J. P. Johansson - Inventor of the Universal Pipe Wrench and the Adjustable Wrench

By SVEN RYNELL

Johan Petter Johansson (1853—1943) was a prolific Swedish inventor who made important contributions to many fields in engineering and manufacturing. His most important inventions proved to be in tool engineering — the universal pipe wrench and the adjustable wrench — the story of which is told here by Dr. Sven Rynell.

Sweden's high standard of living is very much a latter-day phenomenon—as recently as the close of the 19th century, Sweden was still an impoverished outpost of Europe. It was during this period that hundreds of thousands of Swedes emigrated to the United States in search of better fortune. Most of them succeeded, many of them pioneered developments in numerous fields.

Others, no less ambitious, stayed at home and played a pioneering role in the development of their own country. One of these was Johan Petter Johansson, a crofter's son from Vårgårda in the county of Västergötland. He had actually made up his mind to emigrate when he was offered a job as a travelling fitter by a company for whom he had previously worked. Behind him were many hard years as a navvy, machine erector and master smith. If he stayed in Sweden, although his parents and several other close relatives emigrated to the United States, it was not to remain a wage-earning workman for the rest of his life. His one ambition was to branch out on his own. In time he managed to borrow a small sum as his working capital which enabled him to make a start. The following year, in 1887, he built a workshop on the outskirts of Enköping, a small town northwest of Stockholm. Thus was founded an enterprise which was rapidly to become well-known throughout the world.

At first, Johansson's workshop was principally engaged in repair work. In those days, workmen had to cart huge loads of tools to work in order to be sure of having a tool for every conceivable dimension of tubing, screw, nut, etc. Johansson could not afford complete sets of tools for himself and his employees, and was consequently forced to find another solution to this problem.

By 1888 he had made a good deal of progress in this direction and had already invented the adjustable two-handle pipe wrench. Now only a few sizes of a single tool sufficed for work on pipes and sleeves of all dimensions. Additionally, the wrench could also be used as a holding tool—a feature which still makes the two-handle pipe wrench superior to the single-handle wrenches later developed.

Only a few years after J. P. Johansson was granted patents for his "universal pipe wrench", his next and most important invention began to take shape. In the autumn of 1891 he was granted patents for an adjustable wrench characterized in that both jaws were movable.

This wrench consisted of two parts, arranged crosswise, the ends comprising the jaws and being adjustable in relation to each other by means of a screw located in the handle. However, Johansson was not altogether satisfied and realized that there was room for further development. He made one of the two jaws immovable and adapted the design of the rest of the tool accordingly. By means of the adjusting screw, the movable jaw could now be brought close up to the fixed jaw. This enabled the wrench to be used on even the smallest nuts and bolts. The adjustable wrench—of a type now used daily throughout the world—had been invented. The patent dates from May 11, 1892.

At this time, J. P. Johansson had entered into association with a Stockholm businessman by the name of B. A. Hjorth who later acquired exclusive rights to the sale of Johansson's products. Hjorth's firm, which subsequently adopted the name of Bahco, introduced the new inventions on the world market. Johansson devoted his energies to running the manufacturing side of the business, exploring new approaches to tool design and continuing to indulge his inventive bent. He was first in Scandinavia to begin manufacturing fans of American pattern in the 1890's and over the course of years took out roughly 100 patents.

At the outbreak of World War I, Johansson sold the majority shareholding in his company to Hjorth. This brought manufacture and sales under single management and proved to be beneficial for the prosperous growth of the company. For his part, Johansson had more time to devote to problems of a technical nature which were his primary interest. In addition, he had greater opportunity to stir up more activity in two other spheres which were a pet concern of his—local affairs and social matters.

