, type KBS, is used. This machine has attracted a great deal of interest in both Polish and foreign mining centres. A schematic diagram of its operation is shown in Figure 5. This type of machine is used for the extraction of thin seams with a steep angle of inclination. The KBS combine for an output of 660 tons per day consists of a 60-kW-cutting-loader unit (4), a haulage unit (3) to pull the cutting unit, and a fully automated safety winch (1). For increased concentration in development work, the pneumatic rocker-shovel loader, type LKZ-5p, is used; this mining equipment is shown in Figure 6.

Standard mining machines are used as components forming a combined loading and transportation system; for example, a shovel loader (Figure 6), scraper loaders, pan conveyors, and belt conveyors. The advantages of electro-hydraulic drives are applied to Polish mining machines, e. g. the hydraulic longwall coal cutters. The Hydraulic Longwall Coal Cutter, type WSH-60, that is shown in Figure 9, can be also used for loading from tunnel headings. Figure 10 shows a Longwall Coal Cutter, type WSH-60, in operation on a 'Slask'-type Scraper Conveyor. Figure 7 shows a Heavy Armoured Scraper Conveyor, type "PZPC Samson", for operation in longwall faces where heavy shearer-loaders are used. The average output of this conveyor is 300 tons per hour, and the length of the conveyor is 200 or 300 metres. Figure 8 shows an Armoured Scraper Conveyor, the 'Slask', which is a three-chain multidrive conveyor used as track for coal cutters. Hydraulic drives make possible the application of remote control and automation to mining operations. The Polish-designed, fully mechanized, type ASI-1, automated longwall face installation -- a system offering an output to 4,000 tons of coal per 24 hours -- usually comprises the hydraulic roof support, type "Gliwice"; the two-directional shear loader, type KBW-3; the movable armoured conveyor, type Samson (Figure 7), with a plough for removal of fine coal; the fully automatic shear loader is connected with the roof support. Figure 11 shows the self-advancing longwall support, type OSM-1, composed of alternately spaced two and three-leg units attached to the armoured conveyor by means of push rams. This type of support (OSM-1) provides a full mechanization of roof control just behind the coal-getting machine, shifting of armoured conveyor, releasing of units at the waving line, and advancing under the newly exposed roof and resetting for the next cutting operation. This type of support is recommended for minimum 180-metre-long faces and 0.5-metre advances. Figure 12 shows the longwall OSM-1 in operation. The system of armoured

conveyor, stage loader and belt conveyors, all automatically combined with operations on the longwall face, represents the existing trend in Poland, which is to mine coal without manpower at the coal face and to switch from hand-tools to heavy longwall shearer loaders, from light to heavy winches and from screens to the jigs, cyclones and flotation of modern coal cleaning plants.

At present the objective of mining coal with limited manpower at the coal face is first attained in newly constructed mines. A typical example is the coal mine "WESOLA" (joyful, or merry mine), where the proportion of mechanical mining and loading reaches about 95 per cent -- but the total average for old and new mines would be about 50 per cent. The open-pit mining of brown coal is at present fully mechanized.

Since practically all coal mining machines (97 per cent) are manufactured in Poland, it is easy to visualize the amount of equipment that is actually used, and its replacement, to operate over 750 longwall faces and 1,750 headings in the underground coal mining of the country.

#### TRENDS FOR THE FUTURE

While modernizing old mines and introducing mechanization through the construction of coal-cutting and loading machines and through the modern over-all planning of mining operation, the Polish engineers have found that the percentage of small sizes of coal is increasing. Attention has, therefore, been directed towards steadily increasing the amount of large lumps of coal through suitable modification of the construction of cutting and loading machines.

The greater concentration on coal output has led to reduction in number of faces with more production per face, an improvement in economics of materials, a larger output per man-shift, and a shortening and simplification of transportation roads.

Poland produced 122 million and exported 22.4 million tons of coal in 1966. The high standard of coal-mining technique attained has given Polish engineers an organized knowledge of design and construction applicable to new mines outside of Poland, and has built up an export trade in mining machines and mining surface plants. Polish engineers have been called upon to design and construct, in other countries, coal mines equipped with machines of Polish origin. In this undertaking, they are supported by scientific research centres employing trained staffs of researchers, designers and constructors. Polish mining machines and auxiliary equipment are used by the Soviet Union, the German Democratic Republic of East Germany, Czechoslovakia, Yugoslavia, Italy, India, Egypt, Indonesia, Morocco, and other countries. In Poland, it is hoped that a share of mining machine exports can find their way to Canada and help to balance payments for imports from Canada. Import of Polish mining

machinery could be competitive because its durability has been proved during the last twenty years of use, and prices are lower. The constant trend to mechanization, automation, and modernization of the Polish mining industry has resulted in a steady build-up of scientific and technical centres, such as the Central Mining Institute in Katowice, employing over 1,000 people; the Designing and Mechanization Office in Gliwice; the Experimental Office of Mining Design in Wroclaw; the Coal Preparation Design Offices in Katowice, and the Central Mining Rescue Station in Bytom.

Polish bituminous coal, especially the coking coal, will be in demand for export because (a) lower cost of mining as a result of the modernization of mines, (b) improved quality of marketed coal, and (c) high fuel-value in relation to other fuels. The importation of high-quality coal, of the types in demand in Canada, could be envisioned. This, in turn, could help to increase the volume of Canadian exports to Poland.

The production of high-powered combines and automated longwall equipment speeds up the development of mining technique to give the increase of coal output required by dynamic industrialization. The concentration of output from longwall faces is obtained by increasing the length of faces to maximum limits and through effective organization of work. In room-and-pillar faces and headings, high daily output is achieved by use of aggregates for cutting-loading operations with conveyors. The number of production levels, longwall faces, and headings, has dropped, while output has been rising. This concentration on efficiency of production has resulted in a reduction of costs and an increased productivity.

The extent of the concentration of production and the increase in productivity is illustrated by the following comparison: in 1960 there were 243 levels, 810 longwall faces and 4,031 headings active, and in 1966, respectively, 210 levels, 741 longwall faces and 1,767 headings.

The present and the future of the country's economic development depends on the availability of energy. Polish energy resources are limited virtually exclusively to coal, with other sources, at present, of little significance. This makes coal a national industry for both today and the future.

#### THE POLISH MINER

The importance and the size of the coal mining industries, because of their role in the production of energy, have made the Polish miners a rather privileged group in the industrial society of the country. The volume of the manpower involved in coal mining is illustrated in Table 1.

TABLE 1

Manpower Data - Coal Mining, Poland, 1965

Total number of persons employed in coal mining	- 352,100
Total number of persons physically working	- 319,400
Total number of persons underground working	- 210,400

The Amount of Coal Mined

<u>Bituminous Coal (1965)</u>	- 118,831,000 tons
Production of coke	- 15,354,000 tons
Exported Coal	- 21,045,000 tons
<u>Brown Coal (1965)</u>	- 23,594,000 tons
Exported	- 5,199,000 tons

Average Production Per Man-Day Shift

Bituminous Coal Average		
for total employment	-	1,475 kg.
physically employed	-	1,636 kg.
underground	-	2,164 kg.
mechanical mining 46.6%		mechanical loading 50.8%
Brown Coal Average		
for total employment	-	7,248 kg.
in open pit mining	-	13,756 kg.
in underground mining	-	2,864 kg.
mechanized mining	-	97%

The average production per man-day in bituminous mines is **lower in (1965)** -- for total employment, 1,475 kg., and underground, 2,164 kg. -- as compared with 1938, when the figures were 1,738 and 2,413 kg. respectively. The lower current production per man-day is due to the fact that, in the pre-war era of privately owned mines, much less attention was directed towards the preservation of mineral resources; the easily accessible coal veins were therefore mined first. One could also expect that the labour and engineering forces employed by an enterprise run by the State might be less efficient and perhaps reluctant to be



strained to the limit of their possibilities.

