at least some idea of the figure to which the cost of the contract is likely to run. The building of the schooner yacht "Gleniffer," the largest two-masted schooner ever built purely for pleasure, was, however, undertaken in a different fashion. Her owner, Mr. James Coats, Jr., of Ferguslie, Paisley, Scotland, takes his yachting on rather original lines. He has done much to further the nautical sport in Scotland, and something for the cause of international sport, for he was owner of the 10-tonner "Madge," the most successful British boat ever sailed in American waters. It is one of his peculiarities that he never sells a boat, and the result is that notwithstanding the generous manner in which he has presented steam and sailing yachts to many relatives and friends, he still stands in possession of over a dozen yachts, steam and sail. Next to the "Madge," which was laid up in America and allowed to rot after a phenomenally successful career, his best known boat was the cutter "Marjorie," which played a prominent part in British yachting twenty years ago. "Marjorie" was gradually outclassed, and when Mr. Coats decided to build again, he had lost his keen zest for racing and decided to procure a craft in which he could enjoy the maximum of comfort when cruising.

He figured out therefore the amount of accommodation which he required aboard, and commissioned Mr. George L. Watson to build him a boat which would provide it. So generous were his ideas in this direction, that the natural method of meeting them would have been to build one of the large steam yachts in which our millionaires now seek pastime. Mr. Coats is, however, old-fashioned enough to cherish a deeply-rooted distaste for the steamship, and his orders were that the new vessel should be canvas-driven. The fact that the building of a shapely hull round the generous accommodation which he had sketched would produce the largest sailing yacht ever built did not alter his plans, and the result was the production of the schooner "Gleniffer," which has been for some time the most notable yacht of the whole Clyde fleet.

The 90-footers built for "America" Cup racing are generally considered as going to the limit in sailing yachts, but these fall a long way short of the dimensions of this magnificent schooner. From figurehead to taffrail "Gleniffer" measures 187½ feet, over 50 feet longer than "Columbia." The beam of the schooner is 27 feet, and her draught 17 feet, while her measurement by the Thames rule works out at about 450 tons. It is in displacement that her extra bulk as compared to the Cup racers is specially apparent, for while the cutters are severely undercut below water, "Gleniffer" is comparatively long-keeled and deep-bodied—the very ideal of a vessel intended for cruising.

In general outline and in section, the yacht has a striking resemblance to the "Thistle," which was sent across the Atlantic in 1887 to race for the "America" Cup. The profile forward is almost identical, for in designing it Mr. Watson abandoned the modern spoon bow and went back to the more graceful clipper or swan-neck bow of ten or a dozen years ago. Above the water the stem shows distinctly hollow, but about the water-line it sweeps into a convex curve which is carried down into the lower keel plates. From the end of this curve the keel runs with little or no increase of draught back to the heel of the sternpost. The sternpost is less raked than has been the rule in recent productions, and it cuts at top through a fairly long and very graceful counter, which rises with a good deal of spring and gives an overhang aft of about 27 feet. The forward overhang measures about 16½ feet.

One hundred and fifty tons of lead is required as ballast to steady her against her enormous spread of sail, and this is carried inside, most of it being in one solid ingot. Compared with the yachts of modern design she looks high in the topsides, but this is accounted for by the fact that instead of the usual apology for a rail her decks are set round with a serviceable gunwale 2 feet 6 inches high. The deck has been kept as clear as possible, and is broken only by a small smoking lounge at the galley, which is situated amidships.

In the construction of the yacht nothing has been sacrificed for lightness or speed. The materials are all of the best procurable, and the scantlings are in every case in excess of what are demanded for the highest class at Lloyds. Under water the plates are overlapped and riveted in the usual way with a double row of rivets, but in the topsides the plates are butted and strapped inside, leaving a beautifully smooth surface. The elaborate scale upon which the fittings below are carried out gives the best possible proof that the yacht was designed primarily for comfort and convenience in cruising, and one advantage of the sailing yacht is shown in the fact that the "Gleniffer" has more spacious cabins and better accommodation than many steam yachts two or three times her size. A passage 3 feet 6 inches wide leads from the companion to the main saloon, a large and airy apartment which extends the whole breadth of the yacht amidships, and is so designed that it may be divided by curtains into dining and drawing cabins or used as one big saloon. Abaft of this, on the starboard side, are the owner's private apartments, consisting of library, sleeping cabin, and bathroom, all of these being airy, well-lit cabins of about ten feet square with seven feet of headroom throughout. Opposite these on the port side are guests' cabins, planned in somewhat similar style, and consisting of four cabins with bathrooms, cloakrooms and smokeroom adjoining. Aft of these again are two ladies' cabins, handsomely fitted and provided with everything necessary for the comfort of lady guests.

