

Brooklyn, the tunnel will extend to the present Flatbush Avenue station, where it will be 18 feet below the street level. From this point to the Franklin Avenue station the tracks will run through a subway and then they will rise through an open cut to an elevated structure, which will commence in the neighborhood of Nosstrand Avenue. At Ralph Avenue the road will sink into a subway, which will run under Howard Avenue as far as Manhattan Crossing, from which point it will rise to the surface and continue by an elevated structure to a point near the boundary line of the Borough of Brooklyn. At the Flatbush Avenue station the regular Pullman car and freight service will be maintained. It was not considered desirable to build the tunnel beneath the river of the large size necessary to accommodate standard railway passenger coaches.

As a matter of fact, the proposed tunnel under the East River will not be the first to be built. A tunnel 8½ feet high and 10 feet wide, as shown in the engraving, sufficiently large for persons to pass through on a handcar, already reaches at the foot of East Seventy-first Street to Ravenswood, passing under Blackwell's Island. The tunnel extends from the plant of the East River Gas Company in Ravenswood to its mains in Manhattan, a large main running through it. It was eighteen months in being built, being completed in July, 1894. It is a thorough success. There has been no trouble with it since its completion, and it shows conclusively that a passenger tunnel is practicable. The amount of seepage is small and might be reduced if it were necessary. The tunnel is 2,516.4 feet long. The top of the tunnel under the channel between Blackwell's Island and the Manhattan side of the river at the point of nearest approach to the bottom of the river is 40.93 feet below the river bed, while under the channel between the island and the Brooklyn side the nearest approach of the top of the tunnel to the river bed is 82.33 feet. The depth of water on the Manhattan side is 65 feet and on the Brooklyn side 30 feet.

The construction of the tunnel under the river bed was by the shield system. The plates composing the walls are 1¼ inches thick, 16 inches wide, and 3 feet long. The edges are deeply flanged and bolted and riveted together. The joints are filled with liquid concrete. Construction was carried on at the rate of 5 feet a day. The capacity of the tunnel is such that it could contain sufficient mains to supply the whole of Manhattan with gas.

BICYCLISTS who suffer injury to their persons or property through collisions with other users of the highways or with road obstructions should always study up on "contributory negligence" before seeking redress at law. Cases of the kind usually afford opportunity for discriminating work in drawing the line between ordinary watchfulness and prudence on the part of the plaintiff and failure to take that reasonable care of himself which is legally incumbent upon every traveler by horse, foot or wheel.

"DEUTSCHLAND"—THE LATEST AND FASTEST OF THE TRANSATLANTIC LINERS.

A striking feature which attends the competition between the steamship companies that ply between England and America is the extraordinary development which has taken place in the last decade in the great German companies, the Hamburg-American and the

tion of fast ships; but in placing the "Kaiser Wilhelm der Grosse" upon the route, the North German Lloyd Company easily moved up to first place, for this magnificent vessel in one of her early voyages achieved an average speed for the whole trip across the Atlantic of about 22.35 knots an hour and an all-day speed of 23 knots an hour.

It was only a question of time when the Hamburg-American Company would produce an answer to the "Kaiser Wilhelm der Grosse"; and such a ship is now being built at the Vulcan yards, Bredow, near Stettin, Germany. The new vessel is to surpass the "Kaiser Wilhelm der Grosse" in size, speed, accommodation, and indeed, as far as the intentions of the company go, in every point of comparison. As will be seen from the accompanying table, the new vessel, which will be named the "Deutschland," will be larger than any ship afloat at the time of her launch, except the "Oceanic," of the White Star Line, which is expected to make her maiden trip in the autumn of 1899. The "Oceanic" exceeds the "Deutschland" in every dimension and is only inferior to her in speed; but as was explained in our article on this great ship in the issue of the SCIENTIFIC AMERICAN for February 11, 1899, she is not to be reckoned among the "fliers," as the company will not aim at a speed of more than about 20 knots an hour. The "Deutschland," on the other hand, is to be capable of sustaining a sea speed of no less than 23 knots an hour, something that has never been attempted in any previous transatlantic liner. The dimensions of the vessel are as follows:

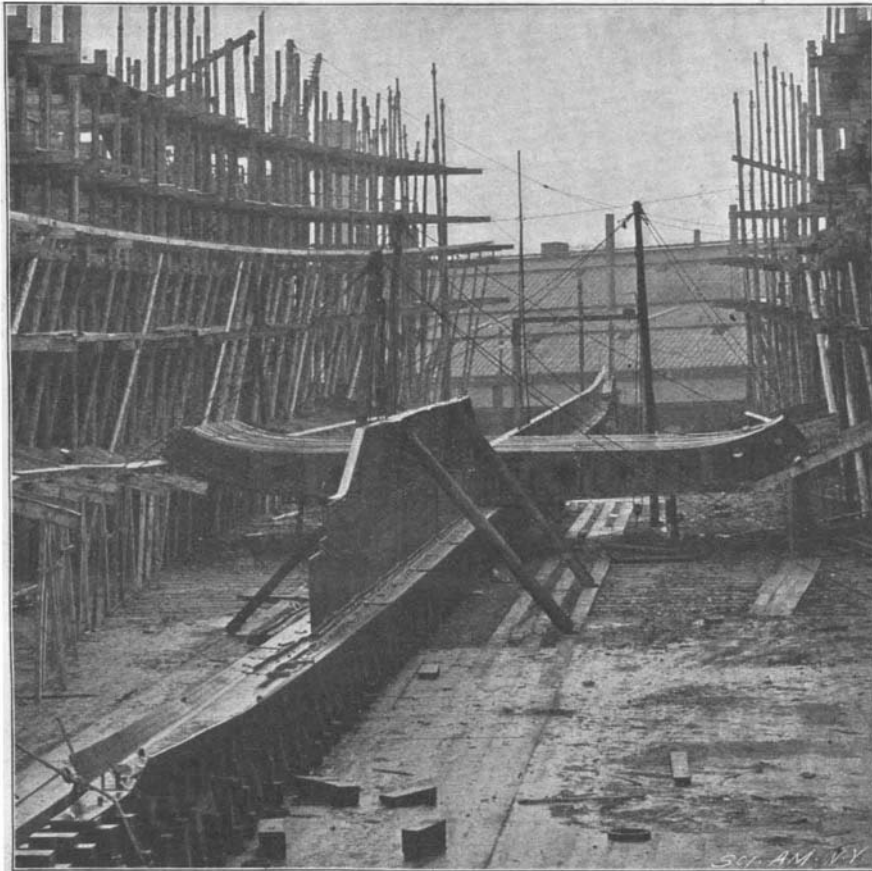
Length over all.....	686½ feet.
On the water line.....	662 "
Beam.....	67 " 4 inches.
Depth.....	44 "
Average sea speed.....	23 knots.

There are to be 264 first-class cabins, providing for 736 berths; 100 second-class cabins with 300 berths; and 282 steerage berths, making a total of sleeping accommodation for 1,320 people.

To realize such high speed in so large a vessel will, of course, require engines of unprecedented size and power. The "Campania" has about 30,000 horse power and the "Kaiser Wilhelm," whose model is probably finer than that of the "Campania" is credited with 28,000 horse power, but the new ship will have engines and boilers capable of maintaining, day and night, an aggregate output of 35,000 horse power. The boiler plant will consist of twelve compound boilers, each