In the official statistical statement structure of monthly earnings of labour in Poland for 1965, shown in Figure 13, the Polish miners are in the top groupings, (3,000 Zloty to 5,000 Zloty monthly, with an average pay of 3,500 Zloty). More than 60 per cent of Poles are earning below 2,000, down to 600, monthly. Because of the large demand for a labour force in the coal mining industry, the state is making this profession more attractive, increasing the earnings on the average by 40 to 50 per cent as compared with other industries. The Polish miner, being in possession of the so-called "Miner's Card", enjoys special privileges, such as preference in receiving coal rations, assignment of better living quarters, and better supply of food articles.

In Canada the average earning for miners is \$450.00 monthly. The comparative buying powers of the monthly earnings of Polish and Canadian miners are illustrated in Table 2, in which the prices of four food items and four clothing items are compared. On the basis of such a simplified comparison (used only as an illustration), the Canadian miner could buy three times more than the Polish miner. This statistical deficiency in the earnings of the Polish miners is to some extent compensated for by having lower rents to pay, ranging from 5 to 10 per cent of earnings; cheaper transportation; lower cost of vacations; and other benefits provided by the socialistic State where nearly all facilities are supplied by the Government. The Department of Mining and Energy has over 175 resort centres, in which over 75,000 persons from the mining community spend annual vacations, paying low rents and lodgings. In addition to their established mining holiday privileges, more than 33,000 persons from the mining communities take advantage of other vacation arrangements provided by the organizations serving the labour force in general.

Statistically, the average Pole is eating and drinking better now than before World War II; some comparison figures are listed:

	<u>1933 to 1937</u>	<u>1965</u>
Bread and grain	137 kg.	141 kg.
Meat	19.6 kg.	56 kg.
Milk	262 litres	356 litres
Eggs	114 pieces	162 pieces
Sugar	9.6 kg.	32.6 kg.
Beer	3.4 litres	24.0 litres
Alcohol	0.9 litres	2.6 litres
Cigarettes	672 pieces	1,700 pieces
Cotton material	9.5 metres	19.9 metres

TABLE 2  
Miners' Monthly Wages, 1965

<u>POLAND (3,500 ZL.)</u>			<u>CANADA (\$450.00)</u>		<u>FACTOR</u>
<u>Food Items</u>	<u>Price Per Kilogram Zloty</u>	<u>Amount (kg.) For 3,500 Zl.</u>	<u>Price Per Kg \$</u>	<u>Amount (kg.) For \$450.00</u>	<u>Equivalent \$450.00 3500 Zl.</u>
Bread	4.	875	.30	1500	1.7
Sugar	12.	292	.42	1070	3.7
Butter	70.	50	1.75	257	5.2
Meat	36.	97	2.00	225	2.5
<u>Clothing Items</u>	<u>Price Zloty</u>	<u>Number of Items</u>	<u>Price \$</u>	<u>Number of Items</u>	
Coat	700.	5	\$70.00	6.4	1.3
Suit (Men)	1200.	3	80.00	5.6	1.8
Shirt	150.	23	4.00	112.5	4.9
Boots	370.	9	10.00	45.0	5.0
				Average Factor	3.25

The statistical structure of basic food consumed in Poland in comparison to Canadian consumption is shown in Table 3.

TABLE 3

	<u>Consumption of Basic Foods (kg.)</u>								
	<u>Grain</u>	<u>Potatoes</u>	<u>Meat</u>	<u>Fats</u>	<u>Milk Butter-fat</u>	<u>Protein</u>	<u>Eggs</u>	<u>Fish</u>	<u>Sugar</u>
Canada (1964/65)	67	72	86	19	7	8	14	7	46
Poland (1965)	141	215	49	15	8	9	9	5	33

Because of the existing difference in price structure of food and earnings, the miner in Poland would be very likely to consume more bread (grain) and potatoes because of lower price and easier access.

The Polish miner is practically assured of considerable representation in Parliament (SEJM). At present, labour nominations to run for Parliament are made through recognized labour unions, and their number must not exceed 50 per cent of the available places in the ridings. However, a formal nomination submitted by the Professional Union of Miners, before the election usually results in a seat.

All miners are exposed to a greater risk of accidents, and the Polish miner is not exempt from this danger brought on by his profession. In Polish coal mines and coal briquetting plants, in 1965, 177 persons were killed; 6,164 others were disabled for more than four weeks. With a mining capacity of 118,850,000 tons of bituminous coal and 23,600,000 tons of brown coal, totalling 142,450,000 tons in 1965, it could be concluded that, in order to get out from underground one million tons of coal mined in Poland, a mine community pays with 1.25 lives and 43.3 serious accidents. In comparison with the pre-war statistics, the present rate of fatal accidents is one half.

The Polish mining engineers and coal miners have good reason to be proud of their technical achievements in the field of coal mining during the past twenty years. They look to the future with anticipation of even greater attainments in the modernization of the coal-mining industry and to further improvements in both working and living conditions.

#### ACKNOWLEDGEMENT

The author acknowledges gratefully his indebtedness to the various sources, listed under "References", from which he has drawn the information, statistical data and photographs used in this report, and to P. E. Shannon, of the Mines Branch, for much editorial help.

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# POPULATION IN 1965 ACCORDING TO SEX AND AGE

