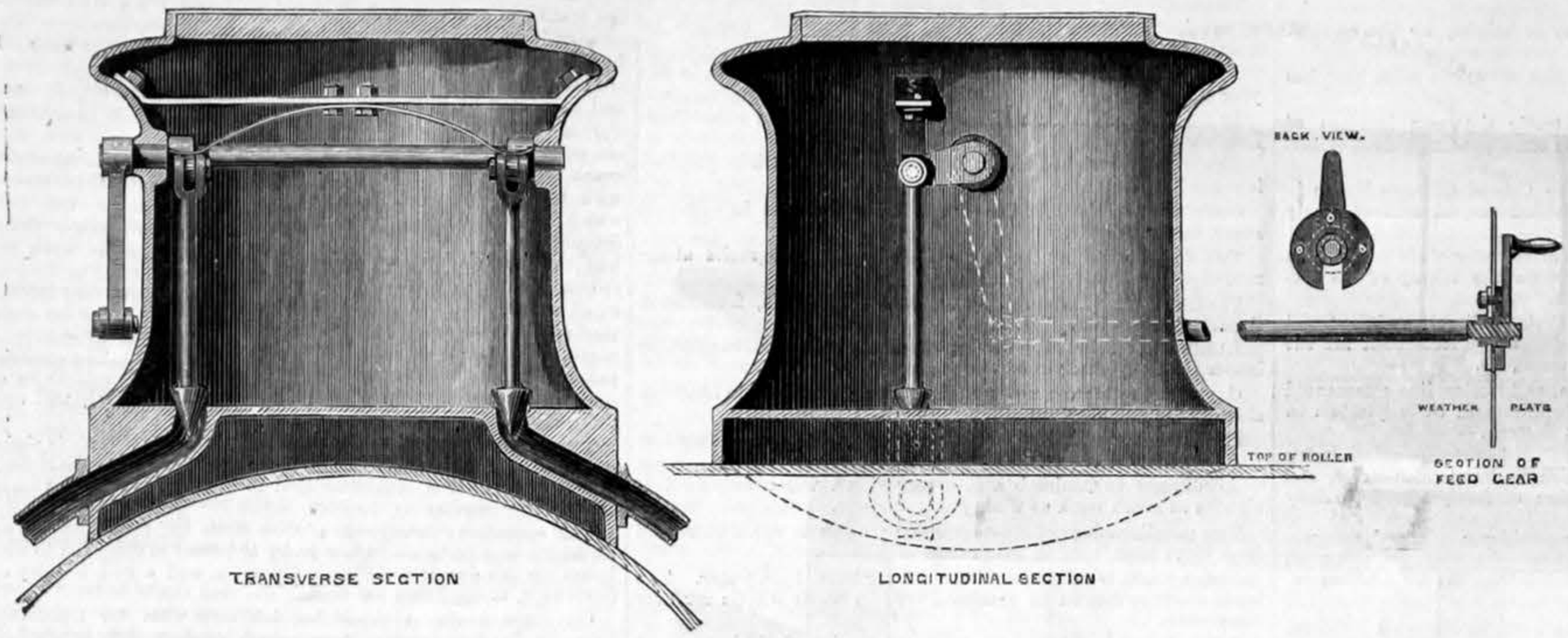
THE SAND BOXES ON THE NORTH LONDON RAILWAY.



In pursuance of a promise made some time since we give illustrations this week of the admirable sand-boxes invented by Mr. W. Adams for the engines of the North-London Railway. In the engraving will be found Mr. Adams' most recent improvements, which consist principally in the use of a hand-wheel and screw regulator instead of a notched rod. The sand is carefully dried and screened, and the delivery may be regulated with the utmost precision, so that on a long slippery incline there is no waste. We have carefully watched the working of the apparatus, and we have no hesitation in pronouncing it the best thing of the kind used on a British railway. Its construction is so exceedingly simple that minute description is quite unnecessary. The stoppers are pressed down by a transverse spring, and raised by the hand-wheel and rod, as shown.

ON THE GANGES CANAL.

By Thomas Login, C.E., Late Superintendent Northern Division Ganges Canal.

It is of the utmost importance that the public should be put in possession of such facts in connection with the Ganges Canal as shall lead them to form a just estimate of the great value of canals in India. In England canals are generally regarded as useful only for the purposes of navigation, and since the development of the railway system are considered to be almost obsolete. But in India canals are chiefly valuable for the purposes of irrigation, and in this point of view it is difficult to over-estimate their importance.

