

ROAD AND FARM LOCOMOTIVES AND STEAM ROAD ROLLERS.

The newest types of Messrs. Aveling and Porter's steam road roller and road and farm locomotives are illustrated on this page, the steam roller particularly presenting many improvements when contrasted with the well known roller of Messrs. Aveling and Porter's manufacture which has already been illustrated in the SCIENTIFIC AMERICAN. As nearly as practicable, the steam roller is now made to conform in design and construction to the successful and extremely simple road locomotive of this eminent firm. The heavy turntable and steering apparatus of the old pattern roller is avoided, and the weight thereof is added to the rolling wheels, the thickness of whose tyres is now $1\frac{1}{4}$ inches, instead of $2\frac{1}{4}$ inches, as heretofore. The durability of the wheels is thus increased twofold. One man only is required for the entire control of the roller, in place of two, and the running expenses, including coal, oil, and wages, are by this arrangement reduced to six dollars per day for the 15 ton size. The consumption of fuel is less than in the old style of roller; the boiler and engine are larger and more powerful; the number of wearing parts is fewer; and moreover, the first cost of the machine is materially less.

Now that the steam roller has become a recognized necessity in the practice of good road making, this improvement and reduction in cost will be acceptable to the large number of corporations and contractors requiring such machines.

The engraving of the road and farm locomotive is taken from one of Messrs. Aveling and Porter's recent manufacture. In general construction it does not differ materially from the engine of this firm which gained the first prize at the latest trials of traction engines by the Royal Agricultural Society of England. In some of its minor details, alterations have been made which add to the success of the locomotive. Messrs. Aveling and Porter have built upwards of a thousand road and farm locomotives, and they have gained first prizes with them at the International Exhibitions of London, Paris, and Vienna.

The variety of uses to which these locomotives are applied, including plowing, thrashing, and the removal of heavy material, induces a large and extensive demand, which has never been so great as at the present time. Mr. A. T. Stewart, at his Garden City, Long Island, has adopted the Aveling and Porter road locomotive, and its success has been remarkable in plowing, thrashing, hauling, and the uprooting of large trees. Mr. Hinsdale, Mr. Stewart's manager at Garden City, speaks very highly in its praise.

Messrs. Aveling and Porter's agent in New York city is Mr. W. C. Oastler, 43 Exchange Place.

Gas from Sewer Refuse.

A novel and apparently important utilization of sewage has recently been successfully put in practice in Breslau, Germany. Mr. Alfred Sendermann announces that from this waste he has obtained an excellent illuminating gas, and this on a scale sufficiently great to warrant the belief that the plan might be extended to meet the requirements of large communities.

The apparatus, which is built underground, consists in a large reservoir in which the material is collected and thence run off to retorts located at a still lower level. The gas is here generated in the usual way, and conducted to a tarcistern and then to a condenser. The purification is effected by milk of lime, and finally by passage through clean water.

The gas thus obtained is said to burn with even a brighter flame than that made from coal. Its odor is slightly acid, but not at all disagreeable.

The common residues, such as coke, tar, and fatty matter, are inodorous and perfectly utilizable. The cost of the apparatus is no dearer than that of the ordinary description, while the expense of the product is necessarily less than that of coal gas. There is no disengagement of bad odor from the factory. If these claims are legitimate, several important sanitary problems will be solved by the invention.

Fish as Makers of Oxygen.

Dr. Moreau has recently investigated the facts indicated by Biot, from which it appears that the gas contained in the natatory vessels of fish is nearly pure oxygen. Dr. Moreau has verified this, and has also discovered that, when other gases are found in the vessel, such as nitrogen, their presence is due to accessory causes. In order to prove this view, he examines fishes which had existed for a long time in shallow water. These, after determining by many analyses the quantity of oxygen which they had secreted to be about 16 per cent of the vesical gas, he plunged into water of a depth

phy, or any other occupation that is within the measure of their strength and adapted to their tastes.

The Overworked Man of Business.

The London *Sanitary Record*, in an interesting article on "Overwork," gives the following graphic picture of the business man who is overtasking his powers:

"Sooner or later he finds that his day's work has become an effort, a toil rather than a delight; the last hour has become a strain only maintained by determination; a sense of exhaustion and fatigue envelopes his closure of the day's work, and the last columns of figures have presented difficulties hitherto unknown, and the last pile of letters has seemed more trying than of yore. Anything new, of an unwonted character, making special demands upon the higher faculties, becomes arduous and distasteful, revealing the fact that the higher powers are first commencing to give way, to announce their inability; while the more routine matters, which have almost become automatic, or even habitual, can still be effectively discharged. But in time even these lower processes are affected, and the last half hour at the office is a distinct trial, and is followed by a new sense of exhaustion. There is a certain amount of irritability combined with the sense of exhaustion, that irritability which is ever found along with the exhaustion of nerve matter; this irritation, sometimes almost amounting to exaltation, marks the commencement of nervous exhaustion and failure. While work seems to become more irksome, the usual sources of pleasure no longer afford their wonted solace and satisfaction. There is a heightened susceptibility to any little trivial annoyance, domestic matters are felt more keenly, the dinner is not so satisfactory, the children are noisy; the more necessity for rest, and the more distinct the craving for comfort and quiet, the less seems forthcoming. There is an emotional exaltation which reveals the irritability of the exhausted nerve centers; the newspaper is stupid and uninteresting, the piano wants tuning, servants are deteriorating, children are less obedient, and wives less sympathizing than of yore. The mind is as sensitive as is the skin after a blister; the slightest touch produces pain."

