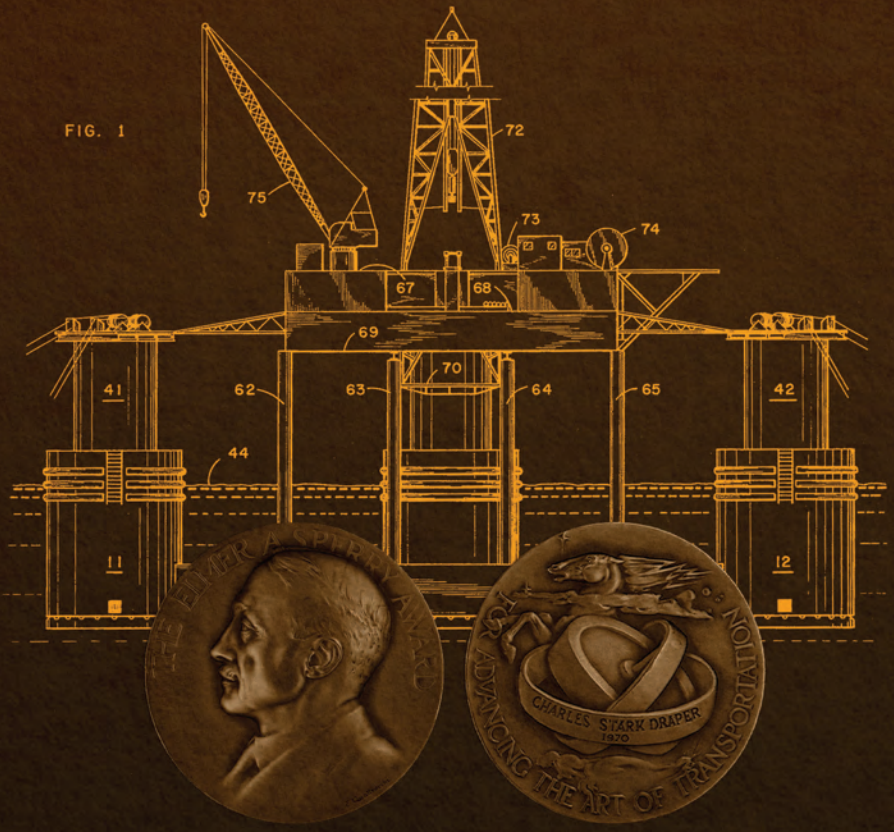


The Elmer A. Sperry Award

For the design and development of the semi-submersible platform.

Presentation of

The Elmer A. Sperry Award

For 2014

TO

Alden J. "Doc" Laborde
Bruce G. Collipp
Alan C. McClure

BY

The Elmer A. Sperry Board of Award

REPRESENTED BY THE:

American Society of Mechanical Engineers
Institute of Electrical and Electronics Engineers
SAE International
Society of Naval Architects and Marine Engineers
American Institute of Aeronautics and Astronautics
American Society of Civil Engineers

The award is for their most vital and collective contributions for the invention, design and development of the mobile offshore semi-submersible platform. This technological advancement in the early nineteen sixties made it possible to conduct offshore oil and gas exploration and production in deep waters around the world for the foreseeable future. Further, it substantially increased the reliability of the availability of fossil fuel which enhanced the long-term advancement of all modes of transportation.

At the OTC 2015, SNAME Reception
Houston, Texas • May 4, 2015

Semi-submersible Mohole Platform

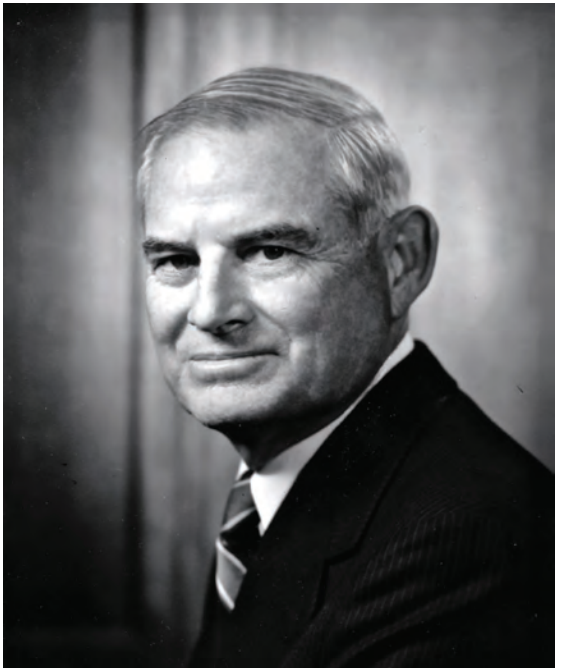
A semi-submersible drilling unit is comprised of three primary structural configurations that are inter-connected.

- Lower Hull - A wide base of totally submerged pontoons or mats connected together by a framing system.
- Columns - A series of vertical buoyant columns that rise from the lower hull.
- Upper Hull – A horizontal deck or platform that is supported by the columns. The upper hull contains all drilling machinery, equipment and associated systems, as well as the crew's living quarters.

The lower hull has the volume, i.e., the buoyancy necessary to support the entire structure. The semi-submersible is held at station by a mooring system or by a group of thruster propellers. The upper hull is located well above the waterline to clear the ocean waves expected in the area of operation.

Semi-submersible Mohole Platform

Alden J. "Doc" Laborde



Alden J. "Doc" Laborde was born in Vinton, Louisiana, on December 18, 1915. He graduated from Marksville High School and in 1932 entered Louisiana State University where he became active in the ROTC. In 1934 Laborde was nominated to the United States Naval Academy in Annapolis. He graduated in 1938 and was commissioned an Ensign but was released from service after two years because of less than perfect vision. He returned home and started a business in Lafayette where he met his future wife Margaret Bienvenu.

Soon after hearing the news of the Japanese bombing of Pearl Harbor on December 7, 1941, Laborde returned to active duty in the Navy. He was released from active duty on Christmas Eve 1945.

Laborde's naval experience was suited to the growing offshore oil industry that was starting to boom off the Gulf Coast following the war. Laborde found work with Kerr-McGee Oil Industries in Morgan City, Louisiana, as a Marine Superintendent. In this capacity he had a front-row seat for observing the problems and limitations of offshore oil drilling under varying conditions of distance from shore, water depth, sea floor structure, and wind and wave conditions. Laborde observed the water depth limitation of drilling with the machinery located on the deck of partially submerged barges.

Further, he recognized the increased capability and the functionality of the Breton Rig 20 that was conceived by John Hayward. Breton Rig 20 combined a barge and an elevated deck mounted on posts (a "posted" barge) so that the rig's working decks were above the water and only the columns connecting to the submerged barge were exposed to the wave forces.

