

A National Historic

Mechanical Engineering Landmark . . .

**THE
A.B. WOOD
LOW HEAD HIGH VOLUME
SCREW PUMP**

No. 1 Pumping Station
New Orleans, La.
June 11, 1974

THE AMERICAN SOCIETY OF MECHANICAL ENGINEERS



THE SEWERAGE and WATER BOARD of NEW ORLEANS

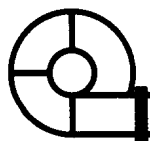


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DEDICATION CEREMONY

Welcome and Introduction
of Honored Guests

Edgar H. Pavia, Vice President
ASME Region X

Explanation of Landmark Program

Professor E. S. Ferguson
Chairman, ASME History &
Heritage Committee

History of A. B. Wood
Screw Pump

Louis T. Frantz
Sewerage & Water Board of
New Orleans (Retired)

Presentation of Plaque

Dr. Daniel C. Drucker
President, ASME

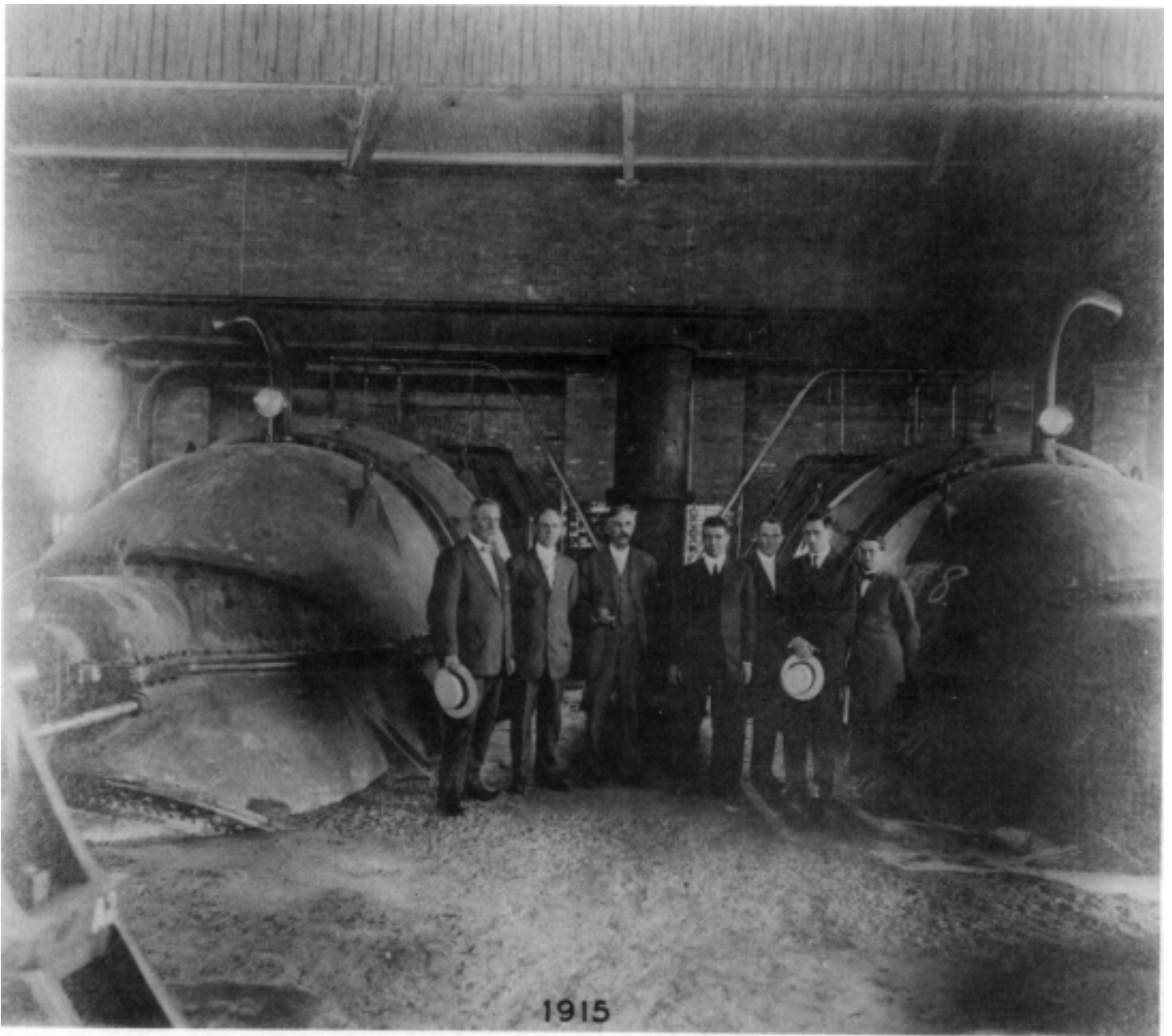
Acceptance

Ulisse Nolan, President Pro-Tem
Sewerage & Water Board of
New Orleans

June 11, 1974

11:30 A.M.

Pumping Station No. 1
Melpomene and Broad Streets
New Orleans, La.



In 1915 the 12 ft. Wood Screw Pump was the most advanced drainage pump in use. Wood's pumps were built all over the world after their successful operation in New Orleans was proven.

CHAPTER I

THE CITY: EARLY NEW ORLEANS

The city of New Orleans is shaped like a saucer -- below the river in front, and below the level of the lake in back. There are levees along the river and the lake, and a protection levee which is drawn up along the upper limits of the city. Drainage in New Orleans means lifting every inch of rainfall out of the city mechanically, and lifting it over these levees -- a process which was never successful until the screw pump was developed by A. Baldwin Wood in 1912.

A Little Background

In 1878 the second most fatal visitation of yellow fever hit New Orleans. Its death rate was nearly forty of every one thousand persons. This made the total deaths rise to one hundred thousand since the fever first occurred in the city in 1796.

In 1880 a frantic attempt was made to solve the increasingly acute sanitation problems and supply the city with pure water, adequate drainage and city-wide sewage -- problems that had been ignored during the long desperate years of the Civil War and the subsequent period of reconstruction. By this time the population of the city had reached a quarter of a million people.

Among the solutions offered was a recommendation made by engineers to build twenty sewers, but it was never implemented because the cost would have been almost equal to the State debt.

