sponson, with captain's house under, for the better handling while docking and taking piers. From both of these bridges the bow and stern rudders are controlled by means of wheels connected with independent steam-steering gear placed below on the engine starting platform. A hand-screw steering apparatus is also placed in reserve aft in case of emergency. Docking and engine telegraphs are provided on each of the bridges.

The vessel was engined by the builders and the machinery consists of compound diagonal surface-condensing engines, the diameters of the cylinders being one 68 inches and two 92 inches in diameter, with a piston stroke of 84 inches. They are the largest and most powerful paddle-wheel engines yet built. Their nominal and indicated horse powers are respectively 1,290 and 10,000. When the ship was on her trials they worked up to close upon 12,000 horse power.

The three steam cylinders are placed side by side, and working on three cranks, the high-pressure cylinder being placed between the two low-pressure cylinders. The high-pressure cylinder is fitted with a piston valve and each of the low-pressure cylinders with flat slide valves, all controlled by the usual double eccentrics and link motion valve gear. The crank shaft is a ponderous piece of machinery. It is built, and, together with the paddle shafts, is forged of mild steel and bored hollow. The starting and reversing is effected by a large steam and hydraulic engine on the direct-acting principle.

The condenser is cylindrical, and placed athwartships between the cylinders and the supports for the shafting, and the condensing water is supplied by a circulating pump worked by an independent steam engine.

The paddle wheels are made of steel, and constructed on the feathering principle, with curved floats. The floats are each 18 feet in length. Steam is supplied to the engine by four double-ended boilers arranged in two compartments, one forward and one aft of the engine room. They are adapted to work with Messrs Howden's system of forced draught.

The vessel has two funnels and two pole masts, and presents a very handsome and majestic appearance. On July 8, the "Empress Queen" made four trial runs between the Cloch and Cumbrae Lights, when she averaged over 22 knots per hour, and, considering the stormy weather which prevailed on that day, the result was gratifying. The following Monday a six hours' sea trial was carried out on the Clyde with equal success, the average speed over the whole course out to sea being 22 knots. While on her trials on the Clyde the highest speed attained was fractionally less than 23 knots an hour.

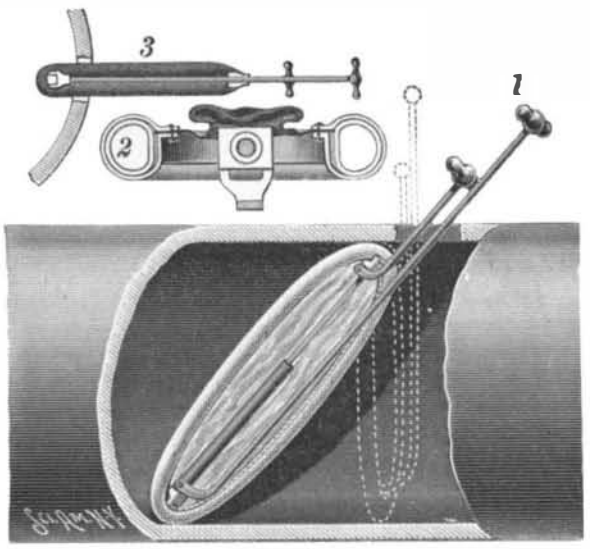
The "Empress Queen," which is licensed to carry 1,994 first and second class passengers by the Board of Trade, is now running to and from Liverpool and Douglas, which will be her regular station.

The Railroad in Alaska.