While still employed by Kerr-McGee, Laborde set his mind to improve upon the Breton Rig 20. He applied his practical experience and designed a submersible unit that embodied unique features. Laborde's innovative new design did not gain encouragement and investment from Kerr-McGee who declined to build to the new design. Laborde departed Kerr-McGee to team with John Hayward and formed Ocean Drilling and Exploration Company (ODECO).

ODECO found a receptive financier and a business colleague in Charles Murphy, Jr. of Murphy Oil Company. Murphy committed $500,000 towards construction of Laborde's "posted barge" and assisted him in finding additional investors.

A unit was built in accordance with Laborde's design and it was named *Mr. Charlie* to honor Charles Murphy, Jr.'s father who was commonly known as Mr. Charlie. Much to Laborde's relief Shell Oil signed the original contract to hire the rig and on June 15, 1954, the rig sailed to undergo operation tests and fulfill its first assignment. The rig was followed by interested competitors, skeptic press and curious public to see if the rig would perform as expected by the designer. Again to Laborde's relief, the tests were successful. The rig was ballasted and submerged to sit on the sea floor and de-ballasted to return to the floating upright position.

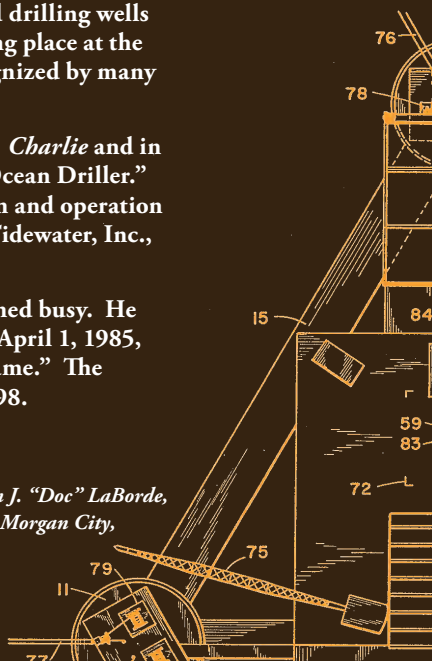
Bruce G. Collipp, the inventor of the semi-submersible platform, reviewed the design of *Mr. Charlie* with Laborde, followed the construction and was onboard the rig during its initial tests. *Mr. Charlie* continued drilling wells for some thirty years and eventually found a very public resting place at the Rig Museum in Morgan City, Louisiana. *Mr. Charlie* is recognized by many as the stepping stone to the semi-submersible platform

ODECO went on to design and build several variations of *Mr. Charlie* and in mid-1963 introduced the first new build semi-submersible, "Ocean Driller." Laborde broadened his interest to include design, construction and operation of offshore supply vessels. He and his brother, John, formed Tidewater, Inc., a world leader in offshore supply boats.

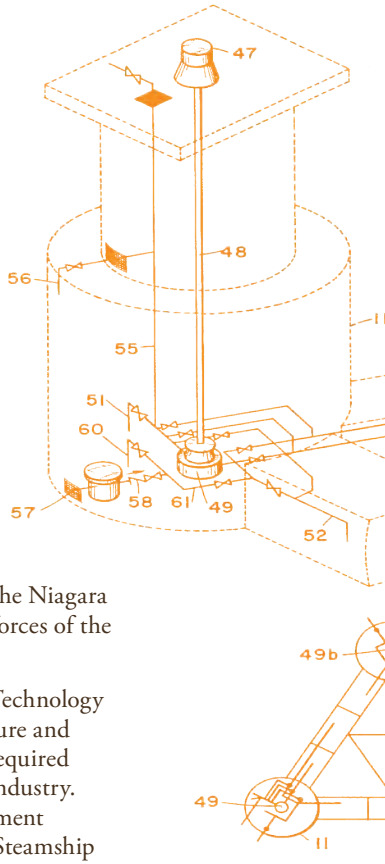
Alden J. "Doc" Laborde retired on January 1, 1977 but remained busy. He has been recognized by many well-known organizations. On April 1, 1985, Fortune Magazine inducted him into the "National Hall of Fame." The Offshore Energy Center named him "Industry Pioneer" in 1998.

Laborde passed away in June, 2014.

The foregoing was composed mostly with reference to the publication, "Alden J. "Doc" LaBorde, The Man Behind the Rig," International Petroleum Museum & Exposition, Morgan City, Louisiana, and the citation by the Offshore Energy Center, Houston, Texas.



Bruce G. Collipp



Bruce G. Collipp grew up in Niagara Falls, New York.

As a youth he was fond of models of boats and enjoyed jumping in to the Niagara River. While swimming downstream and having to "battle" with the forces of the waves Collipp developed an interest in waves.

To follow his interests Collipp entered the Massachusetts Institute of Technology (MIT) on a scholarship to pursue higher education in Naval Architecture and Marine Engineering. It was a five year course and in those days MIT required that one of the five years be devoted by the student to working in the industry. Its purpose was to show that the student would be able to find employment after graduation. Collipp managed to be introduced to Lykes Brothers Steamship Company and spent a year at sea as a Cadet on a Lykes ship. After earning his BS degree Collipp was offered a Fulbright scholarship which he declined and went back to sea for a year and half as an officer. Then he returned to MIT for a Master's degree.

The requirements for a Master's degree included a thesis. About that time there were concerns about the adequacy of rules for stability of ships. Having read something about offshore drilling rigs Collipp was intrigued by them. As a student he visited a company that was drilling in 30-40 ft. of water and came back believing that eventually ways would be found to drill in deeper waters.

The problem of the stability of rigs seemed interesting to Collipp which resulted in his thesis, "The Design of an Offshore Oil Drilling Rig." It dealt with the stability of a rig during tow and its installation at the drilling location. The thesis started Collipp on his way to solving a problem that had plagued the drilling industry ever since it went into water in search of oil. Collipp's 1953 thesis has been cited in the defense and offense of many patents.

After completing his studies at MIT Collipp joined Shell's Technical Services Division in Houston in 1954. His initial assignment was the development of a new drilling rig design and Collipp aimed for a semi-submersible unit. To start with he visited with Laborde and Hayward to go over the design of the submersible, *Mr. Charlie*, and stayed with it through construction and trials. Some of Collipp's ideas were incorporated in *Mr. Charlie*. Initial work on his own design was started in 1955 and in 1956 it was model tested at the University of California's towing tank. The shape tested had three columns and was called, *Trident*. A patent for the design was filed in 1961 as patent No. 3,163,147, "Floating Drilling Platform." All royalties went to Shell.