The Sandy Hook Ordnance Experiments.

The experiments with the ten-inch Rodman smooth bore gun, which has been altered into an eight-inch rifled piece by the insertion of a wrought iron core, are still in progress at Sandy Hook. It is intended to subject the weapon to the test of 500 rounds; and up to the time of writing, 400 rounds have been fired. The charge used is 35 lbs. hexagonal powder, with a Butler projectile weighing 170 lbs. At the 363rd round, the pressure in the bore was 25,500 lbs. per square inch. Careful examination with a star gage, an instrument capable of noting changes in diameter of the bore of $\frac{1}{1000}$ of an inch, fail to show the slightest variation, and the gun is apparently as strong as when first fired.

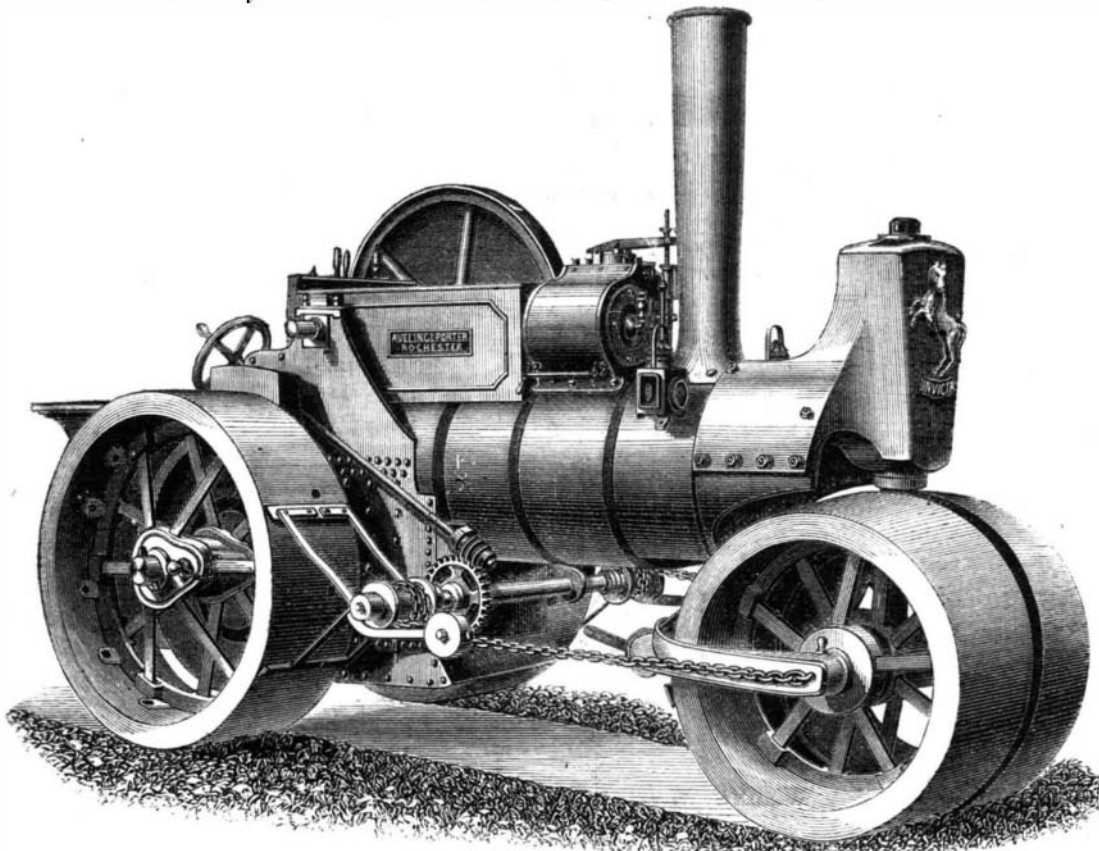
It is intended to continue using the piece after the 500th round, until bursting takes place, in order to determine the limit of strength. These results are of the highest importance, since, if the success thus far encountered is continued, some 4,000 smooth bore guns, now in government possession, will be fully trebled in value and efficiency.