The building of a railroad through Chilkoot Pass will be undertaken by the Chilkoot Railroad and Transportation Company, of Tacoma. It will be 8 miles long and will connect Dyea at tidewater with the mouth of the Dyea Cañon. Transportation through this cañon and across the pass to Crater Lake will be effected by a system of tramways, the contract for which has been awarded to the Trenton, N. J., Iron Company, which agrees to have them in operation by June 15, 1898. The tramway will be of the Bleichert system. The first one will be 4 miles in length, reaching from the cañon to Sheep Camp, with a rise of 1,000 feet. A second tramway will extend from Sheep Camp to Summit, 3½ miles, with a rise of 2,500 feet, and thence to Crater Lake, with a fall of 500 feet. Iron supports will be put in every 100 feet. The tramway will have a capacity of 120 tons daily—sufficient for the outfits of 200 miners. It is to be hoped that the promoters of this much needed means of transportation will not encounter any serious legal difficulties. It was believed that the Interior Department had the power to grant permission to run over the public lands, but no provision was made in the act of March 3, 1875, for Alaska, as no one then thought that railroads would be run in the Territory. The same state of affairs applies to the tramways, the cable roads, the telegraph and telephone lines and other enterprises which demand passage over the public domains. The originators of the enterprises will be forced to apply to Congress for charters or for legislation that may enable the Interior Department to take charge of the matter. It is probable that Congress will act at once upon these applications, so that the railroads can be built before the spring season opens. The Interior Department has many applications for such franchises, but it can do nothing but refer them to Congress for action, and so notifies all those who applied. Out of the five passes over which routes could be constructed from the coast to the interior, three have been surveyed for this purpose.

A GAS MAIN STOPPER.

To temporarily stop a gas main and prevent the flow of gas therein, as is frequently necessary in making changes or repairs, the device shown in the accompanying illustration has been invented and patented by Patrick Goodman, 115th Street, East River (address in care of the Standard Gas Company), New York City. Fig. 1 shows the manner of using the device, a portion of the gas main being broken out, Fig. 2 represents a cross section and Fig. 3 illustrates the manner of inserting the device in a pipe. Two flat steel springs are made with eyes at their ends by which they are pivoted to two rods, one telescoping with the other, the springs being slightly curved outwardly, but being capable of compression. Outside of the springs is an elastic packing, which may be of rubber tubing, and outside of such packing, and inclosing it with the springs, is a casing to which is attached a flexible diaphragm of cloth, leather or other suitable material, practically impervious to gas. Pivotally attached to the outer ends of the telescoping rods are outwardly extending handle bars, slightly curved near their pivotal points, and one handle bar being slightly longer than the other. The device, when first inserted in a hole in the side of a pipe or main, occupies an inclined position, as shown in full lines in Fig. 1, but, upon drawing upon the longer handle, the device assumes a vertical position, as indicated by the dotted lines, the springs being forced outward to form a ring which presses closely against the interior surface of the pipe, and, with the diaphragm, entirely shuts off the flow of gas.

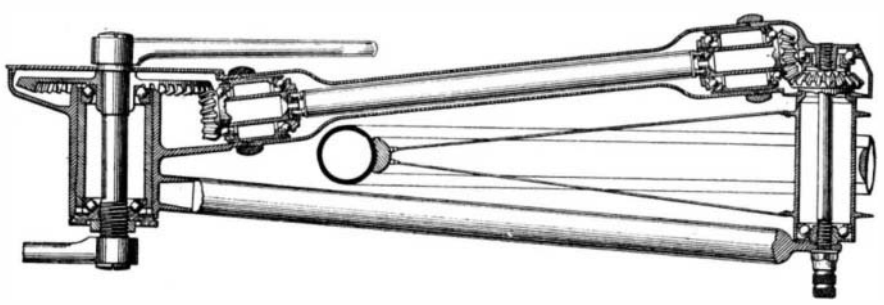


GOODMAN'S GAS MAIN STOPPER.

THE CHAINLESS BICYCLE.

The most conspicuous bicycle exhibit at the American Institute Fair is that of the Bayvelgere machine—one of the new type of chainless wheels which is likely to compete strongly with the chain-driven type during the coming season. The exhibit is somewhat historical, as it contains one of the earliest bevel-geared wheels put upon the market and one or two of the experimental machines made by the Bayvelgere Company, among which is one that has several thousand miles travel to its credit and shows surprisingly little wear as the result of it.

The aim of the designer of this wheel has been to provide a construction which will maintain each pair of gears at all times in proper alignment and yet allow of considerable deflection in the connecting shaft. This has been accomplished by inclosing and supporting each pair of gears, both at the crank hanger and at the rear wheel, in a rigid casing, which is incapable of being sprung out of shape by any rough usage that may be put upon the bicycle. The power is transmitted from one set of gears to the other by means of a shaft formed with a knuckle joint at each end.



DRIVING GEAR OF THE BAYVELGERE CHAINLESS BICYCLE.

