

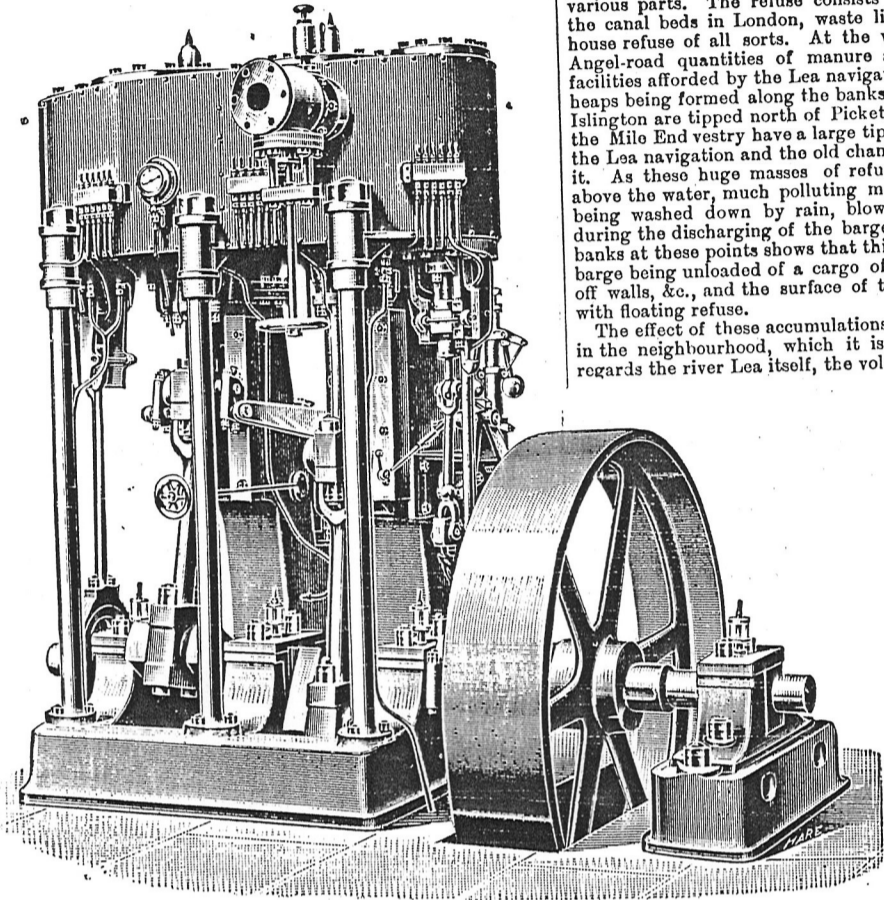
# On Her Majesty's Service

WASC 1761

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COMPOUND VERTICAL JET-CONDENSING ENGINE.

The above engraving illustrates a compound condensing engine made by Messrs. Alex. Shanks and Son, Limited, for various purposes. All the details are the result of extended experience. The engraving is from the photograph of an engine having cylinders 14in. and 22in. diameter respectively, and 14in. stroke. The crank shaft is 4 1/2in. diameter in the journals, and 5 1/2in. at the fly-wheel, which is 5ft. 2in. diameter, and 13in. wide. The air pump is 10in. diameter, 7in. stroke, and the engine runs at a speed of 180 revolutions per minute, &c. It is of the ordinary marine type, with two strong cast iron columns, forming guides, behind, and three polished wrought iron columns in front. The valves are piston valves without rings, the high-pressure cylinder having two, a main

