said to have borne a tensile strain of 45,000 lbs.—20 tons 2 cwt. nearly—per square inch, which were used in the construction of the steamships of the "American" line of steamers running between Philadelphia and Liverpoel, and in which the Americans take great pride. The public are, however, attracted to the stand of the Pottstown Iron Company by a very noisy nail-making machine, which turns out about 200 nails per minute, in sizes of 2in. to 4½in. long; the most noticeable feature about this machine is an automatic feeding arrangement, which supplies the materials of which the nails are made.

The American ironfounders have long been celebrated for the superior quality of their chilled cast iron wheels for railway and tramway purpose, and I believe most of the English tramway companies find it to their advantage to import the wheels for their cars from America. The exhibition of chilled wheels is a large and interesting one, but it is somewhat singular to find the inventor of the most approved form of this class of wheel has abandoned his original ideas, and adopted a new form, with steel or wrought iron tires. The drawing will explain the new method of construction adopted by Mr. Atwood, of Brooklyn, for securing the tire, by which the use of bolts or rivets, and the shrinking of the tire upon the body of the wheel, are dispensed with. The wheel is composed of the boss of the wheel B, the spokes, C and C2, connecting the boss and the rim D, in which are cavities forming a corrugated surface, and the flange F, on which the pins or lugs G G are cast. The tire is made with two cavities, I, I. on its inner surface, forming a corrugated surface, and on the flange side of the tire are holes to receive the projections G G. The form given to the tire A, by the cavities on its inner surface, leaves the thickest part of the tire under the central portion of the tread. When the tire is laid upon the flange, the pins G, G, will enter the holes or sockets H H, which are made a little larger than the pins, so that they should not touch. When the tire is placed on and fitted to the body of the wheel there should be an opening of about ¼in. at L., between the tire A and the rim D, through which the packing is to be done. A space is left between the tire A and the rim D, forming an annular chamber K, which is larger within than at its orifice L, and this chamber K, is packed with hemp, cotton, or other fibrous material, forming a cushion, sustaining the whole weight of the load upon the wheel. This packing, which fills the cavities I I in the tire A and the cavities E E in the rim D, interlocks and secures the tire to the body of the wheel without the necessity of using bolts or other fastenings, thus doing away with all metallic connection between the tire and the body of the wheel in the line of force of the blows, the pins or projections G G serving the purposes simply of preventing the tire from turning or sliding around upon the central portion or body of the wheel, or, in case of fracture, from flying off. The hemp, cotton, or other fibrous material, moistened with glycerine, is to be inserted into the chamber K, one strand after another, each being consolidated by packing, using mallets and caulking tools, filling the chamber K piece by piece, and driving each one down as long as any can be forced into the aperture. After the chamber K is perfectly filled with the packing, the narrow space L, through which the packing has been done, should be filled with lead or other soft metal to make it water tight. The edge of the tire is then to be turned off, and the dovetail groove N cut into the rim D, into which groove the rim M is to be shrunk. The office of this ring is to prevent the packing from coming out, and to keep it dry. This ring should be turned off to give it a finish.

Another extensive exhibit is made by Messrs. Ferris and Miles, of Philadelphia, comprising steam hammers, punching machines, lathes, slotting machines, drills, and lathes for car and locomotive axles. There are no great peculiarities about any of these tools which call for particular notice. A radial drilling machine has a very neat adjustable feed; a crank handle on the pinion shaft serves to throw the carriage rapidly up or down, or by a screw nut in the handle it can be instantly clamped, by a patent annular clutch, to the worm-wheel on the same shaft, which operates the self-feeder; there is also a hand-wheel for slow motion and hand-feed. The punching machine is driven by gearing. The punches are placed at the extreme front of the machine, which is made very narrow so as not to obstruct the view of the work—with the same object the plunger and guide plates are made of wrought iron, very neat and compact. The die seat is a wrought iron block, dovetailed into the frame of the machine, which projects in front and is cut away and pointed like the horn of an anvil. This arrangement enables the punches to work within 1 inch; it means of any flange or projection, and, therefore, renders these machines applicable for punching many articles that have hitherto been drilled or punched by hand.