It is rare indeed that inventions are as "perfected" as were the universal pipe wrench and the adjustable wrench when Johansson was granted his patents. A comparison between the earliest models and presentday products strikingly shows their close resemblance in many respects. This does not suggest, however, that development stood still. As soon as the patents expired, Johansson's tools were widely copied. As far as the adjustable wrench is concerned, it is interesting to note that the first persons to start manufacturing this tool in the U.S. were two Swedish immigrants who had taken with them across the Atlantic a set of tools produced at Enköping. Today, the two companies

these men founded occupy a leading position in their field on the American market. Intensive research and development projects were begun in other countries as well with the aim of producing even better and more practical designs.

Johansson and his successors did not rest on their laurels, however. Although the manufacturing range of the Bahco tool works has been gradually broadened, special attention has been given over the years to the development of the pipe wrench and the adjustable wrench. As regards the latter, a significant advance was made when an I-section handle was introduced, that is to say a wide lengthwise channel was incorporated in the handle. This greatly reduced the weight of the wrench and provided a better grip for the hand. In order to facilitate adjustment of the jaw span, a larger part of the adjusting knurl was exposed to the fingers. On modern Bahco wrenches, the channel in the handle continues all the way up to the knurl without a break.

Johansson's early adjustable wrenches in 1892 featured a 45° angle between handle and jaw opening, and this pattern was also adopted for the wrenches that were produced in other countries. Bahco was first among all manufacturers to change this angle to 15°, which is far more practical. With an adjustable wrench of this kind, it is possible to turn an ordinary hex nut even in spaces so confined that the wrench can only be swung 30°. At the same time, the shank of the sliding jaw was modified to keep it from projecting beyond the head, even with the wrench at its widest opening.

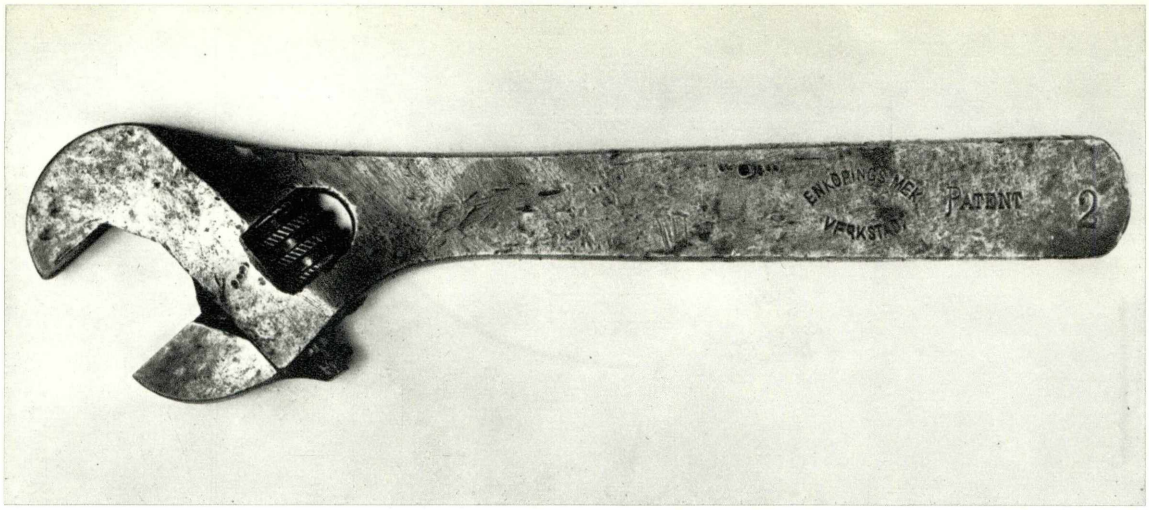
As a result of these and other improvements, the adjustable wrench has become a handier and even more useful tool adapted to the present-day need for practical tools permitting speedy and efficient work. It is indeed a universal tool in both senses of the word: it is used throughout the world, and it has a wider range of applications than any other hand tool. A single statistic will suffice to give some idea of the tremendous importance this tool has acquired: Bahco—the largest manufacturers of adjustable wrenches in the world outside the U.S.—had produced more than 35 million adjustable wrenches by the end of 1964 at the tool works founded by J. P. Johansson.