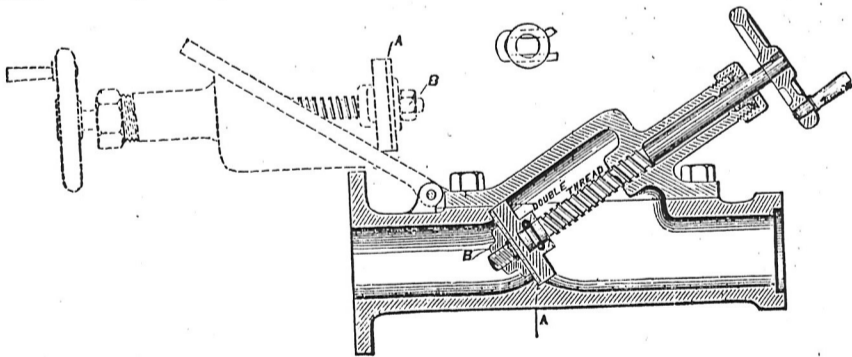


SHANKS' COMPOUND VERTICAL CONDENSING ENGINE

valve and a cut-off valve, the one inside the other. The cut-off is under the control of the governor, shown, which is of a type admitting of very small variation in the speed of the engine. The automatic gear is of the link type. The bearings are large, and the length of the main bearings is two diameters. The lubrication throughout is on the sight-drop principle, the oil-drops being all protected from dust by glass. The cylinders are lagged with asbestos meal, hair felt, and planished steel sheets, and are fitted with relief valves, drain cocks, and indicator cocks. The pistons are of the ordinary Ramsbottom kind, with cast iron rings. The eccentric straps are strong iron castings. The air pump is brass-lined, and has brass valve seats and guards and india-rubber valves. The engine is generally substantial, and appears to be well finished, and well adapted for long runs.

HUMBLE AND BARKER'S VALVE.

The valve illustrated by the accompanying engraving has been made with a view to obtaining a full way and easy removal of the part carrying the valve, and giving a straight



way through when that removal is made, so that the vessel to which it is attached may be easily cleaned out. Its construction is clearly shown by the engraving, and it is made by Mr. S. Humble, 9, Victoria-street, Westminster.

THE POLLUTION OF THE RIVER LEA.

We take the following from a report by Prof. Henry Robinson, M. Inst. C.E., on the condition of the Lea with regard to pollution:—

The river Lea, after passing in an easterly direction through Lord Salisbury's estate at Hatfield, turns to the north-east through Hertford, where the effluent sewage of that town flows into it through the "Manifold Ditch"—the purity of which effluent leaves very much to be desired—at a point near Ware, and about fourteen miles above the intake of the East London Water Company. Several streams contribute to the flow of the river Lea before and after it passes Hertford, including the Beane, Rib, Ash, and Stort. These tributaries are to a greater or lesser degree the recipients of polluting matter, but owing to the large volume of water in the Lea and Stort navigation into which

they pass, and the many miles of run of the river, self purification will doubtless have been effected to a considerable extent.

Many years ago the course of the river Lea was in places straightened and rendered navigable. One result has been that the banks of the navigation are utilised for the reception of large quantities of house and other refuse, which is brought by barges and tipped in great heaps above the level of and along the banks, which are thereby polluted. The effluent sewage from the Cheshunt district flows into an artificial cut called the Black Ditch, which passes through the parishes of Enfield and Edmonton. This joins Pymmes Brook, in the latter parish, which discharges into the Lea below Tottenham Lock, in the parish of Tottenham. In its course it is joined, in the neighbourhood of Angel-road, Edmonton, by a sewage effluent channel called the Lete Ditch, which receives the effluents from Edmonton and part of Enfield. Where these several effluents discharge into the Lea, deposits of foul mud and floating pollution are observable.

Along the banks of the Lea for miles south of Enfield Lock, I noticed large deposits of refuse, which had been barged there from various parts. The refuse consists of foul sludge dredged from the canal beds in London, waste lime from the gas works, and house refuse of all sorts. At the wharves at Ponders End and Angel-road quantities of manure are sometimes landed. The facilities afforded by the Lea navigation have led to miles of refuse heaps being formed along the banks. Considerable deposits from Islington are tipped north of Pickett's Lock, near Edmonton, and the Mile End vestry have a large tip on Edmonton Marsh, between the Lea navigation and the old channel of the river to the east of it. As these huge masses of refuse lie close to, and generally above the water, much polluting matter passes into it either by being washed down by rain, blown in by wind, or dropped in during the discharging of the barges. The black mud along the banks at these points shows that this is so. In fact, I noticed a barge being unloaded of a cargo of house refuse, bedding, paper off walls, &c., and the surface of the water around was covered with floating refuse.