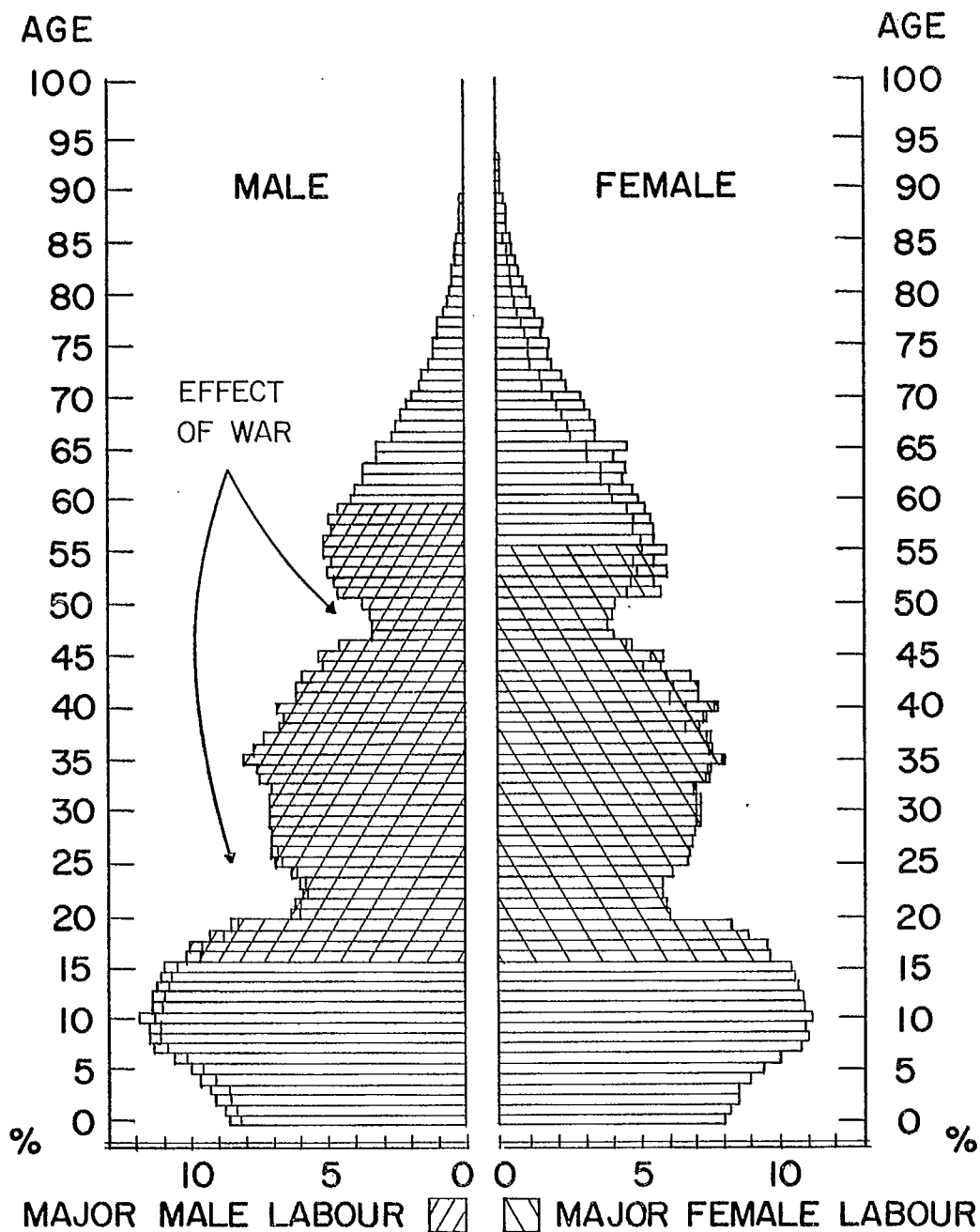


Figure 1. Labour population of Poland in 1965 according to sex and age.

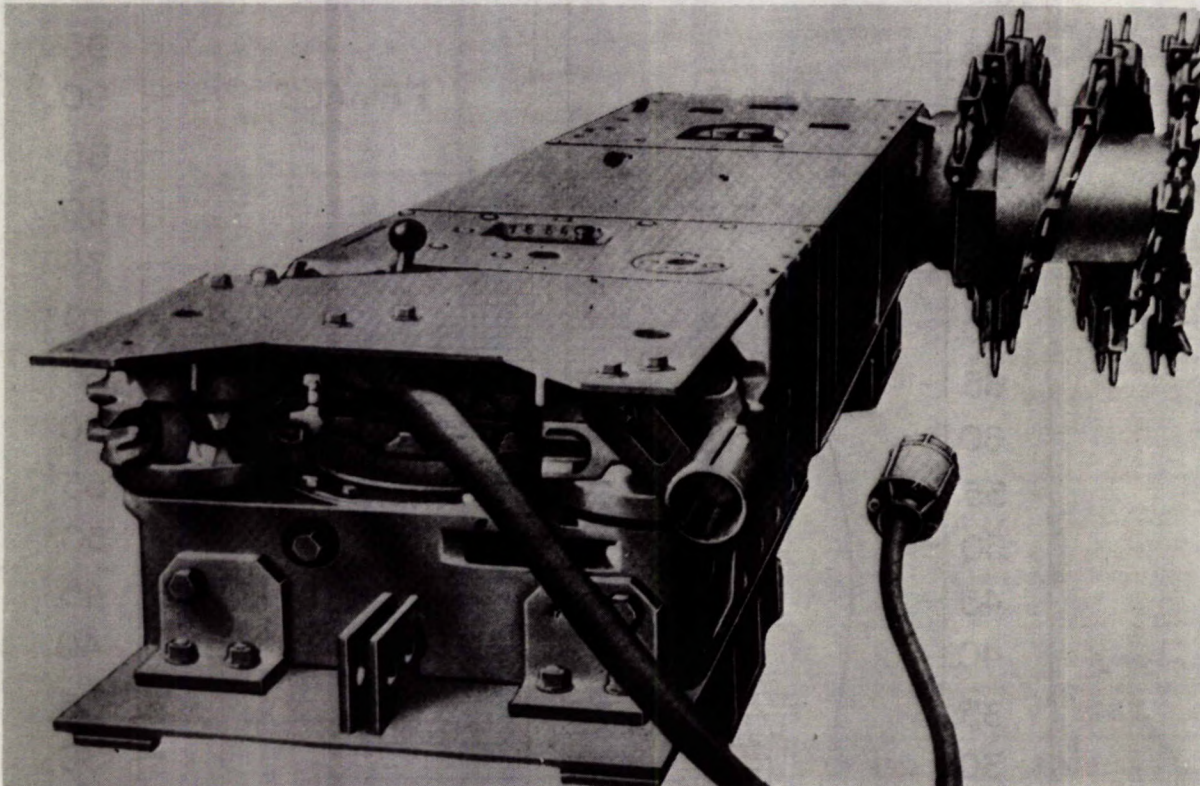


Figure 2. Shearer-loader combine, Type KWB2A.

