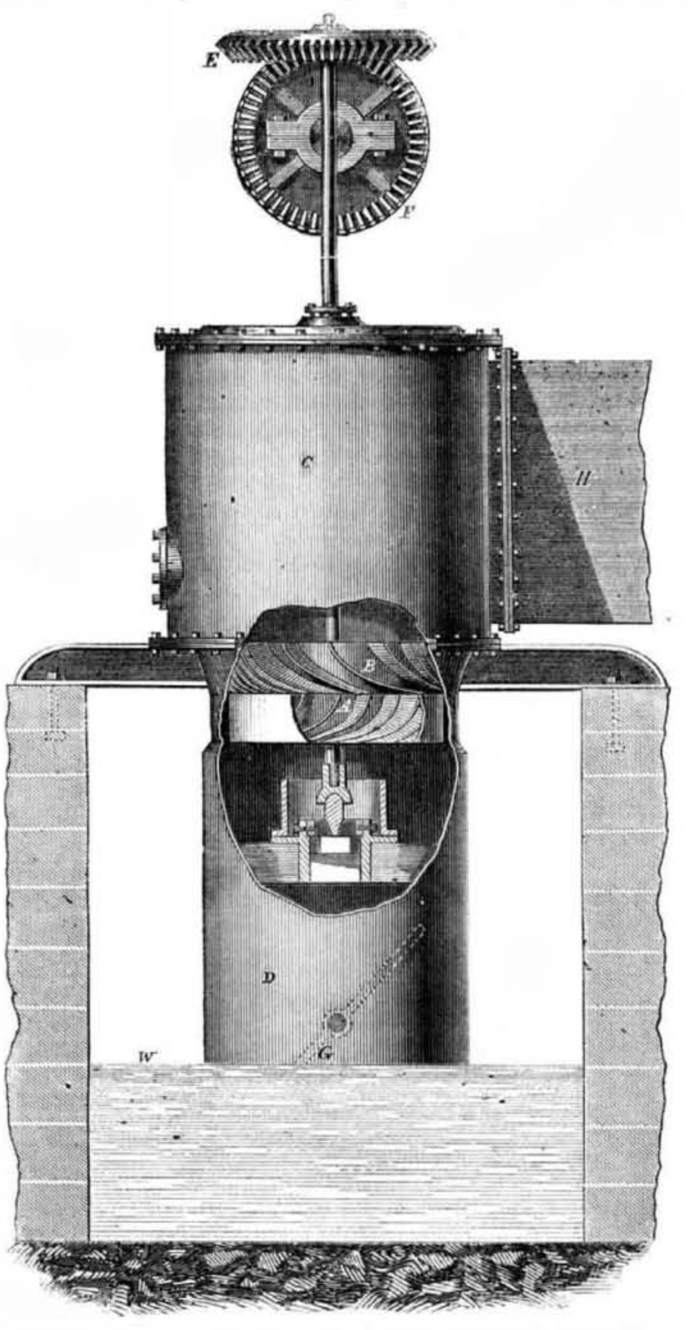
PHILADELPHIA WATER WHEEL EXPERIMENTS.

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 percentage 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 amount 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



STEVENSON'S JONVAL TURBINE WATER WHEEL.

the pulley shaft on top of shears, reducing the speed from 20 to 24 revolutions of drum shaft per minute.

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 1½ 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 of copying linear drawings by the photograph is only about *one-tenth* as much as the hand system. Such are the results obtained at the Ordnance Office in England, in which a saving to the government of $200,000 per annum has been effected by the adoption of the photograph for this particular purpose.

Professor Jillson has arranged a single index to the Patent Office report, by which the name of each patentee, the number of his patent, the pages of the drawing and claim, are all exhibited at a glance. This is an excellent improvement. Heretofore, it has been necessary to consult two separate and inconvenient indexes.

B.

