PROPOSED NEW BRIDGE, LONDON.

It is recorded that when James I. threatened to punish the citizens of London by the removal of himself and his court to some other city, the Lord Mayor calmly informed the King of the hope of the citizens that His Majesty would leave them the Thames. So long as the river remained, the people of London believed that they might endure the loss of even the Solomon of the West. Since that time much has been done by means of railways and improved roads to facilitate the intercourse of nations and to promote commerce; but the Thames is still what it was in the days of King James, the link by which London is united with the rest of the world. If, as Sir John Herschel says, "London is the center of the terrene globe," that position is due to the possession of a navigable channel. What other city can show such a proof of international trade as may be witnessed every day in the year between London Bridge and Blackwall?

The supremacy of London in commerce is in a great measure attributed to the navigability of the river, and in dealing with the Thames this fact should never be overlooked. While every one admits the advantage of unimpeded communication between the parts of the metropolis on both sides of the river, it should also be remembered that an advantage of the kind would be dearly purchased if to secure it impediments were raised to interrupt the traffic on the water. The local requirements of Whitechapel and Bermondsey should never be allowed to override the general interest of the city (which is also the interest of England), and although it would be well for carts from Shoreditch to reach the Old Kent Road expeditiously, the gain in time would hardly compensate for the loss that is inevitable if commercial arrangements which have taken centuries to mature should be disturbed or destroyed.

When, for example, it is proposed to erect a bridge with a massive pier in the very middle of the waterway, or a bridge of a height that will prevent many of the vessels that trade with London from passing under it, or a bridge on so ingenious a principle that there is risk of the intricate machinery becoming disarranged in the opening or closing, it is evident that in every one of those cases there is a certainty of interference with the traffic of the Thames, and the trade of the port will in consequence be sacrificed to local interests. On the other hand, a fixed bridge at a high elevation above the river would involve local inconvenience, for it must be costly, and unless the approaches are carried for a great distance inward, the gradients will be steep and involve a loss of tractive power.

If the foregoing assumptions are correct, it is evident that the question of constructing a bridge over the Thames below London Bridge is one in which compromise is demanded if there is to be a satisfactory solution. Something must be abated by all parties, by the representatives of land traffic as well as by the riverside proprietors. It is physically impossible to have a bridge with easy gradients for land traffic, and which will be also clear above the highest masts, or one on a low level which shall still be equally convenient for ships and wagons; and the most prudent course will be to construct a bridge on a principle that will give a minimum of inconvenience, while allowing of easy gradients and a capacious waterway. In the opinion of the special committee of the London Corporation, who were appointed to investigate this question, the design which is illustrated by us this week complied with those conditions. The committee reported that the design commended itself to them "as one providing a bridge which would interfere but very slightly with the river traffic, and would bring about that relief to the commerce and trade of this city contemplated by the references to your committee."

It will be seen from the illustrations that the City Architect has adopted the bascule principle for his bridge, as being simple in arrangement, economical, and convenient, besides admitting of that architectural effect in the towers which is necessary for a structure placed in so important a position. In the upper view the bridge is open, and in the lower one closed.

The proposed bridge, having in its center the same height of waterway as London Bridge, viz., 29 feet, would consist of two side spans of 190 feet each, and a center span or opening of 3 0 feet. The roadway of side spans would be carried by two wrought iron lattice girders, of ordinary type, or by shallow lattice girders carried by suspension chains from the towers, with girders spaced 35 feet apart, and cross girders between carrying buckled plates on which the railway would be bedded.

The center span of 300 feet would be bridged by two hinged platforms, forming the "bascule." The longitudinal and cross girders and buckled plates of the platforms are all proposed to be steel, to reduce the weight as much as possible. Each platform would be suspended by eight pitched chains, passing over polygonal barrels fixed in the semicircular arches between the towers, and from thence to the hoisting machinery in the towers, where they would terminate in a plain chain or iron rod carrying the balance weights.

The hoisting machinery could be worked by steam power, or by hydraulic apparatus, supplied by tanks fixed in the roof of the towers.

The arches between the towers carrying the polygonal chain barrels would be formed of four wrought-iron braced semicircular arched ribs, connected transversely by four wrought-iron lattice frames. The rise of each arch in center would be 130 feet above Thames high-water mark, or of 100 feet headway for a width of at least 150 feet.

