The operations undertaken by General Newton at Hallett's Point, for the Hell Gate, involve the solution of an important problem of engineering as regards the most effective and economical process of submarine blasting. Tho *modus operandi* employed at Hallett's Point is entirely different from the manner in which the work of removing the obstructions has been accomplished at Diamond and Coenties Reefs, and is what is technically termed tunnel blasting. At Hallett's Point, in August, 1869, a coffer dam was commenced under the superintendence of General Newton, and was completed in October.

The dam is an irregular polygon in shape, having a circumference of 443 feet and a mean interior diameter of about 100 feet. The dam is built between low and high water marks. The excavation of the shaft immediately followed the construction of the dam, and during the spring of 1870 the shaft was sunk to the depth of twenty-two feet below water.

The theory of the mining operations contemplates the removal of as much rock as can be excavated with safety previous to the final explosion, the result of which will be the sinking of the remaining mass into the deep pit excavated for its reception. The mass of rock remaining for the final explosion will be supported by piers, each of which will be charged with nitro-glycerin. These piers are simply a portion of the solid rock left standing. From the bottom of the main shaft, tunnels proceed in all directions, and are ten in number. Each of the tunnels extends from 150 feet to 350 feet outward, and they are all connected together by cross-galleries at intervals of twenty-five feet. The tunnels were begun towards the close of July, 1870, the shaft being at the same time sunk to a line nearly forty feet below low water mark. The tunneling is really an object of a great deal of interest, as much from the novelty as from any other feature. The tunnels are of various cross sections, some over twenty feet in hight, and varying in width from ten to fifteen feet."

The "Improved Drill" of the American Diamond Drill Company, recently illustrated and described in the SCIENTIFIC AMERICAN, has been recently introduced into one of the headings, and, we are informed by General Newton, gives prospect of affording efficient aid in hastening the completion of the work, which will take probably two or three years more continuous labor. As the work advances, room is made for more miners, and therefore the rate of advance may increase with the progress of the excavation.

The liberal views of the Engineer in Chief, General Newton, are rendering this work important in another respect. He has made it a sort of engineering arena for the trial of different explosives and drilling machines; and the relative value of most of the mining appliances in market will be determined during the progress of the work. In this way, important contributions to engineering science will be made, whose value will be second only to the splendid results anticipated by the removal of the obstructions from the Hell Gate passage. These out of the way, the upper end of the island will become a scene of busy thrift, scarcely less prosperous than that which fills with unintermitting hum the lower part of the city.

The Holly System of Hydrants for Extinguishing Fires.

A correspondent, Mr. J. H. Balsley, of Dayton, Ohio, writes to inform us that the Holly system has been adopted in that city. Twenty-one miles of pipe have been laid, and the propelling power is a stationary engine, capable of producing a water pressure of 130 lbs. on the inch. A pressure of 80 lbs. on the inch will throw water 100 feet high, through 100 feet of hose, out of a one inch nozzle. With iron pipes to stand this pressure, all the connections must be equally strong, especially in buildings, as the bursting of a pipe under that pressure will flood a building in a few minutes. This apparatus will throw six or eight good fire streams when running at a safe speed. As the supply of water for domestic and manufacturing purposes is taken from these pipes, the engine must be kept always in motion to keep up a pressure sufficient for fire extinguishing purposes; in any other case, two sets of engines and pipes would be needed. The bursting of a four inch pipe will destroy the fire streams, and a large consumption for domestic or manufacturing purposes will have the same effect. The consumption of fuel in proportion to the water raised is considerable, and the expenses of the fire department, and the insurance premiums have not decreased in consequence of the introduction of this system.