In illustration of this point it may be mentioned that in 1860, notwithstanding the incomplete state of the distribution channels of the Ganges Canal, it was the means of producing food for upwards of 1,300,000 human beings, which, at the low rate of £1 10s. per head, represented an amount of nearly two million pounds sterling. In India the promotion of irrigation works becomes a matter of public policy as well as humanity, for the wide-spreading distress occasioned by the want of water is liable to produce discontent and disaffection.

It is to be remembered, also, that about half the revenue of India is derived from land rent. Government in that country may be regarded as a great landed proprietor, receiving some twenty millions a year in rent; and there is every reason why this public property should be improved by means of irrigation just as the private property of an English landlord is improved by draining and other works. To have the means of bringing a supply of water when required on to the parched fields of India would have the effect of more than doubling the value of the land; it is, therefore, submitted that it would be wise policy for the Government to carry out works of this description with vigour, although it would involve borrowing money for the purpose.

Even from what has been already said, the Ganges Canal will appear to have been useful, and prevented serious distress among the population, and probably disastrous consequences to the authorities, although it has not paid so well in direct revenue as was anticipated. But the public in England require to be cautioned against drawing an inference from remarks recently made on the Ganges Canal—that it is a stupendous failure. The state and prospects of the canal have been much discussed of late, owing to the desire of a company to purchase it as a private speculation. It is well known that the authorities, both in England and India, are much opposed to the idea of public irrigation works being undertaken by commercial companies, and there appears to be good grounds for the objection unless the proprietors of the canals are at the same time owners of the land.

As before observed, navigation being of secondary importance with canals in India, their chief value is as channels of irrigation; and when fields require water it must be supplied to them at whatever inconvenience as to navigation, or famine, with all its concomitant evils, is the result. It is also to be noticed that a canal with a continuous stream of water must either be open or closed; it is not like a railway that may be opened for a part only of its length and usefully worked on such part.

Again, an irrigation canal presents difficulties for frequent inspection as to its condition, and when to this is added the fact of the entire dependence upon it of all cultivators of land who have left off keeping up wells and extra bullocks for the work of irrigation, it shows how essential it is that the works should be controlled by a more extensive organisation than that of a commercial company.

It may be said that the chief function of canals in India is to compensate for the irregularities of the seasons, and they should be looked upon as a means of insurance by which cultivators of land, at a cost of about 5 per cent. on the value of their crops, may insure them against failure. This arrangement is practicable with canals in the hands of Government, but it is doubtful whether any commercial companies could afford to wait so long for the return of their outlay as would be involved in so low a rate of insurance. And as regards the Ganges Canal in particular, seeing that it flows through some of the most thickly populated districts of India, it is probable that the transference of its proprietorship from the Government to a company, even if practicable on other grounds, would be productive of so many complications requiring legal adjustment, as would go far to neutralise the effect expected to result from the relief from ownership.

Several causes have combined to retard the development of irrigation on the Ganges Canal.

First, there is the novelty of the idea to a people who have been unaccustomed to material changes for ages and generations back.

Secondly, the distribution channels were incomplete at the time of the opening of the canal, and progress was interrupted by the mutiny in 1857, and afterwards by the want of money caused by it.

Thirdly, the new settlement of the several districts had also a considerable effect in keeping back irrigation. It operated in this way: It was known that fields watered from either wells or canals have an extra charge put upon them; this induced cultivators to avoid taking canal water before the settlement was fixed in order to avoid the entire tax.

Fourthly, the uncertainty of supply; and, lastly, the system of irrigation in practice. This, however, is common to all canals at present; still it may be advisable to advert to the present system of collecting water rent, as involving the difficulty referred to. In illustration of this it may be stated that in 1861—62 some 4,000 villages obtained water from the Ganges Canal, and there were on an average nearly 200 fields in each village. Then as parties incurring water rent possess, on an average, only about five fields each, such rent would have to be collected from forty parties in each village. It will hence be seen what extensive accounts have to be kept of lands irrigated.

In addition to this the difficulties are much increased by the want of uniformity in the water rates, and by the defective mode of collecting. It would occupy too much space to dwell upon the defects and to suggest improvements.

The quantity of water used is not known, but it is certain that there is great waste; for it appears that in the year of the famine a sufficient quantity of water was admitted into the Ganges Canal to have submerged the whole area returned as irrigated (536 square miles) to a depth of no less than 10ft.