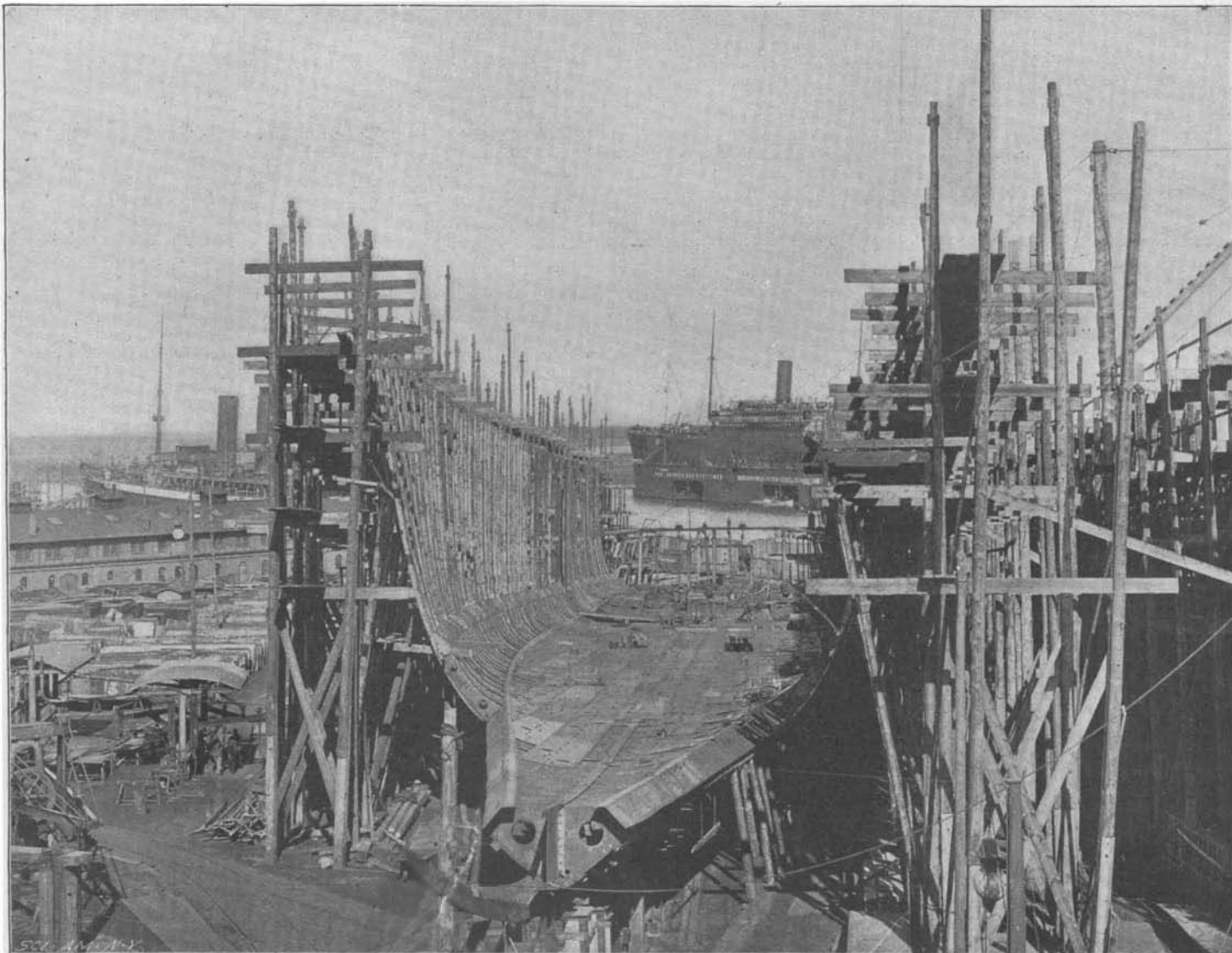
provided with eight furnaces, and four single boilers with four furnaces each; thus there will be altogether 112 furnaces to feed in the stoke hold of the vessel. The steam pressure will be 225 pounds to the square inch. While the sea speed is to be 23 knots an hour, the trial speed calls for 23½ knots an hour, and it is not unlikely that this will be exceeded by fully a knot, in which case the huge vessel will be traveling at the unprecedented speed for a large ship of 28 land miles per hour.

The passenger accommodation will possess some novel features, particularly in respect of size of the saloons and staterooms; the main saloon,



KEEL AND ENGINE FOUNDATIONS OF HAMBURG-AMERICAN LINER "DEUTSCHLAND."

North German Lloyd. Within a few years they have both moved up to the very first rank, the Hamburg-American being the largest ocean transportation company in the world. Although in this competition the features of accommodation, comfort, and safety have always received great attention, the feature of speed has been the one that has appealed most to the popular imagination. To hold the record across the Atlantic has been one of the chief aims which actuated the policy of the past. It was not until the present decade that the German companies made any effort to approach their English, French, and American rivals in the produc-



THE CONSTRUCTION OF A 23-KNOT LINER.

The "Deutschland." Length, 686½ feet; beam, 67 feet 4 inches; depth, 44 feet; horse power, 35,000; average sea speed, 23 knots.

DIMENSIONS OF THE LARGEST OCEAN STEAMERS.