The principal advantages of the design proposed are:

First. Lowness of level and, consequently, *easy gradients for the land traffic.*

Second. *Economy of construction* in the approaches on both banks of the river, the lowness of the level allowing of direct access, and necessitating very slight alterations of the adjoining streets and properties.

Third. Occupation of less river space than a swing bridge, which, when swung open, requires a clear space equal to the half span of the bridge.

Fourth. *Less interference with the tide-way* or navigation of the river, there being only two towers or piers, instead of three or four, as in the swing bridge schemes.

Fifth. *Beauty of form.* The chief features of the bridge being capable of architectural treatment, it might be rendered the most picturesque bridge on the river.

Sixth. *Facility and rapidity of working* by the special arrangements of machinery proposed. For instance, a ship signaled at a quarter of a mile distant, and sailing or steaming at the rate of, say, six or seven miles an hour, could pass through the bridge and the land traffic be resumed in three minutes; or if half a dozen vessels were within half a mile of the bridge, all could pass in five and a half minutes.

It has been estimated that the cost of the bascule bridge, including approaches, machinery, maintenance, etc., would not exceed 750,000*l*., which is about one-half the sum that would be necessary for the construction of a high level bridge allowing of equal facilities for the river traffic.—*The Architect.*

Importance of Roads.

We are not aware that any estimate has ever been made of the actual cost of the public roads of the United States, or that the expense of providing them has ever been attempted by any bureau of statistics, but we make the rough estimate that they have cost at least seven hundred million dollars—probably much more—while unknown millions are annually expended in attempting to keep them in repair. If the money were only well applied, it would be an expenditure of great profit and economy, as everything which the farmer does off his own land is greatly affected by their condition. All his many loads of surplus farm products are drawn over them, and it makes some difference to him and to his horses whether those loads are conveyed easily over hard, smooth surfaces, or dragged through mud and against stones with severe labor to the team, fatigue to the driver, and wear and breakage to the wagon. Every week he and his family, more or less, go to the village for numberless errands, or to church on the Sabbath, and the good or bad condition of the roads seems to affect every fiber, pleasantly or unpleasantly, of their feeling or nervous sensations. On an average, there is at least twenty miles of traveling each week for the members of a single family. It would make a difference of five dollars a week, everything counted, whether this teaming and traveling is done over a nice, comfortable road, or through mud holes, sloughs. ruts, and unbridged streams, or against stones. Five dollars a week amounts to $250 a year, a snug little sum to tax the farmer with; and when this sum is multiplied by at least five million owners or drivers of horses, carriages, wagons, heavy teams, etc., the aggregate cost would be something over a billion dollars! Does any one say this is too large an estimate? Then proceed in detail and show in what particulars; but do not blindly and ignorantly say it is wrong without careful examination. Suppose, however, we admit that it is double the reality, is not the six hundred millions every year, expended directly or indirectly by our people, worthy of more attention on the part of patriots, statesmen, politicians, office seekers, public spirited men, writers for newspapers, agricultural journalists, and in fact of every one who passes over a road?

So long as our public highways in most parts of the country are made and repaired with so little interest and so little thought, we must suffer an enormous loss. We would like to ask how many of our readers, who drive or ride over the common roads, never see a loose stone, or a fixed stone, to strike, jolt and batter every passing wheel, or who do not see hundreds of them which might be removed with the expenditure of a small portion of the road tax? How many never saw sods and muck scraped into the road bed, to form a highway or "turnpike," which would be excellent for corn and potatoes, but which when worked into a mass of mud, or cut into ruts a foot deep, constitute a strange object to be called a "road?" How many never saw along the roadsides, thrifty patches of thistles, burdocks, mulleins, John's wort, nettles, etc., etc., ready to seed all the neighbors' fields? Until we can find such happy persons in the majority, we hope more attention may be given to correcting these evils, although we would not lessen the praiseworthy attention which is now freely accorded to enterprises and interests of almost infinitely less importance, but good in their small way.—*Country Gentleman.*

A Polish for Fine Carved Work.

Half-pint linseed oil, half-pint of old ale, the white of an egg, 1 oz. spirits of wine, 1 oz. spirits of salts; well shake before using. A little to be applied to the face of a soft linen pad, and lightly rubbed for a minute or two over the article to be restored, which must afterward be polished off with an old silk handkerchief. This will keep any length of time if well corked. This polish is useful for delicate cabinet work; it is also recommended for papier mache work.