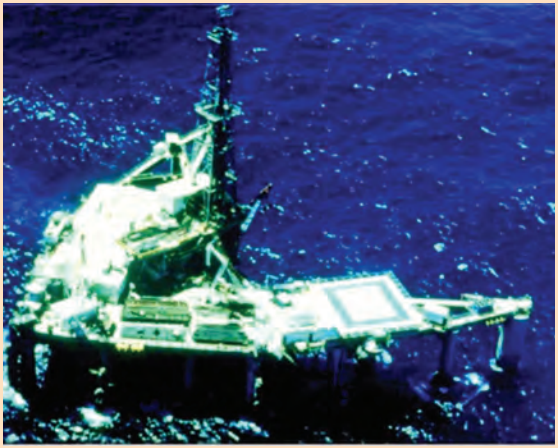
Shell's contractual commitment for drilling in deep water would not allow time for new construction. In search for a rig to meet Shell's commitment and also find a way to introduce his own features of a semi-submersible, Collipp targeted a submersible rig that belonged to the Bluewater company that met most of the desired hydrodynamic properties. The rig was converted to a semi-submersible and it met the acid test in 1962 when it performed successfully in 297 ft. of water, an historical event in the history of the offshore drilling and exploration industry. It is significant that the whole project from selection of the particular rig to the successful tests was shielded in absolute secrecy unlike the story of *Mr. Charlie*. The rig was named *Bluewater 1* and concurrently Bruce G. Collipp became the inventor of the semi-submersible platform. *Bluewater 1* signaled the boom in the construction of semi-submersibles and it continues today.

Collipp gave in-house classes on the methods that he applied for the hydrodynamic calculations for semi-submersible platforms. Three years later Shell held seminars to introduce the new technology to the industry. Collipp went on to build *Bluewater2* and remained at Shell to advance the technology of semi-submersible rigs, drilling ships and fixed-leg platforms. He was involved in Shell's Cognac platform, the world's deepest fixed-leg platform for 1,025 ft. water depth.

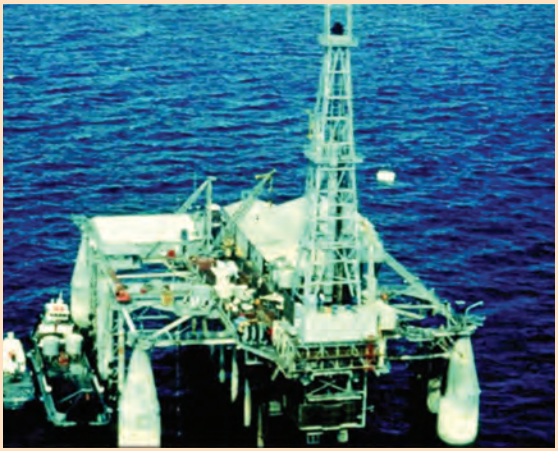
Bruce G. Collipp retired from Shell to establish his own consulting practice.

Collipp is the recipient of a number of awards and medals:

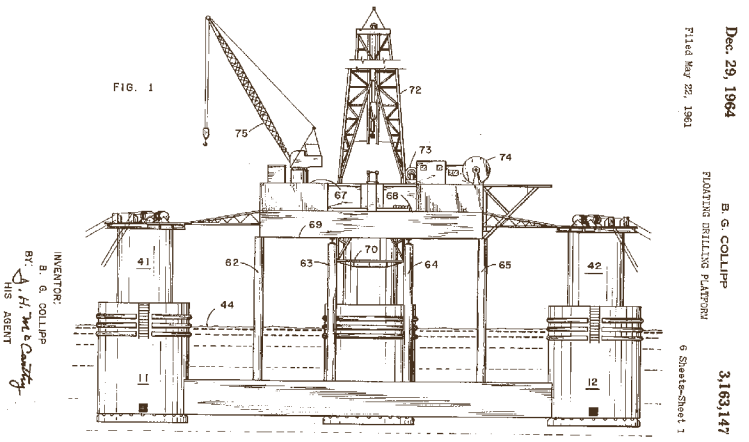
- ASME Holley Medal, 1979, for his unique acts of engineering that has accomplished great and timely public service
- National Academy of Sciences, 1991, Elected Member
- Gibbs Brothers Medal, 1991, for his development of innovative ocean engineering technologies
- SNAME, Blakely Smith Medal 1993 for Outstanding Accomplishment in Ocean Engineering
- Offshore Energy Center, 1998, named Industry Pioneer
- OTC 2002, Distinguished Achievement Award



Ocean Driller



Bluewater 1


Dec. 29, 1964
B. G. COLLIPP
3,163,147
Filed May 22, 1961
FLOATING DRILLING PLATFORM
6 Sheets-Sheet 1
FIG. 1
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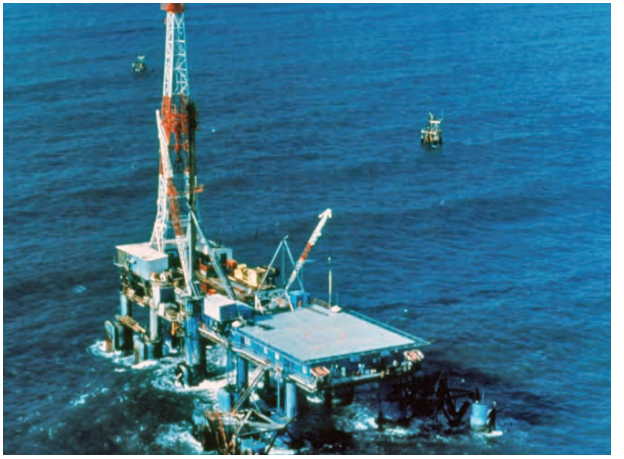
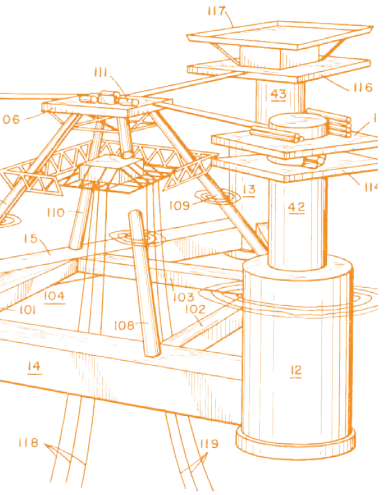
INVENTOR:
B. G. COLLIPP
BY: A. H. Mc & Cartter
HIS AGENT



Mr. Charlie

Alan C. McClure



Born August 7, 1923 in Yonkers, New York, Alan C. McClure graduated with a Bachelor of Science degree in Naval Architecture and Marine Engineering from the University of Michigan in 1949 and obtained a Master of Science degree in Naval Architecture and Marine Engineering from the Massachusetts Institute of Technology in 1950. In 1947 he married his wife, Gloria,

Following his service with the US Army in WWII and the completion of his education, McClure started his career at the Electric Boat Division of the General Dynamics Corporation. There he was involved in the design of the first nuclear powered submarine. In 1962 he moved to Houston, TX, to join the Brown & Root Corporation and serve as Chief Naval Architect on Project Mohole. Leaving in 1967 he joined the Continental Oil Corporation where he was engaged in the design of offshore production platforms.