Every wheelman is well aware that, under the strain of hill climbing, when the maximum pressure is put upon the pedals, the rear forks are liable to spring somewhat out of line. This is due to the pull of the chain being applied only on one side of the wheel. In the chain-driven wheel this flexibility is of comparatively little consequence; but any such distortion on a bevel-geared wheel, provided with a rigid intermediate shaft, would cause the gears to bind and set up a considerable amount of friction. The flexible shaft shown in the accompanying engraving adjusts itself to this distortion or to any bending that may be produced by collision or other accident, and permits each pair of gears to work without binding, even though they be considerably out of line with each other.

The flexible shaft is provided with a four point knuckle joint at each end, the points consisting of steel balls which engage corresponding holes in the ends of the axles of the gears at the crank hanger and the rear hub. Each of the two gear wheels adjoining the intermediate shaft is formed in one with a short hollow axle, whose bearings are carried in a short threaded cylinder which is firmly screwed into the crank hanger or the housing of the rear gears, as the case may be. The two casings are connected by means of a tube with enlarged and threaded ends which just fills the space between the casings, and is held in place by means of threaded couplings. Wear of the intermediate gears is taken up by screwing the cylinders containing the ball races into the casings, and the ball bearings are adjusted by screwing up the cones on the outer ends of the short hollow shafts or axles.

The mechanism is entirely inclosed by the casings and connecting tube, and when it is filled with oil or other lubricant, it will run for months without attention. Taken altogether, it is a highly creditable piece of work, both in design and construction.

The Patagonian Expedition from Princeton University.

The Princeton Patagonian expedition which left in February, 1896, returned in August. It was under the auspices of Prof. W. B. Scott, of the department of geology. The object of the expedition was to collect vertebrate fossils from the tertiary deposits and the skins and skeletons of recent birds and mammals. The objective points, says Science, was the port of Gallegos, on the east coast of Southern Patagonia. From this point investigations were conducted along the coast from Sandy Point, in the Straits of Magellan, to Port Desire, on the north. In this region many interesting fossil forms were secured, and a nearly complete series of living birds, mammals and plants. After spending several months in the coast region, the expedition went into the interior, where many new glaciers and watercourses were discovered. Being an unexplored country, not only were new facts relating to the geography of the region discovered, but many plants and animals new to science were also collected, while the information obtained relating to geological phenomena was of the greatest value. Numerous volcanic cones hitherto unreported were discovered.

Owing to the difficulty of traveling in the interior, it was impossible to take any great supply of provisions. So it was found necessary to limit the expedition to Messrs. Hatcher and Peterson. They were absent five months on this trip, during which time it was impossible for them to receive or dispatch any mail and they did not meet with a single human being. After spending a little more than a year on the mainland, the expedition proceeded to Tierra del Fuego and the adjoining islands, where important collections were made and observations were taken of the geology and paleontology of the islands.

Throughout their work the Argentine government was very generous and courteous to the expedition, giving to its members transportation on its war vessels from Buenos Ayres to Gallegos and return, offering to place at its disposal a smaller vessel for use in researches among the islands. The collection is the most valuable of any formed from that region, including as it does a nearly complete series of mosses and flowering plants, 800 skins and skeletons of recent birds, eight tons of fossils, including more than 1,000 skulls and many nearly complete skeletons.

Further Experiments on the Liquefaction of Fluorine.

At the meeting of the Academy of Sciences at Paris, October 12, M. Moissan read a paper on the liquefaction of fluorine with Prof. Dewar's instruments in London. He said it retained its liquid form at minus 120 degrees Centigrade, whereas almost every chemical affinity of the most active of known gases disappears in such great cold. The exceptions are hydrogen and turpentine oil, which even in a temperature of minus 210 degrees Centigrade combine with fluorine and are incandescent.

SCIENCE announces the establishment in Switzerland of a weather bureau. It says: "A dispatch is sent each evening from Zurich giving the weather probabilities for the next twenty-four hours. The predictions are based on data received from the principal meteorological stations of Europe combined with experience of local conditions. The dispatch is further distributed by telephone to those communes prepared to subscribe ten francs [$2] per month for the service."

The American Institute Fair.

