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**An historical account of sub-ways in the british metropolis, for the flow
of pure water and gas into the hoses of the inhabitants...**

Williams, John

London, 1828

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Lectura prima.

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punishments, ways, or means, which to you, or six of you, whereof the said A, B, and C shall be three, shall seem most expedient for the speedy remedy, redress, and reformation of the premisses, and due execution of the same. And all such things as by you shall be made and ordained in this behalf, as well within liberties as without, that ye doe cause the same firmly to be observed, doing therein as to our Justices appertaineth, after the laws and statutes of this our realm, and according to your wisdoms and discretions. Saved always to us such fines and amerçiements as to us thereof shall belong. And we also command our Sheriff or Sheriffs of our said County or Counties of _____ that they shall cause to come before you, or six of you, of the which A, B, and C shall be three, at such days and places as ye shall appoint to them, such and as many honest men of his or their bailywick, as well within the liberties as without, by whom the truth may best be known, to inquire of the premisses; commanding also all other ministers and officers, as well within liberties as without, that they and every of them shall be attendant to you in and about the due execution of this our Commission. In witness whereof, we have caused these our letters patents to be made. Witness ourself at Westminster the _____ day of _____ in the _____ year of our Reign.”

“LECTURA PRIMA.

“My most worthy fellows and companions of this noble and renowned Society, the hourglass of my puisne time is run, and I am now come to take possession of your Reader's place; wherein I must hazard to your censures the fortunes of my inability. These twenty and six years compleat I have had continuance here, and in that time I have onely taken the measure and length of your hall: and herein I acknowledge *Gray's Inn* to be the patron of my best fortunes, and yourselves the best companions of my forepast and present life. I made a question, when it came to my turn to reade, whether I should turn therefrom or not, being then troubled about two things,

Charge and *Care*, both which I put into a pair of scales, wherein I thought *Charge* weighed heavy and solid (for *ibi ponebantur solidi*). *Care* notwithstanding had his equal weight with the other, and poised the scales even; yet I considered the small substance I had got, came by my profession: I therefore took myself, both in credit and conscience, bound to undertake this burthensome place, for the maintenance and preservation of the honour of this house; and with that I put *Charge* and *Care* in one scale, and *Resolution* in the other, which scaled them both up. Twenty years likewise of my last past time I have in the practice of my profession spent, but I hope little consumed thereof; in which time I lanced forth my ship (*in profundum Maris*) for a voyage to the sea, and now she is returned to your shores, furnish'd and ballist with merchandize of several estimates. By my ship I mean my Statute which I reade on, which be the Laws of Shewers; the merchandize be the weighty matters therein contained: by the governours and rulers of this ship, I mean the grave and prudent Commissioners who are put in charge and trust with the execution of these laws: by the mariners, I intend the officers of this law; the merchant's place I reserve unto myself. The wares brought home be of divers sorts, some onely fit for the Imperial Majesty of a King, and these be Royal Prerogatives, shewing forth their splendour like the *Flower de Luce* in the Crown; others belong to high nobility, and some be usefull for the homely commonalty; the rest which shall remain, I have cast under hatches for my last day's mart, when I mean to make chaffer on them all. But though I seem to make these markets of my legal merchandize, yet I do not mean to set such rates upon them as merchants use to do, which be all for (*utile dulce*), for I onely set one price upon all, which is your kind acceptance. Marvell not, I pray you, at these my sea-like salutations; for this day I am become God *Neptune's* oratour, and I mean to display the power of his empire; for my statute, my cases, and my argument, will all depend upon the element of water, over which, as poets feign, *Neptune* hath chief predominance. Well, now my ship is at

shore, and I have cast anchor there, and to my great comfort I see many chapmen attending the market; and therefore now presently I will unlock, and set open the closet of my store, which be contained in the fair volumes of the law, and especially in that law made and enacted in the Parliament held in the 23d year of Henry the 8th, cap. 5, which is *A General Act concerning the Commissioners of Sewers for all the Realm of England.*

“ The causes whereof I made choice to reade upon this law, be five in number, *viz.*

“ *First,* For the antiquity of these Laws of Sewers, though this Statute bear date but 23 Hen. 8.

“ *Secondly,* For the largity and extent thereof, which appears in the style of this Statute, and there termed, *A general Act for all the Realm of England.*

“ *Thirdly,* For the necessary use thereof, which continual practice and daily experience teacheth us.

“ *Fourthly,* I have had a more desire to reade upon these laws, because never any reader did heretofore undertake the same; and upon perusal of this Statute, and upon due consideration taken of others, I thought I could not make my choice of a more fitting, and more necessary law, nor more profitable for my native countrey of *Lincolnshire*, and other maritime places of this kingdom, than this is.

“ And, *Fifthly,* His Majesty's general care, which these laws require at his hands, and his special care, by the which His Highness of late hath taken these laws into his gracious and provident protection.

“ And upon due consideration taken of all these cases, I resolved to proceed in the exposition of this Statute, being made perpetual by the Statute of 3 Ed. 6, cap. 8.

“ And to speak something of the three first causes, I am of opinion, for the reasons and authorities ensuing, that the

laws of Sewers have been, and be of great antiquity, and have told over as much time, and as many years as any other laws of this realm have done: for as Mr. *Cambden* in his *Britannia* saith, *Quod insula Britannia avida in mare omni ex parte se projecit*; therefore this realm adjoining on every side upon the sea, could not be safe, without those provident laws made and used for the defence thereof.

“ And although it is said in Scripture, that Almighty God hath bound the seas by the word of his commandment, and had shut up the deep, and sealed it with his terrible and glorious name; yet God, who bestowed wisdom on man, it was his pleasure he should providently use it over the rest of the creatures, not giving way that he should be remiss or presumptuous in any thing, which by his foresight or judgment might be prevented, helped, and relieved.

“ It is true, that at the floud, *Cum cataracta Cæli fuerint aperta*, when the windows of Heaven were by God's determinate will set open, and that the seas did *Suum excedere modum*, no power of man's hand could stay the swallowing and devouring surges of the seas and waters; yet then notwithstanding had God appointed that his servant *Noah* and his children, and such creatures as he appointed, should be preserved by the ark, which was a work of their own hands: therefore the laws of God and nature have appointed man to make provision for the necessary defence and safety of himself, and of his country; and the laws of this realm, most of which have received their *primam essentiam* from the divine laws of the Almighty, and have fetched their pedigree from the law of nature, have à *principio* been so predominant in this kingdom of *England*, that they have never been wanting at any time to provide for the safety thereof.

“ And if the Register be so ancient a book as Sir *Edward Cook* in one of his Epistles hath there declared it to be, then it may give satisfaction in this kind, that these laws of Sewers

were in those times of great eminency and authority ; for there I find two several Writs or Commissions of that nature ; the one authorizing certain persons to survey the defences in the parts of *Holland* in the County of *Lincoln* ; the other for the viewing and surveying of the surrounded grounds lying between the two rivers *Humber* and *Auckholin*, in the said County of *Lincoln* ; and the first of the said Commissions is set down *verbatim* in *Fitz. nat. bre. fo.* 113. Yet the first Statute which appears to us in print, wherein the frame of a Commission of Sewers is set down, is the Statute of 6 Hen. 6, cap. 5. Yet I make no question but the said Commissions expressed in the Register, and *Fitz. na. bre.* were in their forms long before *Henry* the Sixth's time ; and that the Statute of *Henry* the Sixth adds some more power and strength thereto than was before, having backt them with the power of the Parliament ; and it is something additional in matter, as it was in power, as by both the Commissions compared together is apparent.

“ I do likewise find in the 38th of *Edward* the Third, *Lib. Ass. plac.* 15, that a Commission was awarded to inquire of bridges, and of the repairs thereof, which is a branch of these laws : and *Sir Edward Cook* in his 10th Report, in the case of the Isle of *Ely*, saith, that the Kings of this Realm, before the making of any Statute of Sewers, might grant Commissions for the surveying and repairing of walls, banks, and rivers, and other defences. And of the same opinion is the book of *Sir John Davies* in his *Irish Reports*, in the case of the Royal Piscary of the *Banne*. And *Sir Edward Cook* hath in his first case set the first Statute of Sewers to be in time the 9th of *Henry* the Third, which is in *Magna Charta* the first volume of Statutes, and the most ancient that be extant in our Laws.

“ By all which is manifest, that these laws have been received into the government of this realm, in time as ancient as any other were : and I am the rather herein confirmed ; for that in the ancient Commission expressed in the Register

aforesaid, there be these words, that the King *Ratione dignitatis suæ regis ad providendum salvationi regni sui circumquaque fuit astrictus*. Wherein it is hereby made plain, That the King, by the tenure and prerogative of his crown, was bound to see and foresee the safety of this realm; and so this law is a prerogative law, and seems to be as ancient as any laws of this realm, and all prerogatives be without limitations of time; neither can it be presumed, that all or any Kings till the time of *Henry* the Sixth were so improvident as to want these laws, without the which the realm could not be defended from the violence of that unmercifull enemy, the sea; wherein I do conclude, that these Laws of Sewers be as ancient as any other laws of this kingdom be."