Forward of the main saloon are the officers' quarters—a snug little cabin for the skipper, and three others which give accommodation for the half dozen officers who assist in the command. Alongside these are the steward's pantry and storeroom, which communicate by means of a small hoist with the galley on deck.

The crew of thirty-four men is excellently housed in a commodious and airy forecastle. Under the cabin floor is a lower deck running the whole length of the vessel, with about five feet of headroom. Sails and all the lighter stores are carried here, while water and oil tanks, cables and heavier stores are carried under this again.

As might be anticipated from her great length and sail spread of 18,000 square feet, the "Gleniffer" has made some exceptionally fast passages when going free. Once, off the east coast of Ireland, she logged 16 knots an hour over a measured course of 100 miles from light to light; and last year under similar conditions off the Hebrides she made the same speed over a slightly shorter distance. This pace is probably the greatest ever attained by any ship carrying full sail in a moderate breeze.

THE AUTOMATIC RESTAURANT.

We have slot machines that sell us candy and chewing gum, slot machines that sell collar buttons, slot machines by which we can be weighed, and slot machines which set a phonograph or music-box in motion and soothe us with the latest popular airs while we wait in the railway station or ferry house. Now we have the automatic restaurant, a gigantic slot machine or combination of slot machines from which we can purchase food and drink.

To the American, who is now so accustomed to mechanical contrivances that he no longer is astonished by their performances, this automatic restaurant is but the logical development of the automatic vending machine. The wonder is that this idea is not of American, but of German, origin. Automatic restaurants have been a familiar sight in many of the more prominent European cities for the last nine years.

New York's restaurant, in principle, is very much the same as those of the German towns. It is fitted up much more elaborately, however. Its electric lights, its dazzling mirrors, and its resplendent marble outshine everything on Broadway. The average café which to the country visitor seems to be illuminated with extravagant splendor, is but a dismal place compared with it.

The man who walks into the automatic restaurant with the idea that he can sit down at a table and order what he likes from a waiter, will be sadly mistaken. There are no waiters in the usually accepted sense of that term. The two or three white-aproned men who nonchalantly roam around without apparently much to do are there not to serve meals, but to remove the empty dishes. You must serve yourself. You buy your portion of meat or soup, your glass of beer or wine, or your cup of coffee, and you carry what you have bought to your table. If you are in a hurry, you may stand and eat, and enjoy what is popularly known as a "perpendicular meal."

In describing the automatic restaurant, it may be well to divide its various appliances into three classes. The first class of machines sell hot food by means of coins and checks; the second dispense cold food (salads, desserts) by the use of coins alone; and the third sell liquids (beer, wine, coffee, whisky, liquors, etc.) by the use of coins alone.

The restaurant comprises two floors, or rather a floor and a basement. On the upper floor the patrons purchase what they desire; in the basement the food is cooked or otherwise prepared, and lifted to the floor above by means of elevators.

The operation of the elevators may best be explained by describing the process of purchasing food. The bill of fare is printed upon a board in which the slots are located. Each slot bears a reference letter. Opposite slot *A*, a small placard is pasted which gives the name of the particular dish to be purchased by dropping a coin in that slot. Similar legends are printed upon the placards pasted opposite slots *B*, *C*, *D*, etc.