In 1972 McClure formed the consulting firm of Alan C. McClure Associates, Inc., which gained worldwide recognition for solving offshore and marine transportation problems and was a leader in the development of SWATH semi-submersible vessels. At the time of his death in 1993 he was an active naval architect and chairman of the board of directors of his firm.

Alan McClure was a devoted Life Member and a Fellow of the Society of Naval Architects and Marine Engineers (SNAME). He served as an elected member of the Society's Council and as a Vice President of the Society. He was instrumental in the formation of SNAME's Technical and Research Offshore Committee and was its chairman for over ten years. He also served on many SNAME standing committees, including the Nomination, Education, Awards, Sections, and the T&R Steering Committee.

In 1987 SNAME awarded McClure the coveted Blakely Smith Medal for his "Outstanding Accomplishments in Ocean Engineering." In 2003 he was honored by the Offshore Energy Center, Houston, Texas, and named an "Industry Pioneer."

Alan McClure was recognized and honored for a variety of accomplishments in Ocean Engineering but none as much for the advancement of the design methodology of the semi-submersible platform in its infancy when he served as the Chief Naval Architect of the Mohole Project, at Brown & Root, 1962-1967. Project Mohole was United States' contribution to the International Upper Mantle Study, an outgrowth of the International Geophysical Year. The objective of the program was to obtain a complete core record of the layers of the crust of the earth and the upper part of the mantle, and to obtain additional scientific data by measurements in the hole being drilled. The project was funded by the National Science Foundation and Brown & Root, Inc. was the Prime Contractor.

The requirements for the design of a deep water open ocean floating structure from which Mohole operations were to be conducted were extreme. Basically the structure was required to remain on drilling location, steady and essentially vertical under severe wind, wave and current conditions. No body of referable experience existed at the inception of the design. The time-line history related to Bruce Collipp's patent on semi-submersibles and the secrecy surrounding *Bluewater 1* makes it understandable why the Mohole design team was unaware of any other semi-submersible design evolving at the same time. Propitiously, on joining Brown & Root McClure was made aware of Edward Armstrong's Seadrome concept which was a series of column stabilizing elements strung together to form an open ocean airplane landing strip 1500 feet long. Armstrong was issued a patent for it in 1924 and another patent in 1932 for a refined concept. In 1946 Armstrong received a patent for what he called a drilling platform. Although Armstrong's patents did not completely define the Mohole concept, it did suggest to McClure and the Mohole Team that they should opt for a semi-submersible platform which they eventually did choose for its desirable motion characteristics. However, before making this final decision preliminary studies were conducted to assess the suitability of ships, barges and catamarans.

In view of the lack of referable designs and the complex requirements of the Mohole program, the platform design was based largely on basic naval architecture principles. The initial phase of the Project was to establish the oceanographic, meteorological, positioning and survival condition requirements to which the platform would have to be designed.

The design program from conceptual to detail construction drawings was based on typical new ship design procedures but customized for a semi-submersible platform configuration, particularly with respect to hydrodynamics, ship motions, and structural loads and structural responses. After extensive preliminary studies it was decided that the platform would have six columns and two parallel tubular lower hulls. Then, experimental and analytical studies were conducted for ship motions under a range of drafts and sea conditions. It was important to obtain the desirable relationships between the natural motion periods of the platform and the wave periods to minimize the magnitude of ship motions. Experimental and analytical studies were followed by prediction of ship motions and the calculation of resistance, propulsion, powering, steering, and station keeping. In progressive design cycles the platforms principal dimensions and capabilities of principal machineries were adjusted for two reasons: One, minimize ship motions and two, make compromises and optimize to best satisfy the complex requirements of the Project. It is particularly worthy of note that the final configuration achieved minimization of vessel heave motions in long period seas. The design concept that provided these favorable heave motions, so desirable in floating drilling operations, was not recognized by the drilling industry until six years had transpired.

The Mohole Platform exhaustive design approach became an invaluable guide for semi-submersibles designs to follow. The design approach is thoroughly documented in McClure's 1965 landmark paper presented at the Annual Meeting of the Society of Naval Architects and Marine Engineers. The paper is backed-up by twenty-two references. The value of the paper is enhanced by seventeen insightful discussions by the most respected individuals in the marine research, engineering and design community plus an equally well reasoned closure by Alan McClure.

Alan McClure published some twenty well regarded technical papers including the following directly related to the design of semi-submersible platforms.

"Development of the Project Mohole Drilling Platform," Transactions of the Society of Naval Architects and Marine Engineers, Vol. 73, 1965.

"Project Mohole Drilling Platform: Maneuvering, Propulsion, and Stationkeeping," Sixth Symposium on Naval Hydrodynamics, Office of Naval Research, Department of the Navy, 1966, with A. S. Hove.

"Experimental Study of Stability Limits for Semi-Submersible Drilling Platforms," OTC 2285, Offshore Technology Conference, Houston, Texas 1975, with Edward Numata.

"Assessment of Stability Requirements for Semi-Submersible Units, Transactions of the Society of Naval Architects and Marine Engineers, Vol. 84, 1976, with Edward Numata and W. H. Michel.

