

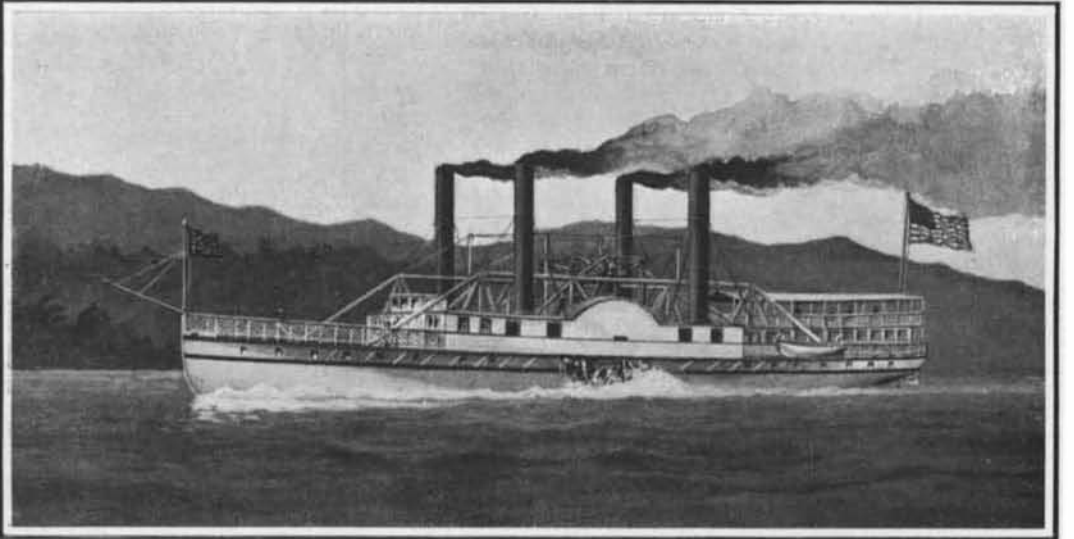
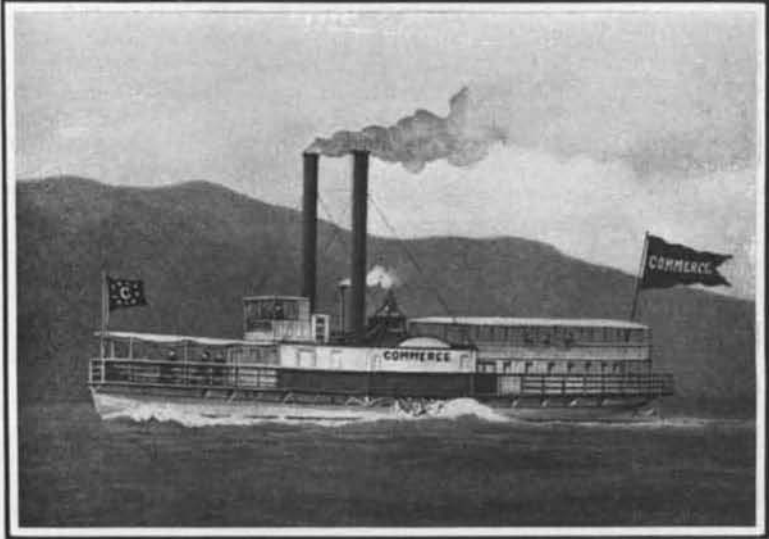
## DEVELOPMENT OF THE HUDSON RIVER STEAMBOAT.

In that broad field of human activity which is covered by the term "engineering," there is probably no product of American design and construction that bears more distinctive national characteristics than

the growing demand. The "Car of Neptune" was built in 1808, the "Paragon" in 1811, the "Firefly" in 1812, and the "Richmond" in 1813-1814. It was not to be expected that so profitable a venture would be allowed to pass unchallenged, and a company was formed at Albany which built two boats to run in opposition to the Fulton line. Fulton and Livingston, however, were granted a perpetual injunction against the opposition company, and the two vessels were turned over to Fulton and broken up. Rendered thus doubly secure

inger," from the Battery across the Bay to Elizabethtown, N. J. Robert R. Livingston, Fulton's backer and close associate, died in 1814, and Fulton on February 24th, 1815.

There can be no doubt that the monopoly granted to Fulton served to delay the development both of the steamboat and of river transportation in general. The decision of the Supreme Court in 1824 opened the river to steam navigation by boats propelled "by fire or steam," and forthwith the improvement of the



Length, 130 feet; beam, 24 feet; depth, 8½ feet. Engines: Cylinders, 16-inch diameter by 4-foot stroke. Carried two boilers on each guard. In August, 1832, ran from New York to Albany in 9 hours and 49 minutes.

THE "COMMERCE." 1825.

THE "CHAMPLAIN." 1832.

the American river steamboat. Also, we venture the assertion that there is no type of passenger vessel plying upon river, lake, or ocean that presents such a perfect picture of graceful lines and contour, or carries such a suggestion of speed as the American river steamboat. That it should show such undisputed beauty is surprising, when we bear in mind that this type of boat has been developed during the past hundred years along lines of the strictest utility, and under the stress of the most severe competition; a competition whose intensity has not been exceeded even in the construction of the competing railroads, which have thrown their elaborate network over the face of the country. Every one of the peculiar characteristics of the river steamboats has been due, not to the mere caprice of the builder, but rather to certain exacting physical conditions of the work which had to be done. The shoal draft, the wide overhanging guards, and even that distinctively American survival (we had almost said anachronism), the walking-beam engine, are instances of "the survival of the fittest" after one hundred years of endeavor to find the best type of boat for this work.