After the desired dish has been selected, a coin of the proper denomination is dropped into the corresponding slot. A handle is pulled, which rings a bell in the basement, and signals the attendants. Simultaneously a brass check is delivered. The coin has dropped down a chute, which lies adjacent to the elevator and is held in place at the bottom by a retaining device. By counting the number of coins as they lie side by side above the retaining device, the attendants know exactly how many dishes of that particular food are wanted. As each dish is served, the retaining device is released, so that a coin drops into a receptacle, leaving behind a number of coins corresponding to the number of dishes still to be served. The food, attractively served in neat chinaware, is placed on a silvered metal tray in one of the compartments of the elevator *A* (Fig. 3). The shaft of the crank *D* is rotated, and carries at its end a bevel gear *G* meshing with the bevel gear *E*. The shaft upon which the gear *E* is carried is provided with a sprocket wheel about which a chain *J* passes, which meshes with the sprocket *F* in the frame *C*, carrying the crank shaft, and likewise with the sprockets *L* and *K* in a frame at the upper end of the elevator. A counterweight *H* facilitates the raising and lowering of the elevator. After the silver tray has been placed in one of the compartments of the elevator *A*, the crank *D* is turned in order to raise the elevator to the floor above. The purchaser sees his dish as it lies in the elevator behind a glass partition; he cannot reach it, however, because it has been lifted somewhat above the discharge opening. Not until he has dropped his brass check into a second slot, bearing a reference letter corresponding to that of the coin slot, and pulled another handle, will the elevator descend sufficiently to enable him to obtain his purchase. After the elevator has descended, the food is removed in the manner shown in Fig. 5.

Here, one peculiarity in the slot mechanism of the automatic restaurant should be mentioned. Spurious coins, as well as coins of improper value, fail to operate the mechanism. An honest slot machine is probably as rare as an honest man. The automatic restaurant machines, however, are far more trustworthy than many a human being. Coins of improper value which have been erroneously inserted are returned. The purchaser is not cheated.

Cold foods, such as salads and desserts, are placed upon the elevators of another section and raised to the purchasing floor in full view, protected, of course, by glass partitions. In order to purchase what one desires, it is necessary simply to drop a coin in the slot and to pull a handle. The elevator then descends one step so that the particular salad or dessert can be withdrawn from the discharge opening just as in the previous case. No checks are here used, since the dishes are cold and the attendants below need not be informed of the particular kind of food desired.

The liquor-dispensing machines have for their most interesting feature a self-measuring valve by means of which an amount of liquor is dispensed which is the exact equivalent in quantity of the value of the money received. It is rather curious to observe that for a five-cent piece a glass of beer—no more and no less—runs out of the faucet. Kümmel, Bénédictine, and other liqueurs are sold with like mechanical accuracy. The glasses are brimful; not a drop too much trickles out of the cask.

When a beer-cask is nearly emptied, a bell is automatically rung to call the attention of the attendants in the basement to its condition.

In Fig. 7, a general view of the automatic valve is presented. *A* is a box which contains registering mechanism, from the dial of which can be immediately ascertained exactly how many cups of coffee, glasses of beer, wine, whisky, or soda-water, as the case may be, have been sold by the particular machine in question. *B* is a money-chamber into which a coin drops after it has fallen through the chute *L*. *C* is a gear-wheel which meshes with a pinion operating the registering mechanism contained in the box *A*. As the gear wheel *C* is moved in response to the movement of the lever *K*, the registering mechanism in the box *A* will be actuated. *D* is a cylinder within which is a cone containing exactly the measure of the liquid to be sold. *H* is a drain-pipe from the cone. By operating the lever *K*, which is released as the coin enters the money chamber *B*, the cone is turned so that an opening with which it is provided may register with the outlet-pipe *E*, in order that the liquid may be discharged. *F* is the feed pipe.

How a glass of beer is bought is best shown in Fig. 1. The glasses are all hung on pegs on a marble panel above the slots. The purchaser removes one of these glasses, rinses it, if he likes, in an automatic sprinkling device especially provided for that purpose, places it beneath the tap, and puts his coin in the slot. He pulls the lever over, as far as it will go, and allows it to fly back. The beer flows out of the tap into his glass in just the right quantity.

The valve by which coffee is dispensed is exactly of similar construction; the cups, however, are disposed not on pegs, but in elevators similar to those by which food is raised. The coffee is kept hot by means of a vessel containing water, within which the coffee tank itself is contained.