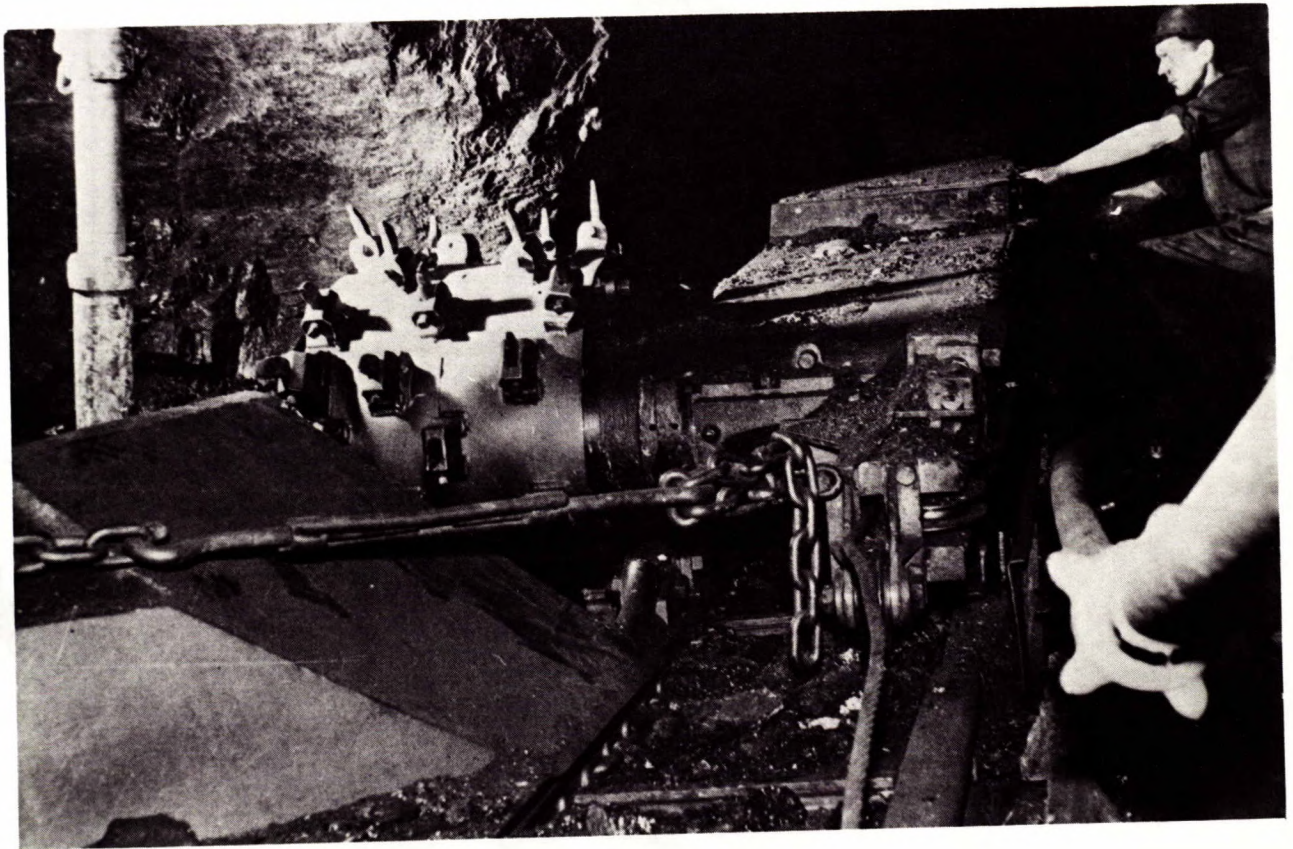
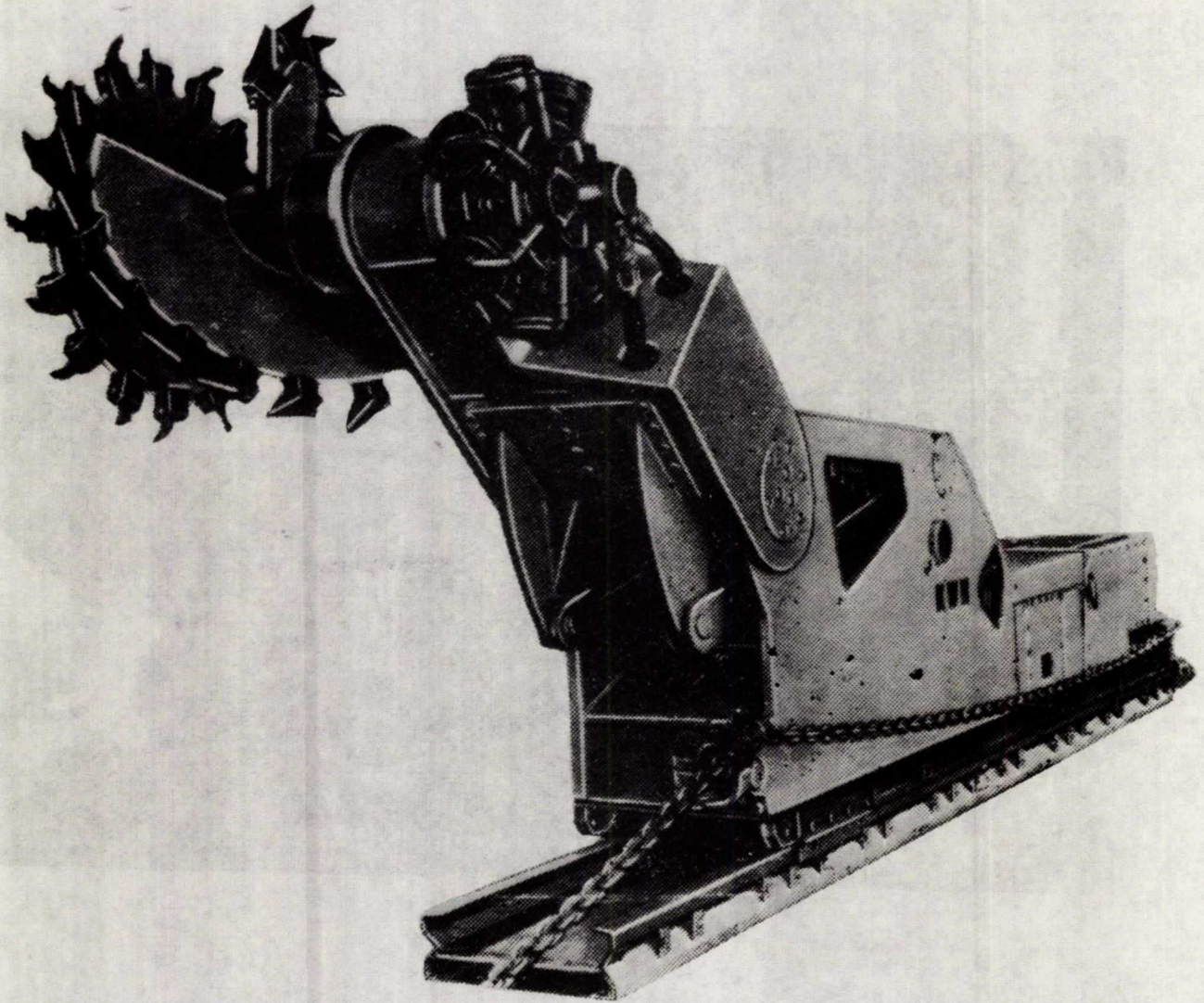


Figure 3. Shearer-loader combine, Type KWB2A, in operation.



*KWH-1 hydraulic ranging  
shearer-loader*

Figure 4. Hydraulic ranging shearer-loader, Type KWH-1.