Shortly afterward, a privately formed company, the New Orleans Drainage and Sewerage Company, organized a fairly ambitious program to lay a six-foot sewer main on Rampart Street from Esplanade to Washington with a pumping system that would discharge 30,000,000 gallons per day into the Mississippi River. Unfortunately, lack of financing caused it to fail.

Then a proposition was placed before the voters to construct such a system out of funds raised by taxation, but it was defeated by a large majority. After all of this grand planning, the final solution was the addition in 1884 of another steam paddle wheel machine to the already existing drainage system which had three similar machines at Dublin Avenue, Bayou St. John, and London Avenue. They were machines of small capacity and low-lift, yet they valiantly tried to paddle wheel a part of the huge New Orleans rainfall and whatever percentage of gutter refuse that could be forced to flow, into the adjoining swamp. Until the 1900's practically all of the city's drainage was done through open canals lifted to lake level by these steam driven paddle wheels.

This had little effect on clogged drains, soil saturated water, and open canals and swamps which bred mosquitos and disease. Cesspools were cleaned by dumping the contents into the river. People gambled with their lives and health by drinking the stagnant rain water collected in huge cypress cisterns which towered in almost every back yard.

The inadequacy of the drainage system caused such embarrassing incidents

to occur as the Mardi Gras parade when everyone walked through foot-deep water; when Tulane University had to dismiss classes because of high water in the lobby; when Antoine's closed until the water had left the dining room; and when the French Opera had to cancel an Adelina Patti performance because the stage was under water.

The Sewerage and Water Board

In 1895 the nucleus of the Sewerage and Water Board (S&WB) was planned by city engineer L. W. Brown, assisted by Majors B. M. Harrod and H. B. Richards on. In 1896 the Louisiana legislature created the New Orleans Drainage Commission, with Major Harrod as chief engineer, and construction on drainage and sewerage systems began in 1897. But work progressed slowly. Funds were lacking and the public was apathetic. Apathetic until the recurrence of yellow fever in 1898 and 1899 which again aroused public support for the struggling systems.