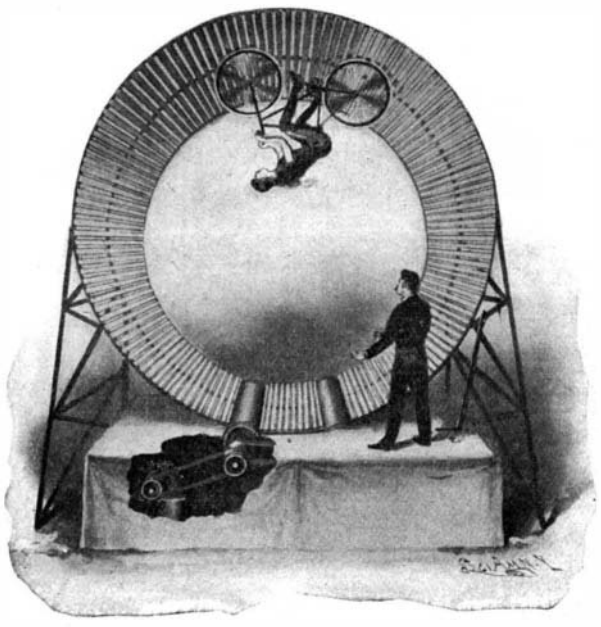
The method of buying liquors or wine or soda-water is precisely the same as that which we have described in connection with the purchase of beer.

New York is by no means the first American city to

possess an automatic restaurant. Philadelphia anticipated it by some months. The Philadelphia equipment is exactly similar, mechanically, to that of New York. Restaurants on the same principle are soon to be opened in Chicago and the leading American cities.

The Pioneer American Manufacturer of Steel.

A contract made by Cornelius Atherton, the pioneer steel maker of the United States, was recently found among the effects of Cornelius Atherton, Jr., who died about twenty years ago at Afton, N. Y. The document, which bears the date of 1772, was found by W. M. Atherton, of Chicago, a descendant of the famous steel maker. It appears in the contract that Atherton agreed to "learn and instruct James and Ezra Reed in the art of making steel." The document was attested by Thomas Barlow, of Kent, Litchfield County, Conn., and Thomas Delano, the great-uncle of Columbus Delano, Secretary of the Interior in Grant's cabinet.



A COMBINED CYCLE-WHIRL AND LOOP-THE-LOOP.

Cornelius Atherton was born in Cambridge, Mass., 1736. In 1763 he became connected with the Dover Iron Works. Associating himself with John and Samuel Adams and John Hancock, he began the manufacture of firearms and cutlery in Boston in the year 1769. After the works were burned down, presumably by the British soldiers, Atherton went to Pennsylvania, becoming one of the founders of the city of Scranton. At that time Scranton was called Slocumb Hollow. Mr. Atherton died at Afton December 4, 1809.

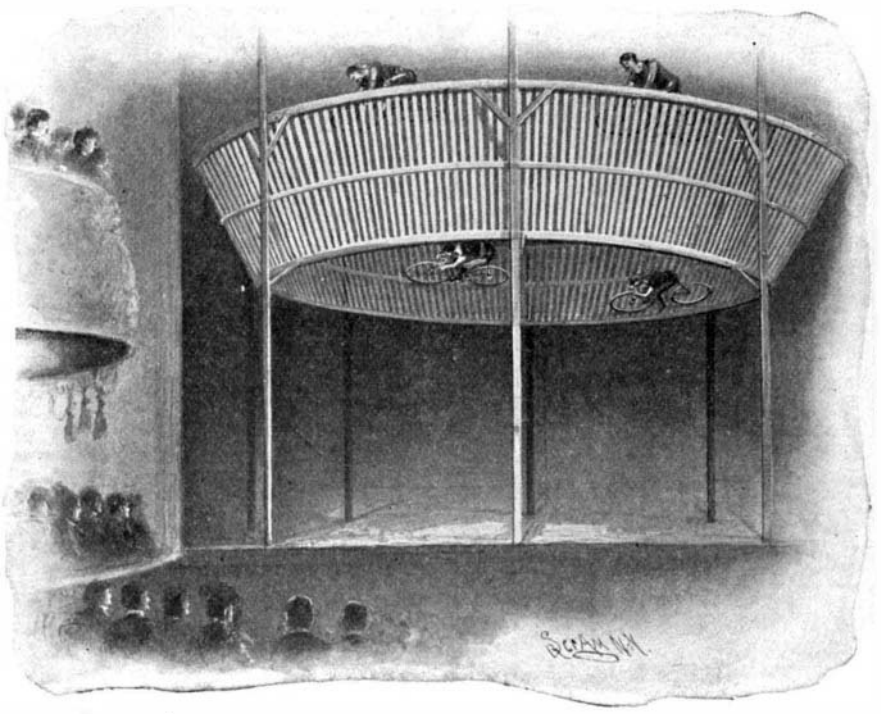
The total gold production of the world from the discovery of America by Columbus to the year 1900 is, according to the report of the United States Mint, in round numbers, $9,811,000,000. Pure gold of this value would weigh about 16,272 tons, and occupy a space equal to 27,039 cubic feet. Graphically this amount could be represented by a solid circular tower of gold 20 feet in diameter, and 86 feet high. The total yearly world production of gold since 1900 would increase the height of such tower about 3 feet each year.

