

Development of Scraper Reclaimers on the North American Continent

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Summary

The author describes the economic background to the choice of scraper reclaimers for reclaiming and homogenizing operations. Recent applications of such machines in the USA are mentioned. It is concluded that the economic advantages of these machines will lead to an increased awareness of this technology in North America.

1. Introduction

At the beginning of the 1970s a development took place in North America which in Europe and elsewhere in the world had already begun many years before, i.e., the use of scrapers as reclaiming machines for most types of bulk materials.

PHB Weserhütte AG, West Germany took an important part in the development of the scraper as a reclaiming machine. This company designed, manufactured and set into operation in 1926 the first commercially used scraper, i.e., a slewing type scraper designed for a potash mine in Southern Alsace. In comparison with the machines in operation today with reclaiming capacities of up to 2,500 t/h the first reclaiming scrapers achieved quite modest capacities of around 80–100 t/h.

Although in the years to come similar machines were built, the real breakthrough came only in the 1960s. The machines originally developed for the potash industry were then used increasingly in the fertilizer and cement industries. Thus the boom in these two industries went along with that of the reclaiming scraper.

2. PWH as Pioneer

The fertilizer and cement works represent those branches of industry where to date scraper machines are most applied. Whereas in the fertilizer industry the scrapers are primarily

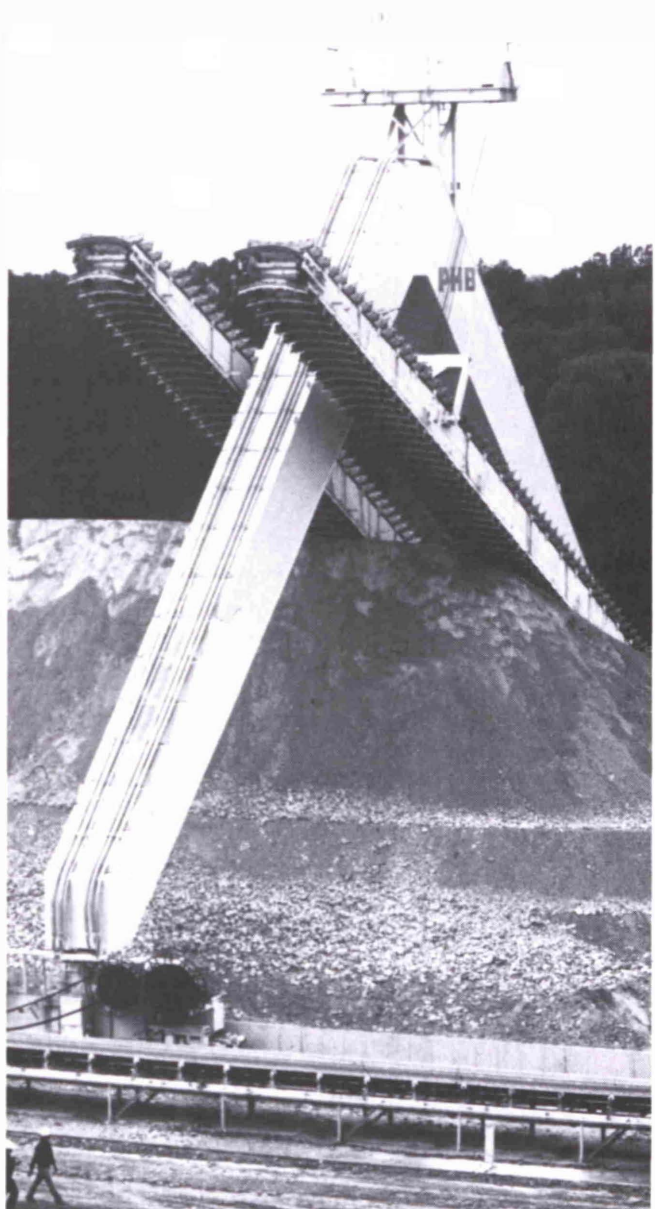


Fig. 1: Portal scraper reclaimer at Gaillard, Alabama

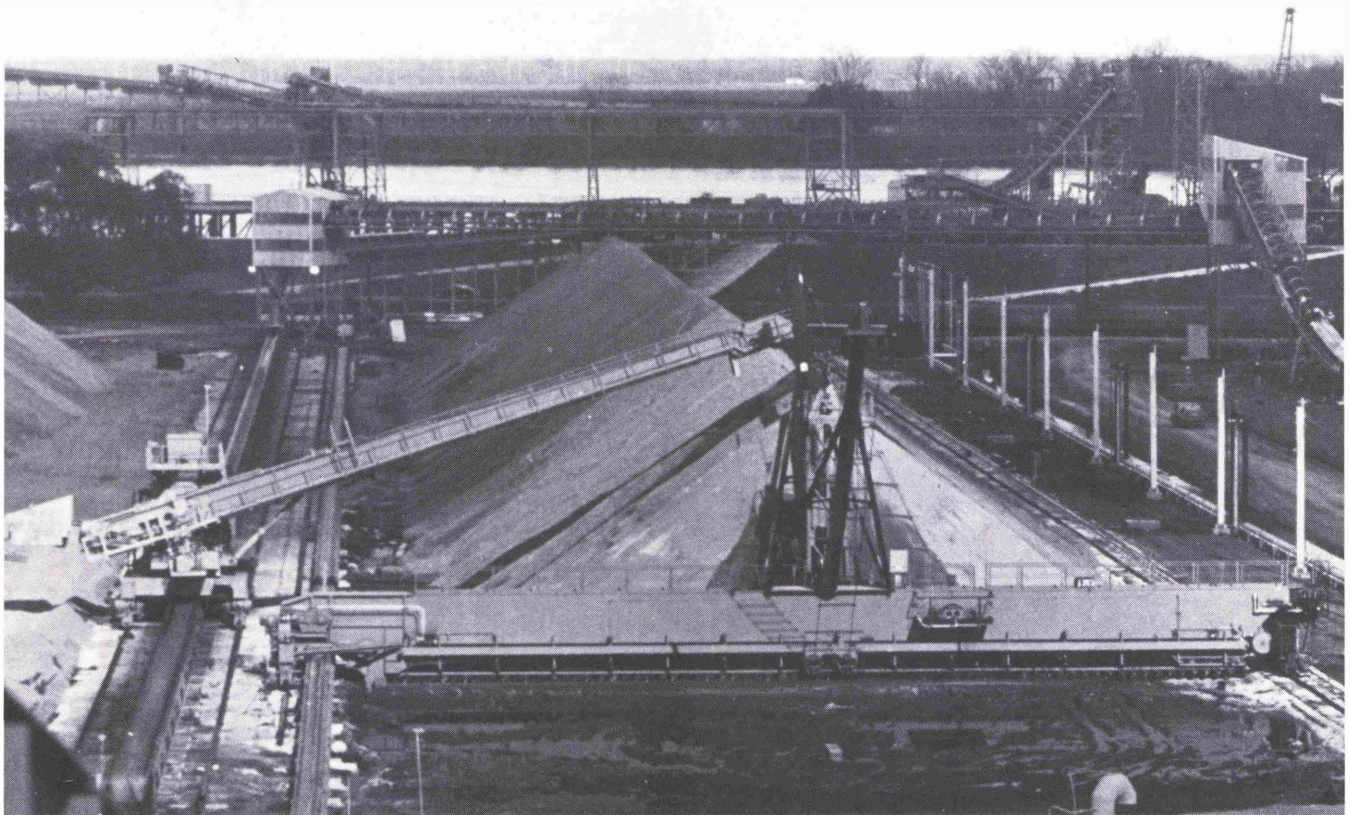


Fig. 2: Bridge scraper reclaimer at Donaldsonville, Louisiana

used as reclaiming machines, they mainly perform homogenizing functions in the cement industry. Automation, increasing quality requirements for the final product and the varying quality characteristics of the raw material needed for cement making are the criteria that made the improvement of the preparation of raw materials an absolute necessity. As PHB Weserhütte had already performed pioneer work with the development of the reclaiming scraper it was merely a matter of course that this company also carried out the first steps in designing the scrapers that were to become homogenizing machines.

The supply of a bridge scraper by PWH in 1960 for a cement plant in Dotternhausen, West Germany, is in fact the starting point for the use of scrapers as homogenizing machines. Whereas in the beginning homogenizing plants were built as longitudinal stockpiles for cement works, the trend now shows a clear development in the direction of circular piles. The fact that the first circular stockpile for homogenization of raw materials in a cement plant was also built by PWH only confirms such trend-setting developments.