The city had been free of fever for a number of years, due almost entirely to the rigid quarantine set up at the mouth of the Mississippi from 1880 to 1897 by Dr. Joseph Holt, president of the Louisiana State Board of Health. The epidemics of 1898 and 1899 were traced directly to victims who gained entrance into New Orleans by land routes.

Women were greatly responsible for the successful campaign of sanitation education waged in 1899. Their vehement and well organized propaganda culminated in a city bond issue for the construction, maintenance and extension of a drainage, sewerage and water system by the S&WB, successor to the New Orleans Drainage Commission.

Came the last days of 1900 and progress had been made: The big open drainage canals were emptied daily for the first time in the city's history, which in turn drained the gutters. Results were quite favorable. There were fewer mosquitos; soggy ground dried out; land values increased; health improved; and the death rate dropped. The S&WB had proven its justification for existence. The next step was solving its problems of pumping.

CHAPTER II

THE MAN: A. BALDWIN WOOD

"His was a life of achievement and usefulness" -- from a New Orleans Time-Picayune editorial upon the death of Albert Baldwin Wood in 1956.

Among the Spanish nobles and notables who were sent to this country by the King of Spain was young Don Francisco de Bouligny, who arrived in New Orleans as Lt. Governor of Louisiana in 1769. Later he was to become Governor and Administrator of the Province of Louisiana. Don Francisco sired one of the oldest Spanish-French families in the city and established the historic Bouligny Plantation that once sprawled the vicinity of what is now Napoleon Avenue.

In the latter half of the last century, Octavie, one of the Bouligny descendants, married an Englishman named John S. Wood, whose family had been pioneers in Pennsylvania and co-founders of Germantown.

From this Spanish-French and Anglo-American union was born a son, who was destined to become a prominent engineer and humanitarian. Born in New Orleans in December of 1879 he was Albert Baldwin Wood, named for his uncle, Albert Baldwin, president of the old New Orleans National Bank and head of the Baldwin Hardware Company.

Wood attended Tulane High School and Tulane University. In 1899 he graduated with honors, receiving the Glendy Burke Award for mathematics and a B. S. degree in engineering. That same year also saw his start with the Sewerage and Water Board, where he remained until his death in 1956. He began his career as an assistant manager of drainage water and was promoted to mechanical engineer in 1906. By 1939 he had become general superintendent of the Board, a position he held for the remainder of his life.

He not only dedicated his inventive genius and outstanding engineering skill, and gave unreservedly his administrative ability to the S&WB for fifty-seven years, but permitted the Board to use without pay and royalties any and all of his famous pumps. Over the years he refused many offers at ten to twenty times his salary which would have taken him to other cities and countries; but he was content to draw a mere \$5,000 a year from the Board. Even in 1931, thirty-two years after he had been with the Board, his salary was only \$7, 500 a year. And in that year, with no increase in salary, he took on the duties of Director of Water Purification in addition to his own.

A 1954 editorial in the New Orleans States opened with this line: "When the fledgling engineer Baldwin Wood was hired in 1899 by the S&WB, the city drove the richest labor bargain in all its history."

In 1949, while Wood was serving as the elected general superintendent of the Board, the mayor's annual report described the S&WB as the "Wonder Board"

because of all the achievements it had made under Wood's direction. The Board furnished drinking water to 600,000 people at very low rates, pumped city sewage through an automatic system and was continually involved in new construction and expansion programs.

The Inventor

Even while in school Wood had started his inventive bent, probing into radio and what is called electronics today. He and another classmate built a wireless set merely from what they had read by Marconi, and established communication from one Tulane classroom to another.

In 1906 he invented a six-foot centrifugal pump that was the largest of its kind. Shortly afterward he invented "flapgates" to stop water back-up when the pumps were stopped -- a concept which surprised the engineering world.

By 1912 he had invented a hydraulic testing machine, and also conceived the idea of "half-soling" sewer pipes which had worn through on the bottom by constant use. This idea saved New Orleans thousands of dollars.