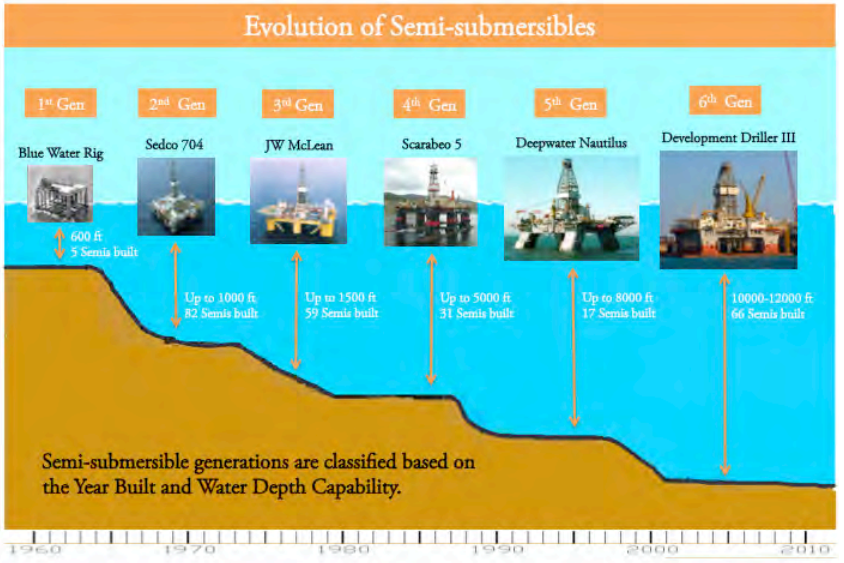
Regrettably the Government discontinued the Mohole Project for lack of funding while the platform was under construction. However, a new semi-submersible with dimensions nearly identical to the Mohole Platform was constructed and entered service in 1975.

Evolution and Growth of Semi-Submersibles

It is accepted that submersibles were the forerunners of the semi-submersible platforms. In addition to Breton Rig 20 and *Mr. Charlie,* there were lesser known jack-up units in operation in the early fifties such as The Offshore Company's Rig 52.

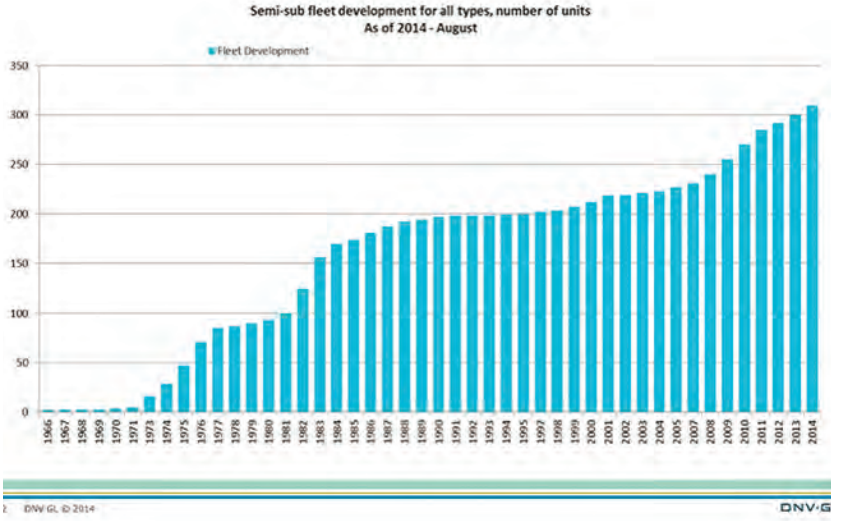
Nearly immediately after *Bluewater 1*, semi-submersibles ODECO's Ocean Driller and the triangular rig *SEDCO 135* were put into service. The late sixties and early seventies saw the construction of a number of semi-submersibles of varying designs that continue today.

It is believed that currently there may be as many as 300 units at site or in transit composed of possibly as many as 60 designs or variations thereof for a variety of applications. The ownership represents some 30 countries. There are six general areas of operation. The three graphs that follow show growth by water depth, by number of units over time and by number of units contracted for different applications over time.

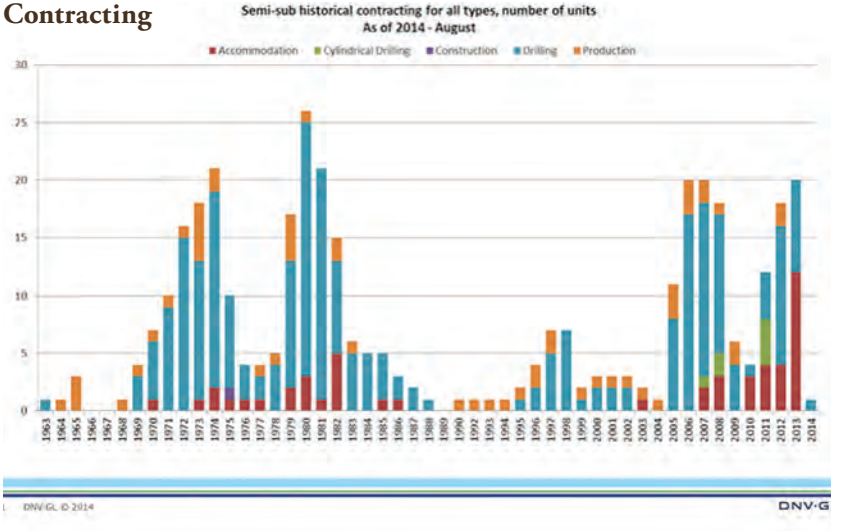


Year of Build

Fleet development



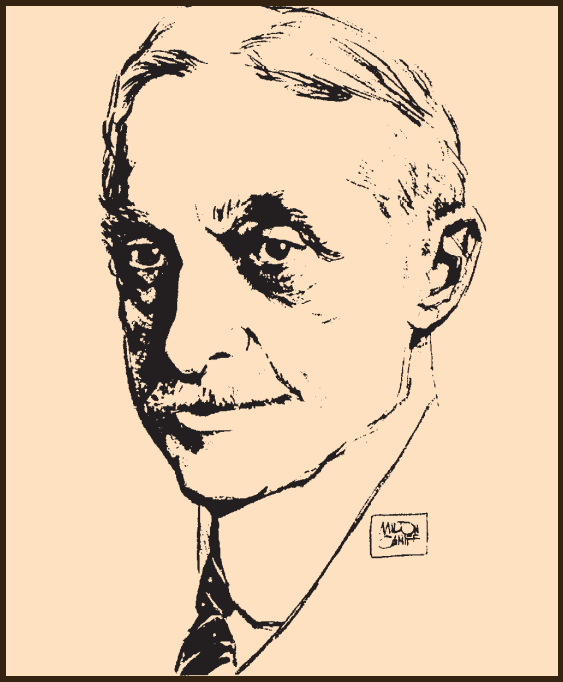
Contracting



While the awards are limited to three, there were other individuals whose contributions to the design and development of semi-submersibles in the early years deserve to be cited and honored:

John Hayward, Jerome L. Goldman, Charles Murphy, Jr., Paul Wolff, Walter Michell, Peter J. O'Reilly, Dillard Hammett, Bill Martinovich.