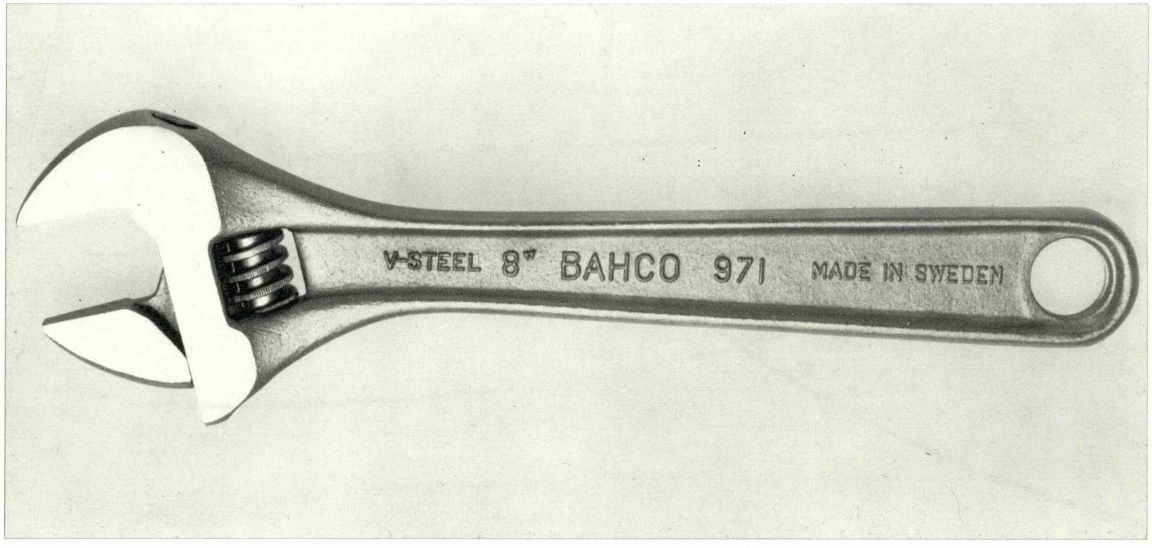
The adjustable two-handle pipe wrench has also filled a steadily growing need in its field. This wrench is indispensable to plumbers everywhere, whether in highly industrialized countries or the underdeveloped areas of the world.