The greatest of his inventions were the gigantic screw pumps which he developed in 1912 and the trash pumps in 1916. The latter saved the city \$220,000 in one contract alone when used for dredging operations.

Altogether, Wood had thirty-eight inventions patented.

Through the years he was actively consulted by public and private agencies in Chicago, Milwaukee, Baltimore, San Francisco, and Ontario, Canada. In 1900 he redesigned Chicago's entire drainage system and in 1917 was appointed consulting engineer to the Chicago City Water Works.

The royalties from his inventions and consulting fees made him a rather wealthy man, but as mentioned earlier, never at any time did he charge or collect royalties from any of his inventions used by the S&WB.

In 1939 he received an honorary degree of Doctor of Engineering from Tulane University which read: "Engineer, designer, and inventor, whose genius has contributed much to the comfort, safety, and livelihood of multitudes of human beings. The importance of his large capacity and high efficiency pumps has received world-wide recognition. This city and this university are proud that he is theirs."

The "Nydia"

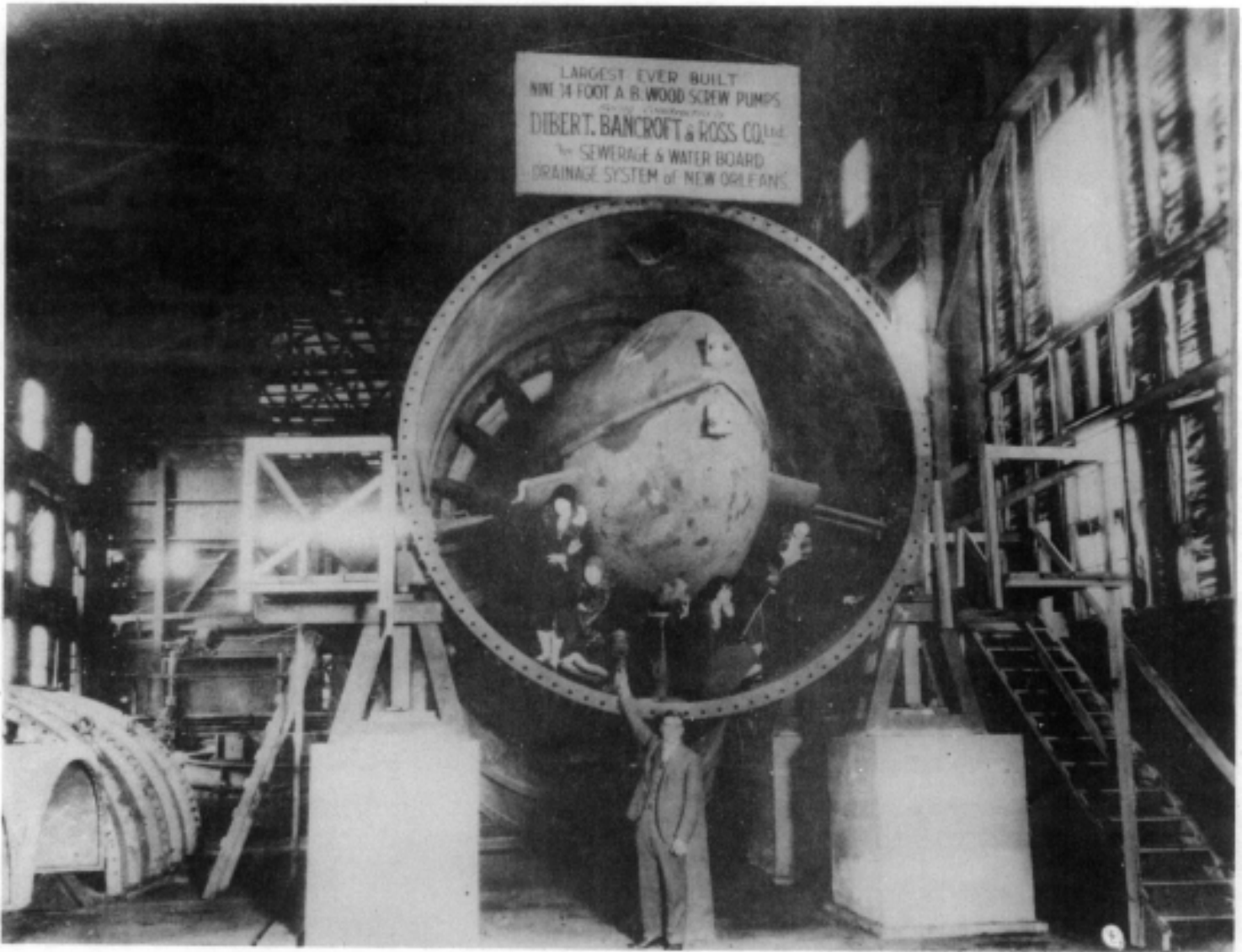
All through his life Wood had only two passions -- the S&WB and his thirty-foot sailing sloop, the "Nydia" -- named for the blind girl in "The Last Days of Pompeii". He was an excellent sailor and navigator and frequently cruised the Mississippi Sound, alone and away from everybody and everything. "Communing with nature," as he termed it.