THE ECLIPSE OF THE SUN.—In the number of our journal for October 21, of the present year, we informed our readers of the preparations being made, at home and abroad, for obtaining accurate and detailed accounts of the solar phenomena visible during the eclipse taking place on December 11; and we are glad to be able to report that the most favorable conditions existed during the critical period, and that perfect photographs of the corona were obtained. A party of astronomers, English, French, and Italian, journeyed to the East for the purpose of observing the eclipse, the most approved instruments having been forwarded in advance; and we hear, by telegraph *viâ* the Red Sea, that the desires of the party were fully satisfied, and that the settlement of several disputed facts as to the sun's composition, atmosphere, and luminosity may be looked for on the publication of the report. Mr. Norman Lockyer had charge of the expedition, Italy being represented by Signor Respighi, and France by M. Jannsen.

THE Russian Grand Duke, Prince Alexis, has contributed $5000 for distribution among the poor of New York city.

NOTES ON FLYING AND FLYING MACHINES.

[From the Cornhill Magazine.]

NUMBER II.

We owe to M. de Lucy, of Paris, the results of the first actual experiments carried out in this direction. The following account of his observations (made in the years 1868, 1869) is taken from a paper by Mr. Brearey, the Honorary Secretary to the Aëronaut cal Society. "M. de Lucy asserts," says Mr. Brearey, "that there is an unchangeable law to which he has never found any exception, amongst the considerable number of birds and insects whose weight and measurements he has taken—namely, that the smaller and lighter the winged animal is, the greater is the comparative extent of supporting surface. Thus in comparing insects with one another—the gnat, which weighs 460 times less than the stag beetle, has 14 times greater relative surface. The lady bird, which weighs 150 times less than the stag beetle, possesses 5 times more relative surface, etc. It is the same with birds. The sparrow, which weighs about ten times less than a pigeon, has twice as much relative surface. The pigeon, which weighs about eight times less than the stork, has twice as much relative surface. The sparrow, which weighs 339 times less than the Australian crane, possesses 7 times more relative surface, etc. If we now compare the insects and the birds, the gradation will become even more striking. The gnat, for example, which weighs 97,000 times less than the pigeon, has 40 times more relative surface; it weighs 3,000,000 times less than the crane of Australia, and possesses relatively 140 times more surface than this latter, which is the heaviest bird M. de Lucy had weighed, and was that also which had the smallest amount of surface, the weight being nearly 21 lbs., and the supporting surface 137 inches per kilogramme (2 lbs. $3\frac{1}{4}$ oz.). Yet of all travelling birds the Australian cranes undertake the longest and most remote journeys, and, with the exception of the eagles, elevate themselves highest, and maintain flight the longest."

M. de Lucy does not seem to have noticed the law to which these numbers point. It is exceedingly simple, and amounts in fact merely to this, that instead of the wing surface of a flying creature being proportioned to the weight, it should be proportioned to the surface of the body (or technically, that instead of being proportioned to the cube, it should be proportioned to the square of the linear dimensions). Thus, suppose that of two flying creatures one is 7 times as tall as the other, the proportions of their bodies being similar, then the body surface of the larger will be 49 times (or 7 times 7) that of the other, and the weight 343 times (or 7 times 7 times 7) that of the other. But instead of the extent of wing surface being 343 times as great, it is but 49 times as great. In other words, relatively to its weight, the smaller will have a wing surface 7 times greater than that of the larger. How closely this agrees with what is observed in nature will be seen by the case of the sparrow as compared with the Australian crane; for M. de Lucy's experiments show that the sparrow weighs 339 times less than the Australian crane, but has a relative wing surface 7 times greater.

It follows, in fact, from M. de Lucy's experiments that, as we see in nature, birds of similar shape should have wings similarly proportioned, and not wings corresponding to the relative weight of the birds. The same remark applies to insects; and we see, in fact, that the bee, the bluebottle, and the common fly—insects not unlike in their proportions—have wings proportioned to their surface dimensions; the same holding amongst long bodied insects, like the gnat and the dragon fly, and the same also among the different orders of flying beetles.