3. North American Developments

On the North American continent the development was, although with a certain time differential, identical to that in Europe. It is not surprising, therefore, that it was an affiliated company of a European cement manufacturer who used, for the first time, reclaiming scrapers in his American cement works. In 1974 the first portal scrapers were used for reclaiming cement clinker in the cement plants of St. Constant, Quebec and Exshaw, Alberta, followed in the next year by a similar machine for the cement works in Demopolis, Alabama. Almost at the same time a bridge-type scraper for

homogenization of raw phosphate and a portal-type scraper for reclaiming of DAP and MAP were installed by PWH in a fertilizer plant in Donaldsonville, Louisiana.

The oil embargo in 1974 and the resulting difficulties with fuel procurement awakened for the first time the hitherto untroubled conscience of the American industry as far as energy was concerned. The cost explosion following the oil embargo in the energy sector had as a consequence that many American cement manufacturers renounced the considerably more energy-intensive wet process and re-equipped their plants for adoption of the dry process. At the same time many cement manufacturers were confronted with tighter regulations for environmental protection and had to decide on whether to modify, at high costs, their existing works or simply to replace these by new installations that corresponded to the latest state-of-the-art.

Both criteria, i.e., the need for adopting the dry process and the new/re-construction of the old installations forcibly helped the scraper to be introduced on the American market. It is a matter of fact that for the dry process the homogenization of the raw material is of greater importance than for the wet process. Consequently, the cement industry in North America followed the European example and also selected the bridge scraper as the machine for homogenizing raw material.

A worldwide active cement manufacturer and an engineering company of international reputation were the first to make the decisive step to introduce the scraper as a homogenizing machine in the U.S. The circular stockpiles with bridge scraper built at about the same time by PWH and completed in 1980 in Permanente and Redding, both in California, are the first plants of this type in the United States.



Fig. 3: Circular stockpile with stacker and bridge scraper reclaimer at Redding, California

Fig. 4: Stacker und portal scraper reclaimer at Battle River power plant, Alberta, Canada