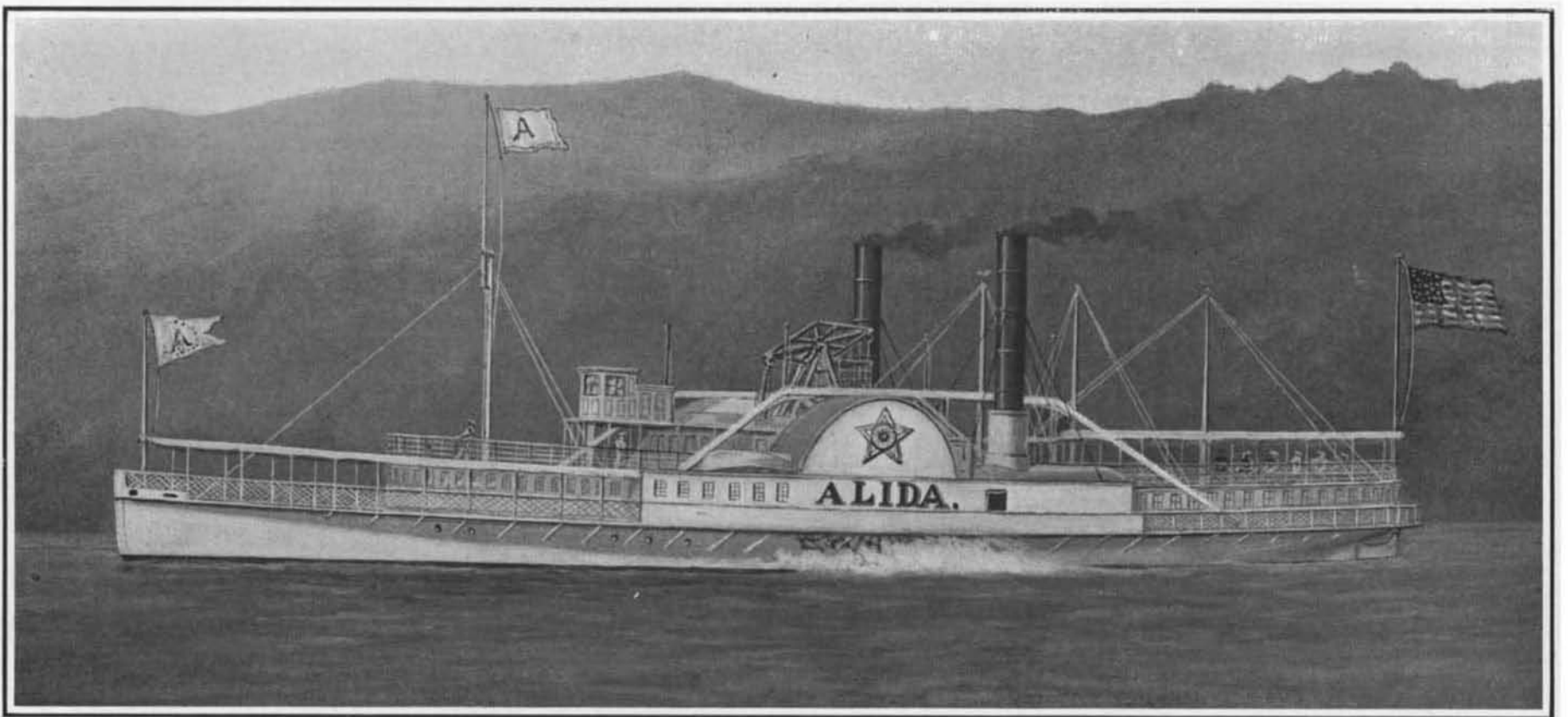
The successful trip of the "Clermont" to Albany in 1807, in the then incredibly brief time of 32 hours, brought the new system of transportation into immediate favor, and the growth of traffic, in spite of the fare of \$7 for the single trip, was such as to warrant the construction of four additional steamboats to meet

in the possession of their exclusive rights in the State of New York, Fulton and Livingston took out additional patents, and settled down to the development of the river carrying trade. Not much is known of the four successors to the "Clermont" mentioned above, beyond the fact that the weakness of construction, which was evident in the "Clermont," was remedied. The rectangular cross section was abandoned; a keel and keelsons were introduced to give the longitudinal stiffness; the flat bottom was abandoned in favor of a dead rise, and the bilge was given the rounded form which characterizes the later vessels.

In 1811 Aaron Ogden, Governor of New Jersey, petitioned the New York Legislature against the Fulton monopoly, but was unsuccessful. He built a steamboat called the "Sea Horse," to run between Elizabethtown, N. J., and New York city, and this vessel is credited by John H. Morrison in his "History of Steam Navigation" with being fitted with an engine that was the pioneer of the American beam engine. Subsequently, Livingston and Fulton gave Ogden permission to run his steamboat on his ferry route for a period of ten years. Out of this arrangement came the litigation, ultimately carried to the United States Supreme Court, by which the steamboat monopoly, which had existed for seventeen years, was broken. One of the most active opponents of the Fulton-Livingston interests was "Commodore" Vanderbilt, who in the early 20's was operating two boats, the "Bellona" and "Stoud-

steamboat began to go forward by leaps and bounds. The original North River Company was at once confronted by opposition lines. The Hudson River Line built three boats, the "Constitution," "Constellation," and "Independence," and certain people in Albany set afloat the "De Witt Clinton." The year 1824 is notable for the launching of the first steamboat to carry compound engines, the "Henry Eckford." The cylinders were 12 and 24 inches in diameter, and the stroke 4 feet. The new type of engine gave satisfaction, and it was used in several vessels, including the "Commerce," launched in 1825, of which we present an illustration, and the "Sun" of about the same date. The dimensions of the "Commerce" show the trend of development. She was of less length than the "Clermont," 130 feet as against 150 feet, but of nearly twice the beam, the "Clermont" having been altogether too narrow for stability. Her engines had cylinders 16 and 30 inches in diameter by 4 feet stroke. Altered in 1852 and renamed "Ontario," this remarkable vessel was not finally broken up until the year 1894. The "Sun," whose engines were of the same compound model and of the same dimensions, is credited with having made the trip from New York to Albany in the year 1826 in twelve hours and sixteen minutes, with thirteen landings, so that in the intervening nineteen years since the voyage of the "Clermont," the time of passage had been reduced about two-thirds.