So that, setting apart differences of muscular capacity and adaptation, a man, in order to fly, would need wings bearing the same proportion to his body as we observe in the wings of the sparrow or the pigeon. In fact, the wings commonly assigned to angels by sculptors and painters would not be so disproportioned to the requirements of flight as has been commonly supposed, if only the muscular power of the human frame were well adapted to act upon wings so placed and shaped, and there were no actual inferiority in the power of human muscles (cross section for cross section) as compared with those birds.

So far as the practicability of actual flight on man's part is concerned, these two points are, indeed, among the most important that we have to consider. It was to Borelli's remarks on these points, in his famous treatise, *De Motu Animalium*, that the opinion so long entertained respecting the impracticability of flight must be referred. He compared the relative dimensions of the breast muscles of birds with those of corresponding muscles in man, and thence argued that man's frame is altogether unadapted to the use of wings. He compared also the relative muscular energy of birds and men, that is, the power of muscles of equal size in the bird and the man; and was yet further confirmed in the opinion that man can never be a flying animal.

But although the reasoning of Borelli suffices perfectly well to show that man can never fly by attaching pinions to his arms, and flapping these in imitation (however close) of a bird's action in flying, it by no means follows that man must be unable to fly when the most powerful muscles of his body are called into action to move suitably devised pinions. M. Besnier made a step in this direction (towards the close of the last century) when he employed, in his attempts to fly, those powerful muscles of the arm which are used in supporting a weight over the shoulder (as when a bricklayer carries a hod, or when a countryman carries a load of hay with a pitchfork). But the way in which he employed the muscles of the leg was less satisfactory. In his method, a long rod passed over each shoulder, folding pinions being attached to both ends of each rod. When either end of a rod was drawn down, the descending pinion opened, the ascending pinion at the other end closing; and the two rods were worked by alternate downward pulls with the arms and legs. The downward pull with the arms was exceedingly effective; but the downward pull with the legs was altogether feeble. For the body lying horizontally, the muscles used in the downward pull with the legs were those by which the leg is carried forward in walking, and these muscles have very little strength, as any one will see who, standing upright on one leg, tries, without bending the knee of the other, to push forward any considerable weight with the front of his leg.

Yet even with this imperfect contrivance Besnier achieved a partial success. His pinions did not, indeed, serve to raise him in the air; but when, by a sharp run forward, he had brought that aërial supporting power, of which we have spoken above into action, the pinions, sharply worked, so far sustained him as to allow him to cross a river of considerable width. It is not unlikely that, had Besnier provided fixed sustaining surfaces, in addition to the movable pinions, he might have increased the distance he could traverse. But, as regards flight, there was a further and much more serious defect in his apparatus. No means whatever were provided for propulsion. The wings tended to raise the body (this tendency only availing, however, to sustain it); but they could give no forward motion. With a slight modification, it is probable that Besnier's method would enable an active man to travel over ground with extreme rapidity, clearing impediments of considerable height, and taking tolerably wide rivers almost "in his stride;" but we believe that the method could never enable men actually to fly.

It may be remarked, indeed, that the art of flying, if it is ever attained, will probably be arrived at by means of attempts directed, in the first place, towards rapid passage along *terra firma*. As the trapeze gymnast avails himself of the supporting power of ropes, so the supporting power of the air may be called into action to aid men in traversing the ground. The following passage from Turnor's *Astra Castra* shows that our velocipedists might soon be outvied by half-flying pedestrians:—"Soon after Bacon's time," he tells us, "projects were instituted to train up children from their infancy in the exercise of flying with artificial wings, which seemed to be the favorite plan of the artists and philosophers of that day. If we credit the accounts of some of these experiments, it would seem that considerable progress was made that way. The individuals who used the wings could skim over the surface of the earth with a great deal of ease and celerity. This was accomplished by the combined faculties of running and flying. It is stated that, by an alternate continued motion of the wings against the air, and of the feet against the ground, they were enabled to move along with a striding motion, and with incredible speed."