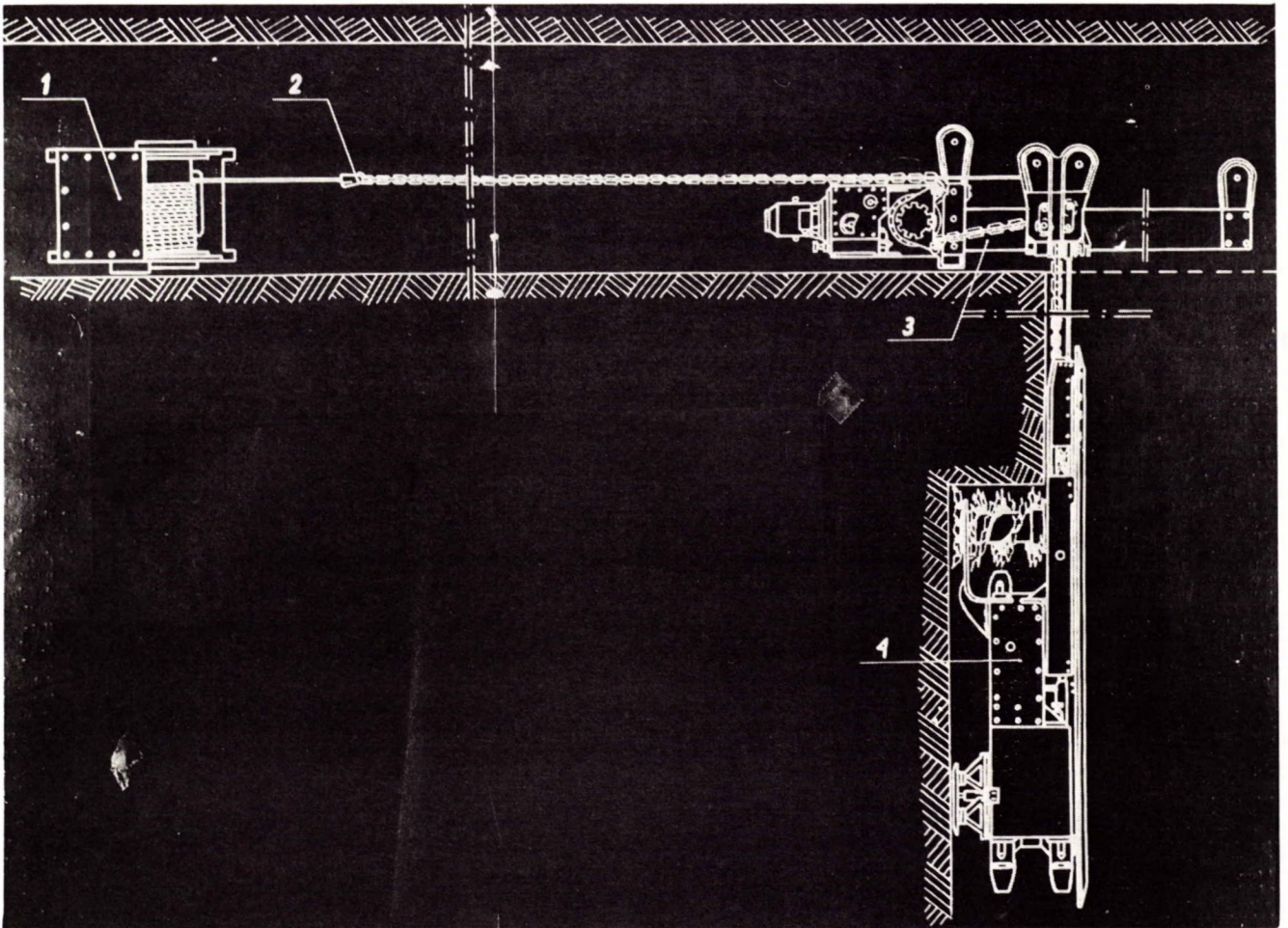


Figure 5. Schematic diagram of shearer-loader, Type KBS.

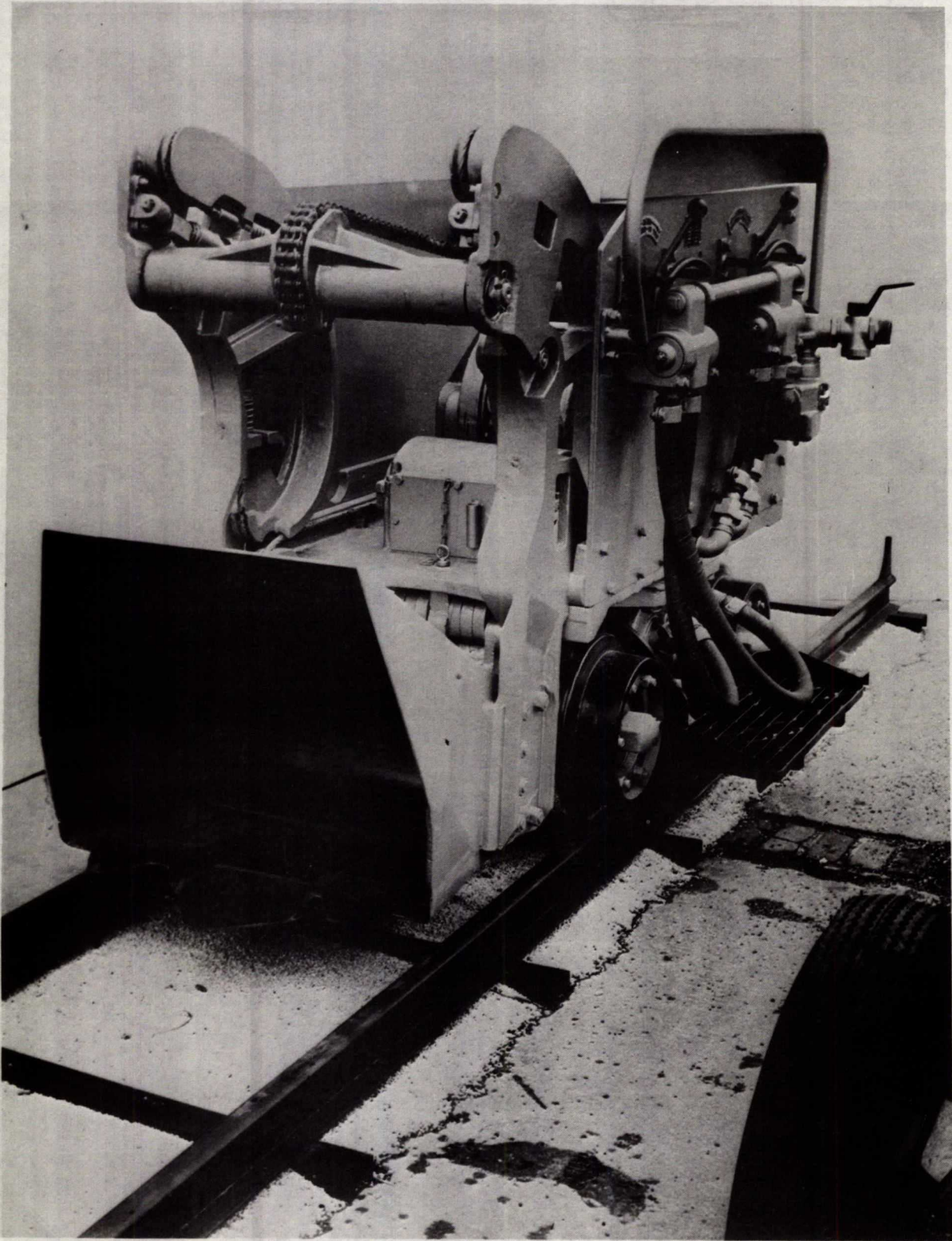


Figure 6. Pneumatic rocker shovel loader, Type LZK-SP.