The year 1826 is notable for the fact that John Ste-



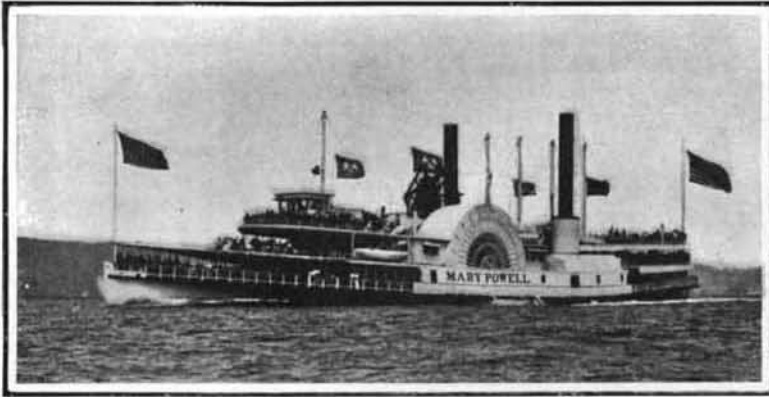
Length, 265 feet; beam, 30 feet; depth, 10 feet. Engine, 56-inch diameter by 12-foot stroke. The boilers, as in all the boats of this period, were carried upon the guards, outside of the hull. On May 5, 1848, ran New York to Hudson, 116¼ miles, in 5 hours and 20 minutes at speed of 21.8 miles per hour.

THE "ALIDA." 1847.

vens, the Fulton monopoly having been broken, entered the Hudson River passenger business, and applied his genius to the design of engines and steamboats; and it is doubtful if anyone who worked at the problem in the first half century succeeding Fulton has left a deeper impress. Possessed of a natural

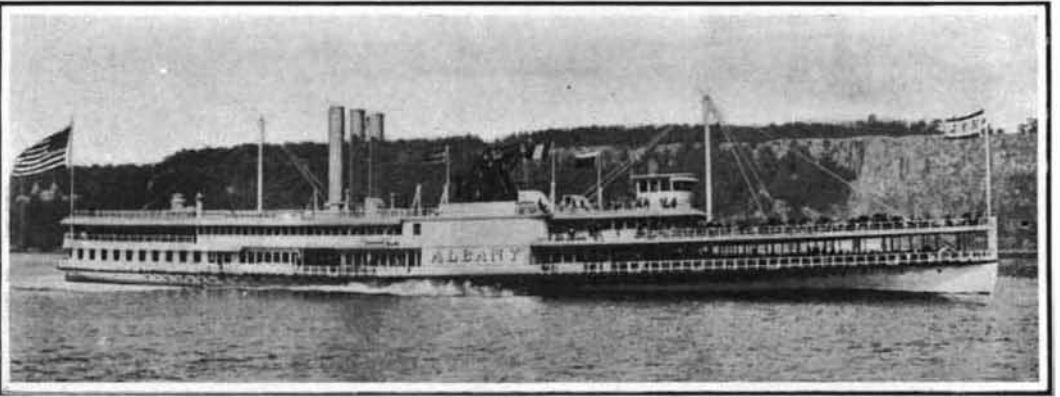
It was at about this time that the practice was followed in some of the steamboats of providing two separate engines, one for each paddle wheel. The "North America," above referred to, had engines of this kind, as did the "Champlain," 1832, which is shown in one of our illustrations. The "Champlain" also illustrates

wonderful development in the speed of the Hudson River steamboat. At that time there were no steam vessels anywhere in the world that could approach these famous craft in speed, and that American shipbuilders and engineers should have gained such a commanding lead over the Old World is to be attributed



As originally built in 1861: Length was 260 feet; beam, 34 1/4 feet; depth, 10 1/4 feet. Engine: Cylinder, 62-inch diameter by 12-foot stroke. Vessel rebuilt in 1875 and 1881. On August 7th, 1874, ran from New York to Poughkeepsie, 74 3/4 miles, in 3 hours and 19 minutes at speed of 22.54 miles per hour.

THE "MARY POWELL." 1861.