Several Acts have subsequently been passed in more modern times, for amending that of *Henry* the 8th, particularly as respects the metropolis:—for an account of these, see an interesting paper in this volume, pages 84 to 93. But it appears that the Sewers in the metropolis have not been built in a manner, and of such materials, as entirely to effect the purposes intended. This has been noticed in a respectable Periodical—"Register of the Arts and Sciences"—under the head of

PROPOSED IMPROVEMENT IN THE PUBLIC SEWERS.

"The preservation of health must be an object of the highest interest to every body. The air we breathe is necessary to our mere *existence*, but on the purity of it depends our *health*. An eminent Physician* has said, that "*a proper attention to air and cleanliness, would do more to preserve the health of mankind than all the prescriptions of the Faculty.*"

* Buchan.

“Owing to the present defective construction of the London Sewers, prodigious quantities of filth and rubbish, of every denomination, are accumulated in them; and to such a degree at times, that the masonry is incapable of withstanding the enormous pressure, and a bursting, or “blowing up,” as it is called, is the consequence.

“The Sewers are, in fact, the abode of pestilence; in them large quantities of various animal and vegetable matter are constantly undergoing the putrefactive fermentation which sends forth their noxious exhalations, infecting and contaminating the surrounding atmosphere. In the neighbourhood of distilleries, brewhouses, and dyehouses, where large quantities of hot liquid are frequently poured off into the Sewers, the most offensive vapours arise; and in all parts of London, the same effect is produced in a greater or less degree by a change of weather for wet, which stirs up the masses of filth, accelerating the putrefactive processes by the supply of water. Need we then be at a loss to account, in a great measure, for the sallow, unhealthy appearance of the inhabitants who breathe this impure air, when we consider that at every inspiration their lungs are filled with it (twenty times in a minute), a portion of it thus enters the blood, circulates through every vein and artery of the body, vitiating all the secretions? We are ourselves fully persuaded that the nauseous gasses continually being extricated from the putrefying substances contained in the Sewers, must be prejudicial to the health even of the most robust; but to the delicately constituted, to invalids, and to infants and children, the effects must be pernicious in the highest degree.

“The scavengers have a practice (which we have ourselves noticed), when they have sent away their intended last cart-load of the sweepings of the day, to sweep all the remainder into the nearest Sewer, to save themselves trouble. Individuals, too, who live near to the gratings, avail themselves of the convenient and ready means afforded by the Sewers, to get rid of all their rubbish or filth; and under cover of the

night, whole cart-loads of various offensive matter, from slaughter-houses and other places, are brought to the gratings, and forced through them. The matters thus thrown down, pass immediately out of sight, owing to their falling upon the inclined plane of the collateral or branch Sewer, which forms a very obtuse angle with the well or opening into the street; the matters, therefore, proceed forward to the end of the branch Sewer, and fall into the main Sewer. Here a solid heap of ponderous matter is formed, which is constantly increasing in bulk. The same effect takes place in all those parts of the main Sewers, where the collateral Sewers form a junction, till in time (the space of a year or two) the entire main Sewer is choked up, and nothing more can pass through it. Then, from necessity, is commenced an operation of a very annoying and offensive description;—the street is stopped up, the pavement removed, and the Sewer is laid open for the purpose of clearing out its foul contents: this done, the upper arching is rebuilt, the ground remade, and the pavement laid afresh.* The cause of the first choking up of the Sewer remains unchanged; therefore the same occurrence takes place in the period of a very few years, and recourse is necessarily had to the previous disgusting operations of opening, clearing out, and rebuilding; only to be renewed again at the end of a similar period of time. The expence of these proceedings is enormous; the sum is levied upon the inhabitants by a tax, called the *Sewer Rate*, and placed in the hands of the *Commissioners of Sewers*, for their disbursement."

That the evils described may be perfectly understood, as necessarily resulting from an improper construction, an illustrative diagram is given in page 200 of the Publication from which these extracts have been made.

* The inconvenience of breaking the ground is felt a considerable time, as the paving stones are obliged to be repeatedly laid ere a smooth surface can be maintained.

“ Not doubting that our readers are generally satisfied of the mechanical defects in the present structure of the Sewers, we now come to the agreeable task of announcing to them that a plan has been proposed for their improvement, which cannot fail, in our opinion, to afford a perfect cure for all the evils and inconveniences experienced. It is therefore with sincere pleasure we have noticed the laudable exertions of a very respectable and intelligent man,* to procure its general adoption, in lieu of the present ill-constructed, pernicious, and extravagantly expensive plan.

“ In the preceding page we have given an engraved representation of the proposed new plan, by figure 2, to which we now refer our readers, together with the explanation of the letters of reference.

“ It will be readily perceived on inspection, that stones and all ponderous substances cannot possibly enter the Sewer—that nothing but the water can pass into it, which quickly flows off when above the level of the bottom of the collateral Sewer 1, as shewn in the engraving.

“ The ponderous matter and silt collected at the bottom of the well lies in a compact and quiescent state, and the water which covers it, to the depth of several feet, effectually prevents all noxious exhalations; acting precisely as the “stink-trap” commonly used in the sinks and drains of private houses; and, like them, the supernatant water is constantly being changed by fresh accessions of that fluid almost unceasingly running into the Sewer. It is proposed that the cesspool shall be cleared out once a month, or oftener, if required. The solid matter may be removed by means of a rake, or other proper instrument; and whenever necessary, a man might be employed to go down for the purpose of cleansing it, which might take ten or twenty minutes to do thoroughly. If, by

* Joseph Cuff, Esq. of Ebenezer Terrace, London Hospital.

extreme negligence, a foul smell should at any time arise from the well or cesspool, the remedy is in every body's power, and may be instantly effected, at the most trifling expence, instead of suffering under the dreadful perpetual nuisances of the present absurd and expensive system, which is a disgrace to us, in this mechanical and scientific age.

“ If the Sewers were to be constructed upon the plan now proposed, it would materially check the common abuse of throwing all manner of rubbish into them ; as whatever is thus thrown down, does not pass away into the main Sewer, but remains in the cesspool till cleared out ; therefore, persons living contiguous to the gratings, would not suffer others to continue their former malpractices, nor misuse them themselves, as they might previously have done.

“ The Sewers are at present the resort of a prodigious quantity of rats, which come through the gratings at pleasure, and pass into the dwelling-houses. By the new plan they could not do this, which is evident on inspection : the rats would indeed no longer resort to the Sewers, as there would be no food for them ; and as they could not possibly find any other such strong hold, they would rapidly fall a prey to the ensnaring arts of the rat-catcher, and their numbers be thus greatly reduced.

“ Feeling assured ourselves, that *health, convenience, and economy* would be greatly promoted by the adoption of the proposed alterations in the Sewers, we have been anxious to submit the plan to the consideration of our readers ; and we now put it forth, in the firm hope that it will receive their approbation generally, and that the gentleman before mentioned, who has taken up the matter with such a laudable spirit, will eventually receive the support of the public at large.”

An important invention has also been announced, called a Purifying Furnace, by Mr. R. Bulkeley, of New York, who has pre-

sented a memorial to the Corporation, for erecting small purifying furnaces over sewers and canals, which, with small coal-fires, will destroy the foul air, greatly contribute to the health of the City, and add to the value of property in the neighbourhood of these Sewers.*

The paving of streets arose, first, from loose stones being placed in muddy roads, to step over them—

“ But one step more : be not in haste ;

“ This stone’s as slippery as the last.”

By degrees the number was increased, until a regular paving, or pitching, was formed ; in which state the streets remained for ages, without any flat or flag-stones, as a pavement, to walk on. Some of the streets of London, and of many country towns, continue so to this day ; and on the Continent they are almost universally so. The pavement is a modern improvement, supposed to be suggested by a Mr. Spranger, in 1754, after seven years’ labour in persuading his neighbours to adopt it.

The words *paving* and *pavement* are consequently distinct terms.

The earliest record we have in the History of London of paving the streets, appears in Vol. 5,

* Perhaps were *nitre* to be added, this ingenious invention would prove more effectual.

p. 774, of the *Fœdera*. It is an ordinance of King Edward III. in Council, dated in 1353, "for laying a tax of threepence on every sack of wool, and every 300 of woolfels; sixpence on every last of leather; fourpence on every fodder of lead; four-pence on every tun of wine; and one halfpenny on every twenty shillings value of all other goods, carried either by land or water to the staple of Westminster, in order to repair the highway leading from the gate of London, called Temple Bar, to the gate of the Abbey at Westminster; that highway being, by the frequent passing of carts and horses, carrying merchandize and provisions to the said staple, become so deep and miry, and the paving so broken and worn, as to be very dangerous both to men and carriages. And as the proprietors of the houses near, and leading to, that staple, have, by means of the said staple, greatly raised their rents, the way before those houses should, at their charge, be paved; and that part of the said way where no houses are, should be paved anew out of the said duties; and the remainder of the said duties should be applied towards the erecting a Bridge near the royal palace of Westminster, for the convenience of the said staple." —It does not appear what bridge is here alluded to; though probably it was only that mentioned by Stow as being "over Long Ditch;" for it is certain that there was not any over the Thames at this period.