Elmer A. Sperry, 1860-1930



After graduating from the Cortland, N.Y. Normal School in 1880, Sperry had an association with Professor Anthony at Cornell, where he helped wire its first generator. From that experience he conceived his initial invention, an improved electrical generator and arc light. He then opened an electric company in Chicago and continued on to invent major improvements in electric mining equipment, locomotives, streetcars and an electric automobile. He developed gyroscopic stabilizers for ships and aircraft, a successful marine gyro-compass and gyro-controlled steering and fire control systems used on Allied warships during World War I. Sperry also developed an aircraft searchlight and the world's first guided missile. His gyroscopic work resulted in the automatic pilot in 1930. The Elmer A. Sperry Award was established in 1955 to encourage progress in transportation engineering.

The Elmer A. Sperry Award

To commemorate the life and achievements of Elmer Ambrose Sperry, whose genius and perseverance contributed so much to so many types of transportation, the Elmer A. Sperry Award was established by his daughter, Helen (Mrs. Robert Brooke Lea), and his son, Elmer A. Sperry, Jr., in January 1955, the year marking the 25th anniversary of their father's death. Additional gifts from interested individuals and corporations also contribute to the work of the board.

Elmer Sperry's inventions and his activities in many fields of engineering have benefited tremendously all forms of transportation. Land transportation has profited by his pioneer work with the storage battery, his development of one of the first electric automobiles (on which he introduced 4-wheel brakes and self-centering steering), his electric trolley car of improved design (features of its drive and electric braking system are still in use), and his rail flaw detector (which has added an important factor of safety to modern railroading). Sea transportation has been measurably advanced by his gyrocompass (which has freed humans from the uncertainties of the magnetic compass) and by such navigational aids as the course recorder and automatic steering for ships. Air transportation is indebted to him for the airplane gyro-pilot and the other air navigational instruments he and his son, Lawrence, developed together.

The donors of the Elmer A. Sperry Award have stated that its purpose is to encourage progress in the engineering of transportation. Initially, the donors specified that the award recipient should be chosen by a Board of Award representing the four engineering societies in which Elmer A. Sperry was most active:

American Society of Mechanical Engineers (of which he was the 48th president)

American Institute of Electrical Engineers (of which he was a founder member)

Society of Automotive Engineers

Society of Naval Architects and Marine Engineers

In 1960, the participating societies were augmented by the addition of the Institute of Aerospace Sciences. In 1962, upon merging with the Institute of Radio Engineers, the American Institute of Electrical Engineers became known as the Institute of Electrical and Electronics Engineers; and in 1963, the Institute of Aerospace Sciences, upon merger with the American Rocket Society, became the American Institute of Aeronautics and Astronautics. In 1990, the American Society of Civil Engineers became the sixth society to become a member of the Elmer A. Sperry Board of Award. In 2006, the Society of Automotive Engineers changed its name to SAE International.

Important discoveries and engineering advances are often the work of a group, and the donors have further specified that the Elmer A. Sperry Award honor the distinguished contributions of groups as well as individuals.

Since they are confident that future contributions will pave the way for changes in the art of transportation equal at least to those already achieved, the donors have requested that the board from time to time review past awards. This will enable the board in the future to be cognizant of new areas of achievement and to invite participation, if it seems desirable, of additional engineering groups representative of new aspects or modes of transportation.

The Sperry Secretariat

The donors have placed the Elmer A. Sperry Award fund in the custody of the American Society of Mechanical Engineers. This organization is empowered to administer the fund, which has been placed in an interest bearing account whose earnings are used to cover the expenses of the board. A secretariat is administered by the ASME, which has generously donated the time of its staff to assist the Sperry Board in its work.

The Elmer A. Sperry Board of Award welcomes suggestions from the transportation industry and the engineering profession for candidates for consideration for this award.

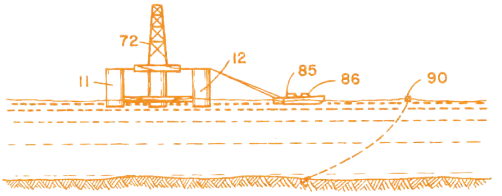


FIG. 5

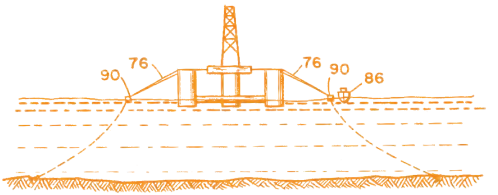


FIG. 6

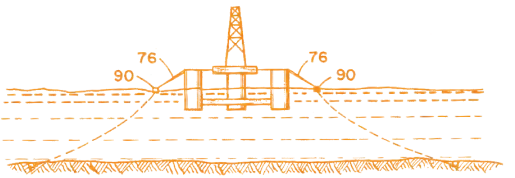


FIG. 7

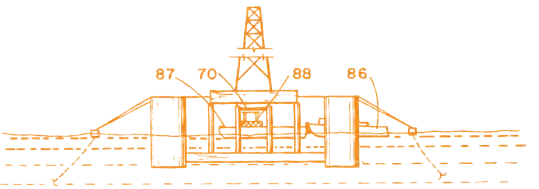


FIG. 8

INVENTOR:
B. G. COLLIPP
BY: J. H. McCarthy
HIS AGENT

Previous Elmer A. Sperry Awards

1955 To ***William Francis Gibbs*** and his Associates for design of the S.S. United States.

1956 To ***Donald W. Douglas*** and his Associates for the DC series of air transport planes.

1957 To ***Harold L. Hamilton, Richard M. Dilworth*** and ***Eugene W. Kettering*** and Citation to their Associates for developing the diesel-electric locomotive.

1958 To ***Ferdinand Porsche*** (in memoriam) and ***Heinz Nordhoff*** and Citation to their Associates for development of the Volkswagen automobile.

1959 To ***Sir Geoffrey de Havilland, Major Frank B. Halford*** (in memoriam) and ***Charles C. Walker*** and Citation to their Associates for the first jet-powered passenger aircraft and engines.

1960 To ***Frederick Darcy Braddon*** and Citation to the Engineering Department of the Marine Division of the Sperry Gyroscope Company, for the three-axis gyroscopic navigational reference.

1961 To ***Robert Gilmore LeTourneau*** and Citation to the Research and Development Division, Firestone Tire and Rubber Company, for high speed, large capacity, earth moving equipment and giant size tires.

1962 To ***Lloyd J. Hibbard*** for applying the ignitron rectifier to railroad motive power.

1963 To ***Earl A. Thompson*** and Citations to ***Ralph F. Beck, William L. Carnegie, Walter B. Herndon, Oliver K. Kelley*** and ***Maurice S. Rosenberger*** for design and development of the first notably successful automatic automobile transmission.

1964 To ***Igor Sikorsky*** and ***Michael E. Gluhareff*** and Citation to the Engineering Department of the Sikorsky Aircraft Division, United Aircraft Corporation, for the invention and development of the high-lift helicopter leading to the Skycrane.