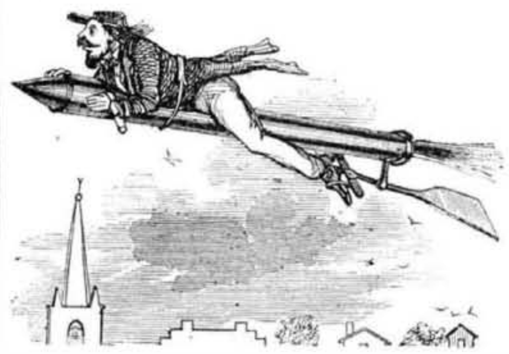
FLYING MACHINES IN THE FUTURE.

Of all inventions of which it is possible to conceive in the futnre, there is none which so captivates the imagination as that of a flying machine. The power of rising up into the air, and rnshing in any direction desired at the rate of a mile or more in a minute, is a power for which mankind would be willing to pay very liberally. What a luxurious mode of locomotion! To sweep along smoothly, gracefully and swiftly over the tree tops, changing the course at pleasure, and alighting at will; how perfectly it would eclipse all other means of

travel by land and sea! This magnificent problem, so alluring to the imagination and of the highest practical convenience and value, has been left heretofore to the dreams of a few visionaries and the feeble efforts of a few clumsy inventors. We, ourselves, have thought that, in the present state of human knowledge, it contained no promise of success. But, considering the greatness of the prize and the trifling character of the endeavors which have been put forth to obtain it, would it not indeed be well, as our correspondents suggest, to make a new and combined effort to realize it, under all the light and power of modern science and mechanism?

What little attention this subject has heretofore received from inventors has been almost wholly confined to two directions—flying by muscular power and the guidance of balloons. Both of these we have been accustomed to regard as impracticable. But, as Mr. Hyatt suggests, the flying by muscular power is a field of invention which has by no means been thoroughly explored. Though it may be impossible for a man to raise his own weight rapidly by beating the air, the *sustaining* of his weight in the air and moving horizontally is an entirely different problem. In the bird, the wings are moved by the most powerful muscles in the system. Has this hint been acted upon, and the muscles of the legs and shoulders been brought to bear upon the wings in the most efficient manner? Again: has the constancy of the rotary motion been made available in a flying machine? If spiral fans were used, of course, two sets would be required to prevent the machine from turning itself in the direction opposite to the motion of the fans.

But the thing that is really wanted is a machine driven by some natural power, so that the flyer may ride at his ease. For this purpose, we mnst have a new gas, electric or chemical engine. What we require are two or more substances, solid or liquid, which, by merely being brought in contact, would be converted into gas. Place these in the re-action or Avery engine, which, by running at high velocity, would yield a large power in proportion to its weight, and it is possible—yes, probable—that the machine would drive spiral fans with sufficient force to raise itself from the ground. Would not the binoxyd of hydrogen and charcoal fill these conditions? This engine would run with such immense velocity that the fans would have to be very small; and it is probable that a moderate widening of the arms themselves—giving them a spiral inclination—would be the true plan. There might be two generating vessels,



corresponding to the steam boiler; and when one was exhausted, the second might be brought into action while the supply of material was renewed in the first; thus supplying and exhausting them alternately.

The simplest, however, of all conceivable flying machines would be a cylinder blowing out gas in the rear, and driving itself along on the principle of the rocket. Carbonic acid may be liquified, and, at a temperature of 150°, it exerts a pressure of 1,496 lbs. to the square inch. If, consequently, a cylinder were filled with this liquid, and an opening, an inch square, made in the lower end, the cylinder would be driven upward with a force equal to 1,496 lbs., which would carry a man, with a surplus of som 350 lbs. for the weight of the machine.

We might add several other hints to inventors who desire to enter on this enticing field; but we will conclude with only one more. The newly-discovered metal aluminum, from its extraordinary combination of lightness and strength, is the proper material for flying machines.

FLYING MACHINES—A BIRD-WOMAN.