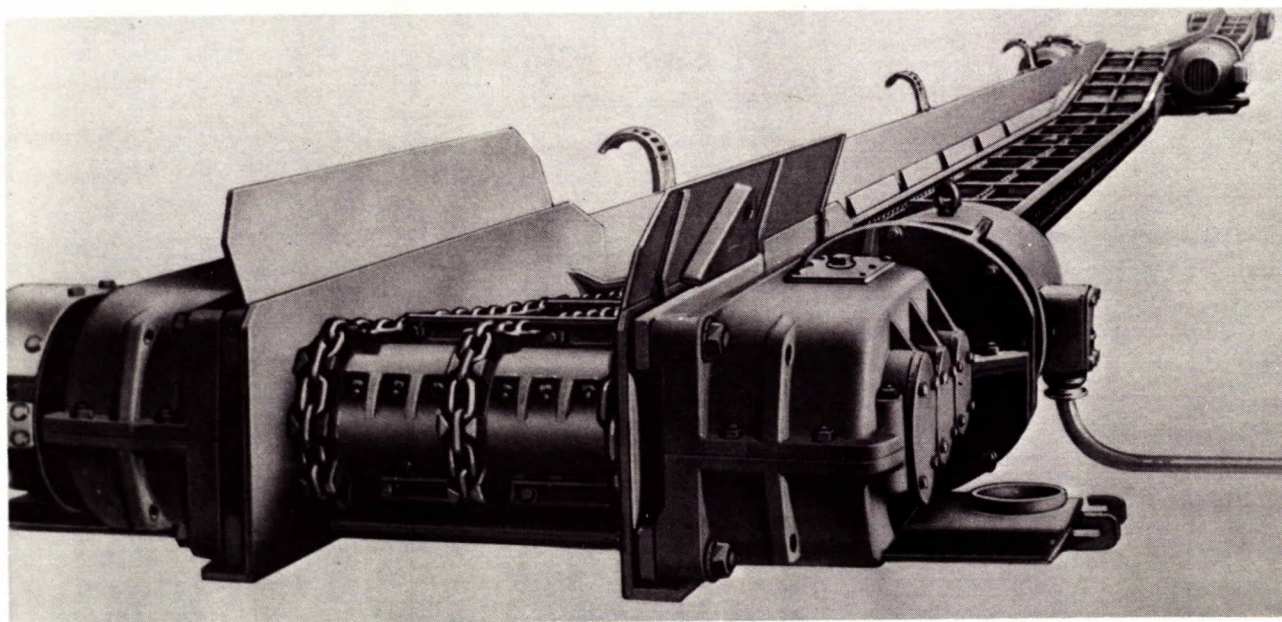


Figure 7. Heavy armoured scraper conveyor, Type "Samson".

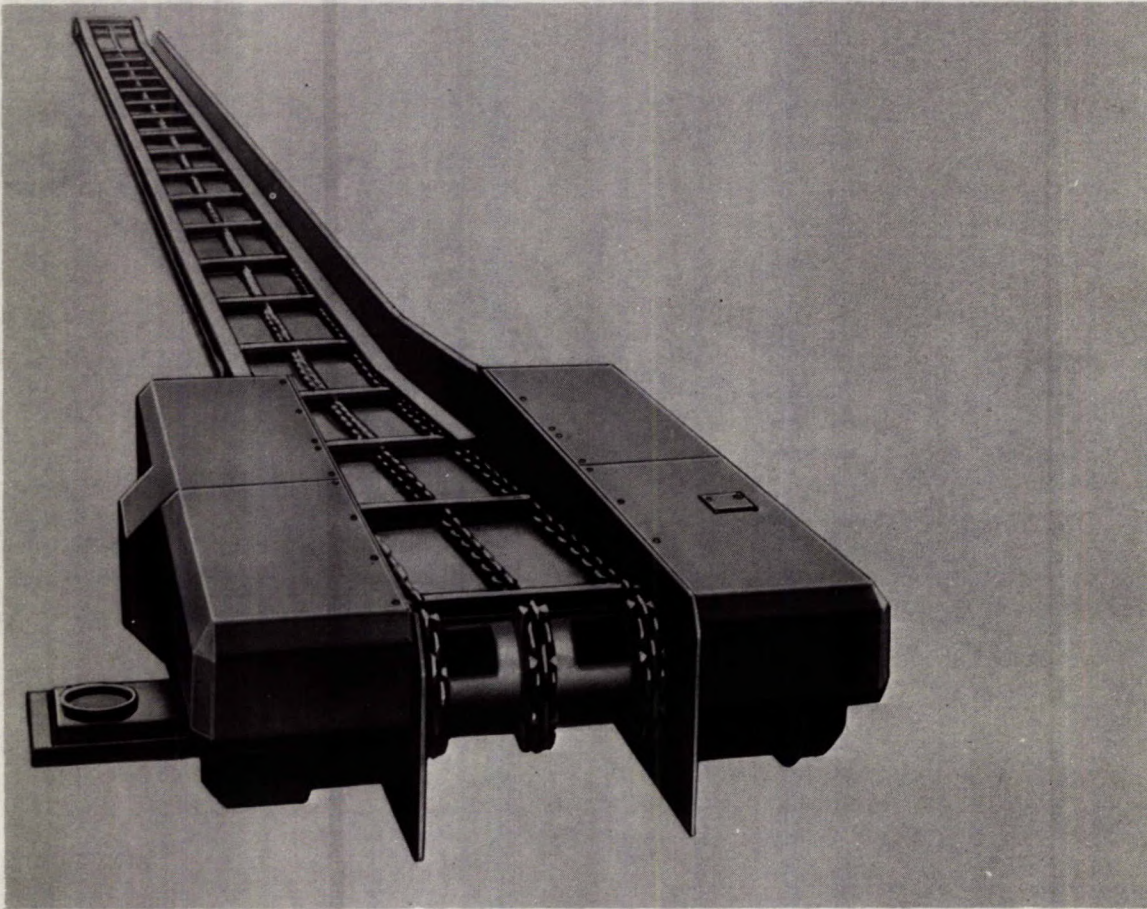


Figure 8. Armoured scraper conveyor, Type "Slask".

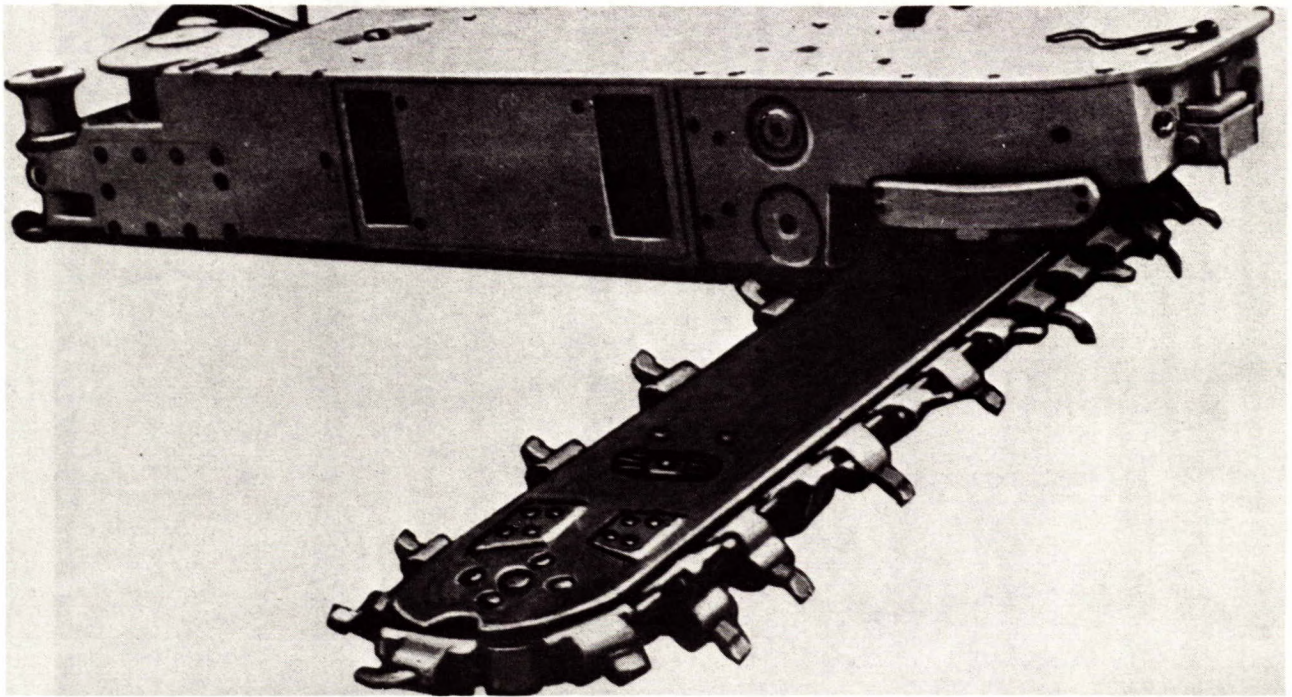


Figure 9. Hydraulic longwall coal-cutter.