Many people had heard Wood remark earnestly and sincerely that when he died he hoped it would be aboard the "Nydia". In his 77th year, on the afternoon

of May 10, 1956, a kindly providence granted his wish. Within minutes after he had left the pier, Wood died of a heart attack at the tiller.

When his will was read it was discovered that in addition to his legacy to Tulane University he stipulated: ". . . that my boat the 'Nydia' and her spars be carefully preserved under a shed on land owned by my wife or Tulane University for a period of at least 99 years."

Thus it was that he provided for his beloved "Nydia," the sloop that had been his companion for so many years and that was faithful even at his death.



Largest ever. The 14 ft. Wood Screw Pump, built in 1929, took away even more drainage and sewer water than the 12 ft. pumps already in use in the system.

CHAPTER III

THE GIFT: THE WOOD SCREW PUMP

The Situation in 1900

As mentioned in Chapter I, drainage in New Orleans means lifting the water out of the city mechanically. In 1900 the city's system had vertical shaft screw pumps, installed at the beginning of the system. They were almost the largest pumping machinery in the country, 8 feet in diameter, with synchronous movement and at that time were considered the best available. One of their great disadvantages though, was their location. They were sunk in the basement, and when anything was out of order the mechanics had to go down in the subterranean chamber to repair them. Eventually they proved to be inadequate to the needs of the city.

In 1912 the city very urgently needed increased drainage pumping station facilities, and Wood, who had learned a great deal about the pumping problems of New Orleans through his employment at S&WB, offered in addition to his regular duties to design a special pump for the city's specific needs. This he did, and in 1913 he presented the Board with plans for a twelve-foot screw pump, giving the Board perpetual rights to it.

The Pump

The Wood Screw Pump, which is still used in the city, consists of a syphon in the summit. Inside the syphon is a steel bladed rotating impeller. The casing is split horizontally to facilitate access to the interior of the pump. The pumps were placed at the top of a pipe syphon which had pipe connections to the suction and discharge canals without the intervention of valves or gates. Priming was accomplished by means of rotary vacuum pumps. By admitting air to the casing before stopping the pump, the vacuum is broken and the water is prevented from syphoning back into the suction basin.

This pump, then the biggest and most powerful in the world, later made New Orleans the mecca for the world's engineers. In light of this, it seems strange that local opposition had to be overcome before thirteen of these pumps could be ordered and built. It was estimated that each would cost \$15, 000. Each would have a capacity of 392 million gallons a day. In operation all at once, they would pump a column of water ten feet square, over a mile and a half high. On November 7, 1913, the S&WB advertised for bids on the pump and immediate opposition came from an unexpected source.

In the early days of the struggling inception of the S&WB there were people who preferred private ownership and operation giving the city the option to buy later, who suggested that the franchise originally given a defunct sewerage company be renewed. The matter was referred to a special city council committee. Pending the action of this committee, a plan was proposed to create a sewerage, drainage and water ordinance which called for a special two mills tax and the use of one half the surplus of the one percent debt tax that was passed largely due to the previously mentioned publicity and educational campaign organized by the women.