Holborn was first paved in 1417, as appears from an order in the *Fœdera*, Vol. 9, p. 447 ; in which King Henry V. taking notice “ that the highway named Holborn, in London, was so deep and miry, that many perils and hazards were thereby occasioned, as well to the King’s carriages passing that way, as to those of his subjects; he therefore ordained two vessels, each of twenty tons burthen, to be employed at his expence, for bringing stones for paving and mending the same.”—This shews the gradual improvement of London’s suburbs.

By a statute, cap. 11, the street-way between Charing Cross and Strand Cross, in the suburbs of London, was directed to be sufficiently paved and maintained at the charge of the owners of the land adjoining.—This shews that the Strand was not then built in a continued street.

An Act of Parliament was passed in 1539, for paving the following streets in London, *viz.* the street leading from Aldgate to Whitechapel Church ; the upper part of Chancery-lane ; the way leading from Holborn Bars, westward, towards St. Giles’s in the Fields, as far as any habitation is on both sides of the said street ; Gray’s Inn-lane, Shoe-lane, and Fenter’s, now Fetter-lane, the two last being thoroughfares and passages from Fleet-street into Holborn. That part of Chancery-lane now to be paved, is thus described:—“ From the Bars, beside the Rolls,

lately set up by the Lord Privy Seal, unto the said highway in Holborn." All the streets directed to be paved, are said to be "very foul, and full of pits and sloughs, very perilous and noxious, as well for the King's subjects on horseback as on foot, and with carriages."

The Parliament, which met in January of 1543, resumed the consideration of the bad state of those parts of the metropolis which still remained unpaved, and were become almost impassable, and made an Act as follows:—"Whereas, the streets named Whitecross-street, Chiswell-street, Golding-lane, Grub-street, Goswell-street, Long-lane, St. John-street, from the Bars of Smithfield up to the Pound, at the corner of the wall extending along the highway leading up to Islington; and also the street from the said Bars to Cow-cross; Water-lane, in Fleet-street; the way without Temple Bar, leading westward, by and unto Clement's Inn gates and New Inn gates to Drewry-place, in the County of Middlesex; and also one little lane stretching from the said way to the sign of the Bell, at Drewry-lane end; and the common way leading through a certain place called Petit-France, from the Bars of the west end of Tothill-street, at Westminster, unto the uttermost part of the west end of the said place called Petit-France; Bishopsgate-street to and above Shoreditch Church; the Strand Bridge, and the way leading from the said Bridge towards

Temple Bar; the lane called Foskue-lane, from the garden and tenement of the Bishop of Litchfield; and the gardens and tenement called the Bell and Proctors, down to Strand Bridge; be very foul, and full of pits and sloughs, very perilous and noxious, and very necessary to be kept clean, for the avoiding of corrupt savours, and an occasion of pestilence: for the amendment and reformation whereof, they are directed to be paved with stone, and a channel made in the midst of them, at the charge of the ground landlords, in like manner and form as the streets of the City of London be paved." And it was also enacted, "that the Lord Mayor, Aldermen, &c. of London, shall have power to enquire into, hear, and determine the defaults of paving and reparation of streets; and that any three Justices in London, whereof the Mayor to be one, may set fines upon such as do not pave and repair any street or lane in London, or the Liberties thereof, to be levied by distress or action, &c. by the Chamberlain, to the use of the Mayor and Commonalty of the said City." And further it was enacted, "that the Conduits of London should be made and repaired, for the better watering of the City and its Liberties; and that the Mayor and Citizens should have power to bring water to the said from Hampstead Heath, St. Mary-le-bone, Hackney, and Muswell Hill, upon their indemnifying the owners of lands for damages that might be done by the said water-courses, &c."

9789 An Act of Parliament was passed in the year 1571, directing a new cut or trench to be made at the charge of the Mayor, Commonalty, and Citizens of London, whereby the River Lea was to be made to convey all kinds of victuals, corn, and other necessaries, from the town of Ware to the City of London, and from London to Ware. By this means the conveyance of grain, and other provisions, out of Hertfordshire, was greatly facilitated, and a considerable expence of land-carriage saved. In the same year the streets in the eastern suburbs of London, as far as Whitechapel Bars, were, by an Act of Parliament, ordered to be paved.

037 In the year 1662, the Hackney Coaches having created an extraordinary charge on the inhabitants of London and Westminster, by destroying the paving, the Parliament enacted—that all hackney coaches, in and about the Cities of London and Westminster, should annually pay towards the charge of paving and cleansing the ways and streets in and about the said Cities, the sum of £5 each; and every load of hay 6d., and straw 2d. The same Act likewise provided for enlarging the passages at Stock's Market; from Fleet Conduit to St. Paul's Church; the passage and gateway out of Cheapside into St. Paul's Church-yard; the passage at St. Dunstan's Church, in Fleet-street; from Cheapside to Bucklersbury; the passage at Temple Bar, and

several others in the out-parts; and to pave Petty France to St. James's House, St. James's-street, Pall Mall, and Hedge-lane.

About 1754, Mr. Spranger, a gentleman, of Covent-garden, published the outline of a plan for paving the streets of the City and Liberty of Westminster in an uniform manner.

Mr. Hanway, ever attentive to the public interests, published a "Letter to Mr. Spranger, on his excellent proposal for cleansing and lighting the streets of Westminster, &c." About seven years after, by the assistance of Parliament, the plan was adopted, agreeably to Mr. Hanway's hints and observations, who attended closely to the business, till it was carried into execution; and when he found the Citizens of London had come to a resolution to adopt the new mode of paving, he directed his attention to other objects of general utility.—*Extract from the Memoirs of Jonas Hanway, Esq. page 26.*

In the Session of Parliament 1762, an Act was passed for new paving the streets, and removing the posts and signs that had long been a blemish to the principal parts of this metropolis. The paving before was exceedingly inconvenient, as well to foot-passengers, as to those who were obliged to travel in the highway; but by virtue of this Act, they were both altered,

and the principal parts of the Cities of London and Westminster were paved in the elegant as well as convenient manner in which they now appear.

But even to this year, 1828, the paving and pavement in the streets of London are, generally speaking, in a bad state. This is in a great measure to be attributed to the ground being undermined by so many sewers, water and gas pipes, &c. added to the almost incessant passing of heavily laden carriages, the consequences of which it will be every day more difficult to obviate.

Mr. John Loudon M^cAdam, in the introduction to his System of Road-making, says—"The present very defective state of the turnpike roads and highways in the United Kingdom, and the continual and apparently unlimited increase of the toll duties, are the considerations which have given rise to the publication of the following remarks.

"Of the value of the information contained in them, the intelligent reader will be the most competent judge; the author can only venture to assure him, that the few facts brought forward in the course of the work, have been most carefully authenticated; that the opinions advanced are the result of much thought, and patient investigation; that whatever may appear theore-

tical, has, for the most part, been already reduced to practice; and that where practice has been wanting, a long experience of the evils arising from the present system, and not the mere love of innovation, has been the motive for the suggestion of the remedies proposed.

“These, however, the author gladly submits to the good sense and candour of the public; only requesting, in the words of a celebrated writer, that whoever favours him with a perusal, will not judge, by a few hours' reading, of the labours of nearly thirty years.

“In the neighbourhood of London, the roads are formed of gravel; in Essex and Sussex they are formed of flint; in Wilts, Somerset, and Gloucester, limestone is principally used; in the North of England, and in Scotland, whinstone is the principal material; and in Shropshire and Staffordshire, large pebbles mixed with sand.

“Excellent roads may be made with any of these materials.

“The gravel of which the roads round London are formed, is the worst, because it is mixed with a large portion of clay, and because the component parts of gravel are round, and want the angular points of contact, by which broken stone unites, and forms a solid body. The loose

state of the roads near London is a consequence of this quality in the material, and of the entire neglect, or ignorance of the method of amending it.

“Flint makes an excellent road, if due attention be paid to the size; but, from want of that attention, many of the flint roads are rough, loose, and expensive.

“Limestone, when properly prepared and applied, makes a smooth, solid road, and becomes consolidated sooner than any other material; but, from its nature, is not the most lasting.

“Whinstone is the most durable of all materials; and wherever it is well and judiciously applied, the roads are comparatively good and cheap.

“The pebbles of Shropshire and Staffordshire are of a hard substance, and only require a prudent application to be made good road materials.

“On the other hand, the Scottish roads, made of the very best materials, which are abundant and cheap in every part of that country, are the most loose, rough, and expensive roads in the United Kingdom, owing to the unskilful use of the material.

“The *formation* of roads is defective in most parts of the country; in particular, the roads round London are made high in the middle, in the form of a roof, by which means a carriage goes upon a dangerous slope, unless kept on the very centre of the road.

“These roads are repaired by throwing a large quantity of unprepared gravel in the middle, and trusting that, by its never consolidating, it will in due time move towards the sides.

“When a road has been originally well made, it will be easily repaired. Such a road can never become rough or loose, though it will gradually wear thin and weak, in proportion to the use to which it is exposed; the amendment will then be made by the addition of a quantity of materials, prepared as at first. As there will be no expence on such road, between the first making and each subsequent repair, except the necessary attention to the water-ways, and to accidental injuries, the funds will be no longer burdened with the unceasing expenditure at present experienced, from continual efforts at repairing, without amendment of the roads.”