In the basement of the Madison Square Garden will be found an exhibit which will be recognized by visitors who were present at the Chicago World's Fair and became familiar with the celebrated display in the Department of Forestry. Reference is made to the lovely collection of American woods shown by Romeyn B. Hough, B.A., of Lowville, N. Y. It was a happy inspiration which led Mr. Hough to conceive the idea of preserving his specimens in the form of extremely thin and transparent sections or shavings, instead of in the form of the blocks or thick strips with which we are familiar. The most unique part of this exhibit is a set of albums, each page of which contains three specimens of one particular kind of wood. The sections measure about 2 inches by 4½ inches and they are cut from the tree in three different directions: transverse, radial and tangential The wood is prepared by a process which in no way interferes with the natural colors and texture of the wood, and the specimens are cut in a special machine which produces sections varying from $\frac{1}{8}$ of an inch for transverse to $\frac{1}{200}$ of an inch for radial and tangential sections.

So fine is the work of the machine that sections of California white pine are shown which are only $\frac{1}{400}$ of an inch thick. These are of course transparent, and on holding up the hand to the light and looking at it through one of these sections a curious so-called X ray effect is produced, due to the refraction of the light in passing through the wood. In addition to the exquisite beauty of this work, the collection of volumes forms a complete treatise on the subject of American woods. The exhibit also includes preparations of woods for the stereopticon and the microscope, and a collection of wooden cross section cards for visiting or business purposes. The printing qualities of the wood, either for type or steel plate, appear to be excellent, and the grain and delicate tints of the woods give them a dainty and artistic effect.

The exhibit of the American Gas Furnace Company, of Elizabeth, N. J., comprises an oil gas machine placed in Machinery Hall, and in the Main Hall a large number of furnaces for hardening and annealing steel work, gas forges, brazing blowpipes, a furnace for automatic hardening, and an automatic tempering and coloring machine, in which the work is fed into a hopper and passes through a revolving spiral way, where it is constantly subjected to the action of sand or ground flint, heated to the proper degree, and finally leaves the furnace drawn to the desired temper-color.

The oil gas machine for converting naphtha into a fixed gas is automatic in its action, requiring no further attention than keeping the storage tanks filled. A 2 inch pipe is laid from the gas machine across the Garden to the floor above, and the mixture of atomized naphtha and dry air is so well combined that there is no evidence of condensation at any point. The gas is delivered to the furnaces at a pressure of 1 pound to the square inch. The lighting qualities of the gas are shown by means of a number of Welsbach lamps, to which it is fed through a pressure regulator, which reduces the gas pressure of 1 pound to the square inch required for the furnaces to 4 inches of water pressure. This is the first public exhibition made by this company, and its plant is certainly an interesting feature of the fair.

The Otto Gas Engine Company, of Philadelphia, show four of the justly celebrated Otto engines, the oldest type of gas engine to take a successful hold upon the public. Seven thousand of these engines are at work in England, and one of these shown at the fair is numbered 5,588, showing that over this number have been built in the United States. The exhibit comprises one 9 horse power horizontal engine, driving a 110 volt dynamo; a 25 horse power marine engine; a 36 horse power horizontal power engine and a 3½ horse power vertical engine.

The Harting Gas Engine Company call attention to the few parts of their machines, rendering them easy to operate by the unskilled hands of the amateur. The governing is done from the exhaust, and the claim of simplicity is certainly borne out by the appearance of the 2½, 1 and ¾ horse power engines exhibited.

Wietz & Weiss, of New York, show four gas engines, ranging from ½ to 8 horse power, which they claim will develop a horse power hour on 17 cubic feet of gas, and 1 horse power and 2 horse power kerosene engines, which are said to burn but 1 pint of oil per horse power per hour. A closed oil tank, carrying sufficient oil to run the kerosene engine ten hours, is attached to the cylinder above the crank chamber. The oil is forced into the cylinder through a small tube, and there it is vaporized and mixed with the proper quantity of air. To control the engine under varying load, the number of injections is regulated by a governor connected to an eccentric on the main shaft.