Name of Ship.	Date.	Length Over All.	Beam.	Depth.	Draught.	Displacement.	Maximum Speed.
		Feet.	Feet.	Feet.	Feet.	Tons.	Knots.
Great East-ern.....	1858	692	83	57½	25¼	27,000	12
Paris.....	1888	560	63	42	26¼	13,000	20
Teutonic.....	1890	585	57¼	42	26	12,000	20
St. Paul.....	1895	554	63	42	27	14,000	21
Campania.....	1893	625	65	41¼	28	19,000	22
Kaiser Wil-helm der Grosse.....	1897	649	66	43	29	20,000	23-35
Oceanic.....	1899	704	68	49	32¼	28,500	20
Deutsch-land.....	1900	686¼	67½	44	29	22,000	23¼

for instance, being capable of seating 500 passengers at one time.

Novel features will be a large playroom for children on the upper deck, and a gymnasium. On the promenade deck there is to be provided a grill room into which a passenger may step and order broiled steak, chops, etc., at a few minutes' notice. It is features such as these that are robbing the transatlantic passage of the romance which was attached to it in the days of our forefathers. We present an illustration showing the "Deutschland" at two different stages of her construction. In one of the cuts the vessel is represented with her keel plate laid and about a dozen of the frames of her flooring forward of the engine space laid in place. The deep wall of the plating which rises from the keel forward of the floor framing marks the position of the engines, where it is necessary to strengthen the frame in order to take the enormous strains of 35,000 horse power which they will develop. In the second illustration the framing and plating of the double bottom is about completed and the frames of the vessel amidship are carried up to their full height. It is expected that the "Deutschland" will make her first trip to this port in April of next year.

As the right of all persons to reasonable use of the highway presumably includes the privilege of leaving carriages at the wayside for temporary purposes, some question has been raised as to the legality of ordinances which prohibit the leaving of bicycles at the curb.

The Origin of Diamonds.

The origin of diamonds is always an interesting question, and Prof. Bonney recently read a paper on the subject before the English Royal Society, which is of considerable importance. In the localities from which the previous supplies of diamonds have been drawn, both in India and Brazil, the gem occurred like a pebble in certain gravelly materials, but had not been traced back to any rock that gave an indication of its genesis. Even after the discovery of diamonds in the river sand on the Orange and Vall Rivers in Southern Africa, they were found in a peculiar material of a brownish-buff color which turned to a dark greenish-bluish tint, and became harder as the miners dug down. The diamonds lay in this material together with several other minerals, such as garnets, iron ores, augite, olivine, etc. Digging was at first begun unsystematically, but from these early efforts the great diamond mining industry was developed. Excavations have been carried on near Kimberley to a depth of more than 1,400 feet. Here the rock is about as hard as ordinary limestone, the blue ground is only found in limited areas. The rocks around are of dark shales banded with hard sandstone in which sheets or dikes of basalt or some material which was once in a molten condition are occasionally found. The blue ground fills a sort of huge shaft in these other rocks, and is itself cut up by similar dikes. Some geologists consider that the gems are produced where they now lie, while others think that they have been formed of some older rock, which has been shattered by volcanic explosions. Many of the minerals associated with it look as if they had been thus derived, and it was sometimes broken. At last it is thought that the mystery has been cleared up. About two years ago the manager of a diamond mine near Kimberley picked up a specimen in which smaller diamonds were apparently embedded in a garnet. His curiosity was at once excited and he proceeded to investigate various bowlders. One of them was broken open and was found to contain diamonds. The rock is one which is known to mineralogists as "eclogite." It appeared to be composed almost exclusively of red garnet rock and a rather peculiar light green augite. The rock is coarsely crystalline and was once, no doubt, like garnet in a

molten condition, the diamond being one of its original constituents. This discovery tends to indicate that the "blue ground" in which diamonds were found is not the true birthplace of the diamond. The bowlders are often water-marked and may have reposed for ages in an ancient gravel at the very bottom of sedimentary rocks of the district. Eventually the overlying materials and some of the shattered rocky floor in which the diamonds were embedded, of which these bowlders are only samples, were sent flying by volcanic explosion. It was believed that in this way the diamond-bearing "blue ground" was formed.

The Current Supplement.