Mr. M^cAdam directs the surface of his road to be made as follows:—

“No addition of materials is to be brought

upon a road, unless in any part it be found that there is not a quantity of clean stone equal to ten inches in thickness.

“ The stone already in the road is to be loosened up and broken, so as no piece shall exceed six ounces in weight.

“ The road is then to be laid as flat as possible; a rise of three inches from the centre to the side is sufficient for a road 30 feet wide.

“ The stones, when loosened in the road, are to be gathered off by means of a strong heavy rake, with teeth two and a half inches in length, to the side of the road, and there broken; and on no account are stones to be broken *on* the road.

“ When the great stones have been removed, and none left in the road exceeding six ounces, the road is to be put in shape, and a rake employed to smooth the surface, which will at the same time bring to the surface the remaining stone, and will allow the dirt to go down.

“ When the road is so prepared, the stone that has been broken by the side of the road is then to be carefully spread on it; this is rather a nice operation, and the future quality of the road will greatly depend on the manner in which it is performed. The stone must not be laid on

in shovels full, but scattered over the surface, one shovel full following another, and spreading over a considerable space.

“ Only a small space of road should be lifted at once; five men in a gang should be set to lift it *all across*: two men should continue to pick up and rake off the large stones, and to form the road for receiving the broken stone; the other three should break stones; the broken stone to be laid on as soon as the piece of road is prepared to receive it, and then break up another piece; two or three yards at one lift are enough.

“ The proportioning the work among the five men must of course be regulated by the nature of the road: when there are many very large stones, the three breakers may not be able to keep pace with the two men employed in lifting and forming; and when there are few large stones, the contrary may be the case: of all this the Surveyor must judge and direct.*

“ It is plain that the first *turnpike* roads were merely attempts to open more direct communications through the country, in continuing, by mechanical means, the rocky paths to which travellers were obliged to resort. With this view,

* This is inserted in consequence of some of the streets of London having been Macadamized.

large masses of stone were first sunk into the ground, and afterwards thick layers of broken stone strewed over them, so as, in fact, to form an artificial rock. The insecurity of this unskilful structure must be obvious. The rain penetrating through every part of the surface, kept it continually in a loose state ; and as it was imbedded *below the ground* water, it was constantly broken up in winter by the frost : hence the vast sums required for the forming new roads, and the heavy and incessant expence of keeping them in a passable state. Any improvements that have been made on this plan, merely relate to the smoothness of the surface, by more carefully laying on the stones, at consequently a greater expence ; but the original principle remains the same in every road, except those where the new system has been fully adopted. Under such disadvantages, it is not surprising that the roads of the kingdom have not kept pace with the advancement of every other useful art. The large sums demanded for the first outlay, and the frequent failure of such speculations from the badness of the roads, and the expence of their subsequent repairs, sufficiently account for the tardy progress of road-making. From conviction of the very insufficient and expensive nature of the method in use, I was led to consider of the possibility of constructing lines of communication, capable of conveying the heaviest weights over every kind of soil, and at all seasons, upon principles purely

scientific: a plan which, even in theory, differs as widely from the inartificial methods of road-making hitherto practised, as the principle by which an arch is thrown over a river, differs from the heap of stones which constitutes the ford.

“ Although no measures have yet been taken for establishing any systematic plan for the management of roads, it is gratifying to observe the spirit of improvement which is extending itself over the country. This is manifest in various ways. The plan of converting the paving of streets into stoned roads, was introduced into the Bristol district about six years ago; and it may reasonably be expected, that paving will very soon be nearly superseded by the more convenient, safe, and economical substitute of stoned roads. Of the superior convenience of roads, there can be no question; and all the minor objections which have been started, can be so easily obviated, that a very little reflection will be sufficient for any candid mind. The inhabitants of towns are generally apprehensive that roads will be less commodious for foot-passengers than pavements; but (if proper care be bestowed on cleaning and watering) a road made of broken stone will be found more eligible than such pavements as those of London. In some towns, where the principal streets are turnpike roads, the Commissioners have caused them to be made of materials broken very small, which,

when skilfully laid, form a smooth, firm surface.

“The great difference between the cost of a road, and even the worst London pavement, would enable the City to bestow such care on the cleanliness of the carriage-ways, as would allow the inhabitants to enjoy all the advantages of smooth road, with even increased comfort to the foot-passenger.”

The foregoing paragraphs are extracts from the Parliamentary Report of the Committee on Mr. M^cAdam's Petition, dated the 20th of June, 1823, on Road-making.

“And in the Appendix to that Report, the Committee state it will be found, from the evidence of Mr. Freeling, ‘That the Post Office did not take Mr. M^cAdam's services into consideration, or suppose that £2,000 would be a sufficient remuneration for those services; they merely stated, in answer to papers from the Treasury, that they considered it would be right to *advance* to Mr. M^cAdam the sum of £2,000, and consider Mr. M^cAdam's claims as establishing a ground for further remuneration.’

“In consequence of that report, the Lords Commissioners of His Majesty's Treasury again, on the 23d of September, refer the subject to the Postmasters General, who, considering the first sum of £5,019. 6s. to be admitted as proved

before the Committee, recommended the payment of his expences from 1814, to be calculated upon the same principle as the travelling allowance is made to the Superintendent of the Mail Coaches, amounting to £1,837. 17s. 6d.; and they further propose the sum of £2000 or £2500 to be granted to Mr. M^cAdam, as a moderate compensation for his services. Upon this, the Lords Commissioners of the Treasury issued a second sum of £2,000, stating that their Lordships, adverting to the large amount of Mr. M^cAdam's claims, cannot feel themselves justified in issuing any further sum to him on account thereof, without the express authority of Parliament for that purpose. On the 5th December, 1820, Mr. M^cAdam again addressed a letter to the Lords of the Treasury, which was transmitted to the Post Office; and the Postmasters General, referring to their former letter, observe that they have no difficulty in bearing their testimony to the services of Mr. M^cAdam, and to the benefits which the public were likely to derive from them; and also stated that in their opinion the charges were reasonable.

“ The last memorial presented by Mr. M^cAdam was to the Postmasters General, who, in transmitting it to the Treasury, observe—‘The favourable opinions which we entertained and expressed in our former reports upon this subject, have been confirmed by experience; and that, by employing Mr. M^cAdam to survey the

roads in Lancashire, the most beneficial results are likely to follow.'

"Having thus given a succinct and connected account of these different proceedings, and having taken into their consideration the whole of the correspondence which has passed previous to this enquiry between the Lords Commissioners of His Majesty's Treasury and the Postmasters General, together with several memorials presented at different periods to these Departments by the petitioner, with the documents accompanying them; and having considered Mr. M^cAdam's statement of his case, and the proof adduced in support of it, which accompany this report; your Committee are of opinion that Mr. M^cAdam has, by means of great assiduity, skill, and many years' personal labour, and at a considerable expence out of his private property, introduced into very extensive practice a system of repairing, making, and managing the turnpike roads and highways of the kingdom, from which the public have derived most important and valuable advantages.

"That, in addition to the notoriety of the fact, that the improved condition of the public roads is in a great degree to be ascribed to the ability, zeal, and indefatigable exertions of Mr. M^cAdam, it now for the first time appears that Mr. M^cAdam has gratuitously given his personal

attention upon, and advice and assistance to, no less a number than seventy turnpike trusts, in twenty-eight counties of the kingdom, from many of which he has not received the payment even of his expences; that he has, for a considerable length of time, been engaged in an extensive correspondence with persons connected with the management and improvement of roads, affording, in the most unreserved manner, information and instruction wherever required; and that he has attended, during several Sessions of Parliament, the Committees of this House, for the same purpose of communicating information: all which services, together with the assistance he has been called upon to give to the Post Office, he has rendered without reward or pecuniary compensation of any kind, beyond the sum of £4,000 advanced to him by the Lords Commissioners of the Treasury, in part payment of his expences.

“ Looking to the result of these services as affecting the community at large; the increase of comfort, convenience, and safety to the public generally; the diminution of expence in the wear and tear of carriages of all descriptions; the reduction of horse labour, and consequent expence of horses; the relief of the oppressive burthen of the poor-rates, by the additional means created for employing the surplus labouring population of the encumbered parishes; the abolition in many instances of a great part, and in some of

the whole of the statute duty, complained of by the agriculturists; and the very essential benefit to the agricultural, commercial, and manufacturing classes, by the more easy and equal diffusion of the produce of the soil over the various parts of the kingdom; the free as well as rapid circulation of commercial capital, thereby adding greatly to the national wealth and prosperity which this system has materially contributed to effect; the Committee cannot hesitate to express their opinion, in concurrence with that already pronounced by the heads of the department of the Post Office, that the sum of £2,000 or £2,500, in addition to his expences, to be calculated after the same rate of allowance as is granted by that office to the Surveyor or Superintendent of Mail Coaches, will be but a moderate compensation to Mr. M^cAdam for his great exertions and very valuable services.

“The Committee, with a view to abridge the Appendix, have omitted to include several testimonials forwarded to them from different innkeepers and postmasters, stating the advantages they have derived from the improvement of the roads under Mr. M^cAdam’s system; but which tend to confirm the general opinion favourable to the system.