An exhibit worthy of special mention is that of the Clauson-Kaas Manufacturing Company, of New York. The stall is filled with a varied assortment of the very beautiful papier maché models which are made by this company, chiefly for use in the lecture room. The different departments include models of fruits, vegetables, botanical specimens, the anatomy of the human body and many other objects. The models are all hand painted, and the greatest care is taken to give them perfect shape and color. The imitation is carried to the point of weighting the objects, and the surface is made to give the correct sensations to the touch. This reproduction of the "feel" and weight in the case of fruits and vegetables is very deceptive, and it is difficult to realize that the weighted papier maché potato is not the garden-grown article. The most difficult and successful modeling is shown in the anatomical department, and the model of the human ear, in which each articulated detail is exactly reproduced, is a masterpiece of modeling. A curious display of models is that forming part of the mycological cabinet, which is the name given to the imitations of mushrooms and toadstools of all continents. The object of this cabinet is to propagate and enlarge people's knowledge of all edible and poisonous mushrooms and toadstools. It is considered that the surest way to teach the public what to gather and what to let alone is to teach them by means of these models and the description that goes with them. It may surprise the uninitiated to learn that the collection includes models of 119 specimens, of which 21 are poisonous, 14 suspicious, 24 not edible, the remainder —less than one-half of the total—being edible.

A modest stand, but one that should commend itself to every resident of the city that has the welfare of the dumb creation at heart, is that containing the Hallanan rubber horseshoe pads. The pads are made of rubber and canvas, backed with sole leather. They are made slightly larger than the horse's foot across the quarters, and form part of the shoe. The shoer fits the foot and pad with a three-quarter steel shoe of uniform thickness, and the space between the pad and the foot is filled with tar or oakum. The object of the pads is to place the weight of the horse evenly on the sole and frog and prevent the jar to the foot. It also tends to prevent slipping on smooth pavements or on ice-covered ground. It is used by the fire departments of New York and Brooklyn, where it is said to give good service and it has received the indorsement of several societies for the prevention of cruelty to animals.

One of the best pieces of mechanical construction in the Fair is an angular coupling or quarter turn countershaft, shown by T. R. Almond, of Brooklyn. It is intended to be used in place of the quarter turn belt or miter gears. At the point of intersection of the center lines of the two shafts, and at right angles to them, is a vertical shaft upon which is a stout sliding sleeve provided with two short horizontal arms placed 90 degrees apart. The arms terminate in steel balls which engage sockets on the extremities of two short rocking levers which are pivotally attached to the two countershafts. As the shafts are turned the sleeve on the vertical shaft has a rotating and sliding motion. The device, which is ingenious and well worked out, is said to develop less friction and show less wear than the more common methods of making quarter turn connections. The inventor was awarded the John Scott medal on the recommendation of the Franklin Institute.

A pair of electric dumbbells are shown by the W. and S. Electric Company, of Brooklyn. A small dry battery is suspended between the shoulders, and the wires are carried to the two dumbbells, where they connect with the wire wrapping of the handles. The strength of the current is regulated by a switch placed on the chest of the user.

The New York Trade School has contributed an exhibit of the excellent work turned out by its students, which calls for special mention. The question of trade schools and apprenticeship is a very live one just now, and if any one doubts the value of the instruction which is given in technical night schools, he should examine this exhibit. The work is shown on boards and comprises most of the departments. The work done by the class of 1896-97 in blacksmithing is exceedingly fine and much of it shows a finish which would do credit to a skilled journeyman. There are also exhibits of work in stone cutting, sheet metal work, steam fitting and plumbing.

The management have introduced some novel features in this year's exhibition, notably the food show and the exhibition of fruits and flowers. The latter is somewhat limited, but what there is of it is very choice, many of the exhibits coming from professional exhibitors, and from the gardens and conservatories of such exhibitors as Cornelius N. Bliss, William Rockefeller, J. Loeb and D. Wilson. The field is such a vast and attractive one that it should soon be possible for the annual exhibit of fruits and flowers to develop an independent existence. There is sufficient wealth and enthusiasm devoted to floriculture alone in and around Greater New York to fill the whole Garden with exhibits at an annual show.

A Remedy for Yellow Fever.

A special cable dispatch to the New York Sun, from Montevideo, on October 10, states that Dr. Sanarelli, the discoverer of the bacillus of yellow fever, announces that he has discovered a curative serum for that dread disease. He will shortly publish the results of his experiments.