1965 To ***Maynard L. Pennell, Richard L. Rouzie, John E. Steiner, William H. Cook*** and ***Richard L. Loesch, Jr.*** and Citation to the Commercial Airplane Division, The Boeing Company, for the concept, design, development, production and practical application of the family of jet transports exemplified by the 707, 720 and 727.

1966 To ***Hideo Shima, Matsutaro Fuji*** and ***Shigenari Oishi*** and Citation to the Japanese National Railways for the design, development and construction of the New Tokaido Line with its many important advances in railroad transportation.

1967 To ***Edward R. Dye*** (in memoriam), ***Hugh DeHaven,*** and ***Robert A. Wolf*** for their contribution to automotive occupant safety and Citation to the research engineers of Cornell Aeronautical Laboratory and the staff of the Crash Injury Research projects of the Cornell University Medical College.

1968 To ***Christopher S. Cockerell*** and ***Richard Stanton-Jones*** and Citation to the men and women of the British Hovercraft Corporation for the design, construction and application of a family of commercially useful Hovercraft.

1969 To ***Douglas C. MacMillan, M. Nielsen*** and ***Edward L. Teale, Jr.*** and Citations to ***Wilbert C. Gumprich*** and the organizations of George G. Sharp, Inc., Babcock and Wilcox Company, and the New York Shipbuilding Corporation for the design and construction of the N.S. Savannah, the first nuclear ship with reactor, to be operated for commercial purposes.

1970 To ***Charles Stark Draper*** and Citations to the personnel of the MIT Instrumentation Laboratories, Delco Electronics Division, General Motors Corporation, and Aero Products Division, Litton Systems, for the successful application of inertial guidance systems to commercial air navigation.

1971 To ***Sedgwick N. Wight*** (in memoriam) and ***George W. Baughman*** and Citations to ***William D. Hailes, Lloyd V. Lewis, Clarence S. Snavely, Herbert A. Wallace,*** and the employees of General Railway Signal Company, and the Signal & Communications Division, Westinghouse Air Brake Company, for development of Centralized Traffic Control on railways.

1972 To ***Leonard S. Hobbs*** and ***Perry W. Pratt*** and the dedicated engineers of the Pratt & Whitney Aircraft Division of United Aircraft Corporation for the design and development of the JT-3 turbo jet engine.

1975 To ***Jerome L. Goldman, Frank A. Nemec*** and ***James J. Henry*** and Citations to the naval architects and marine engineers of Friede and Goldman, Inc. and Alfred W. Schwendtner for revolutionizing marine cargo transport through the design and development of barge carrying cargo vessels.

1977 To ***Clifford L. Eastburg*** and ***Harley J. Urbach*** and Citations to the Railroad Engineering Department of The Timken Company for the development, subsequent improvement, manufacture and application of tapered roller bearings for railroad and industrial uses.

1978 To ***Robert Puiseux*** and Citations to the employees of the Manufacture Française des Pneumatiques Michelin for the development of the radial tire.

1979 To ***Leslie J. Clark*** for his contributions to the conceptualization and initial development of the sea transport of liquefied natural gas.

1980 To ***William M. Allen, Malcolm T. Stamper, Joseph F. Sutter*** and ***Everette L. Webb*** and Citations to the employees of Boeing Commercial Airplane Company for their leadership in the development, successful introduction & acceptance of wide-body jet aircraft for commercial service.

1981 To ***Edward J. Wasp*** for his contributions toward the development and application of long distance pipeline slurry transport of coal and other finely divided solid materials.

1982 To ***Jörg Brenneisen, Ehrhard Futterlieb, Joachim Körber, Edmund Müller, G. Reiner Nill, Manfred Schulz, Herbert Stemmler*** and ***Werner Teich*** for their contributions to the development and application of solid state adjustable frequency induction motor transmission to diesel and electric motor locomotives in heavy freight and passenger service.

1983 To ***Sir George Edwards,*** OM, CBE, FRS; ***General Henri Ziegler,*** CBE, CVO, LM, CG; ***Sir Stanley Hooker,*** CBE, FRS (in memoriam); ***Sir Archibald Russell,*** CBE, FRS; and M. André Turcat, L d'H, CG; commemorating their outstanding international contributions to the successful introduction and subsequent safe service of commercial supersonic aircraft exemplified by the Concorde.

1984 To ***Frederick Aronowitz, Joseph E. Killpatrick, Warren M. Macek*** and ***Theodore J. Podgorski*** for the conception of the principles and development of a ring laser gyroscopic system incorporated in a new series of commercial jet liners and other vehicles.

1985 To ***Richard K. Quinn, Carlton E. Tripp,*** and ***George H. Plude*** for the inclusion of numerous innovative design concepts and an unusual method of construction of the first 1,000-foot self-unloading Great Lakes vessel, the M/V Stewart J. Cort.

1986 To ***George W. Jeffs, Dr. William R. Lucas, Dr. George E. Mueller, George F. Page, Robert F. Thompson*** and ***John F. Yardley*** for significant personal and technical contributions to the concept and achievement of a reusable Space Transportation System.

1987 To ***Harry R. Wetenkamp*** for his contributions toward the development and application of curved plate railroad wheel designs.

1988 To ***J. A. Pierce*** for his pioneering work & technical achievements that led to the establishment of the OMEGA Navigation System, the world's first ground-based global navigation system.

1989 To ***Harold E. Froehlich, Charles B. Momsen, Jr.,*** and ***Allyn C. Vine*** for the invention, development and deployment of the deep-diving submarine, Alvin.

1990 To ***Claud M. Davis, Richard B. Hanrahan, John F. Keeley,*** and ***James H. Mollenauer*** for the conception, design, development and delivery of the Federal Aviation Administration enroute air traffic control system.

1991 To ***Malcom Purcell McLean*** for his pioneering work in revolutionizing cargo transportation through the introduction of intermodal containerization.

1992 To ***Daniel K. Ludwig*** (in memoriam) for the design, development and construction of the modern supertanker.

1993 To ***Heinz Leiber, Wolf-Dieter Jonner*** and ***Hans Jürgen Gerstenmeier*** and Citations to their colleagues in Robert Bosch GmbH for their conception, design and development of the Anti-lock Braking System for application in motor vehicles.

1994 To ***Russell G. Altherr*** for the conception, design and development of a slackfree connector for articulated railroad freight cars.

1996 To ***Thomas G. Butler*** (in memoriam) and ***Richard H. MacNeal*** for the development and mechanization of NASA Structural Analysis (NASTRAN) for widespread utilization as a working tool for finite element computation.