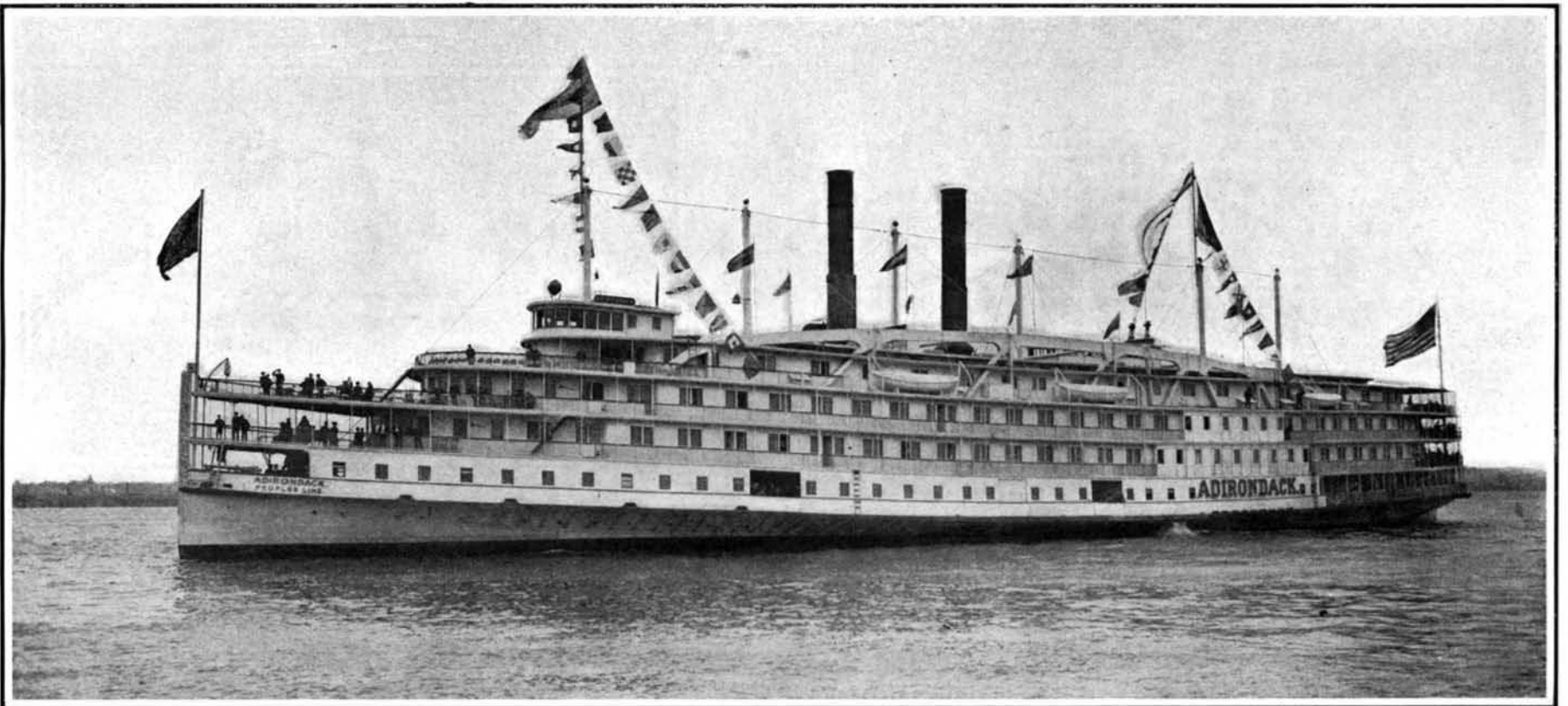
As originally built in 1880: Length, 285 feet; beam, 40 feet; depth, 11 1/2 feet. Cylinder, 75-inch diameter; stroke, 12 feet. Subsequently lengthened to 325 feet. Has feathering paddle-wheels. On October 22d, 1880, ran from 22d Street, New York, to Poughkeepsie, 72 3/4 miles, in 3 hours 8 minutes, at speed of 23.26 miles per hour. The "Albany" and the "New York" were the first large Hudson River boats to be built of iron.

THE "ALBANY." 1880.

gift for engineering, and being a man of wealth and the owner of works of his own, he approached all problems from the scientific standpoint, carrying on careful experimental work before he started the construction of the full-sized engine or boat. To him we owe the present open-skeleton walking beam, with its inclosing wrought-iron strap. In his new "Philadel-

another point of current practice in the possession of four separate boilers, one carried forward and one aft of the wheel house on the guards on each side of the vessel. The "four-pipe boats" with their two oscillating walking beams must have presented an odd appearance to the people of that day, who were accustomed to the one- and the two-pipe practice of the

to the facilities afforded by our magnificent rivers, to the keen competition between the various companies, and to the fact that then as now it is the fastest means of conveyance that wins the popular favor. Two of the swiftest boats of the day were the "Swallow," which was built for the original North River line, and the "Rochester," built in the same year, 1836,



Length, 412 feet; beam, 50 feet; draft, 8 feet. Beam engine, cylinder, 81-inch diameter, 12-foot stroke. Horse-power, 3,800. Speed, maximum 20 1/4 miles per hour. Contains 350 state-rooms. The dining-room can seat 300 guests. There are four decks for the accommodation of passengers.

THE "ADIRONDACK" FOR NIGHT SERVICE. 1896.

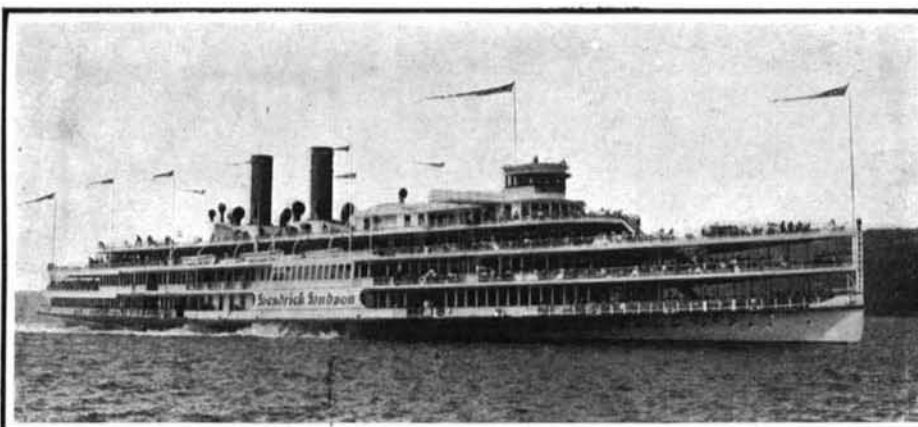
phia," 1826, he introduced the practice of carrying the boilers outside the boat upon the guards; and in her engine he introduced balanced poppet valves and wrought-iron side pipes. In the following year he introduced (in the "North America") for the first time the familiar truss or "hog frame" for stiffening the hull, a device which has survived in the Hudson River steamboat to the present day.

previous years. The next vessel to make a considerable cut in the running time to Albany after the performance of the "Sun" was the "Novelty," which on May 31st, 1832, ran from Albany to New York in nine hours and forty-seven minutes. On August 23rd of the same year, the "Champlain" made the run north in nine hours and forty-nine minutes.