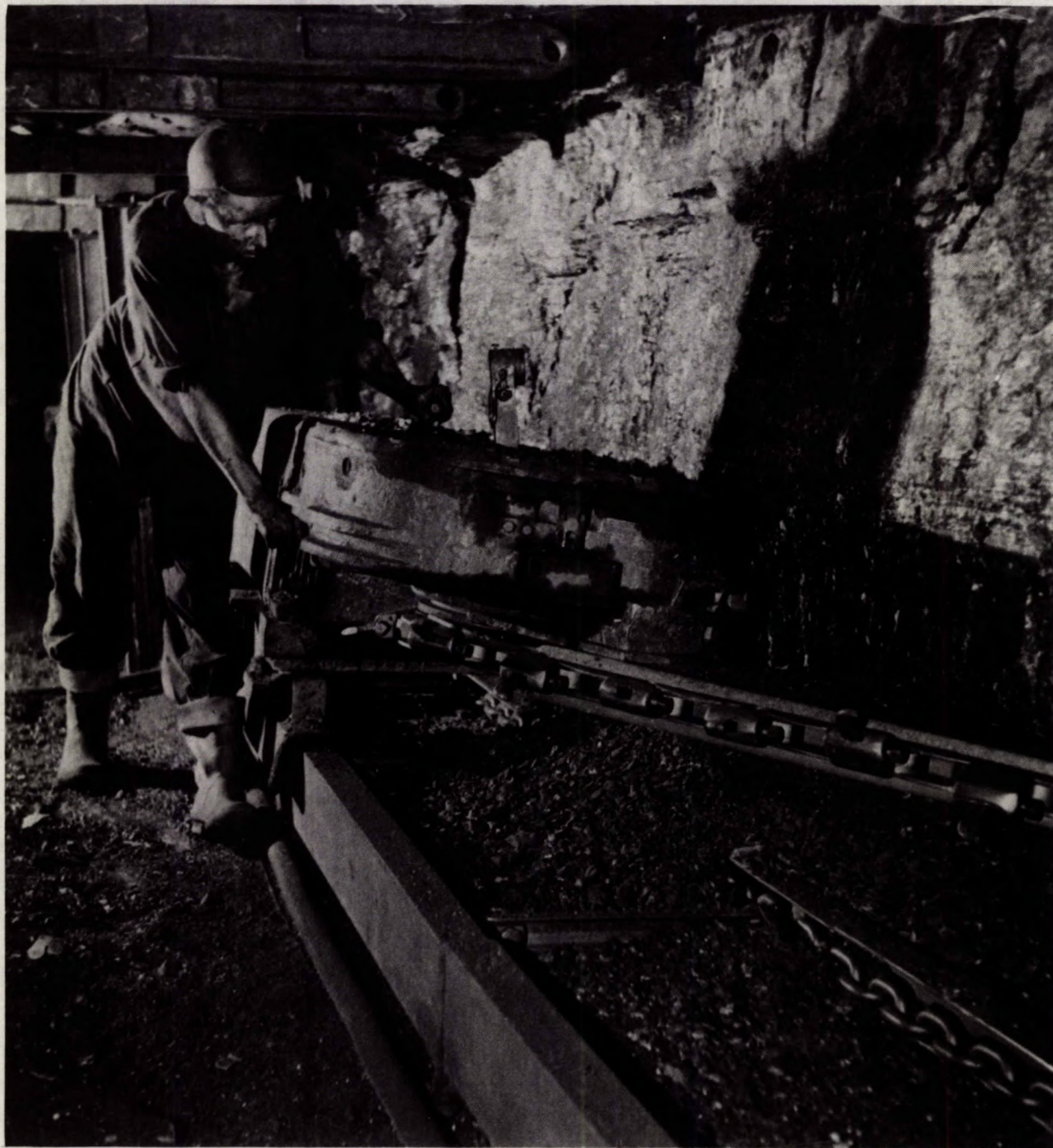


Figure 10. Longwall coal-cutter on scraper conveyor "Slask",  
in operation.

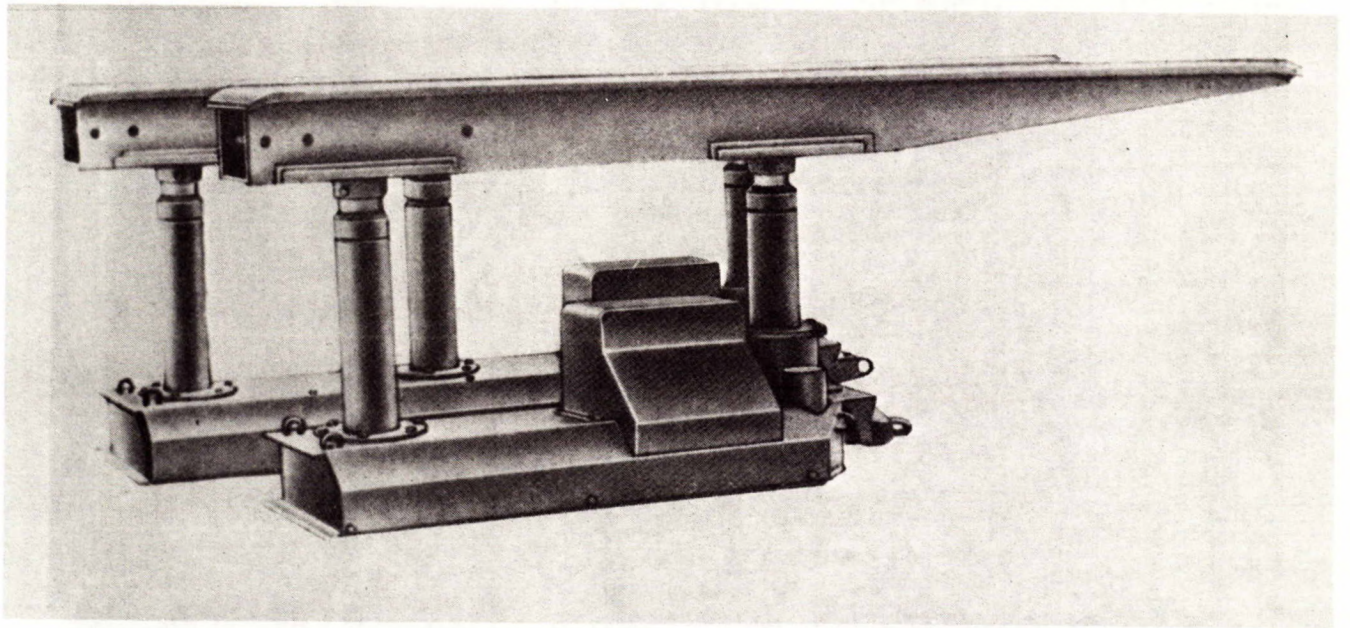


Figure 11. Self-advancing roof supports, Type OSM-1.