The high price of gas and the comparative cheapness of petroleum has led extensively to the adoption of the latter material for lighting small towns and villages; indeed, the substitution of petroleum for gas is not unknown in England in localities where the gas companies have been excessive in their charges. Watkin's patent portable gas attachment does not burn the oil directly, but by the application of a portion of the flame the liquid is converted into gas and burned with a mixture of atmospheric air. The reservoir containing the oil is placed on the upper side of an ordinary street lamp, and has an inclined bottom leading to the discharge pipe to prevent any accumulation of liquid from remaining in the reservoir and becoming unfit for burning. The oil is conveyed from the reservoir through a small pipe carried down the side of the lamp to the tap shown on the cut, of which the following is an explanation:—A, burner tip; B, mixing or gas chamber, having the air holes C; D, conducting tube communicating with tube B; E, generating chamber; F, lighting cup; G, plug or screw; H, shield; I, coupling; J, connecting tube, metallic packed; K, valve or stop cock, which is a screw, and is only closed when screwed down to the bottom, without reference to how the handle stands; L, needle hole. The burner is first heated by burning alcohol in cup F; then valve K is opened by turning once round. The naphtha passes through the packed connecting tube J to the generating chamber E, where it is vaporised, and passes through needle hole L into the mixing chamber B, and is there mixed with the air entering air holes C, ascends tube B, and burns in a flame at tip A, while a portion unable to escape at tip A passes into the down conducting tube D, burns in jets directly under generating chamber E. The shield H protects these jets from the wind, and the upward draught through shield H causes the jets to re-ignite whenever blown out. The packing in tube J regulates the flow of naphtha into the burner, and prevents its return when vaporised; the end with the small hole is always screwed into coupling I. The action of this lamp resembles that of the well-known Rob Roy, or Norwegian cooking lamps, in which the flame is utilised to vaporise the oil. The material used in this lamp is redistilled naphta of 72 or 74 degrees gravity, one pint giving a light for six hours at a cost of two cents, about one halfpenny, and the reservoirs will hold sufficient oil for fourteen hours. Street lamps are lighted by this means at an annual charge of from 18 dollars to 30 dollars per aunum, according to the number of nights and length of time the lamps are lighted. The charge for lighting street lamps with gas varies from 49 to 60 dollars per annum, the price of gas for domestic purposes in Philadelphia being 3.15 dollars per 100ft.

THE BERLIN NATIONAL GALLERY.

(See page 228.)

The new National Gallery in all its details and considered as a whole may be looked upon as a triumph of German art. Architecture, sculpture, and painting have here contended, and poured out their most beautiful and richest gifts, as if to prove to our own age and to posterity that the German people are not only able to win victories in the field, but are the equals of other nations also in the gentler arts of peace.

The building is a pseudo-peripteros (a structure surrounded by a facing of columns) in the Greek style, Renaissance forms, however, being also introduced. On a basement, 40 ft. high, of grey granite, rise two stories of red sandstone, the roof being supported by fluted Corinthian columns. The principal front, of 100 ft. long, has a portion of columns, and is ornamented by a frieze in relief by Moritz Schulz, on which are represented three-quarter size, figures of the most celebrated German artists. The tympanum of the portico, which is to receive an equestrian statue of Friedrich Wilhem IV., has been sculptured by Wittig. Flights of steps lead up to the principal front, at the foot of which are two groups by M. Schulz, representing Sculpture and Painting, while at the top are two female figures, the "Purpose of Art," by Calandrelli, and "Creating Sculpture," by Moser. The side fronts of the building, 200 ft. long, are intersected by attached Corinthian columns; these rest upon a sober substructure, and are crowned by a rich entablature, with the names of artists inscribed in large gold letters. A half-round apse, in the same style of architecture as that just described, closes in the building at the rear. The whole building, to provide a proper light for its many rooms, has been set back towards the new Museum, and in the midst of the colonnades either already existing or still to be erected. The space thus created between the latter and the new National Gallery will be made into ornamental grounds, in which marble statuary will be placed.