Now it has been found that 10in. depth of water distributed over four waterings 2½in. deep is sufficient for wheat and such like crops. This estimate seems to leave a depth of at least 9ft. of water to be accounted for as the results of the several causes of absorption, evaporation, waste, and false returns. The mere mention of these facts shows the need of a more effective supervision. Much might be said about the importance of publishing a daily register of the height of water in the canal, and thus inducing parties to enter into contracts for a supply of water with a knowledge of what supply they could rely upon receiving. These and other points relating to the revenue derivable from the working of the canal, although of the greatest importance, can scarcely be laid before the public with sufficient distinctness to be clearly apprehended.

In India, as is well known, engineers have much to do with revenue matters, but it would be very desirable, as far as practicable, to separate engineering from revenue duties, which would, in all probability, be attended with benefit to both divisions of the work.

At present the only point intended to be urged is the very great importance of promoting irrigation works, such as the Ganges Canal, in India. It is much to be feared that the public in England are not sufficiently alive to the importance of this subject in its bearing on the future welfare and prosperity of India. With a view, therefore, of producing a more general interest in this great question, the foregoing facts and considerations of a popular nature are submitted to public attention.

(To be continued.)

Bovill *versus* Goodier.—(*Specially reported for* The Engineer).—On Wednesday morning the Master of the Rolls gave judgment in the case of Bovill *v.* Goodier. He stated that this was a suit instituted by the plaintiff to restrain the defendant from the infringement of a patent of the former for the grinding of flour, and the collecting and utilisation of the stive or dust. The defendant contested both the title and the infringement. The case was one of those showing the troubles which often await inventors. Up to the time of the expiration of the patent in 1863 the plaintiff had been involved in constant litigation in its defence, in consequence of which the patent was then extended for another five years, but the litigation was still constant. In almost every instance of such litigation the plaintiff has to establish his case from the beginning against every person who brings an action, and he receives protection till the invalidity of his right is proved. In considering whether the plaintiff has already established his patent in a court of law, the case of Bovill *v.* Keyworth, tried at the Court of Queen's Bench, was a case in point, and in that court the patent was decided to be valid both in the separate improvements, and the whole in combination, claimed by the inventor. The objections urged before him were also evidently before the mind of Lord Campbell, in the above case. He was of opinion that the sucking away of the dusty air was a distinct part of the patent, and on this point he did not find any evidence laid before him that had not also been brought before the Court of Queen's Bench, except the facts respecting the French patents. To these he attached little weight, for they did not appear ever to have been successful, and the fact that no one uses them shows that they bear little resemblance to the invention of the plaintiff's, which is confessedly one of great commercial value. The plaintiff's patent simply demands sufficient air to drive away the dust without removing the meal, and the French patents appear to be of quite a distinct character. The French inventors probably had the same idea, but they failed to discover how to draw off the dusty air without withdrawing the meal. The burden of proving whether the defendant has infringed the patent lies with the plaintiff. The evidence is that he employed a fan driven by the ordinary power of the mill, that the dusty air was thus driven into an escape-pipe leading it into a chamber with a porous partition, where the dust was collected and the air allowed to escape. He had listened very attentively to the arguments of the counsel on this point, and had since read through the evidence, but he was of opinion that the process made use of by the defendant was substantially the same as that patented by the plaintiff. The only difference appeared to be, that the plaintiff draws out the air by a sucking process, and the defendant by a blowing process—a fan being used in both instances; and wherever a fan is employed it must suck the air in one direction, and blow it in the other. The invention consists of passing a blast over the grinding surfaces with sufficient power only to drive the dusty air into the shaft, and it mattered little where the fan was placed, so that this result was attained. It seemed to him that the defendant had made use of the invention of the plaintiff and adapted the process described in the patent. The plaintiff then was entitled to a decree for an injunction to restrain the defendant from infringing the patent, but in the matter of the validity of the plaintiff's patent, the defendant could not be compelled to agree with the decision given at the Court of Queen's Bench, as he was not a party to that case, and the law is that the defendant cannot be bound by a decision to which he was not a party. He would direct an issue to try whether the plaintiff was the first inventor of the processes described in his patent, and the costs would be reserved till the conclusion of that case.—[For the present we reserve comment on this judgment—remarkable in many ways.]