The period from 1830 to 1840 was marked by a truly

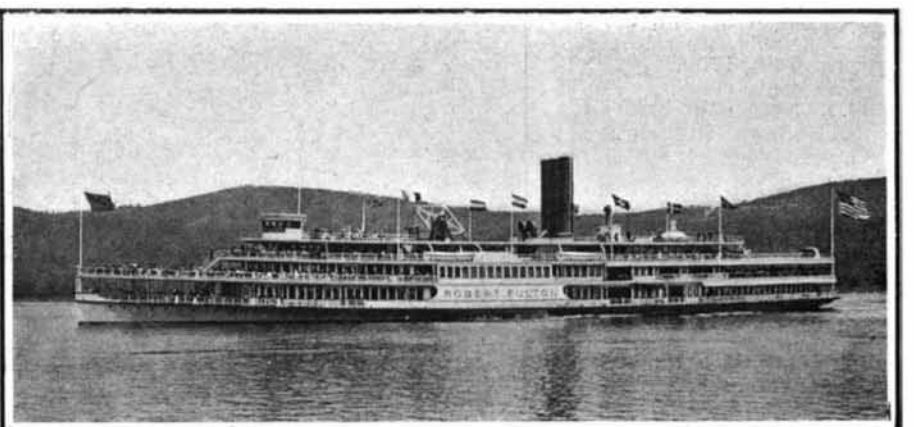
for the People's Line, which was started in 1835. The "Swallow," after frequent alterations to engines and hull, with a view to increase of speed, was finally equipped with a cylinder of the huge diameter for those days of 52 inches, and the "Rochester" with one of 50 inches diameter. The particulars of these boats as given by Morrison show to what an advanced stage

(Continued on page 227.)



Length, 390 feet; beam, 43 feet; width over guards, 82 feet; draft, 7 1/2 feet. Inclined engine; one 45-inch high pressure, two 70-inch low pressure cylinders, with 7-foot stroke. Steam, 170 pounds. Speed on trial trip, 24.5 miles per hour. Has six decks, four of which comfortably accommodate 5,000 passengers.

THE "HENDRICK HUDSON," 1906. DAY SERVICE.



Length, 348 feet; beam, 42 feet; draft, 7 1/2 feet. Beam engine, cylinder 75-inch diameter by 12-foot stroke. Has feathering paddle wheels. This vessel has the finest underwater body of all the Hudson River boats. Her maximum speed is 23 1/2 knots.

THE "ROBERT FULTON." 1909. DAY SERVICE.



**DEVELOPMENT OF THE HUDSON RIVER STEAMBOAT.**

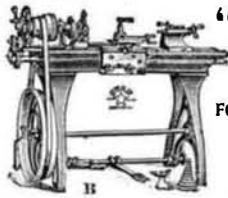
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the development of the river steambot had been carried at that early date. Both boats had return-flue iron boilers, and when pushed to their highest speed would burn from twenty-three to twenty-five cords of wood per trip. The rivalry between the two became so great that finally a formal race from New York to Albany was decided upon, and on November 8th, 1836, they started abreast of each other at 4 P. M. with everything tuned to the highest pitch. The "Rochester" reached Van Wies Point, 140 miles from New York, in eight hours and fifty-seven minutes, and the "Swallow" five minutes later. Some interesting details are given by David Stevenson in an English work, "Engineering in North America," published in 1838, of a trip which he made on the "Rochester" in 1837, when the distance to Albany was made in ten hours and forty minutes. The steam pressure, according to this authority, was 45 pounds, and the steam was cut off at half stroke. Speaking of the remarkable speed of American steamboats at this time, he says the vessels "navigating the Hudson River and Long Island Sound perform their voyages safely and regularly at a speed which far surpasses that of any European steamer hitherto built." A good description was given during this period by a German visitor of a trip made in 1838 on the "North America." He gives the length of the vessel as 200 feet, her beam as 26 feet, and describes her as having two decks, the lower of which was about three feet above the water. There were separate cabins for men and women, that for the men being used also as the dining room. He writes: "There were 320 passengers on board, each of whom slept in a berth, and as sufficient room appeared still to remain, one may imagine how colossal this floating palace must be." He paid three dollars, or two cents per mile, for the passage. In "less elegant" steamboats the fare was one dollar, and in some boats as low as fifty cents.

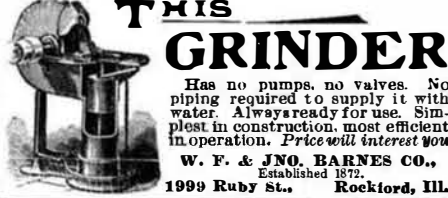
The inventive and original mind of Robert L. Stevens was shown in the design of the "Rainbow," an experimental vessel of very narrow beam, the breadth of which compared to her length was as 1 to 14. She was driven by a pair of inclined condensing engines, one forward and one aft of the wheel, with cylinders 36 inches by 10 feet, coupled to a common crankpin. Her boilers, strapped at every 10 inches with bar iron, 1 1/4 by 6 inches, carried the enormous pressure for those days of 80 to 100 pounds per square inch. The hollow wheel shaft, made of 3/4-inch boiler iron, was 3 feet in diameter. She did not make the high speed expected, and was subsequently used for towing.

The contests of speed which characterized that period were accompanied by rate wars, in which passengers were carried over the full course at rates which at one time dropped as low as twelve cents; and it is recorded that on one occasion rather than see an opposition boat carrying a full passenger list, a rival steambot offered twelve cents apiece to the public for the privilege of taking them; the deficit being subsequently made up when the ship was under way by the simple expedient of raising the price of meals by 300 per cent.