The current SUPPLEMENT, No. 1226, has many pages of very unusual interest. "A Few Spiders and Their Spinning Work" is by Miss Mary I. Cunningham and gives illustrations of the spinning apparatus of the spiders and their webs, drawn under the microscope or directly in the field. This is a natural history article of great value and one which we specially recommend. "Liquid Air," by Dr. W. Hampson, describes a new apparatus for liquefying air and contains much valuable information on the subject. "The Metropolitan Underground Railway of Paris" is illustrated by maps and engravings. "Mechanical Influences in Architecture" is concluded in this number and is a most valuable treatise on the subject. "The French at Muscat" describes interesting scenes which occurred to the French while obtaining coaling stations.

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RECENTLY PATENTED INVENTIONS.

Miscellaneous Inventions.

APPARATUS FOR CATCHING WASTE PRODUCTS FROM LEAD, SILVER, OR OTHER SMELTERS.—WALTER SERGEANT, El Paso, Tex. The apparatus comprises a series of settling-chambers having hopper-shaped bottoms controlled by special devices. The settling-chambers are held in elevated position by standards and are partially separated by alternately-arranged baffle-plates. Transverse air spray-pipes are located between the settling-chambers. A main is connected with the pipes. The waste-products are forced by an exhaust-fan through the trail of the settling. The cold air from the spray-pipes cools the fumes, neutralizes the gases, and precipitates into the hoppers all the metallic substances.

EYEGGLASS-GAGE.—LEVI A. STEVENSON, Gaylord, Mich. This invention provides a gage to assist the oculist or optician in securing the exact distance apart and angular position for the nose clamps of eyeglasses, or for the proper spread for the bridges of spectacles. The device consists of a pair of hinged caliper-legs carrying between them slide-gages.

JACK.—GEORGE B. GALLAGHER, St. Mary's, Ohio. This device is an improvement in "oil-well" jacks used in screwing up and unscrewing oil-well-tool joints. The invention provides improved mechanism operating in connection with the pawls of the jack to release the pawls from the track-bar either singly or doubly and independently of the jack handle or lever, and to permit the track-bar to swing so as to conform with the path of the wrench-handle, thus always retaining a straight line of pressure on the traveler and track.

LOCK.—WINFIELD S. HOUSER, Bellefonte, Pa. This knob-lock is a springless lock employing a night-latch. In the lock a locking-latch is hung to move radially through the edge-plate and has an inwardly-curved and upwardly-extending arm terminating in a stop-lug. A gravity-cam has an enlarged weighted end bearing against the curved side of the latch and having a cut-away periphery to receive the stop-lug. A sliding locking-bolt arranged above these parts has a downwardly-projecting arm adapted to come into contact with the top surface of the latch-arm when both bolt and locking-latch are protruded.

CHURN.—MATTIE O'MARROW, Sulphur Springs, Tex. To provide a simple and effective churn-operating mechanism which does not need any particular form of receptacle to hold the cream, is the purpose of this invention. The churn operates so as to aerate and cool the cream while being churned, and to obstruct the centrifugal action by a breaker. The churn is constructed of wood and can be readily repaired by any farmer familiar with the use of wood-working tools.

FRUIT-CLEANER.—JOEL W. HENDRIX, Palmetto, Fla. This machine is especially designed for the cleaning and polishing of oranges, and is composed of two parallel, spiral roller-brushes driven in unison. A series of longitudinal bars is located over the roller-brushes, adjacent to one another to form a casing through which the material cleaned is passed. The bars carry bristles projecting inwardly toward the roller-brushes. When the brushes are rotated, the oranges pass one by one into the casing by the action of the spirally-arranged brushes, being simultaneously cleaned by the bristles previously mentioned.

BLOWPIPE.—MICHAEL P. FREDDY, Lena, Ill. The blowpipe devised by this inventor is particularly adapted

for the use of jewelers and dentists, and is so constructed that it may be carried in the pocket. The blowpipe comprises an alcohol lamp adjacent to which a reservoir for alcohol is held. A tube extends from the reservoir and is connected with and surrounded by a jet-tube. Upon igniting the wick of the lamp the jet-tube will be heated, thus causing a vapor to form which will be discharged with great heat.

TAIL-HOLDER FOR HORSES.—GEORGE T. ELKINS, Baus, Tenn. This device consists essentially of an especially-constructed clamp to which a strap is secured. The clamp engages the stump of the horse's tail; and the strap is made to engage the breeching. The device prevents the animal's tail from becoming entangled with the reins.

