VIENNA BRONZE WORK.

Great exertions were made by the Austrian manufacturers, not only to make a fine display at Vienna, but also to carry off at Amsterdam the special prizes offered by the Dutch authorities for the best designed articles admitted to the international competition.

Among those who contributed choice specimens was Hollenbach, of Vienna, whose bronze work attracted no little admiration.

One of the finest examples of M. Hollenbach's work, a flower vase in gilt bronze, is shown in the accompanying engraving.

VIENNA BRONZE WORK.

Promised Revival of Sodom and Gomorrah.

It is reported that French capitalists have secured a grant for a railway line from Jaffa to the interior of Palestine, which will open up the Jordan valley and the whole region north of the Suez canal. In certain contingencies this road might become of great military usefulness, but it appears further that the productive resources of the country are considerable, and what is more surprising, that the Dead Sea itself can be turned to commercial account. Chief of these at present are the stores of natural combustibles for which that region is noted.

Hitherto the main obstacle to the development of steam traffic in the Levant has been the total absence of combustible material. Not only Egypt, but the shores of Syria and the Red Sea are completely stripped of wood, and the coal imported from the West commands a price ranging from $10 to $24 a ton. Now the masses of asphalt continually thrown up by the Dead Sea attest the presence of vast subterranean layers of fossil vegetable matter, and these signs were not long overlooked by the enterprising men attracted to Suez by the opening of the canal and the movement of commerce in that direction. Recently numerous soundings have been made between Jaffa and the Dead Sea, which, so far, have not disclosed any deposits of coal proper, but, on the other hand, have laid bare inexhaustible beds of lignite.

Of itself this store of lignite is likely to prove an inestimable gain to the industries and commerce of the Levant; but we should add that the juxtaposition of asphalt in great quantities furnishes the elements of a mixture of lignite and asphaltum in the form of bricks, which is equal in heating capacity to the richest bituminous coal, while its cost on the ground is only $2.50 a ton. It is known that similar bricks, made up of coal dust and bituminous debris from gas works, are much sought after by French railways, since, besides their heating power, they greatly facilitate stowage, owing to their regular shape. Of course the bitumen of lower Palestine has been known from immemorial times, and was used to impart solidity to the structures of unbaked clay in Assyria and Egypt; but it may be said that the discovery of the subterranean combustible has lifted once for all the curse which has so long rested upon Sodom and Gomorrah, and will transform the wasted shores of the Dead Sea into a focus of industry and a magazine of wealth.

New Mechanical Inventions.

An improved Wrench has been patented by Mr. William R. Leeson, of Bridgewater, England. This invention relates to adjustable spanners or monkey-wrenches, and consists in a sort of toggle bar applied between the movable jaw and the shank or handle so as to cause the latter to be firmly griped, so that when pressure is applied to the jaw in a direction tending to open or move it away from the fixed jaw the gripe becomes tighter.

An improved Mechanical movement has been patented by Mr. David E. Cripe, of North Manchester, Ind. The object of this invention is to furnish an improved device for use upon all machinery where a rectilinear motion is converted into a rotary motion, to prevent the machinery from stopping with its crank upon a dead center, so that the machinery can always be started by the movement of the driving pitman.

An improved Fan Attachment for Sewing Machines, etc., has been patented by Mr. James W. Chambers, of Baltimore, Md. A standard is clamped to the table, and a socket to receive the fan handle is pivoted to the standard, and is vibrated by the conjoint and alternate action of a spiral spring and a flexible cord attached to the machine.

The Drainage of Lake Fucino.