As evidence of the high state of development to which the steambot had been carried by the middle of the century, we quote the case of that handsome steamer "Aida," built in 1847 by William Brown of New York. This craft, of which we present an excellent illustration, was 265 feet long, 30 feet broad, and 7 feet deep. She was driven by a steam engine with cylinders 56 inches diameter by 12 feet stroke. From the very first she proved to be a "flyer"; and on May 8th she made the trip of 145 miles from Albany to New York, with six landings, in seven hours and fifty-six minutes. She



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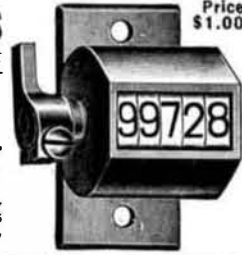
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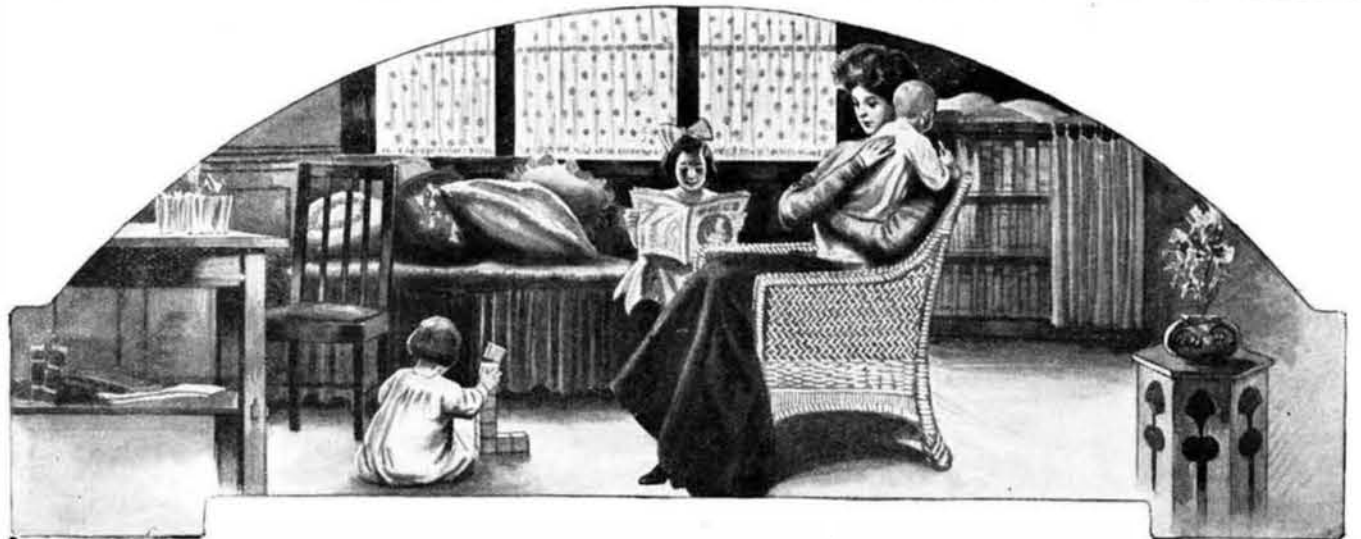


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was not, however, the first boat to bring the time below eight hours, that distinction belonging to the "South America," which on April 19th, 1843, covered the distance in the extraordinary time of seven hours and twenty-six minutes. This trip, however, was made without any landings, and the vessel was favored by a heavy freshet in the river, which not only gave deep water over the shoals, but set up a swift current in the vessel's favor.

It is impossible, within the limits of the present article, to follow in detail the development of the famous steamboats on this famous river. There was a steady increase in size, though the speed, having been carried to the high point of between twenty-one and twenty-two miles an hour, was destined to remain stationary. We can do no more than mention two celebrated boats, the "New World," of the People's Line, with wheels 45 feet in diameter and a piston of 15 feet stroke, and the "Francis Skiddy," with 40-foot wheels and a 14-foot stroke of piston, two vessels which had many struggles for supremacy during the ensuing decade.

We pass on to the year 1852, when in consequence of the many deplorable accidents which occurred, due to the too frequent bursting of boilers, Congress passed a law for the inspection of vessels, which put an end to the perilous practice of steamboat racing. The stories which have come down to us of the reckless way in which engineers would "bottle up their boilers" when racing with a rival boat are astonishing, but nevertheless well verified. Morrison, a most careful historian, credits the statement of an engineer that, on being pressed by his captain to pass another boat, he "prepared for the contest by tying the safety-valve lever, drawing the pointer from the mercury gage, plugging up the mouth of the tube, and urging the fires under the boilers." He passed the other boat, but we are not surprised to learn that it was his opinion that although ordinarily he carried thirty pounds, the pressure during the contest must have risen to fifty or sixty pounds to the inch.

It is probable that the Hudson River boat which has attained the most worldwide popularity is the "Mary Powell," of the Day Line, which, built in 1861, has been in continuous service ever since, and is to-day one of the most popular boats on the river. Her original dimensions were 260 feet length, 34½ feet beam, and 10¼ feet depth. Her model is particularly sweet, with a long, sharp entrance and a very easy run. Her fastest run was made from New York to Poughkeepsie, 73¾ miles, in three hours and thirty-nine minutes, including the time lost in six landings. Deducting this time, her average speed, while running under full power, was 22.54 miles per hour. Her present captain, A. E. Anderson, a son of her previous owner and captain, informs us that during her long life of nearly half a century she has been rebuilt three times and lengthened 40 feet. The lines of the original boat, however, have been religiously preserved. Her present length is 300 feet. Her original engines had one cylinder, 62 inches by 12 feet, which was replaced by a cylinder 72 inches by 12 feet stroke in 1874. Steam is supplied by two return-flue tubular boilers, and she uses a working pressure of thirty-five pounds, under which she makes the eighteen miles per hour necessary to make her scheduled time. Under the forty-five pounds which she is allowed, this wonderful old craft is still good for twenty miles an hour. The hull of the "Mary Powell" was built by M. S. Allison of Jersey City, and her present machinery by the W. & A. Fletcher Company of Hoboken.