SOME FREAK CYCLE-WHIRLS AND LOOP-THE-LOOPS.

The Théatre du Moulin-Rouge of Paris has its "Circle of Death," and the Folies-Bergère has its "Terrible Ring." Both are what may be called "aerial velodromes." The track of the former is a kind of bottomless saucer or truncated cone, composed of laths, separated by a space of 2 to 2½ inches. The walls are inclined at an angle of about 70 degrees. Through the laths it is possible to see everything that passes within. This aerial velodrome measures about 22 feet in diameter at its middle. The track itself is about 7 feet wide. By means of steel suspending wires, the ends of which are wrapped about windlasses, it is possible to raise and lower the track. The most astonishing evolutions are performed when the track is raised about 16 feet from the stage.

Dan Canary's "Circle of Death," exhibited at Madison Square Garden, New York city, is still more complicated. The bicyclist mounts by a long helical spiral until he reaches the circle itself, situated at a height of 60 feet above the ground. In order to emerge from the circle, the bicyclist ascends to the edge of the ring and enters a path which plunges down at a frightful incline.

Perhaps the record for tricks of this kind belongs to Miss Lottie Brandon, who seems to have done things in New York, compared with which the feats of the men who ride through the "Looping-the-Loop" apparatus and the "Circle of Death" seem tame. The track is vertical. In order to acquire the necessary momentum, speed is gotten up on a pair of rollers journaled in the lower part of the circle. When a sufficiently high speed has been attained, the rollers are dropped by an arrangement of levers, and the bicyclist whirls around the circle, which measures about 16 feet in diameter. To stop the bicycle is a more difficult task than to start it. On the descent, a powerful brake is applied, so that the speed is considerably reduced, in order to enable the performer's manager to snatch her from the wheel as she comes dashing down. The wheel itself is carried on by the momentum.—Translated for the SCIENTIFIC AMERICAN from La Nature.



THE ELEVATED BOTTOMLESS CYCLE WHIRL.

American-Made Heathen Idols.

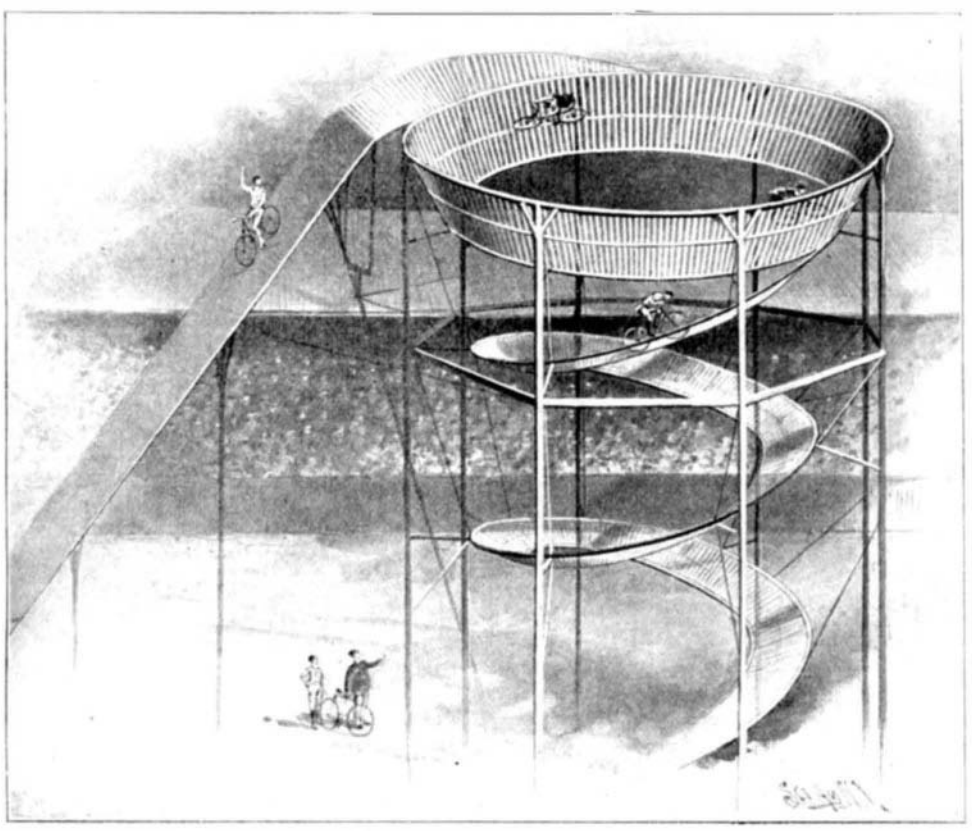
It is not very generally known that Philadelphia is one of the sources of supply whence the Far East derives the idols which it worships. Philadelphia, however, is not the only occidental city in the world which has a plant for the manufacture of graven images. In Germany thousands of idols are turned out each year; and many a little god and fetich, worshiped by the African savage, comes from the enterprising manufacturing town of Birmingham, England. Mr. F. Poole, a Philadelphia missionary, has made the sorrowful discovery that the Christian nations who are so very desirous of converting the benighted idol-worshiper of the East, furnish a goodly percentage of the wooden figures which are the direct means of continuing the very religions that missionaries seek to destroy.