FENCE STAY.—HARDIN W. DORSETT, Spearville, Kan. The purpose of this invention is to provide means for bracing and staying the running wires of wire fences. To this end the invention embodies a structure formed of integral malleable metal comprising a rolled or tubulated main portion with a notched flange to hold the wires and with a spur and foot at the bottom, the spur serving to enter the ground and the foot bearing thereon to brace the entire structure.

INSULATOR.—JOHN A. CARPENTER, Oxville, and CHARLES F. TONN, Bluffs, Ill. This insulator, for telephone, telegraph, and electric light wires, comprises two sections, from one of which lugs extend which are adapted to be secured to the other section. A wire having been placed between the lugs, a gasket of rubber is arranged on the upper side of the wire and around the lugs, after which the upper section is screwed down. The insulator is designed to obviate the use of tie-wires and of the battery power usually required in charging such tie-wires.

BUST-PAD AND CHEST-PROTECTOR.—MAURICE F. BUCNER, New Brighton, England. The bust-improver and chest-protector is a light, cool, and easily-adjusted substitute for pads as a means of improving the figure of the wearer and of preventing unsightly creases in the outer garment. The device is also suitable for use as a chest-protector.

TENPIN-BALL.—HENRY G. WILMERLING, Brooklyn, New York city. Tenpin-balls very often check or break at the finger and thumb openings. The inventor of this ball provides the thumb and finger openings with elastic cushions held in place so that they will not interfere with the bowling of the ball and will not check or break no matter how hard they may be brought in contact with a return-rail.

FAUCET.—ENOS W. THAYER, Meredith, N. H. This faucet has a tapering hollow plug, one end of which is open to receive the liquid supply and the other end of which is provided with an orifice adapted to register with the nozzle of the faucet, the plug being so arranged that it can be given slight endwise movement immediately before it is turned, so that friction between the plug and casing is avoided.

TOBACCO-PIPE.—FRANK L. SHUNK, Gold Creek, Mont. The object of the present invention is to provide a means for shielding the flame of a match from wind while lighting the tobacco. The pipe is provided with a shield consisting of two rings of metal, each having a semicircular opening, the two openings being adapted to form a single circular opening when brought in alignment. When the rings have been thus adjusted, a match may be inserted in the circular opening to light the tobacco.

WATER-WHEEL.—RUDOLPH B. KUMMER, Columbus, Neb. This improvement in water-wheels provides a construction which will enable full efficiency to be obtained with any gate-opening. The water-wheel has longitudinally-extending blades or buckets. A cylindrical gate movable longitudinally of the wheel, has a peripheral groove near its lower end. Fitting and rotating in this groove is a partition plate having slots receiving the wheel-blades. A mechanism is provided for raising and lowering the gate.

CLOTHES-RACK.—JOHN F. KOOB, Union, Hudson County, N. J. The clothes-rack is constructed so that when not in use it will occupy a vertical position, and when in use will occupy a horizontal position. When the rack is in a vertical position, its slats will be quite close together, so that but little space is occupied. When raised to a horizontal position the slats automatically spread apart so as to afford a maximum surface for drying purposes. An automatic locking device holds the slats of the rack in a horizontal position. The device may be tripped by a person standing on the floor, no matter at what elevation the rack may be.

GARBAGE-RECEPTACLE AND CLOSET THEREFOR.—CORNELIA S. ROBINSON, Manhattan, New York city. This invention is an improvement on a device patented by the same inventor. The invention provides a casing set in the wall of a building and having a door leading to the room. A fresh-air intake is secured to the apertured bottom of the casing and leads to the outer air. An outlet flue leads from the top of the casing. A receptacle formed at its lower end with an external apertured shell or foot surrounds the opening in the bottom. The receptacle has a cover with an outlet pipe extending into the outlet flue. It will be observed that proper ventilation is provided so as to remove the odors arising from the garbage.