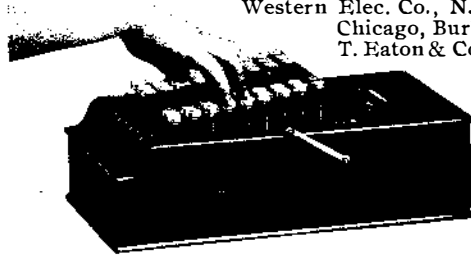
Another wooden vessel famous in her day was the "St. John," 1864, the cylinder of whose engine was 85 inches in diameter with the exaggerated stroke of 15 feet.

The year 1880 was signalized by the appearance of the first iron steamboat,

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The number dated October 16 and appearing on the newsstands at that time is to be a particularly good one, with unusually fine photographs. There is an automobile article by Albert Lee, a story about "The Poor Man's Race Horse"—whippet hounds; an article on how to find and track deer, another concerning the use of electricity for light machinery on the farm, and still another—of rare interest—on athletics at the Vatican, with some splendid photographs.



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The National Weekly

the "Albany," the second being the "New York," 1886. These, with two exceptions, are probably the fastest large passenger steamers plying on American inland waters to-day. With their long, unbroken lines, graceful sheer, and triple buff-colored smokestacks, they present as beautiful a marine picture as one would wish to see. Both vessels, after being some time in service, were lengthened by the addition of 30 feet, and as thus altered their dimensions are: "Albany," 325 feet length by 40 feet beam; and "New York," 341 feet length by 40 feet beam; the breadth of both vessels over the guards being 76 feet. The engines are of the typical walking-beam type, with cylinders 76 inches diameter by 12 feet stroke. They were allowed fifty pounds pressure, but thirty-five pounds is sufficient to enable them to attain their scheduled speed of about eighteen miles an hour. The "Albany" holds the blue ribbon of the Hudson River. On October 22nd, on her way up to Albany for winter quarters, she was given an engineer's trial for speed. Leaving 22nd Street at 11:01 A. M., she reached Poughkeepsie dock at 2:09 P. M., thus covering 72¾ miles in three hours and eight minutes, at a speed of 23.26 miles per hour. On May 28th, 1903, the sister boat, the "New York," made the same trip at an average speed of 23.21 miles per hour.

In 1906 the Hudson River Day Line placed in service the handsome steel passenger steamer "Hendrick Hudson," which measures 390 feet over all, 43 feet breadth of hull, 82 feet over the guards, and draws from 7½ to 8 feet of water. The vessel was designed by F. E. Kirby of Detroit and J. W. Millard of New York, who were subsequently engaged by the Hudson-Fulton Commission to design the replica of the "Clermont." Including that in the hold, the vessel has six decks, four of which are available for passenger accommodation. These decks are unusually spacious, and they can accommodate, without crowding, five thousand passengers. The dining room has accommodations for 262 persons. The vessel is driven by an inclined, double-expansion paddle-wheel engine, with a 45-inch high-pressure and two 70-inch low-pressure cylinders acting on three cranks, the common stroke being 7 feet. Steam is furnished at 170 pounds pressure by eight boilers. The paddle wheels in this vessel, as in the "New York" and "Albany," are of feathering type. On her trial trip, made over the measured course on the Hudson, she made 24.5 miles per hour, or about one mile an hour more than the high speed credited to the "New York" and "Albany." The latest addition to the Day Line boats is the "Robert Fulton," built to replace the "New York," which was burned while in her winter quarters. The "Robert Fulton" is 348 feet in length, 42 feet beam, and 76 feet in width over the guards. She was built by the New York Shipbuilding Company of Camden, N. J., and was launched in the record time of two months and ten days after the keel was laid. The hull, which is built of steel, is considered by the company to possess the finest model of any of the large steel vessels of the Day Line. She embodies the best features of the model of the "Mary Powell" and other fast boats, and her appearance on the year of the centennial anniversary of Fulton's great work is very timely. Her maximum speed is 23½ miles an hour. Our illustrations include one of the "Adirondack," which may be taken as typical of the fine fleet of steamers owned by the People's Line, which makes the night trip between New York and Albany. These boats differ from the Day Line steamers in their larger size, more moderate speed, and the towering superstructure for the accommodation of the many tiers of staterooms. The "Adirondack" is 412 feet in length, 50 feet in beam, and draws 8 feet of water. Being a wooden vessel, she is strengthened by the two big suspension trusses which are such a characteristic of the American river steamer. She has 350 staterooms. Her engines, of



3,800 maximum horse-power, can drive her at a speed of 20½ miles an hour. The maximum in size and accommodations is reached in the "C. W. Morse," of the People's Line, which is 427 feet over all, 90 feet over the guards, and contains 450 staterooms. The dining room will accommodate at one time 300 people. She is driven by a walking-beam engine with a cylinder 81 inches in diameter by 12 feet stroke, and her maximum speed is 20½ miles per hour.

In the above necessarily brief story of the development of the Hudson River steamboat, we have endeavored to bring out the salient points of the increase in size, speed, and accommodation of one of the most remarkable and successful types of vessel in the world to-day. It would be well in closing to refer to the phenomenal speeds which were achieved by these vessels over half a century ago, and draw attention to the fact that their record passages were usually made when wind and tide were favorable. The swiftest of the present-day boats would undoubtedly exceed the earlier speeds, though by no very great margin; and it must be remembered that, under existing conditions, they are run under a fixed schedule, generally under a reduced steam pressure, and are operated at several miles less speed than the maximum of which they are capable.