1998 To ***Bradford W. Parkinson*** for leading the concept development and early implementation of the Global Positioning System (GPS) as a breakthrough technology for the precise navigation and position determination of transportation vehicles.

2000 To those individuals who, working at the French National Railroad (SNCF) and ALSTOM between 1965 and 1981, played leading roles in conceiving and creating the initial TGV High Speed Rail System, which opened a new era in passenger rail transportation in France and beyond.

2002 To ***Raymond Pearlson*** for the invention, development and worldwide implementation of a new system for lifting ships out of the water for repair and for launching new ship construction. The simplicity of this concept has allowed both large and small nations to benefit by increasing the efficiency and reducing the cost of shipyard operations.

2004 To ***Josef Becker*** for the invention, development, and worldwide implementation of the Rudderpropeller, a combined propulsion and steering system, which converts engine power into optimum thrust. As the underwater components can be steered through 360 degrees, the full propulsive power can also be used for maneuvering and dynamic positioning of the ship.

2005 To ***Victor Wouk*** for his visionary approach to developing gasoline engine-electric motor hybrid-drive systems for automobiles and his distinguished engineering achievements in the related technologies of small, lightweight, and highly efficient electric power supplies and batteries.

2006 To ***Antony Jameson*** in recognition of his seminal and continuing contributions to the modern design of aircraft through his numerous algorithmic innovations and through the development of the FLO, SYN, and AIRPLANE series of computational fluid dynamics codes.

2007 To ***Robert Cook, Pam Phillips, James White,*** and ***Peter Mahal*** for their seminal work and continuing contributions to aviation through the development of the Engineered Material Arresting System (EMAS) and its installation at many airports.

2008 To ***Thomas P. Stafford, Glynn S. Lunney, Aleksei A. Leonov,*** and ***Konstantin D. Bushuyev*** as leaders of the Apollo-Soyuz mission and as representatives of the Apollo-Soyuz docking interface design team: in recognition of seminal work on spacecraft docking technology and international docking interface methodology.

2009 To ***Boris Popov*** for the development of the ballistic parachute system allowing the safe descent of disabled aircraft.

2010 To ***Takuma Yamaguchi*** for his invention of the ARTICOUPLE, a versatile scheme to connect tugs and barges to form an articulated tug and barge, AT/B, waterborne transportation system operational in rough seas. His initial design has led to the development of many different types of couplers that have resulted in the worldwide use of connected tug and barges for inland waterways, coastal waters and open ocean operation.

2011 To ***Zigmund Bluvband*** and ***Herbert Hecht*** for development and implementation of novel methods and tools for the advancement of dependability and safety in transportation.

2012 To ***John Ward Duckett*** for the development of the Quickchange Movable Barrier

2013 To ***C. Don Bateman*** for the development of the ground proximity warning system for aircraft

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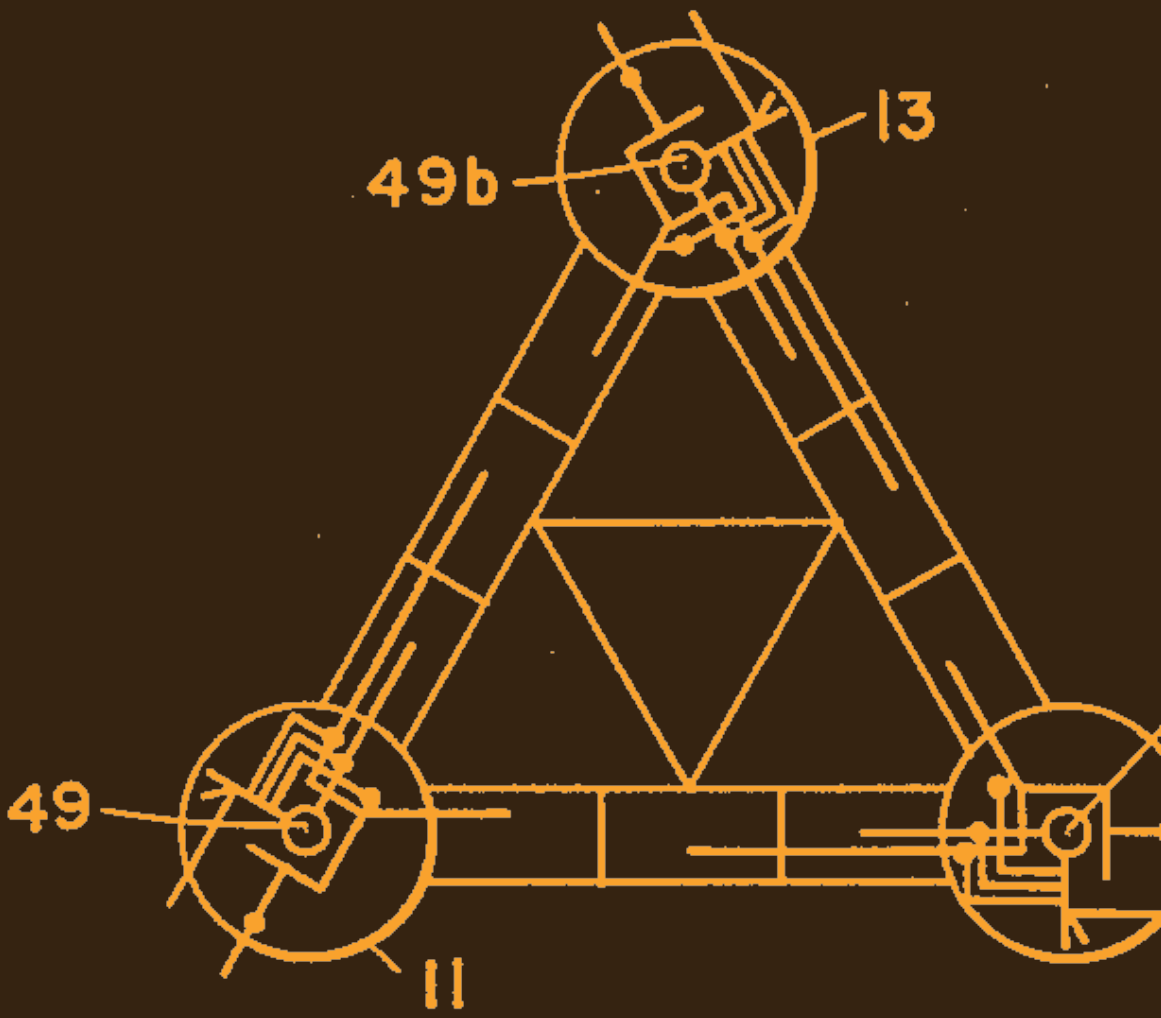
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