Wealth of the Klondike.

The steamer City of Topeka arrived at Seattle, October 11, from Juneau, Alaska, bringing several miners from the Klondike regions and $300,000 in gold. Among the passengers was John F. Maloney, of Juneau, who came out from Dawson City with the Galvin party. He stated that the previous accounts of the wealth of the Klondike were overestimated. He also stated that one claim would produce $1,000,000, and that over $2,000,000 would come out of the Klondike region this fall. Patrick Galvin, who is recognized as one of the bonanza kings of the Klondike and who has been engaged in mining for three years, said: "There are 461 claims which have been operated sufficiently to prove their richness. There are 280 claims staked out, but not developed. Taking these claims and figuring out their cubic contents and making a conservative estimate, I do not see why the output from these claims alone should fall short of $50,000,000."

In a letter from Lake Lindermann a newspaper writer says that there is chaos on the Dyea trail. Thousands of people are struggling hopelessly on with damaged outfits and thousands with no outfits, clothes, food, or shelter are beating back against the storm, trying to reach Dyea. For eleven days the storm has raged, the wind blowing a gale and the rain falling in torrents. To the 800 or 900 people cooped up between the mountain lakes, high above the timber line, the past has been a nightmare. Baking powder is held at $5 per pound; horseshoe nails being 25 cents each. One man at Crater Lake went back over the trail and gathered up 500 nails from the hoofs of dead horses and sold the lot to one man for $65. A stick of dry wood the size of a man's arm sold readily for $4, and green wood sold at the rate of $1,000 a cord.

Libraries and Our New Supplement Catalogue.

It is gratifying to note that our new SUPPLEMENT Catalogue has been eagerly received by the large libraries of the country and has been placed on their shelves as a valuable work of reference. Many of the librarians have been so favorably impressed with the catalogue that they have wished additional copies for various departments of their libraries.

The librarian of the Wabash College Library says it is "An elaborate and most excellent index catalogue." The librarian of the Carnegie Library, of Pittsburg, says: "This little volume will get so much use in our library that we should like another copy, if you could spare one." The librarian of the Public Library, Peoria, Ill., says: "We shall find it of great value in reference work." The librarian of the Cornell College Library, Mount Vernon, Ia., says: "It will be of much help to us in using our back volumes of the SCIENTIFIC AMERICAN SUPPLEMENT."

Copies have been filed in the libraries in different departments of the United States government. This catalogue is a valuable reference index to a whole scientific and technical literature, much of which has not yet been published in book form. We are still able to supply a limited number of cloth-bound copies, which are mailed for twenty-five cents. Copies of the paper cover edition mailed free to any address in the world.

Explosion of Acetylene Gas.

While experimenting with acetylene gas in his machine shop in Rochester, New York, on October 4, Valentine Long, his brother, Frank Long, and Jacob Fassott, an employe, were injured by an explosion of the tank used in making the experiment. Valentine Long's skull is fractured over his right eye and he lost the sight of both his eyes. It is said at the city hospital that he will probably die. The other two men are not seriously injured. The tank was a strange-looking affair, about two and a half feet in diameter and made of galvanized iron, with bands of iron running along the sides to give it strength. It was placed in Long's shop a few days ago by an acetylene company recently formed in Rochester, in which Mr. Long was interested. At the time of the accident Valentine Long was preparing to make a pattern for a new valve that is used on the tank. A lighted gas jet that stood about three feet above the tank is supposed to have ignited the acetylene and caused the explosion. Fassott had a narrow escape from instant death. A piece of the iron from the tank grazed his body, cutting off the buttons from his trousers and making a rent across the bosom of his shirt.

The Steamer Cymric Launched.

The new White Star Line steamer Cymric was launched at the yards of Harland & Wolff, Belfast, on October 12. The Cymric is a freight and passenger steamer of 12,000 tons and is considerably longer than the Georgic, which is the largest of the White Star freight steamers now in the New York service. It is stated that the White Star Line has contracted for over 100,000 tons of new steamer property. The Oceanic was to have been launched in January, 1898, but, owing to the strike in the engineering trade in Great Britain, it is possible it may not be launched until May or June.