A gymnast of our own day, Mr. Charles Spencer ("one of the best teachers of gymnastics in this country," says Mr. Brearey), has met with even more marked success, for he has been able to raise himself by the action of wings attached to his arms. The material of which these wings were made was too fragile for actual flight; and Mr. Spencer was prevented from making strong efforts because the wicker work, to which the apparatus was attached, fitting tightly round his body, caused pain, and obstructed his movements. Yet he tells us that, running down a small incline in the open air, and jumping from the ground, he has been able, by the action of the wings, to sustain flight for a distance of 150 feet; and when the apparatus was suspended in the transept of the Crystal Palace (in the spring of 1868), he was able, as we have said, to raise himself, though only to a slight extent, by the action of the wings. It should be remarked, however, that his apparatus seems very little adapted for its purpose, since the wings are attached to the arms in such sort that the weak breast muscles are chiefly called into play. Borelli's main objection applies in full to such a contrivance; and the wonder is that Mr. Spencer met with even a partial success. One would have expected rather that the prediction of a writer in the *Times* (calling himself Apteryx, or the Wingless) would have been fulfilled, and that "the aëronaut, if he flapped at all, would come to grief, like the sage in *Rasselas* and all others who have tried flying with artificial wing."

The objection founded on the relative weakness of the muscles of man as compared with those of birds (without reference to the question of adaptation), seems at first sight more serious. Although there can be little question that the superior strength of the muscles of birds has been in general enormously exaggerated, yet such a superiority undoubtedly exists to some degree. This gives the bird a clear advantage over man, insomuch that man can never hope by his unaided exertions to rival the bird in its own element. It by no means follows, however, that because man may never be able to rival the flight of the eagle or the condor, of the pigeon or the swallow, he must therefore needs be unable to fly at all.

It should be remembered, also, that men can avail themselves of contrivances by which a considerable velocity may be acquired at starting; and that when the aëronaut is once launched with adequate velocity, a comparatively moderate exertion of force may probably enable him to maintain that velocity, or even to increase it. In this case, a moderate exertion of force would also suffice to enable him to rise to a higher level. Te show that this is so, we need only return to the illustration drawn from the kite. If a weight be attached to a kite's tail, the kite, which will maintain a certain hight when the wind is blowing with a certain degree of force, will rise to a greater hight when the force of the wind is but slightly increased.

Kites afford, indeed, the most striking evidence of the elevating power resulting from the swift motion of an inclined plane through the air, the fact being remembered always that, whatever supporting and elevating power is obtained when air moves horizontally with a certain velocity against an inclined plane, precisely the same supporting and elevating power will be obtained when the inclined plane is drawn or propelled horizontally with equal velocity through still air. Now the following passages from the *History of the Charvolant*, or kite carriage, bear significantly on the subject we are now upon. The kite employed in the first experiments (made early in the present century) had a surface of fifty-five square feet. "Nor was less progress made in the experimental department when large weights were required to be raised or transposed. While on this subject, we must not omit to observe that the first person who soared aloft in the air by this invention was a lady, whose courage would not be denied this test of its strength. An arm chair was brought on the ground, then, lowering the cordage of the kite by slackening the lower brace, the chair was firmly lashed to the main line, and the lady took her seat. The main brace being hauled taut, the huge buoyant sail rose aloft with its fair burden, continuing to ascend to the hight of a hundred yards. On descending, she expressed herself much pleased with the easy motion of the kite and the delightful prospect she had enjoyed. Soon after this, another experiment of a similar nature took place, when the inventor's son successfully carried out a design not less safe than bold—that of scaling, by this powerful aërial machine, the brow of a cliff two hundred feet in perpendicular hight. Here, after safely landing, he again took his seat in a chair expressly prepared for the purpose; and, detaching the swivel line which kept it at its elevation, glided gently down the cordage to the hand of the director. The buoyant sail employed on this occasion was thirty feet in hight, and had a proportionate spread of canvas. The rise of the machine was most majestic, and nothing could surpass the steadiness with which it was manœuvred, the certainty with which it answered the action of the braces, and the ease with which its power was lessened or increased. . . . Subsequently to this, an experiment of a very bold and novel character was made upon an extensive down, where a wagon with a considerable load was drawn along, while this huge machine at the same time carried an observer aloft in the air, realizing almost the romance of flying."