Amalgam Fillings for Teeth

"As a durable filling, amalgam can be used," says Dr. A. C. Castle, "in cases where other metallic fillings cannot be applied. Their use has been on the increase

for very many years; and where formerly only grains were sold, our most distinguished dental depots now monthly sell pounds of the best American prepared amalgams.

Opposition to their use is made by those only who seek to obtain fabulous fees for gold fillings, which cannot be obtained for these, and hence appropriate to themselves the title of "the best dentists." In the appropriate places I have used amalgams for forty years past. No injury, above electro galvanic action, has been done by their presence."

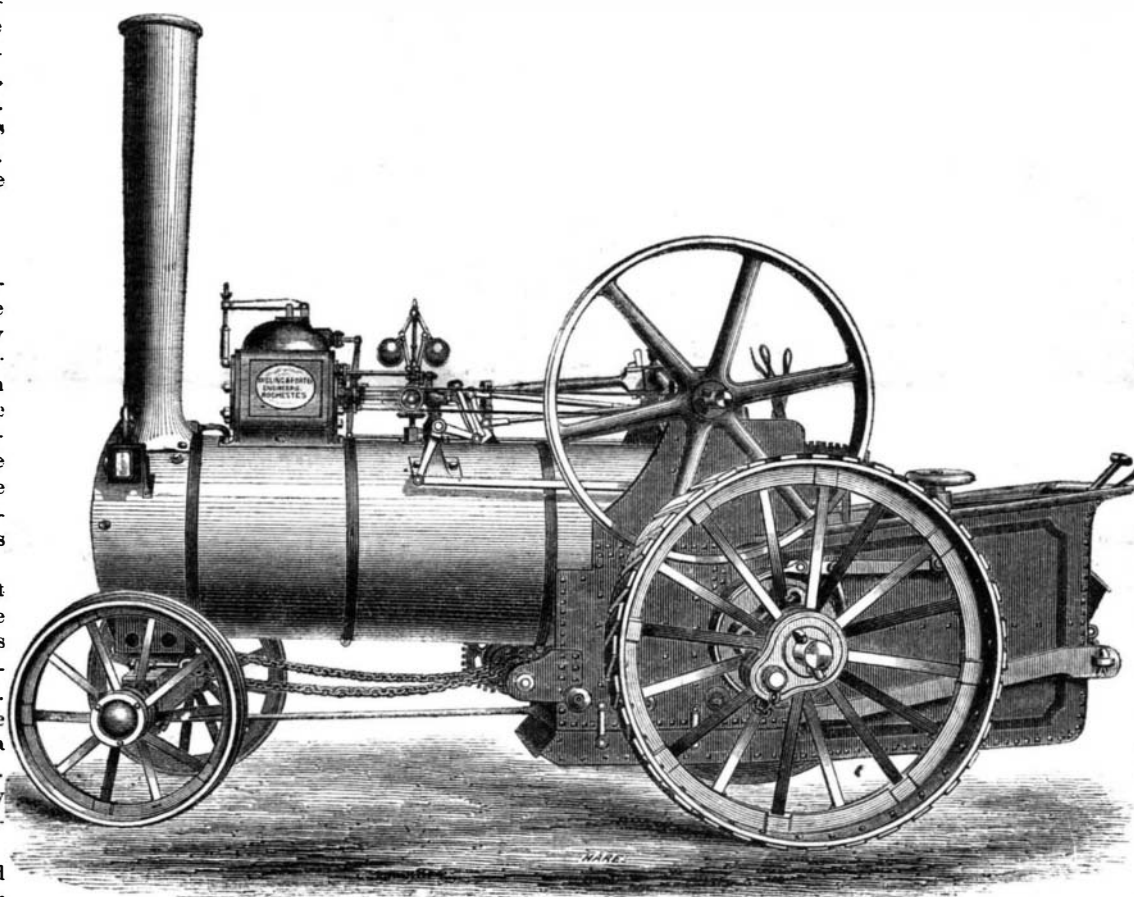


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of some 25 feet. Submitted under these new conditions to a much higher pressure than before, the fish, to counterbalance the same, augmented the quantity of gas contained in the natatory vessel. Analysis of the gas then showed an increase in oxygen to 25 per cent, showing that the cause of the augmentation was clearly a secretion of that gas in a pure state.

A Noble Bequest.

Ex-Mayor T. M. Allen, of Hartford, has offered to give that city \$100,000 for the establishment of a free industrial school for the instruction of boys and girls in the business



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avocations of life—agriculture and the mechanic arts. He suggests that every boy, while he is acquiring a knowledge of the arts, sciences, and modern languages, should become a practical agriculturist and master of some useful trade, and that the girls should be instructed in all the practical duties of the household, understand and become familiar with the chemistry of the kitchen, and made to master the art of making every article of a lady's wardrobe, and also that they learn bookkeeping, banking, telegraphy, photogra-