**THE AMERICAN WALKING-BEAM ENGINE.**

(Concluded from page 223.)

board side being the steam pipe, and the other the exhaust. Each of these pipes carries a separate rocking shaft, which is operated by its own eccentric. The motion of each rocking shaft is communicated to two vertical lifting rods, which operate the valves by means of two cams called "wipers." The eccentric rods are formed with hooks at their outer ends, which engage a pin in the arms of the rocking shafts. They are thrown out of gear by means of the slotted vertical rods through which the eccentric rods work, one of which will be seen in the engraving. These vertical rods are known as strippers, and they are operated by the levers which will be noticed attached to the rocking shaft on the steam pipe. When it is desired to start or reverse the engine, the eccentrics are thrown out of gear, and the valves are worked by a steam starting and reversing engine, which is controlled by the vertical lever seen near the steam pipe. If it is desired, the valves can be operated by the vertical starting bar shown in the engraving.

The handwheel on the small vertical standard in front of the exhaust pipe opens the steam valve for the starting engine, and the wheels which are seen on the other two standards are for operating the injection valve and for turning the surface condenser into a jet condenser, if at any time it should be desired to do so. The surface condenser is located in front of the steam cylinder and below the main deck. Behind the steam cylinder and also below the main deck is the air pump, which is operated by connecting rods from the walking beam. The gear shown attached to the front face of the gallow's frame, above the cylinder, is a hand winch, for lifting the cylinder head.

The paddle wheels are of what is known as the vertical or feathering type, in which the buckets are made to enter and leave the water in a nearly perpendicular position. The old type, with fixed radial buckets, is extravagant and uncomfortable; extravagant because it wastes power in forcing water downward when the buckets strike, and lifting it when they leave the water; and uncomfortable because it sets up a violent vibration throughout the whole vessel. The feathering paddle wheel is smoother and more efficient in its action, and its efficiency is from 12 to 15 per cent greater than the older type. Its construction is as follows: Bolted to heavy timbers just above the guards is a large

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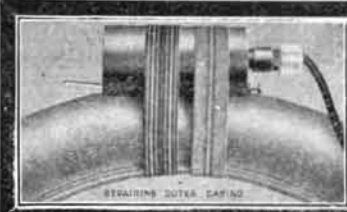
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pin carrying a loose flanged ring, to which are pivotally attached a set of connecting rods. At their outer ends these rods are pivotally connected to rocking arms fastened to the back of the buckets, the buckets themselves being pivotally attached to the rigid spokes of the paddle wheel. The pin and loose ring are placed eccentrically to the crankshaft, and the ring is rotated in its proper relation to the paddle wheel by attaching one of the connecting rods rigidly to it. The eccentricity of the ring is so adjusted that the buckets shall always enter and leave the water in a perpendicular position, thus securing a true feathering action. The wheels are 30 feet in diameter.

Steam is supplied by four steam boilers, of the lobster-return flue type, each 11 feet wide, 9 feet 3 inches diameter of shell, and 33 feet long, with steam domes 87 inches diameter and 10 feet 6 inches high. Forced draft is supplied by two large Dimpfel blowers, driven by independent engines. The steam pressure is 55 pounds to the square inch, and the total horse-power is 3,800.

**RECENTLY PATENTED INVENTIONS. Pertaining to Apparel.**

**ADJUSTABLE PATTERN.**—M. BOGUSHEFSKY, New York, N. Y. This invention consists in the construction and combination of parts, whereby the different edges of the pattern may be moved outwardly or inwardly substantially in parallelism, without varying the relative proportions or the general shape of the pattern. Attachments are employed for varying the style of the garment, rendering one pattern useful for cutting different forms of garments.

**PNEUMATIC HEEL-CUSHION.**—W. L. GORDON, Deal, N. J. The cushion is such as worn at the heel of the shoe on the inside in order to cushion the heel in walking. The cushion has an improved form which increases its elasticity in action, and a further object is to provide improved means for holding the cushion in position.

**Electrical Devices.**

**TELPHER SYSTEM.**—B. T. HITCH, Allen, Md. In this case the invention relates to telpher systems and is particularly applicable to rural mail delivering routes in which the delivery points are relatively far apart. It may be used also as a parcel delivering system or for any purpose in which the rapid transportation of light matter is desirable.

**HEAD-GEAR FOR SUPPORTING LIGHTS.**—D. E. TAYLOR, Willimantic, Conn. The gear is for use by surgeons, dentists, and opticians, and supports an electric light and delivers the rays directly upon the object under inspection. The main feature involves a spring metal band, adapted to extend over the head from the front to the back, and be retained in position by resilient engagement with the forehead and back of the head.

**Of Interest to Farmers.**

**BEEHIVE.**—P. WEAVER, Fort Worth, Texas. The object among others here is to provide a hive of concrete or cement whose walls will be thick enough to exclude heat and cold, and whose interior will be large enough to receive any desired form of honey frames and which will afford at its entrance ventilating means, cleaning out means, and means for the passage of the bees into and out of the hive.

**PEA-HULLER.**—W. L. HAY, Franklin, Tenn. The intention of this inventor is to provide a device of comparatively simple construction in which the hulling of picked peas or of peas on the vines may be accomplished by merely shifting the concave and feeding the peas through the device in the direction most suitable for their proper treatment.

**DEVICE FOR TEACHING MILKING.**—P. J. DEVRIES, Hull, Iowa. The purpose of the improvement is to provide a device that simulates the udder and teats of a cow pending therefrom, together with other details that afford means for practicing the removal of water from the artificial udder by a proper compression of the teats, and thus acquire the art of milking quickly and safely.

**Of General Interest.**

**SOLDER FOR ALUMINIUM.**—J. F. GUGGENBUHL, 22 Rue de Bagnoles, Paris, France. This solder is not easily broken and it readily resists the action of acid and water. It may be used for soldering pieces of pure aluminium or of the alloys thereof, or for soldering aluminium upon copper, zinc, steel and other metals, regardless of the general shape and thickness of the parts.

**BUTTER AND LARD CUTTER.**—C. H. CARLSON, Iron Mountain, Mich. The invention is an improvement in self measuring lard and butter scoops for use in taking lard and butter out of barrels, tubs, or other receptacles. The blades may be made of different sizes to measure different quantities of the material,