### IMPROVED GAS ENGINE.

At the Electrical Exhibition, Crystal Palace, London, there are eight Crossley engines, namely, one 16-horse power nominal gas engine, indicating 40-horse power; three 12-horse power nominal gas engines, of 25-horse power each, indicating 75-horse power; one 8-horse power nominal gas engine, indicating about 15-horse power; one 3.5-horse power nominal gas engine, indicating 5.8-horse power; one 2-horse power nominal gas engine, indicating 3.9-horse power; one half-horse power nominal gas engine, indicating 2-horse a diluted fluid which is conducted into mixing and settling power. The total indicated horse power is 141.7. The brake tanks. The tanks are emptied occasionally, the residuum or effective horse power of these engines, when in good being removed for use as a manure. order, is stated to be about five-sixths of the indicated pow-

er. The 16-horse power engine is an entirely novel de sign, so far as the framing is concerned. We illustrate it herewith. The form is at once rigid, and most economical of material, while nothing can be easier to fix. nor depend less on the skill of the erector. This engine has also a new form of governor, in which, by changing the position of a link against the end of which a cam presses, the gas supply is varied by changing the period of admission. The air supply is nevertheless unaffected. This is a desideratum in Crossley engines. The principle of this new movement, which is simplicity itself, and yet is equal to varying the cut-off in steam engines, is also applicable to

valve is put outside the slide casing, and on it the governor may operate in a manner analogous to that in which it ope- fuel. Assuming the main sewer to be arrested, as it were, rates on the gas valve. It is a form of governor arrangement which has the important advantage of offering no appreciable resistance to the governor itself, the work of form the precipitate into a pulp. This is discharged into moving the valve being done independently by the shaft of two trough levers beneath, which form the motive power the engine.

Everything about this engine is thoroughly substantial, durable, accessible, and, for the most part, even elegant in form. A small half-horse power nominal engine, which drives a number of Swan lamps, with a Siemens dynamo machinery that has ground the black ash and lime, and even affixed to it on a suitable stand, forms a complete little elec- registers the number of gallons of sewage that have passed. tric plant, adapted for use in private houses, and is, we think, a very good little apparatus, and entirely novel, too, as a small installation.-The Engineer.

#### -SEWAGE MACHINE.

has been tackled by a large number of engineers, chemists, Lit, in fact, innocuous; but this hitherto has only been effected | cranks and levers is such that the maximum amount of the

and others, with a greater or less degree of success-more frequently less than greater. Mr. John Hanson's treatment consists in the use of lime and black ash waste as purifiers, and his system has been in use at Tong, near Bradford, England, for about four years with every success. It is also in use at other places, notably at Golcar, near Huddersfield, where the works were desigued by Mr. Hanson and were started near the close of last year. The objection to lime alone, as stated by Mr. Hanson, is that lime alone does not remove the germs of infection, whereas with the addition of black ash waste the water is so effectually purified that, according to a report of the constable of the Tweed Commissioners, salmon fry and other delicate fish can live in the purified water. This black ash waste is a by-product from alkali works. According to Prof. Roscoe, for every ton of soda ash produced, from  $1\frac{1}{2}$  to 2 tons of waste are formed and

# Scientific American.

the free caustic lime which is held in solution, and precipitates both in the form of monosulphide and sulphate, carry ing down with them all the sewage impurities, thus discharging the effluent neutral and pure into the stream. By means of lime alone this is stated to be impossible. The two deodorizers are well stirred in the cistern by agitators, worked by a small gas engine. Into the lime cistern water is introduced to produce the necessary paste, and into the other the sewage runs by gravitation, and thus the effluent of each is

The chief feature of the machine, says Iron, is that it thought Mr. Hanson, and he has devised an automatic

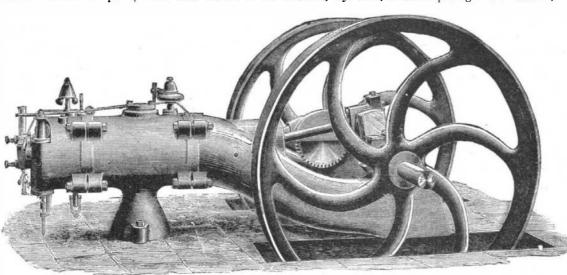
the quantity of sewage water contained in a or b. An indicator, l, is for registering the number of gallons of sewage water that pass through the machine. The chemicals fall through the tube, m, among the grinding rollers, n, by which they are crushed. The rollers are pulled forward by a lever, o, and backward by the lever, p. A sewage pipe, q, conducts the foul water to the sluice valves, r. The water levers, a and b, turn on a fulcrum rod, s. At t is seen the sewage water falling into the water levers.

It will, no doubt, occur to some that as the sewage is purer at night than during the day, the addition of the purifying material during the former period is so much waste. So

> arrangement whereby, as the sewage becomes purer, so the supply of purifying material is cut off until it ceases entirely. As the sewage becomes gradually foul in the morning the supply of the chemicals commences and continues. The mixture of sewage and chemicals will be led from he water levers into a series of settling tanks. ....

