

FRUIT BERRY CRUSHING DEVICES AND THEIR DEVELOPMENT ON THE BASIS OF NEW TECHNOLOGIES

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Annotation: This article provides an overview of the development of fruit berry crushing devices, focusing on the integration of new technologies. It charts the development of these devices from manual processes to complex mechanized and automated solutions, emphasizing significant turning points in their progress. The impact of technology on productivity, sustainability, and quality in the fruit processing industries is covered in the discussion. The article also looks at how contemporary materials like stainless steel can improve hygienic practices and durability. The article provides insightful information about the history, current state, and future of fruit berry crushing devices through a succinct analysis of pertinent literature and references.

Keywords: Fruit berry crushing devices, technology, evolution, mechanization, automation, efficiency, quality, sustainability, innovation, materials.

Introduction. Fruit berries require effective crushing equipment to extract their juices because of their flavor and versatility in culinary applications. This article examines the development of fruit and berry crushing devices over time, with a particular emphasis on how these devices have changed in response to emerging technologies. Fruit berries have long been loved for their vivid flavors and varied uses in culinary delights, from delicious jams to refreshing smoothies. But smashing these juicy gems to release their rich juices and flavors is often the first step towards realizing their full potential. Fruit and berry crushing equipment has evolved dramatically over time, propelled by technological breakthroughs and an increasing need for food processing that is both efficient and high-quality.

Methods. A review of the literature and an investigation of archival materials were used to analyze the development of fruit and berry crushing devices over time. A review of industry journals and patents was used to evaluate recent advancements, with an emphasis on technological and material innovations. Fruit berry crushing is a centuries-old craft, with early techniques involving physical work and crude implements like pestles and mortars. Even though these techniques worked well in small quantities, they were labor-intensive and lacked the efficiency needed in large-scale manufacturing. The need for mechanized solutions became evident as the demand for processed fruit products increased, and the first mechanical fruit crushers were created in the 19th century.

Technological developments in fruit processing have advanced significantly since the industrial revolution. The development of steam engine-driven mechanical crushers transformed the

scope and effectiveness of fruit processing industries. These early crushers lacked the adaptability of contemporary gadgets and were usually made for particular fruits. As the 20th century went on, advancements in materials science and engineering resulted in the creation of increasingly adaptable and effective fruit berry crushing apparatus. With their increased precision and control over the crushing process, electric-powered crushers have become widely used. These gadgets had movable settings to suit various fruit kinds and crushing demands, meeting the various demands of the global food processing sectors.

Results. Early techniques for crushing fruit berries involved a lot of manual labor and simple equipment like pestles and mortars. Mechanization brought forth by the industrial revolution resulted in the 19th century's steam-powered crushers. The 20th century saw the introduction of electric-powered crushers, which provided increased accuracy and adaptability. Automation and digital controls have recently been integrated, enabling precise control over crushing parameters. Stainless steel's long lifespan and hygienic qualities have made it the preferred material for contemporary crushers.

The world of fruit and berry crushing devices has changed dramatically in the last few decades due to rapid technological advancements. The combination of automation and digital controls is one noteworthy advancement that makes it possible to precisely regulate parameters like crushing pressure and speed. This not only enhances the quality of the final product but also reduces waste and increases productivity.

In addition, the integration of state-of-the-art materials and design concepts has yielded crushers that exhibit enhanced durability, hygienic qualities, and energy efficiency. Because stainless steel resists corrosion and is simple to clean, it has become the preferred material for many contemporary crushers. In the future, there are no indications that the development of fruit and berry crushing devices will stop. With real-time data analysis and parameter optimization, emerging technologies like artificial intelligence and machine learning have the potential to further optimize the crushing process. Fruit and berry crushing machines have entered a new era with the integration of automation and digital controls in recent years. By utilizing cutting-edge technologies, these contemporary crushers maximize the crushing process, leading to increased extraction rates and decreased waste. The incorporation of materials like stainless steel has also enhanced durability and hygiene, ensuring compliance with stringent food safety standards.

Furthermore, eco-friendliness and sustainability are becoming more and more important considerations in the development and maintenance of fruit processing machinery. To lessen the environmental effect of crushing operations, manufacturers are looking into renewable energy sources and putting creative recycling and waste-reduction strategies into place. The process of creating fruit and berry crushing devices has been characterized by creativity, inventiveness, and an unwavering quest for excellence. These innovations, from their modest origins to cutting-edge solutions, have been instrumental in realizing the full culinary potential of fruit berries. We may anticipate even more sustainability, efficiency, and accuracy in the crushing process as technology develops, guaranteeing that the flavors of nature's abundance are conserved and savored for future generations.

Discussion. The development of fruit and berry crushing equipment is a reflection of the ongoing pursuit of sustainability, quality, and efficiency. Artificial intelligence and other emerging

technologies have the potential to further optimize the crushing process. Fruit and berry crushing equipment that is automated and mechanized has replaced manual methods in food processing industries, greatly increasing productivity and efficiency. An important turning point in this evolution was the invention of steam engine-driven mechanical crushers during the industrial revolution, which made processed fruit products more widely available and allowed for larger-scale production. Later developments in electric-powered crushers further optimized the crushing process by providing more precise control over variables like pressure and speed of crushing, improving the quality of the final product.

Furthermore, the addition of contemporary materials like stainless steel has enhanced fruit berry crushing devices' hygienic practices and durability while also making cleaning and maintenance simpler. This has been especially important in order to comply with strict food safety laws and standards, guaranteeing that the finished goods are safe to eat and free of contaminants. Furthermore, design improvements have produced smaller, more ergonomic crushers, which minimize the footprint of processing facilities and maximize workflow effectiveness.

The constant quest of efficiency, quality, and sustainability has shaped the development of fruit and berry crushing devices. Manufacturers and engineers have worked to maximize the yield of premium fruit products, reduce waste, and streamline the crushing process with each technological advancement. This quest for efficiency is not only aimed at meeting the growing demand for processed fruit products but also at optimizing resource utilization and reducing operational costs for producers.

In addition, the incorporation of cutting-edge technologies like artificial intelligence (AI) presents enormous potential for additional crushing process optimization. Because artificial intelligence (AI) algorithms are capable of analyzing large amounts of data in real-time, crushers can dynamically adapt and adjust parameters based on variables like fruit variety, ripeness, and moisture content. Higher extraction rates, more consistent products, and less energy use are all possible outcomes of this level of accuracy and control, which eventually improves the financial and environmental sustainability of fruit processing operations.

Furthermore, by anticipating equipment failures before they happen, AI-driven predictive maintenance algorithms can reduce maintenance costs and downtime. Fruit processing facilities can achieve previously unheard-of levels of sustainability, quality, and efficiency by utilizing artificial intelligence (AI). This guarantees that the advantages of technological innovation are felt along the whole production chain. The future of the industry will be significantly shaped by AI's integration into fruit and berry crushing devices, which has the potential to unlock unprecedented levels of productivity and performance as the technology develops.

In conclusion, the development of fruit berry crushing devices has been characterized by a continuous drive for innovation and improvement. These tools have been instrumental in realizing the full culinary potential of fruit berries, from their modest origins in manual labor to their sophisticated, tech-driven solutions today. We can expect more improvements in sustainability, efficiency, and accuracy as technology develops, guaranteeing that the flavors of nature's abundance are conserved and enjoyed for future generations. Fruit and berry crushing devices have evolved from manual processes to complex, technologically advanced solutions. It is anticipated that forthcoming developments will augment efficacy, accuracy, and durability, guaranteeing the perpetuation of fruit berry commodities for posterity.

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