The effect of these accumulations is to create a grave nuisance in the neighbourhood, which it is most desirable to abate. As regards the river Lea itself, the volume flowing in it, except in dry seasons, helps to minimise the effect produced by these pollutions. Nevertheless, the prevention of them would be attended with the advantage of removing any suspicion of pollution, from this cause, of the water which is taken from the Lea by the East London Water Company, at a point close to the Pike and Anchor, near Ponders End. This is conveyed by one of the old river channels, thence by the Mill Cut to the intake at Chingford Mill, and thence to reservoirs. The effluent sewage from Tottenham was formerly discharged into the Lea a little to the south of the before-mentioned Pymmes Brook outfall, but the sewage is now taken into the North Metropolitan system. Nevertheless, the Tottenham outfall is still a source of pollution, owing, it may be, to the old deposits of foul matter not having been removed from the

bed of the channel. There are wharves just above Lea Bridge, where barges load and unload building materials, coal, and manure. A little surface drainage from roads and yards runs into the river.

A weir at the East London Waterworks discharges water into the old bed of the river from the navigation channel. The condition of the water in the Hackney Cut from Lea Bridge to the Old Ford Lock was fairly good, weeds being visible to a depth of about 2ft., and nothing offensive was noticeable. Below the lock, however, the river is tidal, and its condition is very bad. At low tide black mud banks are exposed, and smell abominably. Numerous factory drains discharge direct to the river there. The water, which oscillates backwards and forwards with the tide, is thickly laden with black flocculent filth, having a most offensive smell. The pollution is, no doubt, partly from soap works, chemical works, and various factories, but there appears to be a considerable proportion of sewage effluent mixed with it. Some dead animals were floating about in an advanced state of putrefaction.

Returning to the East London Water-works weir at Lea Bridge, a small quantity of water was passing into the old channel of the river. Below the water-works, in three places, dirty water—chiefly or wholly from the sand washing troughs—was being discharged into the bed of the river, which is not more than a few inches deep here. A little lower down the Great Eastern Railway Company have a tip close to the river bank, where building and stable refuse is discharged. The stream divides lower down, part going to Temple Mills, and part to White House. The latter branch is stagnant and deep, with black mud banks which smell slightly, but get worse towards White House, where the smell is very offensive along the side of the "Pleasure Gardens." The former branch leading to Temple Mills rapidly deteriorates downwards, being practically stagnant, and this condition continues from the fork to a point about a quarter of a mile down where the effluent from the Walthamstow and Leyton Sewage Works comes into the channel through a ditch. The volume of this effluent was far in excess of the volume coming down the main channel. It had a brown cloudy appearance, and gas was bubbling up from the bed of the channel immediately in front of the mouth of the effluent ditch. Black mud banks have formed on each side of the outlet, and continue all along the channel towards Temple Mills. These give off quantities of foul gas, and make the stream as black as ink, and most offensive.

The condition of the channel above the Walthamstow and Leyton sewage outfall is accounted for by the fact that at high tide the water is backed up, and the sewage effluent passes up stream for about half a mile, and stands there practically stagnant. The effluent from the Walthamstow Sewage Works is very bad, and has a most offensive smell all along the course of the brook from Walthamstow to the point where it mixes with the Leyton effluent, a distance of over a mile, so that the polluting effect on the Lea here must be mainly attributed to the Walthamstow Works. The Walthamstow Local Board has, I understand, recently given an undertaking to the Leyton Urban District Council to keep the Dagenham Brook clean, further legal proceedings in connection with the pollution of it being suspended until January next.

At Temple Mills there is a small weir which is submerged at high tide, below the weir are wide black mud banks, which smell badly and give off offensive gases. Several cottage closets discharge direct into the stream, and house refuse is also thrown in. The water in the river here resembles that below Old Ford Lock in its smell and its heavy load of black filth in suspension, but has not the same oily appearance on the surface. Over a mile of channels

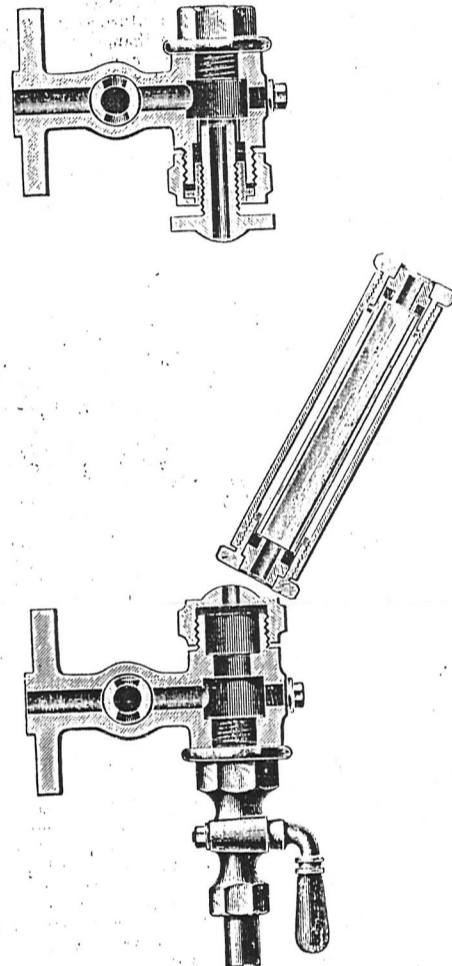
in this disgusting condition pass through, or form the boundary of, the recreation ground known as Hackney Marsh, which is under the control of the London County Council.