## Lutorcine.

This compound is described in a sealed paper which the authors deposited in 1875, and which has now been opened at their request. Lutorcine is obtained on treating monobromated paracresylol with potassa. It crystallizes in very small colorless needles arranged in hemispheric



SIXTEEN HORSE POWER GAS ENGINE.

ment, thereby avoiding the expense of skilled labor and by this machine, its contents flow into a reservoir provided with a set of rollers which convert the lime and black ash to for setting the whole machine in motion. A sufficient quantity of sewage having gone into one or the other of these troughs, it goes down, discharges its contents charged with the precipitating material, and in the action turns all the The invention is very simple. Every crank and lever is set in motion by one fall of the troughs, and it has not a wheel in it. Mr. Hanson calculates that for £500 such a machine could be erected which would clear the sewage of a town of 10,000 inhabitants. Of course, the great idea of treating

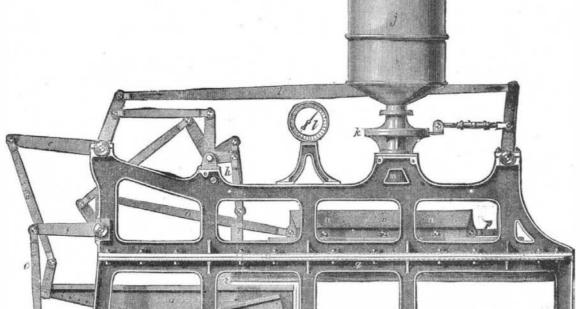
steam engines. If applied to them a separate small steam is worked by the sewage which is to be subjected to treat- masses. It melts at 104° to 105°, and dissolves easily in water, alcohol, and ether, but less readily in benzol and chloroform. It differs from orcine by its crystallization, its melting point, and its colored reactions. In presence of alkalies, lutorcine, on exposure to the air, takes a blood-red tint; acids turn this color to a yellow, but alkalies restore it. Chloride of lime gives a very intense and stable blood-red; potassium permanganate colors it also a bright red. With ferric chloride it takes a deep dirty green, and gives a reddish brown precipitate which does not contain iron. If treated with ammonia in presence of air it is converted intolutorceine, which has a brownish-yellow color, and is turned by acids to a pure yellow. This lutorceine dyes yellow .-G. Vogt and A. Henninger.

#### ENGINEERING INVENTIONS.

Mr. Henry A. Sessions, of Palestine, Tex., has patented The question of the purification and disposal of sewage sewage is to introduce the precipitating elements, to make an improved hand car in which the arrangement of the

power exerted upon the levers by the operators will be applied to the propulsion of the car, in other words, the object is to overcome largely the loss of power incident, through indirect action of the levers and unnecessary friction, to the common construction of car.

Mr. Thomas C. Steward, of Chattanooga, Tenn., has patented an improved car coupling attachment which is simple, convenient, and permits of coupling cars by means of the ordinary link and drawhead without requiring the operator to enter between the cars and endanger his life. This invention is an improvement on the car coupling attachment for which Letters Patent No. 236,855 were issued to the same inventor on the 18th day of January, 1881, and it consists of a bar or lever provided with an adjustable handle and pivoted to a collar loosely mounted on oue end of a J-shaped bar attached to the end of the car. this bar being of such length



the whole of the sulphur burnt in the pyrites kiln, amount- this a very simple matter. ing to from 15 to 20 per cent of the weight of the waste. The purifying properties of black ash waste are as follows: Black ash waste as it comes out of the vat contains all the sulphur which was used in the making of the soda ash. It is then in the form of insoluble monosulphide of calcium. When the monosulphide of calcium is exposed to the action of the atmosphere it passes into a state of higher oxidation, then called disulphide of calcium. When this soluble di-



## MACHINE FOR PURIFYING SEWAGE.

accumulates in enormous quantities. This waste contains at a great expense. Mr. Hanson's machine promises to make that it can catch under the link of a draw-head and lift the link, so that it can enter the draw-head of the next car.

Our engraving represents a side elevation of the apparatus. a and b are the water levers; when one is full of sewage water the lever drops and the empty lever rises, giving tion surface of the brass and the journal upon which the motive power to c and d, which are rods connected with brass rests will be kept lubricated so long as there is any lulevers e and f, and to the whole of the machine. The rods, g and h, are connected to sluices from which flow alternately peculiar arrangement of capillary conductors which conthe sewage water, Nos. 1 and 2, a and b. There is a lever stantly draw up and deliver to the journal the required bar, i, working the back part of the machine. The hopper, sulphate of calcium is brought into contact with caustic j, contains the black ash waste and lime or other chemicals vice for preventing the lubricant from escaping from the lime, after both have been added to the sewage, then the di- for purifying purposes. A slide, k, is regulated to supply journal boxes, and preventing dust from entering them, also sulphite of calcium contained in the black ash reacts upon from j the given quantity of chemicals required to purify to facilitate the insertion of the lubricant.

self-lubricating car axle box in which the concave or fricbricant in the journal box. This end is accomplished by a amount of lubricant. The same inventor has patented a de-

Mr. Henry Roth, of New York city, has patented a novel