“It appears that Mr. M^cAdam has held, from the year 1816 to the present time, and now holds, the situation of General Surveyor of the

Bristol Turnpike Roads, at a salary, the first year, of £400, and each subsequent year, of £500 ; but taking into consideration that, out of this annual salary, £200 is for expences incident to his office, the remaining sum of £300 is, in the opinion of this Committee, not more than an adequate payment for the constant and laborious duties attached to the situation, and cannot, or ought not, to be considered as constituting any remuneration to Mr. M^cAdam for his other distinct and important services.

“ It further appears, that the three sons of Mr. M^cAdam are employed, as general surveyors, upon various lines of road in different parts of the kingdom ; that they have been, and are competitors with all other road surveyors, over whom they possess no other advantage than such as their superior intelligence, skill, and industry entitle them to, having no exclusive or preferable privilege whatever ; that they have improved, and at the same time have very considerably reduced the expence upon almost all the roads under their management ; and that their incomes, when diminished by the necessary disbursements and payments to the persons acting under them, and their own expences, cannot be deemed too large a sum for their own individual services ; but, on the contrary, that they have returned to the public, for the amount of their gains, a fair and full measure of benefit, by the personal

activity, skill, and labour so conspicuous in the management of the roads, and the funds of the trusts under their superintendence; that two of the three had relinquished situations of profit, to afford their aid in giving effect to, and carrying the system into execution, and are justly entitled to the fruits of their industry, and hard-earned incomes, without the participation of any other person; and it does not appear that the petitioner has profited in any manner from the salaries allowed to his sons.

“ In conclusion, your Committee desire to state it as their opinion, that the value of Mr. M^cAdam’s system, and consequently of his services, by no means appears to its full extent upon the roads under the immediate management of himself, or of his sons; but that the effect produced upon a considerable portion of the roads generally throughout the kingdom, since the adoption of his system, has been manifest, and, as your Committee conceive, too apparent to escape the most common or indifferent observer; and further, that it must be obvious, from past experience, that a system from which so much good has been already derived, would, if extended over the whole face of the kingdom, be productive of the most beneficial consequences, both to the condition of the roads, and in effecting a reduction of the amount of the present enormous and improvident expenditure.

“ Your Committee cannot close their Report without directing the attention of the House to that part of Mr. James M^cAdam’s evidence, in which he states the practicability of converting the pavement of the streets of London into smooth and substantial roads; and your Committee have the satisfaction to inform the House, that the experiment is about to be tried in two very different and distinct parts of the metropolis, *viz.* in St. James’s-square, and over Westminster Bridge and its boundary. This most desirable improvement has, as appears from the evidence of Mr. M^cAdam, senior, and from that of Mr. William M^cAdam, already been tried, and completely succeeded (as is well known to many Members of the House) both at Bristol and Exeter, and is in progress of execution upon the paved ways in the county of Lancaster.

“ The benefit to the inhabitants of this large City by such an important improvement, in all its various advantages of comfort, convenience, and economy, can scarcely be appreciated; and your Committee hope, that the plan about to be tried in two separate parts of London, will be found so far to succeed, as to induce its adoption at least in all the large streets of the metropolis; observing, that they believe that it is a plan which Mr. M^cAdam has for many years urged the adoption of, and, as constituting a part of his system, will be found mentioned in all his

publications on the improved system of Road-making.”

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The next important public work which this generation enjoys from the talents and enterprise of our forefathers, is a mechanical supply of water, laid into our houses without going to the springs, wells, conduits, and fountains for it, or purchasing it at the doors from the water-carriers, aforetime a numerous body of men, who of course resisted every attempt to introduce a remedy as a substitute for their labours.

It will be seen in the Histories of London, that about the year 1236, a great want of water prevailing in London, occasioned in a great degree by the encroachments of buildings on the fresh water canals about the City, many of the more substantial citizens contributed in a liberal manner to a scheme for bringing water from six fountains in the town of Tyburn; which was accordingly carried into execution, and is the first instance on record of water being conveyed to the City by means of pipes. Several foreign merchants, who were involved in the general prohibition against landing their goods in London, and were consequently obliged to dispose of their merchandize on ship board, purchased this year, of the Mayor and Citizens of London, the privilege of landing and housing their wood,

at the rent of 50 marks per annum, and a fine of £100, which was applied in aid of the above useful project.

In several parts of the City, conduits were erected for the reception of this water; the first of which was built in the year 1285, at the west end of Cheapside, then called West Cheap; and these conduits were found so convenient, that they soon increased to nineteen in number, and were supplied by water-pipes from different wells or fountains in the neighbourhood of the City, and from the river Thames.

But these conduits having been long since rendered useless by the present method of conveying water from the Thames and New River, they have been totally removed for some years past; by which the passage through the principal streets of the City is much less obstructed than it was in former times.

Stow informs us, that when these conduits were in use, it was customary for the Lord Mayor, Aldermen, and principal Citizens to repair on horseback annually, on the 18th of September, to visit the heads from whence the conduits were supplied; and to hunt a hare in the morning, and a fox after dinner, in the fields adjacent to the town of Tyburn.

Maitland says—Before this time, the City

and places adjacent, were supplied with water by the river of Wells, in the west parts; whose first decay was owing to certain mills erected thereon by the Knights of St. John, which obstructed its navigation, and by degrees gave it the name of Turnmill-brook, which is still preserved in a street of that name, called Turnmill-street, through part of which this water took its course, towards the bottom of Holborn-hill, and thence into the Thames, between the Fleet and St. Bride's that now is: it being entirely choked up above, by various encroachments as low down as Holborn-bridge, in process of time, Turnmill-brook was lost in the name of Fleet-ditch, or Fleet-dyke. The other waters were—Olborn, or Holbourn, a rivulet, which springing up near Middle-row, made its way in a clear current, and fell into a river of Wells at Holborn-bridge: this rivulet underwent the same fate, whose remains are still to be seen in the common sewer under the street that bears its name. Wallbrook, which entered the City through the wall between Bishopsgate and Moorgate, near the west end of Bethlehem Hospital, after many turnings and windings, emptied itself into the Thames at Dowgate: the loss of this river was owing to the many bridges built over it; which at last increased to such a number, covered with houses, that whole streets rose upon its surface, and the channel of the river was reduced to a common sewer. Langbourn, which took its rise in or near the east end

of Fenchurch-street, ran with a swift current, due west, to Sherborne-lane, at the west end of St. Mary, Woolnoth; then dividing its stream into several rills, ran directly south, and was lost in the Wallbrook, on Dowgate-hill: the stoppage of this bourn was owing to the like circumstances as the former.

Besides these running waters, we read of several springs, which supplied the City and suburbs with clear, sweet, and wholesome water; as Holywell, which was a fine spring, and even famed for its miraculous virtue in the times of Popery, but now choked up with soil. The other wells were Clerk's, or Clerkenwell, which spring not far from the west end of Clerkenwell Church: and near to it was Skinner's Well, famous for the plays and interludes acted there at certain seasons of the year: and more eastward, towards the Charter House, were Foyg's Well, Tod's Well, Loder's Well, and Radwell; which, and another in Smithfield, called the Horsepool, or Horsepond, all united their streams, and formed the river of Wells, above mentioned.

Without Cripplegate there was a large pool, supplied by a neighbouring well, which was sometimes so deep as to drown those who slipped into it; but that is diverted into the common sewer, and the well is still preserved, and in great repu-

tation, by the name of Crowder's Well, adjoining to St. Giles's Churchyard, on the north-west side. At the south entrance into the small village of Hoxton was another celebrated spring, called Dame-Annis-the-Clear : this is now enclosed, and made to supply a cold bath, for private property. And less than half a mile more to the east, was a very free, sweet, and clear spring, which served to supply the neighbourhood of Lothbury, where its pipes terminated close to the south-west corner of the Church. This spring overflowed, and formed a piece of water named Perilous Pool, from the many accidents which happened to it : it is now called Peerless Pool.

In the year 1438, Sir William Eastfield, Knight of the Bath, and Mayor of this City, at his proper cost brought water from Tyburn and Highbury Barn to London, and caused conduits to be erected in Fleet Street, Aldermanbury, and at Cripplegate, for the convenience of his fellow-citizens.

In the year 1439, the Abbot of Westminster granted to Robert Large, the Mayor, and Citizens of London, and their successors, one head of water, containing twenty-six perches in length, and one in breadth, together with all its springs, in the Manor of Paddington; in consideration of which grant, the City is for ever to pay to the said Abbot and his successors, at the Feast of

St. Peter, two pepper-corns. But, if the intended work should happen to draw the water from the ancient wells in the Manor of Hida, then the aforesaid grant to cease, and become entirely void.

The Cross in Cheapside, which had been erected to the memory of Queen Eleanor, being greatly decayed, John Hatherley, the Mayor, applied to King Henry the 6th, for permission to rebuild it. He also solicited the royal aid towards repairing the common granary of the City, and the conduits, as well as for completing other improvements then carrying on for supplying the City with water.