As regards remedying the pollutions indicated in this report, those which are due to tipping house refuse can be dealt with by erecting a dust destructor station to cremate the refuse, as is now very generally done. Such an installation would not only solve this difficulty, but it would be commercially profitable. The waste heat could be utilised to produce power for many purposes, and for generating electricity both for lighting and for use in numerous manufacturing operations. As regards pollutions from existing manufactories, they require to be dealt with having due regard to the circumstances of each case. A stream has for so long a time been regarded as the natural way of getting rid of refuse that it will take time to bring about reform in some cases. The Rivers Pollution Prevention Bill and the Floods Prevention Bill, introduced by Lord Thring, now passing through Parliament, indicate that in the near future further powers will be available to effect improvement in rivers.

Many waste products admit of being utilised with advantage to the industries concerned, but where they do not, and where the enforcement of drastic measures might result in stoppage of works which employ local labour, and contribute largely to the rates, it may be necessary to give time, and not to compel the adoption of expedients which may be reasonably required elsewhere. Under such circumstances I advise local authorities to turn their attention to the purification of the streams themselves, including the channels. Many unavoidably polluted streams can be so treated that they cease to be a nuisance and injurious to health. What has been accomplished at Maidenhead-on-Thames in preventing the pollution of the stream there into which effluent sewage passes, affords one solution of the difficulty.

IMPROVED WATER-GAUGE FITTING.

[The accompanying engraving represents a sectional view of an improved water-gauge glass fitting which is being manufactured in Germany by Mr. Theodore Maas, of Mannheim, and which embraces a distinctly novel method of securing the tube. The arrangement is so simple as to require little or no description.



MAAS'S WATER GAUGE ATTACHMENT

The tube, as will be seen, is held in a frame, and in case of fracture can be readily removed by turning the upper nut which, like the lower one, has a spherical bearing surface. By keeping an extra frame and tube in stock the delay in removing the particles of a broken tube—sometimes a tedious one—is greatly minimised, the work of removing and replacing being the work of only a few minutes. The fitting is worth a trial.

THE MUNICIPAL GASWORKS OF BERLIN.\*

ATTENTION is directed to the diminished consumption of gas in Berlin in 1893-94, due partly to commercial depression, but also to the increasing use of gas-economising burners and electric light. Efforts have been made in various ways to increase the use of gas, to reduce the price, and to utilise the by-products. The total quantity of gas manufactured was about 11,750,000 cubic feet in excess of the previous year's total, but does not attain to that of 1891-92. In 1892-93 the decrease in the production of gas exceeded 35,000,000 cubic feet. Gas used otherwise than for illuminating purposes shows an increase of more than 28,250,000 cubic feet, but for the lighting of private houses there is a falling off of upwards of 35,000,000 cubic feet. In some of the older parts of the town there is an increase in the consumption, but in certain other quarters the diminution reaches as much as 18.9 per cent. The English company's works show a total decrease of 1.48 per cent., while in the municipal works the decrease is only 0.61 per cent. for the twelvemonth. A statement follows of the number of electric lamps and gas lamps in use. Assuming one arc light to be equivalent to six glow lamps, and each glow lamp and motor to be equal to one gas jet of sixteen normal candles, the electric lighting establishments represent 155,967 lamps and the private institutions 104,766 lamps. The former show an increase of 18.4 per cent. over last year, and the latter an increase of 13.2 per cent. In March, 1894, the municipal gas companies supplied a total of 925,120 private lights, and there were electric lights equivalent to 260,733 burners. The financial results, an analysis of which follows, were less favourable than those of the previous year. The amount of gas unaccounted for in the municipal establishments is less than in any former period, and

\* Minutes of Proceedings Inst. C.E., vol. cl.—Abstract.