Ventilation of the Houses of Parliament.—Now that the Palace of Westminster is again crowded, it will be of interest to notice a report prepared by Dr. Percy since the session began, stating the mode in which air is supplied to the two Houses. The system of ventilation adopted is that of exhaustion, the air being put in motion by means of heat applied by coke fires in great upcast shafts, the two chief being in the Victoria Tower and the Clock Tower. Go under ground, and you are in something like a rabbit warren. Under as well as above ground there are hundreds of air courses; some for supplying cold air, others for supplying warm air, others for carrying off vitiated air. There are in this great palace steam pipes, of which the aggregate length is about fifteen miles, and 1,200 stop-cocks and valves connected with these pipes. It is supposed that no man living knows all these ways for air and smoke; but three gentlemen have now been for months at work making a plan of them. Taking the House that sits longest, we learn that the air for the House of Commons is admitted from the Star-court and the Common's-court; it is strained through gauze, and then warmed when necessary by Gurney's batteries; after this it ascends through the floor of the House. Dr. Percy notices the difficulty of suiting and satisfying all persons, members young and old, those who have been walking and those who have been sitting, those who have dined and those who are hungry, those who practise cold ablutions and those who are not so fond of cold water. Some persons still think there is nothing like open windows in the summer; but Dr. Percy says it is proved that in the House of Commons this diminishes the quantity of air which ascends through the House, and generally raises the temperature several degrees. When Mr. Gladstone brought in his Franchise Bill, the quantity of air that was passed through the House while he spoke averaged between 9,000,000 and 10,000,000 gallons an hour. The volume of fresh air which a few years ago was considered sufficient is now regarded as wholly inadequate. It is considered desirable to supply about 2,000ft. per man per hour. Care in selecting the place from which the air is drawn is, of course, very important. One of the Commons' inlets for air is close to the entrance to the ladies' gallery, and, notwithstanding all care, the drawing up of carriages will occasionally cause a supply of air with a little taint of the stable-yard. If a person walks through the Commons-court smoking, the odour is immediately perceived near the Speaker's chair. It has been difficult also to keep out the smell of the kitchen, when its windows are open. But as defects are discovered they are remedied as far as possible. Occasionally in squally weather draughts are complained of, but precautions are taken to render the velocity of the air in the Houses as uniform as possible. In the House of Commons the artificial light is supplied from the chamber above the ceilings in which about 1,000ft. of gas are consumed per hour in the evening sittings; none of the products of combustion escape into the House. Until recently there was very serious danger from the exposure of woodwork in this chamber to heat. The late Mr. Braidwood considered that after some eight or ten years' exposure to heat not much exceeding that of boiling water, timber is brought into such a condition that something like spontaneous combustion takes place. The late Captain Fowke inspected the roof one night last session, and strongly expressed his belief of the danger of fire, remarking that throughout the building he had never seen a greater mixture of caution and carelessness in that respect. Attention had already been given to this danger, however, and a very large quantity of wood has been removed and sheet iron substituted. A fire in the ceiling is now very unlikely, and would probably be immediately extinguished. There is now perfect control over the air in every part of the House; but some of the committee rooms of both Houses greatly need better ventilation, and the improvement needs only a trifling outlay. Apprehensions were at one time expressed of danger from the steam boilers; but they are inspected three times every year by skilful engineers engaged by the Manchester Association for the Prevention of Steam Boiler Explosions, and all the improvements which they suggest are adopted.

The Pallas.—The official trial trip of the Pallas took place in Stokes Bay on Wednesday last. We are compelled by want of space to postpone our detailed account of this trip. It must suffice to say that the ship has a pair of compound engines, and carries a pressure of 31 lb. Six runs were first made with full-boiler power, with the following results:—Speed of ship (knots). 1st, 14·220; 2nd, 11·465; 3rd, 15·000; 4th, 10·942; 5th, 15·254; 6th, 10·778. Ship's mean speed, 13·057. Steam pressure, 31 lb.; average vaccuum, 27¾in. Revolutions of engines, per minute, 81, 81, 81, 82, 81, 80½; per run, 337, 416, 320, 441, 317, 438. Four runs with half-boiler power gave the following figures:—Speed of ship (knots).—1st, 12·457; 2nd, 9·917; 3rd, 11·880; 4th, 10·778. Ship's mean speed, 11·077 knots. Indicated horse-power of engines, 3,768. These results prove that the power of the engines was in excess of the Admiralty stipulation, while the speed of the ship fell far short of that which it was expected she would attain. It is difficult to imagine how the fact could be otherwise, as the ship carries a wave some 8ft. high under, or rather over her bows.