Messrs. Editors:—I have seen in your paper an offer of $1,000, from Mr. Hyatt, for the best flying machine; and also (on page 116 of the present volume) a

letter asking for communications on this subject, and I thought I would write to you what I know about it. Six years ago, a friend (a Spaniard) told me that he had once witnessed or read an account of (I don't remember which) the trial of an apparatus for flying through the air. This apparatus was made by an old philosopher, and the experiment was made by his daughter above the bay of Barcelona (Spain); there being numerous boats on the waters of the bay, in case of accident. The experiment was perfectly successful; the young lady circled round and round for many miles, imitating most of the motions of the birds, and landed safely upon the shore. Unfortunately, however, the scientific world was never made aware of this successful experiment in aerial navigation, for the apparatus of the "bird-woman" was ruthlessly seized by the police as soon as she touched *terra-firma;* the authorities considering that her "machine" would be dangerous if made public, and used for unlawful purposes. This happened about 10 years ago. All that "leaked out" in reference to the shape of the apparatus was that it looked something like a bat on the wing, and was made of varnished silk, with some mechanism (to give and direct its motion) operated by the feet and hands of the fair aeronaut.

If Mr. Hyatt or other persons are anxious to learn anything further about this machine, perhaps they can obtain information from the above source. E. M.

Boston, Mass., August 25, 1860.

[We suppose that the "source" of information to which our correspondent refers is the Barcelona police who seized the flying maid. We imagine that Hyatt would have a "good time" in trying to find out about a matter which seems to have frightened the authorities of Barcelona out of their common sense. However, we give the statement for what it is worth; and if this letter of our correspondent should meet the eye of any member of the police of the above-named city, who was cognizant of the facts above narrated, he will oblige us by communicating the same.—Eds.

HYATT'S $1 000 PRIZE.

Messrs. Editors:—I see by your paper that Thaddeus Hyatt offers a prize of $1,000 for the best flying machine. Now, I would like to know whether there are any conditions affixed to this offer. Is there any particular distance required for the machine to fly? Will a navigable balloon fill the requirement? Must the machine be able to raise a man? Some of us would like to see Mr. Hyatt's offer made more definite on these points.

Of course a practical flying machine, cheap in its construction, and operating at little expense, and which would transport a man unlimited distances through the air with certainty and safety, would be the source of immense wealth to its inventor, and the offer of a thousand dollars for such a machine would be ridiculous. But if Mr. Hyatt is a public-spirited man of wealth, who is ready to pay $1,000 for a *step* towards the acquisition of this greatest boon which science and mechanism can bestow on the human race, it is possible that he may have the opportunity of doing so. I am, gentlemen, one of those inventors who profess to understand that matter is not to be moved without the expenditure of adequate force; and it is my opinion that an offer of $5,000 or $10,000 for a machine that would raise the body of a man from the ground, without any buoyancy of the atmosphere, but simply by beating the air, would call forth more than one competitor, and that the prize would be carried off. It is possible, even, that this thousand-dollar prize may call forth inventions that will fill the conditions if they are sufficiently easy; for instance, if *models* only are required, which will fly with their own weight by their own power in beating the air. B. G.

New York, Aug. 25, 1860.

Making Cloth Fireproof.—A patent has lately been secured by F. A. Abel, of the Royal Arsenal at Woolwich (England), for a new method of rendering textile fabrics proof against fire. He takes 25 lbs. of sugar-of-lead, and 15 lbs. of litharge, and boils them for half-an-hour in 40 gallons of water, when the liquor is allowed to settle. Any quantity of the clear liquid that will suffice to cover the cloth to be operated upon is now taken, and the cloth is immersed and freely saturated in it, then dried in the open air. The cloth is now immersed for about one hour in a hot, and moderately strong solution of the silicate of soda, then thoroughly washed in cold water and dried. By these operations an insoluble silicate is formed within the pores of the cloth, thus making it fireproof.

Is the Sun growing Cold and Dark?—There are now more spots on the sun than have been seen before for many years; some of these are visible through a smoked glass to the naked eye. Several stars—some of them of great brilliancy, which, from their ascertained distance, must have been as large as our sun—have totally disappeared from the sky; and the question has been raised among astronomers, whether the light and heat of the sun are gradually fading away. As this would be accompanied by the destruction of all the plants and animals on the earth, it is rather an interesting question. The sun's light and heat is diminished by the dark spots at the present time about 1 per cent.