These several requests were readily granted by the King, as will appear from the following letter:—

“The King to whom these shall come, greeting:—Know ye, that whereas our beloved John Hatherley, Mayor, and the Citizens of London, do intend, for the common utility and decency of all the said City, and for the universal advantage; likewise for the well-pleasing of all liege subjects flowing thither from other parts, at convenient places therein, as it well becomes them so to do, to build and erect divers aqueducts of fresh water, with standards and other machines, and leaden pipes, which have and do run under

and above the earth, above three miles ; and to rebuild a certain common granary, and a certain beautiful Cross in the Westcheap of the said City, which may serve for a reservoir, or, as it were, a mother to the said conduits or aqueducts ; which works cannot be performed without a very large quantity of lead, and workmen proper to carry on the said works :—We, well considering the utility, decency, and advantage of the said works, do, of our own special grace, grant and give our licence for completing the same ; and for the said Citizens to take up two hundred fodder of lead for the building thereon, and to impress plumbers, labourers, &c. for carrying on the said works, paying them their wages.”

And the several grants of springs, heads of water, &c., under which the City was provided with water, were also ratified and confirmed by the King and Parliament, for the consideration of twenty pounds paid into the hanaper.

In the year 1443, the Common Council granted one thousand marks towards erecting a new conduit near St. Paul's Gate, at the upper end of Cheapside, and for the repairing of others. About the same time the King, by his letters patent, empowered Thomas Knowles, John Chichie, &c., executors of John Wells, some time Mayor of London, to repair the highway leading from London to Westminster, before and near

the Palace of the Savoy, which, for the space of 500 feet, they substantially performed with stones and gravel.

It also appears that about the year 1540, Robert Broche, Chaplain to the King, invented the method of making leaden pipes for conveying water under ground, without using solder. Robert Cooper, a goldsmith of London, was the first who made them, and put them in practice.

The supply of water in London, with the exception of the Thames water at London Bridge, mentioned hereafter, appears to have remained in this state for many years, until the time of an enterprising citizen and goldsmith, "Mr. Hugh Middleton, who, by virtue of several Acts of Parliament, passed in the late and present reign (*viz.* James the 1st), granting powers to cut and convey a river from any part of Middlesex or Hertfordshire, to supply the City of London with a sufficient quantity of water for domestic uses, undertook, after several others had attempted it without success, to bring such a river from Chadwell and Amwell, near Ware, in Hertfordshire, to a bason or reservoir near Islington, on the north side of London, for that purpose. He began this work on the 20th of February, 1608, and with great difficulty, art, and industry, and a prodigious expence (of, as it

is recorded, no less than five hundred thousand pounds), with the assistance of King James the 1st, he cut a trench, in some places full thirty feet deep, through oozy, muddy, and stiff, craggy, and stony ground, and with so many windings, to find out a proper current, that it measured thirty-eight miles, three-quarters and six poles from the fountain to the reservoir. This great work was finished so far as to be brought to the intended reservoir; but the water was not let into it till Michaelmas-day, A. D. 1613, when Sir Thomas Middleton, Lord Mayor elect, and brother to the great undertaker of this scheme, accompanied by Sir John Swinnerton, Lord Mayor, many Aldermen, the Recorder, and other gentlemen, repaired to the place called New River Head, in solemn cavalcade. On their arrival, sixty labourers, handsomely dressed, with green caps, marched with pickaxes, shovels, and spades, thrice round the bason, preceded by drums and trumpets, who stopped before the Mayor, &c. seated upon an eminence, and one addressed them in a long copy of verses; which being ended, the sluices were opened, and the stream ran plentifully into the reservoir, under the sound of drums and trumpets, the discharge of cannon, and loud acclamations of the spectators.

The source or head of the New River is at the village of Amwell, twenty miles from London, in the road to Hertford, where a number of

springs are collected into a large bason of considerable depth. On the margin of this bason is a large stone, with inscriptions on each side, containing a short notice of the opening of the stream in 1608, and stating the length of its course from the Chadwell spring, to be forty miles; but by an exact measurement of the river, taken by the Company's surveyor in the year 1723, its length appears to be thirty-eight miles, three quarters, and sixteen poles. By the vast increase of London, the original sources of this river were found inadequate to supply its wants; and the Company applied to Parliament for permission to obtain an additional supply from the River Lea. This application was opposed by the City, but in vain: an Act was passed to sanction the measure; the citizens were constrained to accept of the blessing against their will, and the River Lea may be numbered among the sources of the New River. In the circuitous course which was found necessary to be given to this river, in order to preserve its level, it passes the towns of Ware, Hoddesdon, Broxbourne, and Cheshunt, in Hertfordshire, in nearly a north and south direction; at Waltham Cross it enters Middlesex, where it turns westward; and returning again to Forty Hill, it passes Enfield; from hence its course is continued, with many devious windings, by Winchmore Hill, Hornsey, Newington, Highbury, and Islington, to the great reservoir or bason, from whence the metropolis is supplied

with its waters. Here it is received by fifty-eight main pipes of a seven-inch bore, by which it is conveyed to those parts of the town lying south and west of the reservoir. The eastern part is supplied from a building erected over the river, at a short distance before it reaches its termination, in the lower part of which are several main pipes for that purpose; and a steam engine, erected on the west side of the reservoir, throws the water into a smaller one, from which the inhabitants of Pentonville, and the places in its vicinity, are supplied. It has been several times in agitation to extend the service of this water through Marylebone, for which purpose an immense bason has been constructed in the Hampstead road, near St. James's Chapel; but this plan has not hitherto been successful. Prior to the knowledge of canal navigation we at present possess, it was found necessary to convey the water of the New River over two vallies, in large wooden troughs lined with lead: the one near Bush Hill, two hundred and twenty yards in length; the other, between Hornsey and Highbury, one hundred and seventy-eight yards; both of which had experienced occasional ruptures, to the great injury of the low lands in the vicinity; but about the year 1787, mounds of earth and clay were raised to a sufficient height to imbed the former channels, which, as soon as the new materials had settled, were removed; and since that period no accident of any moment has occurred.

In 1619, the proprietors of this river were incorporated by the name of the New River Company; previous to which, Sir Hugh Middleton had divided his part of it into thirty-six shares, most of which he sold to different persons, amounting, with himself, to twenty-nine in the whole; but though the King was proprietor of half the work, he was precluded from having any share in the management of it, being only allowed to have an agent present at the meetings of the Company. No dividend was made until the year 1633, when only eleven pounds, nine shillings, were paid upon each share. The second dividend amounted to only three pounds, four shillings, and two pence; and a call being expected instead of a third division. Charles 1st, disliking a scheme which appeared not only unproductive, but likely to be attended with loss, reconveyed his moiety to Sir Hugh, on condition of receiving a clear annual rent of five hundred pounds out of the profits. This moiety Sir Hugh also divided into thirty-six shares, to equal those of the adventurers, as they are called, to distinguish them from the others, which are called King's shares; and he subjected these new proprietors to the payment of the annuity, which, added to their exclusion from the management, renders their shares less valuable than the adventurers'. Though the original projector of this stupendous undertaking was ruined by it, few speculations ever produced so large an ultimate profit; a share,

which was originally purchased for one hundred pounds, having been lately sold for fifteen thousand, and their value being still increasing.

Sir Hugh Middleton, a public spirited man, to whom the City of London is indebted for having brought the New River thither, was a native of Denbigh, in North Wales, and a citizen and goldsmith of London. Though that great city was furnished with water by means of sixteen common conduits, besides the larger supply it received from the River Thames; yet, these not being found sufficient, other methods were devised to bring in fresh supplies. For that purpose, three Acts of Parliament were obtained; one in the tenth of Queen Elizabeth, and two others in the third and fourth of James 1st; granting the citizens of London full power to bring a river from any part of Middlesex, or Hertfordshire, to serve the City. But after several attempts, and long and deliberate considerations, the expence being looked upon as infinite, and the danger and difficulty extreme, the project was laid aside. At length Mr. Middleton, who had enriched himself by a profitable speculation in a copper, or, according to some, a silver mine, in Cardiganshire, which he farmed of the Mines Royal Company, at the rent of four hundred pounds per annum, undertook it on his own account; in consideration of which, the City conferred upon him and his heirs, on the 1st of

April, 1606, the full right and power granted to them by the above Acts of Parliament, provided he should begin this cut within two years, and use the best endeavours to finish it within four years from the date of the agreement.