When it became necessary to draft the ordinance, one of the most perfect instruments ever presented to the city council was prepared by attorney Edgar Howard Farrar, assisted by the city attorney and two other gentlemen. This ordinance even anticipated exigencies which could only possibly arise in generations to come. Attorney Farrar not only drew up the ordinance, but all the S&WB legislation with the exception of the Merger Act of 1902. He even handled the test case in the Supreme Court so that the legality of S&WB bonds would be firmly established before they were offered for sale.

Farrar was the unexpected opposition. Retained as attorney by various pump manufacturers, he violently opposed the Board's acceptance of a pump design made by one of their own staff rather than inviting the various pump manufacturers to submit designs and bids. It was his contention, which he vehemently stated before the City council, that it was a waste of public money to gamble on the unknown design of an unknown young engineer, and that recognized engineering departments of reputable pump manufacturers should have been consulted.

The Wood design, however, was thoroughly backed by the S&WB officials, who, in a long and explicit report explained to the city council that the design had been approved two years before and that although previous contracts had required bidders to design and guarantee their pumps, never had the operation ever come close to guarantee. In the end, the city council and the Mayor approved the acceptance of the Wood design. Although the S&WB was an independent public utility, contracts for more than \$25,000 had to come before the commission council. They awarded the contract for thirteen large, twelve-foot Wood Screw Pumps to the Nordberg Manufacturing Company. The amount was \$160,000.

Even before the pumps were installed in the city's drainage system, Wood was beginning to receive recognition of his outstanding engineering ability. In the 1913 Bulletin of Tulane University, College of Technology, attention was called to outstanding achievements of Tulane Technology students. Out of the seven listed, Wood was credited with two: The design for the largest low-lift pump in the world; and the design for the most economical and fastest running centrifugal pump in the world.

In 1915 the first four of the new twelve-foot pumps were installed and tests were made by Professor W. H. Creighton, Dean of the Department of Technology at Tulane University. Statistics given in his report stated: "The pump is larger than any centrifugal pump ever built and among the largest screw pumps, twelve feet in diameter, of horizontal type, designed to give 247, 500 gallons per minute against a seven-foot lift at 75 rpm and to work at this constant speed driven by a 600 hp synchronous motor for any lift from 0 to 10 feet."

He summed up "that while the pump surpasses in efficiency, under normal conditions, those of previous installations, the superiority is much greater just when the greatest service is required. Emergency service is probably the weak point of the old pumps. It is the forte of the new. Results show that the pumps easily answer all requirements and that they are the largest and most efficient low-lift pumps in the world. By installing the Wood pumps instead of using those designed by manufacturers in the original. pumping plant, the city will Obtain a capacity of 550 cubic feet per second at a cost of from \$400, 000 to \$500,000 less when all pumps are installed."

His report showed the pumps to have such remarkable efficiency and revealed features so superior to previous pumps that a complete description was included for the information of other engineers who would have to deal with massive pumping problems.

The drainage system today consists of Wood Screw Pumps of various sizes, the largest of which is fourteen feet in diameter.

The Pumps go International

Before World War I the Dutch government launched one of the world's greatest engineering projects -- reclamation of the Zuyder Zee. The estimated cost was \$125 million. The project was to extend over a period of thirty-five years.

Centuries ago the area covered by the Zuyder Zee was dry land, and the south part of the present sea was Lake Fleve. Northwest tempests repeatedly swept the North Sea, washing away the neck of land between the sea and lake and finally formed the Zuyder Zee, a territory as large as Rhode Island. It constituted a twelfth of the entire area of Holland, capable of supporting 300, 000 people. The first job was to dike out the North Sea. Then the pumping.

The Dutch government had learned about the famous Wood Screw Pump and sent a representative to see Wood. He gave blueprints and the exclusive rights for the manufacture and sale of Wood Pumps in continental Europe to the Werkspoor Company on December 14, 1916. Years later, when Mrs. Wood visited the pumping station at Keon Molen, the Dutch officials treated her like visiting royalty, proudly exhibiting the pumping station, where the floor had been covered with red carpeting for the occasion.

The pumps were also installed in Egypt, China and India.



Sewerage and Water Board of New Orleans
Drainage Pumping Station No. 1
2501 South Broad Avenue