STOKER FOR STRAW-BURNING FURNACES.—HENRY R. NELSON, Gates, Minn. In the bottom of the casing of this mechanical stoker an endless feed-carrier is mounted discharging at one end of the casing. Two sleeves are mounted loosely in bearings at the top of the casing. A shaft is fitted to turn in the sleeves and is turned by gearing in unison with the feeding-carrier. Arms are attached to the sleeves, and a floating feeder-frame is attached to and swings with the arms. A second feeding-carrier is mounted on the floating feeder-frame and is driven by the shaft thereof. The stoker is arranged to feed straw automatically and continuously to the fire-box for immediate consumption.

FLOOR-CLAMP.—EDWIN C. INGERSOLL, Philadelphia, Pa. To provide a floor clamp arranged to enable a carpenter to force a loose floor-board in firm contact with a fixed one, and to nail the loose board in place, is the purpose of the present invention. The frame has a presser-foot and a segmental guideway. A lever is mounted to swing on the frame over the guideway, the lever in turn having a guideway. A jaw slides in the guideway on the lever and has portions engaging the guideway of the frame. The jaws can be held at various positions on the guideway. A stud is carried by the frame and coacts with the jaw.

NON-REFILLABLE BOTTLE.—HENRY WEIL, Manhattan, New York city. This invention seeks to provide a bottle with a valve-mechanism that may be placed and secured in an ordinary bottle-neck, thus permitting a manufacturer to make the bottle in the ordinary mold. The mechanism by means of which it is designed to prevent the refilling of the bottle consists of spring-pressed valves within the neck of the bottle.

MUSIC-LEAF TURNER.—ROBERT HAMMOND, Lake George, N. Y. The music-leaf turner is a mechanical device which may be applied to a piano or like instrument, or to any form of music-rack. The turner is constructed with gripping devices for the leaves, which will not tear the leaves as they are carried from one side to the other. A single trip mechanism is provided through the medium of which the leaf-carriers may be released one after another as rapidly as may be desired. The releasing of one carrier will not in any way interfere with the remaining carriers.

WAGON-BODY RAISER.—SAMUEL N. MAXWELL, Grove, Indian Territory. This inventor has provided a mechanism for the use of farmers whereby a wagon-body may be conveniently lifted off the running-gear and held suspended to be again applied to the running-gear when wanted. The body-raiser is of such construction that it may be erected by any farmer simply by using two pulleys and a winding-shaft or windlass, and is arranged for such leverage or power that very little effort is required to perform the work.

TRESTLE.—ARCHIBALD KERR, Carmichael, Penn. The trestle temporarily supports caskets, coffins and the like, so that their inner and outer surfaces may be trimmed. The trestle is provided with a post, on the upper end of which is a union. An L-shaped support has its vertical member connected with the union and has its horizontal member arranged to support the article to be operated upon or trimmed. Angular legs carried by the horizontal member are adapted to rest on the floor.

POOL-TABLE ATTACHMENT.—THOMAS W. GRIFFIN, Milford, Conn. This invention provides a raceway which may be readily applied to any table for the purpose of directing balls from any of the table-pockets into a receiver at one end of the table, thus rendering it unnecessary for a player to collect the balls from the several pockets. The ball-receiver may be raised by lazy tongs from its receiving position nearly to the top plane of the table, so that it is unnecessary to stoop in order to remove the balls.

WINDOW CUPBOARD OR REFRIGERATOR.—VICTOR F. LUTZ, Brooklyn, New York city. It is a general practice in large cities during cool weather to place food outside of upon the window-sill or upon a fire-escape to keep the food cool. The device patented by the inventor is designed to protect victuals thus stored from dust or dirt. The cupboard or refrigerator provided for this purpose is formed of metal sheets flanged together, the end sheets being ribbed to form shelf-supports, and having vertical guide-flanges at their front edges. These front edges are notched at the ribs; and a front plate having flanges embrace the guide flanges and slide thereon.

Designs.

MINER'S CANDLESTICK.—WILLIAM H. PLEASANTS, Victor, Colo. The candlestick has a flat shank, which is to be driven into the rock, and a loop which contains the candle. A rising hooked shank is provided whereby to hang up the candle when it cannot be otherwise supported.

KNIT SLIPPER BLANK.—ERASTUS R. OLMSTEAD, Saratoga Springs, N. Y. The leading feature of the design consists of a ribbed upper portion and a ribbed ankle portion.

NOTE.—Copies of any of these patents will be furnished by Munn & Co. for ten cents each. Please state the name of the patentee, title of the invention, and date of this paper.