J. P. Johansson's work in the field of ventilation stands as yet

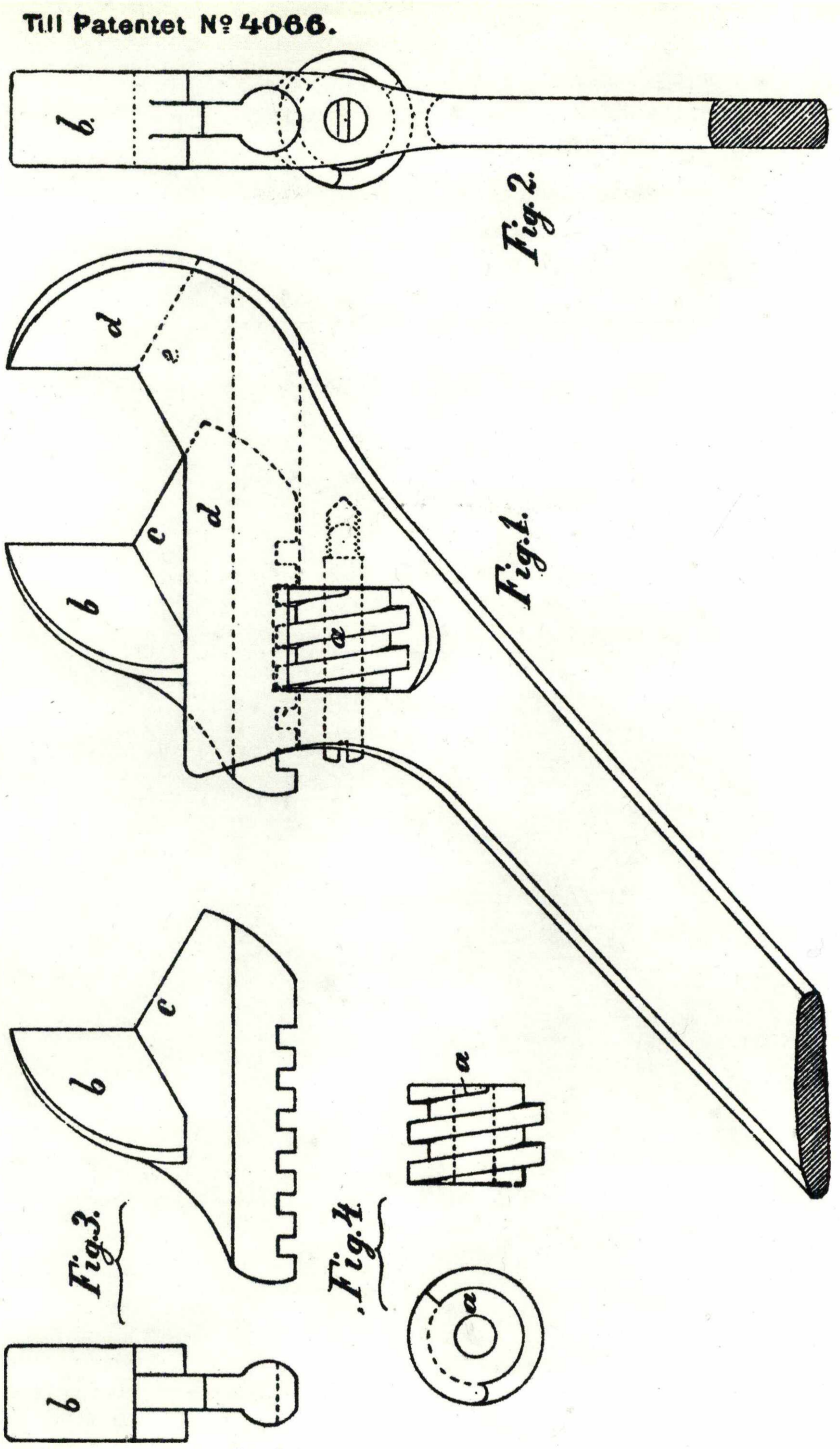


J. P. Johansson (1853—1943) with his two most famous inventions, the universal pipe wrench, and—in his waistcoat pocket—the adjustable wrench.





The adjustable wrench. One of the earliest manufactured, and one of the latest.



J. P. Johansson's patent on the adjustable wrench 1892.



J. P. Johansson's first workshop at Enköping.

further testimony to his farsightedness. The importance of air handling was still a long way from being recognized in the society of the 1890's. Realization of this need came with the growth of industrialization, while rising living standards everywhere have led to a steadily increasing demand in this sphere. The production of fans and ventilation equipment initiated by Johansson now constitutes the No. 1 line in Bahco's operations. Inventive genius was not Johansson's only forte; he was also gifted with the insight to introduce industrial production methods in areas with particularly favourable scope for development.

Those who knew J. P. Johansson personally relate that he was an unusually well-balanced person of even temperament. He radiated good humour and spread cheerfulness around him wherever he went. As an employer, he belonged to the old-time patriarchal school. Despite a huge burden of work, he always found time to give those under him advice and assistance in their private affairs. It was also largely due to his efforts that the part of Enköping where he first built his workshop was in short time transformed from an insalubrious suburb to an idyllic residential district.

In many respects, J. P. Johansson's life story reflects an interesting period in the economic history of Sweden. He was one of the many self-taught men who laid the foundations for the explosive growth of Swedish industry. His inventions combined technical genius with practical experience. In his capacity as production manager, he sacrificed none of the craftsman's strict insistence on quality in every single detail. Far from being an astute businessman, he thought that money merely "created problems". But the company for whose initial expansion he meant so much is today a major enterprise exporting to the far corners of the globe and dominated by the two lines he was instrumental in building up: ventilation products and hand tools.