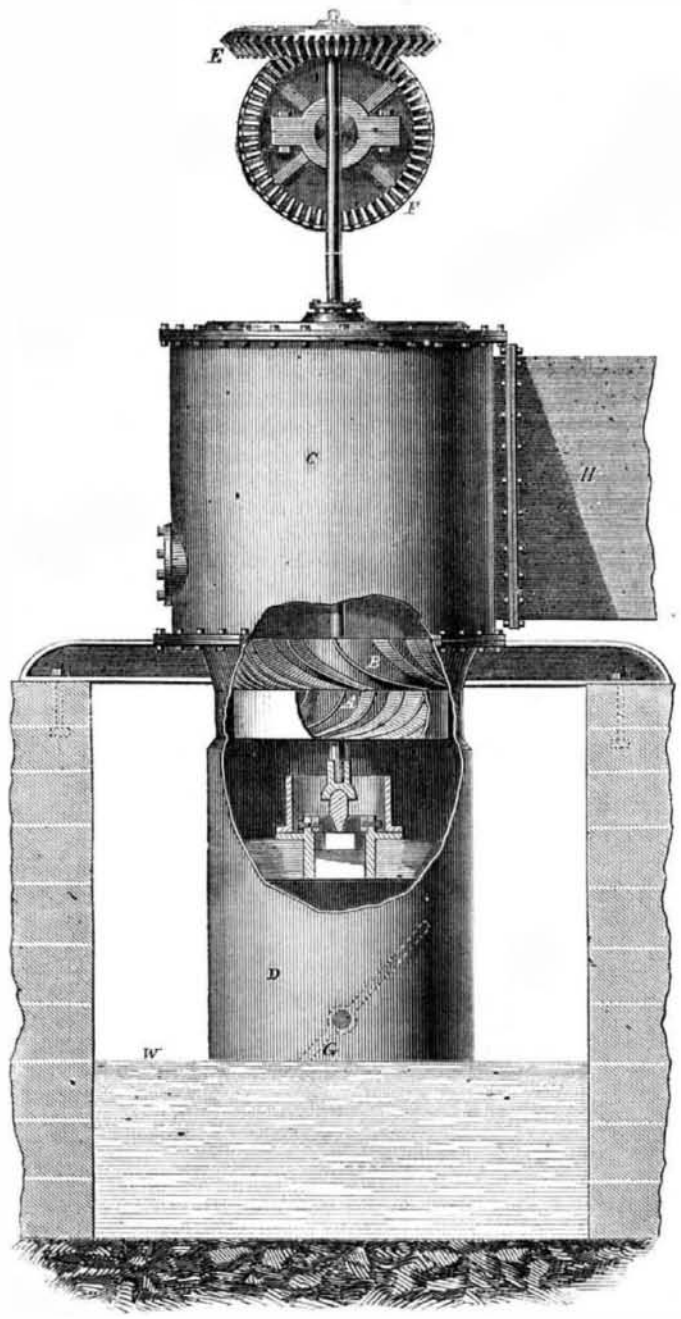
PHILADELPHIA WATER WHEEL EXPERIMENTS.

MESSRS. EDITORS:—Before giving a description of the accompanying engraving, it will be well to state the object of the late trial of turbine wheels at the Fairmount Water Works, and also describe the apparatus and the manner of testing, &c. The principal objects aimed at in the trials were, to ascertain the wheel best adapted to the location and the work of pumping, and also the one that would give the greatest ratio or per-centage when working at its maximum power. The head and fall at Fairmount vary, with the tide, from 8 to 12 feet; and the new wheels were each to be of the power to drive two double-acting pumps of 6 feet stroke and 18 inches bore, at a velocity from 10 to 16 revolutions per minute, raising the water 120 feet to the reservoir. The power of the wheels would be, on an average, that of 125 horses; and as their velocity would be much greater than that required for the pumps, the speed would have to be reduced by a combination of gearing. The head chosen for the trial of the model wheels was 6 feet, and the same combination of gearing was used to reduce the speed to the barrel shaft as would be required for the large wheels. The model wheels were to discharge 200 cubic feet of water per minute under the 6-foot head, but the size of the wheel was left to the judgment of the maker. The manner of testing was the raising of a weight to a certain hight and measuring the water used by the wheel in the given time; and in order to do this an apparatus was constructed, which consisted of a receiving tank and penstock to which was attached a box answering the purpose of a wheel-pit, in which the wheels were placed and secured to the penstock. Below the wheel-pit was the measuring tank, into which the water was discharged from the wheel while the weight was being raised This tank was just 5 feet square and perfectly level. To the outside, and communicating with the inside, there was attached a glass tube and a graduated scale, to mark the exact hight of water in the tank. Leading from the weir or overflow of the wheel-pit, and directly over this tank, was an open spout or conduit, arranged with a gate in such a manner that, at a given signal, the water dischargingfrom the wheel could be instantly turned into the tank, and as quickly checked. Above and over the wheel-pit a shears was erected, and on the top was placed a sheave about 2½ feet diameter, over which a rope passed from the drum to the box containing the weight below, giving a hight of about 50 feet for the weight to rise.