Straightening Gun Barrels.

The *Forest, Forge, and Farm* tells how the gun maker utilizes shadows in his business as follows:

The straightening of a gun barrel is a very delicate and difficult mechanical operation, in which no machinery has as yet successfully competed with the human hand and eye. In addition to long experience, a natural adaptation to the work is necessary in order to attain any considerable degree of proficiency. The business is understood by comparatively few; indeed, many who attempt to learn it can make no progress whatever.

A plate of ground glass, size about 12x15 inches, and set in a dark frame, hangs against a window, some twenty feet from the workman. Horizontally across this glass is a bar of dark colored wood, three-eighths of an inch in width. Upon a convenient rest the operator lays a gun barrel, looking through it at the bar, which casts two fine lines or "shades" in the barrel. These join at the farther end, and gradually diverge, a break occurring in them wherever there is a "crook" in the barrel; the workman thus being enabled to detect the slightest deviation. In order to straighten the barrel it is put on a straightening block and the mechanic strikes it a blow with a steel hammer (these hammers vary in weight from three and a half to four pounds), the force of which is graduated according to kind of crook, size of barrel, and quality of steel. This alternate sighting and hammering is many times repeated, the barrel being turned slowly around while sighting, in order to locate any inequality which may exist at any point.

An inexperienced man may soon learn to tell if the barrel is straight, but it requires much practice to strike in exactly the right spot and with the proper force. The blow must be made in the exact place where the crook occurs, and if too hard, is worse than no blow at all. The barrel is thus treated six or seven times, and is rebored after each successive straightening.

Toward the last, finer crooks, known as "kinks," appear. These are shown by waves, instead of breaks, in the lines, and require light taps rather than blows. The nearer the barrel approaches perfection, the more skill is required to manipulate these kinks into unbroken lines. This is but one of many interesting operations through which a gun passes during the process of manufacture, in any of which its shooting qualities may be seriously impaired. A blow too light, or too heavy, too many, or too few; a discrepancy of one thousandth of an inch in the boring or rifling may transpose into a very poor gun one that would otherwise have been beyond criticism.

Formerly the process of straightening was effected in an entirely different manner, which, compared with the present mode, is both crude and unsatisfactory. One end of a silk or seaweed thread was attached to a bow a few inches longer than the barrel to be operated upon, the other end to a small lead weight known as a "sinker." This being dropped through the barrel, the bow was sprung, the thread drawn taut, and fastened thereon. The workman then looked through the barrel, observing where the light shone under the thread, thus detecting any imperfections. A barrel straightened in this manner, however, shows numerous defects when subjected to the modern method. In the old way the workman, standing near a window, examines and straightens the half nearest him; in the new he is away from the light and operates upon the other half, looking through either end as occasion requires.

The process described never fails to attract the attention of visitors at an armory, and is always looked upon as an interesting novelty. In view of the fact that the accuracy of a bullet's flight is dependent upon the perfection of less than one yard of barrel, it is wonderful that such good shooting can be done at more than one thousand times that distance.

A New Mechanical Constant.

At a recent meeting of the Physical Society, Prof. Perry pointed out the inconvenience of the ordinary constant, the "moment of inertia," employed in calculating the kinetic energy of rotating bodies. According to Rankine and others, the energy stored up in a rotating body, say a flywheel, is= $\frac{1}{2} I \omega^2$, where I is the moment of inertia and ω is the angular velocity. But in general machine practice the number of revolutions per minute is what is known, and ω has to be found from it by calculation.

Prof. Perry therefore proposes to introduce a more convenient constant known as the "M" at present for want of a better name. The M of a flywheel or other rotating body is the amount of kinetic energy possessed by the wheel when making one revolution per minute. Therefore to find the kinetic energy of the wheel at any other speed, say N revolutions per minute, multiply the M by the square of the number of revolutions per minute, N^2. Similarly, to find M from the number of foot pounds of energy in the wheel divide the latter quantity by N^2.

The French Observations of the Solar Eclipse.

A telegram from San Francisco says that the French astronomers who were sent to the Caroline Islands to observe the solar eclipse of May 6 have arrived at that place, and report finding a red star, which, it is believed, will prove a new discovery. The eclipse lasted five minutes and twenty-three seconds. They noticed several new features in the corona, chiefly white prominences, supposed to be vapor or white clouds.