The opening lecture to the class of Civil Engineering, at the University of Edinburgh, was lately given by Professor Fleeming Jenkin. The Professor gave an account of the great project for draining Lake Fucino, in Italy, which, commenced 2,000 years ago, had at last been successfully accomplished. The lake was situated in the Abruzzi province, 53 miles east of Rome, and covered the greater part of a large table land near the small town of Avezzano. The surface of the water was 2,094 feet above the sea, but to the lake there was no natural outlet; and though the action of the wind on the water prevented it from stagnating, the neighborhood of the lake was very unhealthy. Whenever there was a succession of years in which the rainfall was heavy, the lake rose enormously, and covered the adjoining country. The nearest river was the Liris, 3¾ miles away, but the mountain Salviano and a high plain separated the two. The comparisons between what the lake was recently and what it had been in ancient times, were extremely curious, as showing the changes which took place in the rainfall over a long cycle of years. Between 1783 and 1816 the lake rose 30 feet 5 inches, and was then 74 feet deep. From the commencement of 1820 to 1835 it fell to nearly 11 feet below its level in 1783, being then 31 feet deep. In 1861 it had risen again 30 feet. The remains of drainage works on the lake showed that its area was about the same in 1816 as it was in the reign of Julius Cæsar or the Emperor Claudius; though there was evidence that it had risen much higher in prehistoric times. The average extent of the lake was 33,050 acres. It was 12·4 miles long and 6·8 miles broad. The Italian engineers calculated that the lake had been silting up at the rate of 12 inches per century—and that was an interesting geographical fact, as showing the rate at which these large lakes silted—so that the present bottom was 15 feet higher than it was in the reign of the Emperor Claudius. Julius Cæsar had conceived the utility of draining the lake for the sake of the health of the district, and also with the view of increasing the corn growing area near Rome; but his death put an end to the scheme. In the reign of Claudius the project was again revived, and the favorite Narcissus was ordered to go on with the necessary works at the public expense. Suetonius stated that for eleven years 30,000 men were employed there, and the elder Pliny said that the works were so extraordinary that no language could give any idea of them. These works consisted in boring a tunnel under Mount Salviano, 984 feet below its summit, and under the Palentine fields at an average depth of 328 feet to discharge into the river Liris the surplus water of the lake. The construction of a tunnel of about four miles in length at a great depth under a mountain was, in the then state of engineering science, a wonderful undertaking. It would not be an easy job now. The tunnel actually was made, and the lake partially drained; and it appeared from the remains of the old tunnel that the original engineer understood his work well, but that the designs were imperfectly carried out, and the work shockingly scamped by the contractor. First of all, levels could not have been well understood in those days; nevertheless, the outfall had been most correctly chosen, so as to give the reasonable fall to the water of 1½ in 1,000; the new outlet at the river Liris was within a foot or two, and at the same level as that chosen by the Roman engineer, and the Roman engineer had also selected the direction of the tunnel very properly, and had followed so correctly the configuration of the ground in making it that the modern engineers had not been able to improve upon it. The old shafts—40 in number—which had been sunk so that headings might be driven in various directions at one and the same time, had been well constructed, and had been largely taken advantage of in constructing the modern tunnel. A great difficulty the Romans must have encountered was the quantity of water which flowed from the strata; and how they got over it was not easy to say, as it was not known that they had pumps sufficient to cope with large accumulations of water. One of the most curious things about the old tunnel was the constant variation of the cross sections. Beginning with a finely arched entrance, the tunnel as it went into the hill got smaller and smaller, just as the men got tired of the work, until in the center there was only a hole large enough for a man to creep through. Then it opened out again toward the outfall. Where it could be inspected it was all right, but what was altogether out of sight had been scamped in the way indicated. During the progress of the work a great slip had occurred; and evidently, as they could not get through the loose earth, the workmen turned off to the right and made a curved gallery through the stone, some 400 feet in length, round the obstructing mass. The tunnel was opened by Claudius, who first of all witnessed a sanguinary sham sea fight on the lake, in which the convicts, gathered from all parts of Italy, were made to destroy each other. The tunnel, however, soon got blocked, and it was not until Hadrian's time that it was put right. The lake was then reduced to some 17,000 acres. The entrance to the tunnel seemed to have been kept in good order down to the 5th century, but with the fall of the Roman Empire the tunnel was abandoned and the lake resumed its ancient extent. Various abortive attempts were afterward made to open the tunnel from time to time. In 1851 a company, with a capital of £200,000, was formed for draining the lake—the concession they were to get in return being land which was reclaimed; but this enterprise, too, fell through. Prince Alexander Torlonia, who held half the shares in the concern, however, bought up the other half, and having obtained the repeal of some objectionable clauses in the concession, proceeded with the work.

He consulted a French engineer, Franz Mayu de Monsucher, under whose direction a tunnel, following the line of the old one, for carrying off 11,000 gallons of water per minute from the lake, was completed in June, 1875. The cost had been £1,750,000 sterling. The lake had now been completely drained, Torlonia had got an estate of 35,000 acres, the neighborhood was now healthy, and the general prosperity which had been brought about to the population, by this great work, had been most marked.

Trial of Brainerd's Exhaust Pipe.

Brainerd's patent variable exhaust pipe, which we illustrated on page 262, vol. xxxviii., has recently had a trial on one of the engines of the Grand Trunk Railway, Canada. Four trips were made under similar circumstances, two with the Brainerd exhaust and two with the ordinary nozzle. The following table will give an idea of the comparative value of the two nozzles:

	Brainerd's exhaust.	Ordinary nozzle.
Total weight of train in pounds	1,659.150	1,590,400
Total weight of coal burned in pounds	10,305	11,388
Total weight of coal burned in pounds per mile	4,560	5,033
Total weight of coal burned in pounds per ton of load per mile	115	125
Pounds of water evaporated	73,111	72,203
Pounds of water evaporated per pound of coal	7·09	5·01
Maximum steam pressure	135	135
Minimum steam pressure	110	120
Average steam pressure	124·5	130·5