The wheel being set in its place and the rope attached to the barrel shaft being extended over the sheave to the weight below, the wheel was started and the weight raised a short distance, and there held to straighten it. A distance of 25 feet was measured-off by a line, and two signal marks tied to the rope; a stationary signal point was also fixed for these to pass, and all was so arranged that by the wheel running a certain time, and the weight steadily rising, the water was instantly turned into the registering tank below, at the first signal, and at the second it was quickly turned from it, and the hight of water in the tank was then noted down. In order to avoid error in the working of the apparatus, each weight was raised successively three times, and the average amonnt of water was taken as one experiment. In the case of the wheel here described there were 13 experiments with weights from 750 to 1,100 pounds, varying 25 pounds each. The time varied from 20 to 30 seconds, and the greatest result produced was .8777 per cent, or 925 pounds raised 25 feet by 70.25 cubic feet of water, under a head and fall of 6 feet [(925×25)÷(70.25 ×62.5 ×6) = .8777]; to this must be added the friction of the transmitting machinery, estimated at 3 per cent, making a total useful effect of .9077 per-cent of the power employed. The average per-centage of the 13 experiments was .8483 + .03 = .8783. The transmitting machinery consisted of one pair of bevels of 17 and 69 teeth, a counter-shaft, and one pair of spur weeels of 60 and 96 teeth, and barrel shaft, also the pulley shaft on top of shears, reducing the speed from 20 to 24 revolutions of drum shaft per minute.



STEVENSON'S JONVAL TURBINE WATER WHEEL.

The accompanying engraving is a representation of the turbine. H is the trunk for conveying the water into the case or penstock. D is the draft box or suction tube, which, together with the case is partly broken away to show the movable wheel or turbine, A, the stationary or guide wheel, B, and the bridge or step arrangement. G is a gate inside the draft box, and it is operated by a lever. E F are bevel gears. The draft box is an air-tight tube inclosing the wheel and extending down into the tail-water, W, to a depth sufficient to prevent the air from entering and destroying the partial vacuum or draft upon the wheel. A wheel of this kind, located between the two levels of the fall, gets its power from below as well as above; by opening the gate, G, the whole column is set in motion; the water entering the case above through the trunk, H, on one side, takes a circular motion around over the stationary or guide wheel, B, in the direction of the wheel's motion, thus giving the momentum of water entering the case to the wheel, and at the same time equalizing the pressure on all the buckets. This is a new feature of the Jonval turbine and is considered a good one for maximum power wheels, and especially where the water has to be conveyed a long distance to the wheel, as a much smaller trunk or pipe can be used, and considerable expense saved. But the same results will be produced where the water can be brought in over the wheel in a large body at a reduced velocity by a proper construction of the guides. The great per-centage of power obtained by this over the other Jonval wheels, at the late trial, was produced by the difference in form and curve of bucket and guide and the proportions of the wheel generally. It was a strong, practical working wheel, 22 inches in diameter, with well-finished brass buckets, a step of *lignum-vitæ*, 2 inches in diameter (the usual size for such wheels), and the journals of the shafts were 1⅞ inches in diameter by 5 inches long. This wheel can be built in different forms to come within the means of all manufacturers, and it affords, at the same time, a first-class power. J. E. STEVENSON, Millwright.

Novelty Iron Works, New York, Aug. 25, 1860.

OUR WASHINGTON CORRESPONDENCE.

WASHINGTON, D. C., August 25, 1860.

MESSRS. EDITORS:—The great hall of the new western wing of the Patent Office is now completed, and the rejected models (nearly 50,000 in number) have been therein deposited and classified. The hall is 270 feet long and 64 feet broad, unobstructed by supporting columns, and paved with black and white squares of marble. It forms a most elegant and spacious apartment, and, as a specimen of good architecture, it is truly a credit to the country.

The models are placed in iron-framed cabinets arranged near the walls, and they present a very neat and attractive appearance. How immense the sum of toil and study which these silent, rejected models represent!

The hall of the eastern wing having become filled to overflowing with patented models, the southern wing, also, is now being occupied by them; but as this apartment is comparatively small; more space will soon be required. It is hoped that Congress, at its next session, will pass the bill authorizing the return of the rejected models to their respective owners, and thus provide room for the patents.

The northern wing of the Patent Office, lately finished, is occupied by the Census Bureau and Land Office clerks.

The open court-yard inclosed by the four wings of the building—a small park in size—has been laid-out with walks and beautifully grassed over. Two pretty fountains, supplied from the Potomac, adorn the inclosure with glittering jets.

Patent Office Report for 1859.—The first volume containing printed matter was issued some time ago. The two remaining volumes, containing the drawings of all the patents for the year, will be published in the course of three months. Through the favor of the librarian of the Patent Office—Professor W. E. Jillson—we have been enabled to examine some of the proof-sheets of the drawings. They are printed from photographic plates prepared by a method secret with the contractor, Mr. E. P. Jewett, of Buffalo, N. Y. The printed specimens that we have seen are well-done—better, indeed, than might be expected, considering all the circumstances. The original drawings were furnished by the Patent Office, and were done by hand, in pencil; but on so dimunitive a scale that it was found necessary to enlarge them. The bits of paper containing the drawings were then pasted upon stiff sheets, each having as many pictures as was necessary to constitute a page of the book. The drawings, thus arranged, were enlarged, several at a time, by the photograph, and thus reproduced upon metallic plates, ready for printing. With such a practical evidence of the convenience and success of the photograph in copying drawings, we wonder that the Patent Office does not at once discard the present clumsy and costly system of hand labor. Reducing by hand, and then enlarging by the photograph, seems like putting the cart before the horse. Why not use the photograph to start with, and thus produce far better originals, of the exact size required, at a less expense and all at one operation? The ascertained cost