Another historian states " the work was commenced on the 20th of February, 1608, but was so obstructed by the complaints exhibited against it, by divers persons of the counties through which the river was brought, that in 1609, Mr. Middleton was obliged to petition the Lord Mayor and Commonalty of London, for a prolongation of the term in which he was to complete the undertaking, who granted an additional term of five years ; but his difficulties did not terminate here, for by the time he had brought the water into the neighbourhood of Enfield, his whole fortune was nearly spent, and he was again constrained to apply to the Corporation, to interest themselves in a work so directly calculated for their advantage. On their refusal to embark in an enterprise which appeared to them both chargeable and hazardous, he next applied to King James 1st, and was successful. His Majesty, willing to encourage so useful a work, consented to bear half the expences past, and to come ; in consideration of which, Mr. Middleton conveyed to him one moiety of the whole concern. This agreement is dated on the 2d of May, 1612; and it appears from the books

of the Exchequer, that the sums issued from thence to Mr. Middleton, in pursuance of it, amounted to upwards of six thousand, three hundred, and forty-seven pounds; but in an abstract of the Royal Revenue, published in a book called, "Truth brought to Light," it is said that "His Majesty's charge towards bringing the New River to London, from Amwell and Chadwell, for the new Waterworks, was seven thousand, eight hundred, and fifty-six pounds." This assistance enabled Mr. Middleton to surmount all his difficulties and discouragements; and notwithstanding the many hindrances he was compelled to encounter, from persons through whose grounds the channel was cut, he completed his undertaking within the time allowed by the City; and the water was brought into the reservoir at Islington, on Michaelmas-day, in the year 1613. The completion of this work, which Anderson, in his History of Commerce, describes as "suitable to the power and grandeur of ancient Rome, in its zenith of glory," was so acceptable to King James, that he first knighted Mr. Middleton, and afterwards created him a Baronet; and in 1619 he incorporated the proprietors of the concern by letters patent, dated June 21st, under the denomination of "The Governor and Company of the New River, brought from Chadwell and Amwell to London."

The first mechanical supply of water from

the River Thames, appears to be from the skill and science of a foreigner, Mr. Peter Morrys, a Dutchman, who on the 30th of May, in the year 1581, undertook to raise the water to all parts of the City of London, upon condition of receiving a grant from the Mayor and Corporation, of the use of one of the arches of London Bridge, for the term of 500 years, to erect his engine, which he successfully accomplished. In November, 1583, he obtained another grant of the second arch for 500 years. Subsequently, in November, 1701, the fourth arch was obtained for 381 years. The third arch was also obtained in September, 1761, for 321 years; and the fifth, and the Borough wheel, at the south end, for 315 years, in September, 1767. These works proved of great importance to the City, in supplying Thames water in abundance for upwards of 200 years; but at length they were pulled down, under the authority of an Act of Parliament passed in July, 1822, entitled—"An Act for removing the Waterworks at London Bridge.

"Whereas by an indenture, bearing date the thirtieth day of May, in the twenty-third year of the reign of Her Majesty Queen *Elizabeth*, and made, or expressed to be made, between the Right Honourable Sir *John Braunche*, Knight, Lord Mayor of the City of *London*, and the Commonalty and Citizens of the said City, of the one part; and *Peter Morrys*, of the other part; and an indenture bearing date the twenty-fourth day of *December*, in the twenty-fifth year of the reign of her said Majesty Queen *Elizabeth*, and made, or expressed to be made, between the Right Honourable *Thomas Blanche*, Lord Mayor

of the said City of *London*, and the Commonalty and Citizens of the same City, of the one part, and the said *Peter Morrys*, of the other part; and an indenture bearing date the twenty-fourth day of *November*, one thousand seven hundred and one, and made, or expressed to be made, between the Mayor and Commonalty and Citizens of the said City of *London*, of the one part, and *Thomas Morrys*, administrator of his grandfather, the said *Peter Morrys*, of the other part; the said Mayor and Commonalty and Citizens granted licences to erect certain engines in the River *Thames*, at *London Bridge*, and to lay down pipes for supplying the Inhabitants of *London* with water, for terms, of which two hundred and sixty years, or thereabouts, are now unexpired: And whereas certain persons entered into a copartnership, for carrying on the said Waterworks, under the firm or style of "Proprietors of the *London Bridge Waterworks*;" and by virtue of an indenture, or deed of regulations, bearing date the twenty-ninth day of *June*, one thousand seven hundred and three, the property of the said copartnership was divided into three hundred shares, and the management, controul, and direction of the same, and the business thereof, were vested in nine persons, proprietors of the said works, to be appointed as therein is mentioned, and called "A Committee of Assistants," or the major part of them: And whereas two further licences to erect engines in the said River, at the said Bridge, for supplying the inhabitants of *London* and *Southwark* with water, have been granted to certain of the proprietors of the said Waterworks, for terms of which two hundred and sixty years are now unexpired, by certain indentures, one of them bearing date the fifth day of *August*, one thousand seven hundred and sixty-one, and made, or expressed to be made, between the said Mayor and Commonalty and Citizens, of the one part, and *Thomas Strode*, *John Anthony Merle*, *Abraham Atkins*, and *Bibye Lake*, Esquires, for and on behalf of themselves and the rest of the proprietors of the *London Bridge Waterworks*, of the other part; and the other of them, bearing date the eighth day of *July*, one thousand seven hundred and sixty-seven, and made, or expressed to be

made, between the said Mayor and Commonalty and Citizens, of the one part, and the said *John Anthony Merle, Abraham Atkins, and Bibye Lake*, for and on behalf of themselves and the rest of the proprietors of the *London Bridge Waterworks*, of the other part: And whereas the said proprietors of the *London Bridge Waterworks* have, from time to time, purchased and obtained, for the purposes of their said copartnership, certain messuages, ground, buildings, tenements, and hereditaments: And whereas the proprietors of the said *Waterworks* who now form the Committee of Assistants, under or in pursuance of the said indenture, or deed of regulations, are *Richard Clark*, Esquire, *William Child*, Esquire, *Joseph Bradney*, Esquire, *William Willis*, Esquire, *David King*, Esquire, *George Scholey*, Esquire, an Alderman of the said City of *London*; *Thomas Poynder*, Esquire, *William Wix*, Esquire, and Sir *Francis Molyneux Ommanney*, Knight; and *Richard Percival*, Esquire, is now the Treasurer of the said proprietors of the said *Waterworks*: And whereas each and every of the said three hundred shares of and in the said copartnership hath been divided into five shares, so that the property of the said copartnership now consists of one thousand five hundred shares: And whereas by an Act passed in the twenty-ninth year of the reign of King *George the Second*, intituled *An Act to improve, widen, and enlarge the passage over and through London Bridge*, it was provided, that nothing in that Act contained should extend, or be construed, deemed, or taken to extend, to empower the Mayor, Aldermen, and Commons of the City of *London*, in Common Council assembled, to remove or alter any of the Arches under the said Bridge, or any engines fixed up therein, which then belonged to the proprietors of the *London Bridge Waterworks*, or to take away any right which the said proprietors of the said *London Bridge Waterworks* then had, to the use or enjoyment of any of the Arches of the said Bridge by Grant or Lease from the Mayor and Commonalty and Citizens of *London*, for raising water therefrom; and it was thereby enacted, that if it should be found necessary to take down or alter any of the piers of the said bridge, in order to enlarge any of the

Arches thereof, and thereby the raising of water by the said works should be prejudiced, that then, and in every such case, the said Mayor, Aldermen, and Commons of the said City, in Common Council assembled, should, and they were thereby required, on complaint and proof of such damage, to stop or pen up, or cause to be stopped or pent up, a like body of water as should be discharged by the taking down or altering any of the said piers, for the use of the proprietors of the said Waterworks: And whereas by virtue of the powers of the said Act, two of the arches or waterways of the said bridge were converted into one, by making the present large arch near the centre thereof: And whereas, in order to give force to the said Waterworks, several of the arches or waterways under the said bridge have since been partially dammed or stopped up, in pursuance of the said Act, and additional wheels and other machinery have been since erected, extending further into the river from both shores, on the west side of the said bridge: And *whereas the great fall of water occasioned by the said Waterworks and obstructions renders the navigation through the Bridge, at particular times of the tide, dangerous, and destructive to the lives and property of His Majesty's subjects:* And whereas it is necessary that the said Waterworks and obstructions should be removed from the said river; but it is expedient that the public should not be deprived of the supply of water which is now afforded by the said Waterworks: And whereas by Letters Patent of His Majesty King *James the First*, bearing date the twenty-first day of *June*, in the seventeenth year of the reign of His said Majesty, after reciting (amongst other things) that *Hugh Middleton* (afterwards Sir *Hugh Middleton*), with the aid of other adventurers, had brought a fresh stream of running water from the springs of *Chadwell* and *Ammwell* in the County of *Hertford* to the City of *London* and the suburbs thereof, it was granted, ordained, and appointed, that the said Sir *Hugh Middleton* and the twenty-eight other persons therein named, and all and every person or persons who thereafter should be elected and chosen into the place of them, or any of them who should die or

be removed, thereafter should be One Body Corporate and Politic, by the name of "The Governor and Company of the *New River* brought from *Chadwell* and *Ammell* to *London*," and that by the same name they should have perpetual succession: And whereas, for the purpose of obtaining the removal of the said Waterworks and obstructions, and procuring the continuation of a supply of water to the inhabitants of the places who are at present supplied with water from the said Waterworks, the Mayor and Commonalty and Citizens of the City of *London*, and the said Committee of Assistants of the proprietors of the said *London* Bridge Waterworks, and the Governor and Company of the *New River*, are willing and desirous of effecting an arrangement, whereby all the herein-before mentioned Licences for erecting engines on the said River may become void, and all the messuages, buildings, ground, tenements, and hereditaments of the proprietors of the said Waterworks, and all the wheels, pipes, engines, apparatus, and stores, and all the water-rents payable to them from and after the twenty-fourth day of *June* now last past, should be absolutely vested in the said Governor and Company of the *New River*, who should be empowered to raise water, by means of steam engines, from the said River *Thames*; and that in part compensation to the said proprietors of the said Waterworks, the said Governor and Company of the *New River* should secure to them certain annuities or yearly sums during the term of two hundred and sixty years, being the residue remaining unexpired of the terms of years for which the aforesaid Licences were granted; and should also secure certain life annuities, by way of pensions, now payable to certain servants of the said proprietors, or the relatives of such servants; and that to provide further compensation to the said proprietors, the said Mayor and Commonalty and Citizens should be empowered to raise and pay them the sum of ten thousand pounds, together with interest (if any) as hereinafter is mentioned: And whereas, with a view of improving the present approaches to *London* Bridge, or any new Bridge which may be erected near the site thereof, it is expedient