The Philadelphia idol factory, to which we have referred, is conducted by a German. His chief market is India, largely for the reason that the figures which he turns out are Buddhas and Ganesas. In this factory, Buddhas of all sizes and of all materials are made, to be sold at all prices. A white marble Buddha is considered a rather expensive god. His value can be gaged by the foot, for it seems that his price is $50 when his height is two feet. That the models must be accurate goes without saying, for the devotee of India must have all details traditionally exact. The Buddhas are made after an exact copy of a Siamese Buddha reputed to be the best image of the god extant.

The god Ganesa, whose four arms and elephant's head are familiar to the student of Indian mythology, is no less a costly personage than Buddha himself. The commercial value of Ganesas varies. Plain and undecorated Ganesas can be had for $50. If the divine dignity be heightened by ornament, the god may fetch as much as $75. Like the Buddhas, the statues of Ganesa are copied slavishly from an accurate model; for every band, every color, every little decoration, has some symbolic meaning. A bit of color slightly inaccurate in shade, or an ornament improperly placed, may render the most picturesquely hideous Ganesa or Buddha absolutely worthless to a Hindoo.

The little wooden gods which are sold to the poor, although made with like minute attention to details, are not so elaborately embellished. The disciple of Ruskin will probably feel incensed to learn that not only are the gods made in the factory of an occidental to whom they have no artistic meaning, but that they are even made by automatic machines. But what is worse, the cheap machine-made idols are given away by the Secretariat of Korean temples to each worshiper who deposits at the gate a piece of money, in accordance with the time-honored custom of Buddhists.

In justice to the missionaries, be it said that they are bitterly opposed to this traffic in idols. But the German Philadelphian (or Philadelphian German, if that term be preferred), despite all protests, continues to carry on his business.



THE "CIRCLE OF DEATH."

Commercial Utilization of Producer Gas.

According to Mr. H. A. Humphrey, of London, who has closely investigated the problem of the possible application of producer gas to industry, if producer gas were generally introduced to replace direct firing by coal in all cases where gas firing is applicable, the saving in the consumption of fuel would amount to at least one-half of the total quantity now used. The gas producer is an apparatus for the conversion of the whole of the combustible matter obtained in the coal into a combustible gas, no coke residue even resulting—only ashes which it is impossible to burn remaining in the producer. Essentially the gas producer is a closed vessel containing a deep bed of incandescent fuel, through which air or air and steam is blown, and in which partial combustion of the coal takes place. The amount of coal actually burnt in the producer is, however, the minimum necessary to generate the heat required for decomposing the coal and some of the steam, and converting them into an inflammable gas, containing hydrogen, carbon monoxide, and methane gas as the combustible constituents, and carbon dioxide and nitrogen as the non-combustible constituents. In retorts for producing illuminating gas a ton of coal yields about 10,000 cubic feet of lighting gas; but from each ton of coal consumed in the gas-producer about 150,000 cubic feet of producer gas is obtainable. Although the calorific value of the lighting gas is nearly four times that of the same volume of producer gas, the quantity of the latter available is so much greater that the total available heat units in the producer gas are practically four times as great as with lighting gas derived from the same weight of fuel.