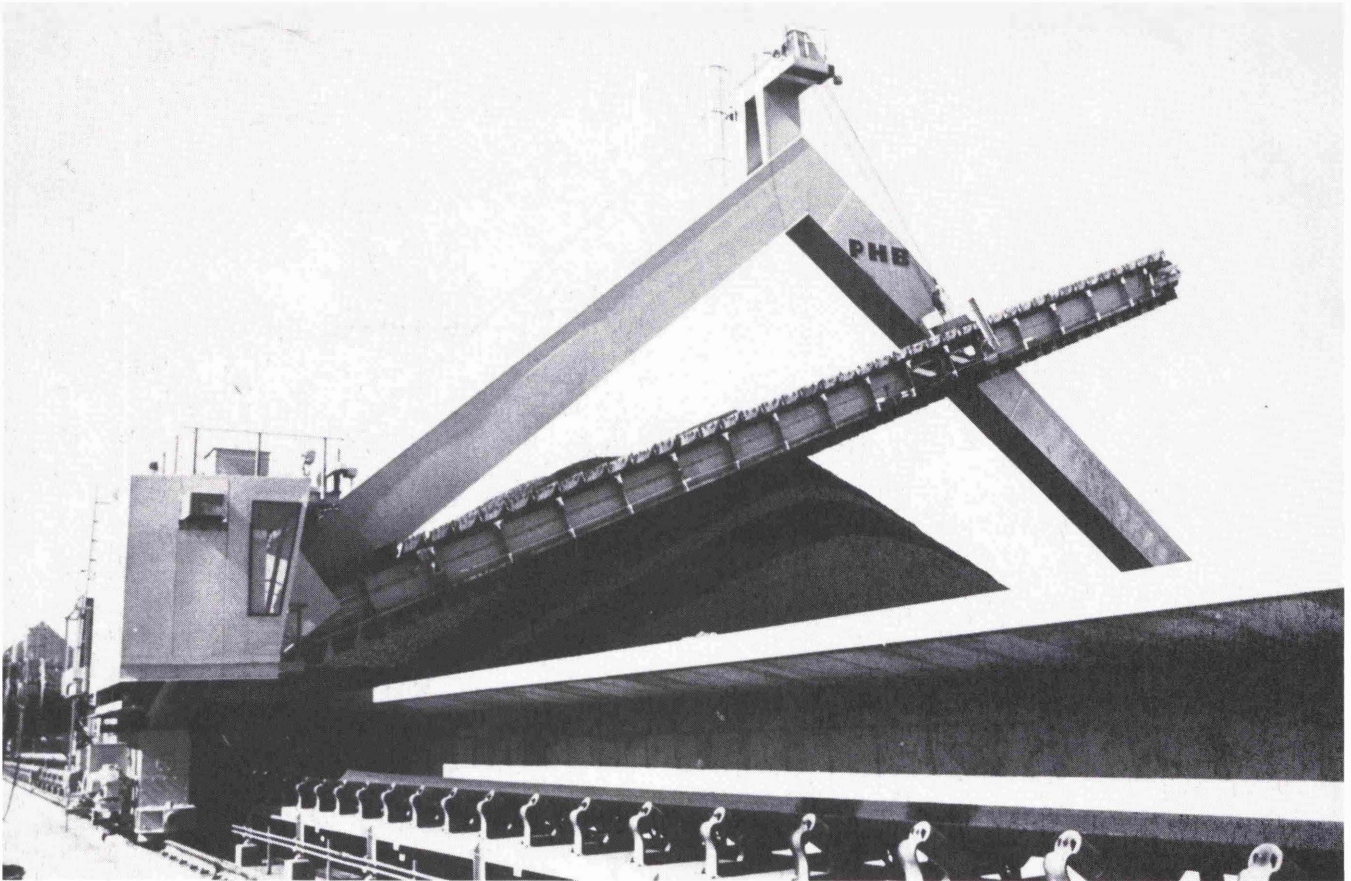


Fig. 5: Combined stacker reclaimer at New Braunfels, Texas

There still exists a large number of cement works which have very uniform raw materials and therefore do not need a homogenizing plant. On the other hand, they need an automatically operating machine for reclaiming the raw materials. The scraper reclaimer has thus made its way in this field also. Here, the cement plants in Brookville, Florida, in New Braunfels, Texas and in Gaillard and Theodore, Alabama should be mentioned. All these plants are equipped with PWH-built portal-type reclaiming scrapers; among these the machine at Gaillard is the biggest portal scraper in operation on the North American continent, as far as reclaiming capacity is concerned (2,200 t/h) (Fig. 1).

Besides being used in the cement industry, scrapers are also being applied more and more for handling fertilizers as can be seen by the PWH supplied installations for the chemical works in Carsland, Alberta, Donaldsonville, Louisiana, Nichols and Bartow in Florida as well as in Redwater, Alberta. The trend in North America, as in the rest of the world, is away from the front-end loader and towards the reclaiming scraper.

The oil embargo of the early 1970s and the discussions whether to partially replace petroleum as a source of energy by coal did not come to the originally expected results. From the originally existing projects for coal gasification, coal liquefaction and change-over from oil-fired power plants to coal only a few have survived, for reasons not to be discussed here. Many of these projects had provisions for using scrapers as reclaiming or homogenizing machines. Ten years ago this would have been unthinkable since at that time these machines were virtually unknown on the American market.

Not all of these projects, however, were shelved as can be seen by the Battle River plant in Alberta where the coal stockpile was equipped, on the occasion of an extension of the existing plant, with a portal scraper as reclaiming machine. This plant is the first coal fired power station in North America that has been equipped with a portal-type scraper as reclaiming machine.

4. Conclusions

It is astonishing that in the field of coal handling the use of scrapers has made only little progress although, when considering the capacities of 2,500 t/h as a reclaiming machine and 2,000 t/h as a homogenizing scraper, not only from the investment cost but also from the operating cost aspect it is the most economical machine available. The main reason for this is to be found in the conservative attitude of the power plant operator who, up to some years ago, accepted only the bucket wheel reclaimer or plow-feeder as reclaiming machines.* As it took quite some time in Europe to convince this industry of the commercial efficiency of the scraper machine, this is expected to happen in North America also. The development will follow a similar pattern in North America as in Europe and therefore the scraper will win more and more ground on the American continent in the years to come.

* PWH also builds bucket wheel reclaimers, drum reclaimers etc.