that the said Mayor and Commonalty and Citizens should be empowered to purchase from the said Governor and Company of the *New River*, such of the estates of the said proprietors of the *London Bridge Waterworks* as are situate near the said present *London Bridge*, to the eastward of the Hall of the Fishmongers' Company: And whereas the said Mayor and Commonalty and Citizens are possessed of a considerable sum of money, arising from the estates vested in them as Trustees for the repairs and support of *London Bridge*: And whereas, if the said Mayor and Commonalty and Citizens be empowered, out of the monies of which they are possessed, as Trustees as aforesaid, to raise a sum of money not exceeding fifteen thousand pounds, to enable them to pay the said sum of ten thousand pounds to the said proprietors of the *London Bridge Waterworks*, and to purchase the said estates from the said Governor and Company of the *New River*, and to defray the expences of this Act, the same may be repaid with interest out of such fund as may hereafter be raised by authority of Parliament for improving or making approaches to the said present bridge, or any new bridge, or for the improvement of the navigation of the said river: May it therefore please Your Majesty that it may be enacted, and be it enacted by the King's Most Excellent Majesty, by and with the advice and consent of the Lords Spiritual and Temporal, and Commons, in this present Parliament assembled, and by the authority of the same, That from and after the payment of the sum of ten thousand pounds to the proprietors of the *London Bridge Waterworks*, as hereinafter is mentioned, so much of the said recited Act of the twenty-ninth Year of the Reign of King *George* the Second, as obliges the water to be stopped or pent up at the said bridge, to give effect to the said Waterworks, and as prevents the Mayor, Aldermen, and Commons of the City of *London*, in Common Council assembled, from removing or causing to be removed the wheels, machinery, and works belonging to the said proprietors of the said Waterworks, or removing or altering any of the arches of the said bridge, shall be, and the same is hereby repealed.

“ II. And be it further enacted, That it shall be lawful for the said Mayor and Commonalty and Citizens of the City of *London*, and they are hereby authorized and empowered to raise and apply, by and out of the monies of which they are possessed as Trustees as aforesaid, any sum or sums of money not exceeding the sum of fifteen thousand pounds, for the purposes of this Act, and that the sum of ten thousand pounds part thereof shall be paid to the said *Richard Percival*, or other the Treasurer for the time being of the said proprietors of the *London Bridge Waterworks*, together with (in case the said sum of ten thousand pounds shall not be paid within fourteen days next after the passing of this Act) interest for the same in the meantime at the rate of five pounds *per centum per annum*, to be computed from the expiration of the said fourteen days.

“ III. And be it further enacted, That it shall be lawful for the Mayor, Aldermen, and Commons of the City of *London*, in Common Council assembled, and they are hereby empowered, in the name of the said Mayor and Commonalty and Citizens of the City of *London*, to agree with the said Governor and Company of the *New River* for the purchase of the houses, buildings, grounds, tenements, and hereditaments in the City of *London*, to be conveyed and assigned by the Committee of Assistants of the said proprietors of the *London Bridge Waterworks*, as hereinafter is mentioned, which are situate to the eastward of Fishmongers' Hall, and to pay any part of the monies to be raised and applied for the purposes of this Act, not exceeding the sum of three thousand pounds, for the purchase thereof, and to accept and take a conveyance thereof from the said Governor and Company of the *New River* (who are hereby empowered to sell and convey the same), notwithstanding the Statutes of Mortmain, or any other law or statute to the contrary.”

The Chelsea Water Company commenced their works, for the same purpose, of drawing

water from the River Thames, under an Act in 1723, for the supply of that place, and the parts adjacent.

The York Buildings Water Company also commenced their works about the same time, for the supply of a part of Westminster, from the River Thames.

After these the Shadwell and West Ham Company drew water from the Thames for the supply of their neighbourhood; and the Hampstead Water Company undertook to supply the north side of London with water from the springs at that place.

In this state the supply of water to the metropolis remained until 1806, when the East London purchased the Shadwell and West Ham works, and obtained their Act for supplying that side of London, and its environs, on a larger scale.

In 1807 the West Middlesex undertook to supply the west side of the metropolis with water from the springs and rivers north-west of London; and the Grand Junction Company commenced their's upon the same plan in 1810.

Other Companies supply the south side of London chiefly, if not entirely, from the River Thames.

Lighting the Streets of London, is the next subject. This was anciently accomplished by hanging lanterns at the doors of the houses and shops, by those who chose to do so; afterwards it became imperative, in consequence of the streets being infested with robbers and housebreakers, owing to the insufficiency of the lights in the night. Application was made to Parliament by the Lord Mayor and Common Council, to enable them to light the streets in a more effectual manner; in compliance with which, an Act was passed, empowering the Lord Mayor, Aldermen, and Commonalty, to erect a sufficient number of glass lamps, and in such places as they should judge proper, to be kept burning from the setting to the rising of the sun, throughout the year; and giving them power to make a rate to defray the expence thereof.

London was accordingly lit by the Corporation in, and the respective parishes out of the City, together with several private lamps in various parts of the metropolis. In this state a number of years elapsed without alteration, except now and then a new reflector or a new lens was placed before the burner, not doing much more than making darkness visible.

At length Mr. Winsor, a Prussian, appeared in London about the year 1800, and gave lectures at the Lyceum Theatre, on the theory of

lighting with Coal Gas, on the principle of Monsieur Le Bon, at Paris. For a year or two it was a popular amusement to go to the Lyceum to see the gas; and after a few years, a public meeting was called at the London Tavern, to raise subscriptions to bring this theory of gas into public use. £20,000 were then placed at the disposal of twenty-four gentlemen, as a committee of trustees, to ascertain the possibility of lighting the streets with it; and, if practicable, to apply to Parliament for an Act to enable the proprietors to light the streets of London. Difficulties unknown came forward to oppose this project. No one appeared bold enough to shew himself a friend to it:—it was the insidious sneer of the wise, and the bold ridicule of the ignorant; until after three years' perseverance, not only an Act of Parliament, but a Charter from King George III. was obtained for this national undertaking.

It is to the honour of His Majesty King George the Fourth, that while this headstrong prejudice existed with the multitude, a noble independent mind induced His Majesty, then Prince of Wales, to become one of the exalted patrons of this infant project; and for this purpose, His Royal Highness granted leave to exhibit the first specimen of public gas lights on the wall of his garden in St. James's Park.

At present but few lamps in London are

lit with oil. Gas has almost extinguished the whole of them; and there are now in London four great Gas Light Companies—the Chartered, the City of London, the Imperial, and the Phoenix; having altogether forty-seven gasometers at work, capable of containing in the whole, nine hundred and seventeen thousand, nine hundred and forty cubic feet of gas, supplied by one thousand, three hundred and fifteen retorts; and these consuming thirty-three thousand chaldrons of coals in a year, and producing forty-one thousand chaldrons of coke; the whole quantity of gas generated annually, being upwards of three hundred and ninety-seven millions of cubic feet, by which sixty one thousand, two hundred and three private, and seven thousand, two hundred and fifty-eight public or street lamps are lighted in the metropolis. Besides these, there are several other minor Companies and public establishments that light with gas.—

The great importance of Sub-ways has now been considered as combining within themselves the four vital objects of municipal regulation in every City, especially in the British Metropolis; *viz.* the *public Sewers*—*paving the Streets*—*the supply of Water*—and *lighting the Streets*.

The annual income these four establishments derive from the public, in the metropolis only, cannot be estimated at less than one million sterling.

This vast sum, properly applied in a different manner, in the way it is capable of being applied, will give increased advantages of great importance to the public in each of those objects ; and the amount may be considerably reduced from year to year, so as to relieve the public very essentially.

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#### THE COMPLETION OF SUB-WAYS,

from the foregoing considerations, becomes an object of undeniable necessity; but in addition to what has been shewn, as respects disturbing the streets to get to the sewers, as well as the water and gas pipes, the quality of the water itself is connected in some degree with the subject of Sub-ways ; for whatever the quality of the water, or wherever it may be drawn from, or however pure, in its progress through the pipes, while they lay in the ground, the mud will be imbibed at the joints, and it will be contaminated.

In an exposé of Mr. Wright, who has exerted himself with great labour to bring the question before the public, he thus expresses himself:—

“ About two years ago my attention was directed, in the way which I shall presently have occasion to state to the Commissioners, to the bad quality of the water furnished to the western portion of the metropolis, by one of the five Com-