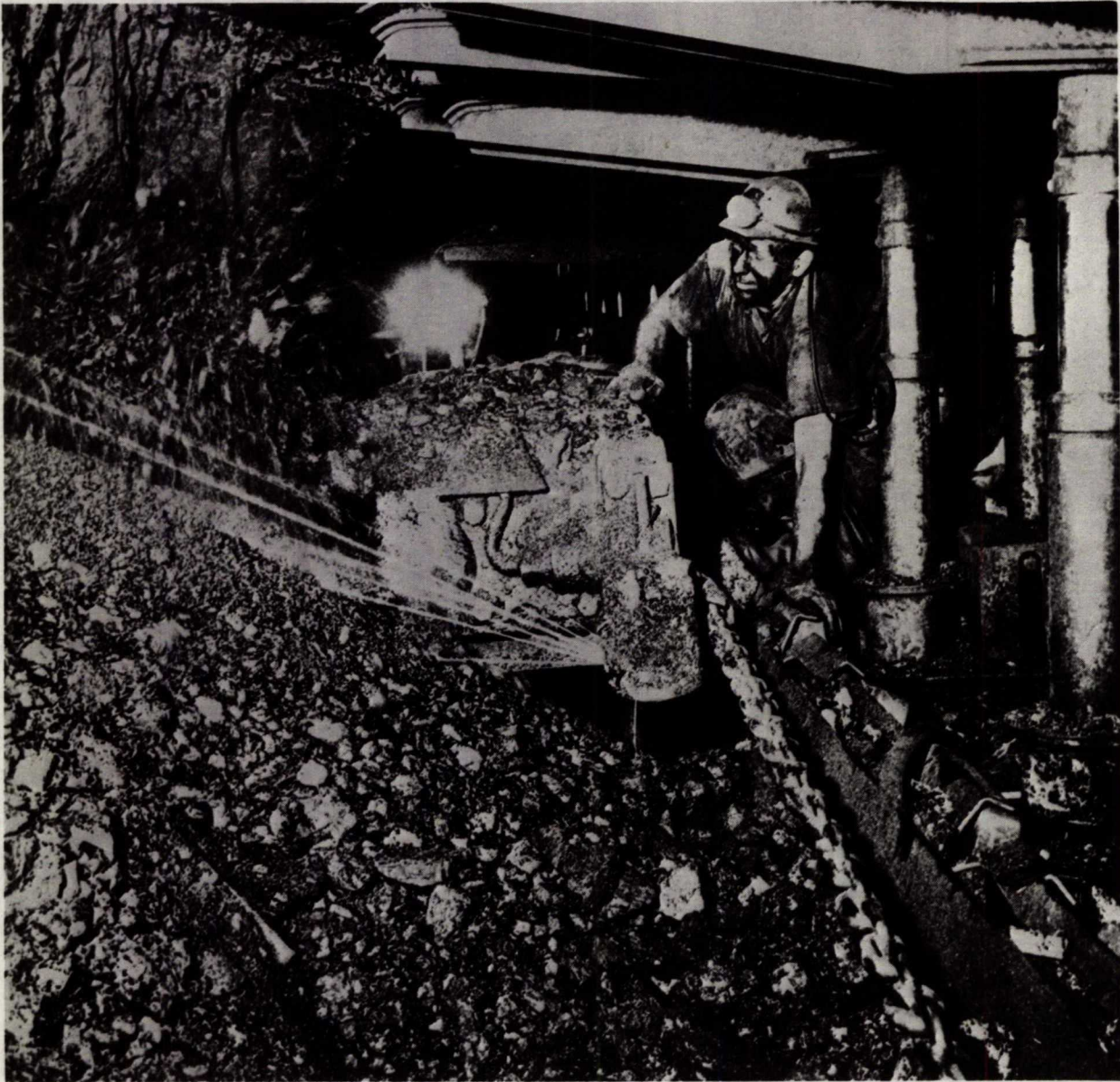


Figure 12. Longwall coal-cutter, conveyor, and self-advancing roof support, in operation.



# EMPLOYMENT STRUCTURE - MONTHLY EARNINGS

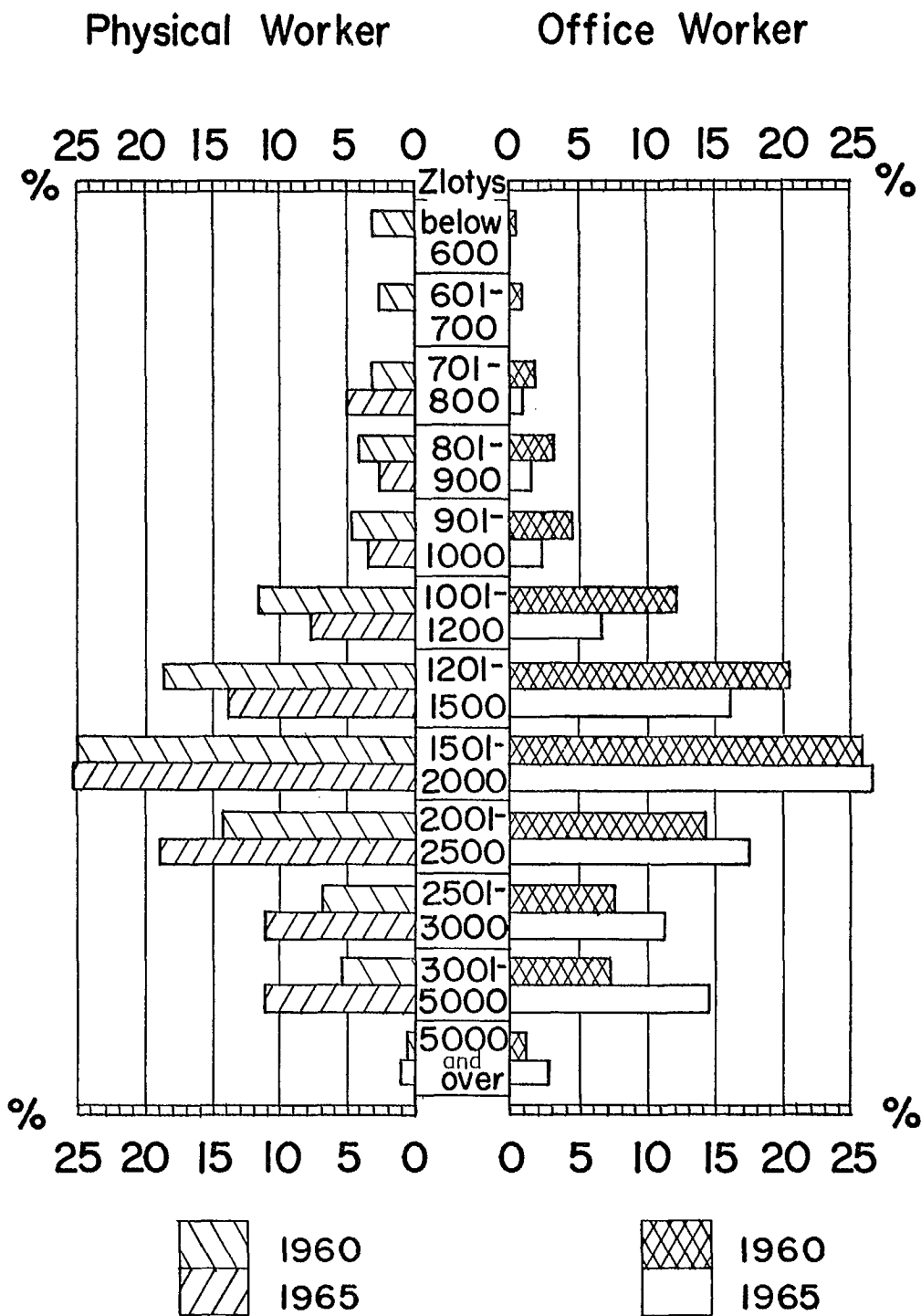


Figure 13. Monthly earnings of labour in Poland for 1965.