We have here abundant evidence of the supporting and elevating power of the air. This power is, however, in a sense, dormant. It requires to be called into action by suitaple contrivances. In the kite, advantage is taken of the motion of the air. In flight, advantage must be taken of motion athwart the air, this motion being, in the first place, communicated while the aëronaut or flying machine is on the ground. Given a sufficient extent of supporting surface and an adequate velocity, any body, however heavy, may be made to rise from the ground; and there can be no question that mechanicians can devise the means of obtaining at least a sufficient velocity of motion to raise either a man or a flying machine, provided with no greater extent of supporting surface than would be manageable in either case. It is not the difficulty of obtaining from the air *at starting* the requisite sup porting power that need deter the aëronaut. The real difficulties are those which follow. The velocity of motion must be maintained, and should admit of being increased. There must be the means of increasing the elevation, however slowly. There must be the means of guiding the aeronaut's flight. And, lastly, the aëronaut or the flying machine must fly with well preserved balance—the supporting power of the air depending entirely on the steadiness with which the supporting surfaces traverse it.

We believe that these difficulties are not insuperable; and not only so, but that none of the failures recorded during the long history of aëronautical experiments need discourage us from trusting in eventual success. Nearly all those failures have resulted from the neglect of conditions which have now been shown to be essential to the solution of the problem. Nothing but failure could be looked for from the attempts hitherto made: and indeed, the only wonder is that failure has not been always as disastrous as in the case of Cocking's ill judged descent. If a man who has made no previous experiments will insist on jumping from the summit of a steeple, with untried wings attached to his arms, it cannot greatly be wondered at that he falls to the ground and breaks his limbs, as Allard and others have done. If, notwithstanding the well known weakness of the human breast muscles, the aëronaut tries to rise, by flapping wings like a bird's, we cannot be surprised that he should fail in his purpose. Nor again can we wonder if attempts to direct balloons from the car should fail, when we know that the car could not even be drawn with ropes against a steady breeze without injury to the supporting balloon. And we need look no further, for the cause of the repeated failures of all the flying machines yet constructed, than to the fact that no adequate provision has yet been made to balance such machines so that they may travel steadily through the air. It seems to have been supposed that if propelling and elevating power were supplied, the flying machine would balance itself; and accordingly, if we examine the proposed constructions, we find that in nine cases out of ten (if not in all) the machine would be as likely to travel bottom upwards as on an even keel. The common parachute (which, however, is not a flying machine) is the only instance we can think of in which a non-buoyant machine for aërial locomotion has possessed what is called a "position of rest."

Perhaps the gravest mistake of all is that of supposing that, on a first trial, a man could balance himself in the air by means of wings. Placed for the first time in deep water, man is utterly unable to swim, and if left to himself will inevitably drown; although a very slight and very easily acquired knowledge of the requisite motions will enable him to preserve his balance. And yet it seems to have been conceived by most of those who have attempted flight, that, when first left to himself in open air, with a more or less ingeniously contrived apparatus attached to him, a man can, not only balance himself in that unstable medium, but resist the down drawing action of gravity (which scarcely acts at all on the swimmer), and wing his way through the air by a series of new and untried movements!

It encourages confidence in the attempts now being made to solve the problem of aërial locomotion, that they are tentative—founded on observation and experiment, and not on vague notions respecting the manner in which birds fly. Fresh experiments are to be made, more particularly on the supporting power of the air, upon bodies of different form moving with different degrees of velocity. These experiments are under the charge of Messrs. Browning and Wenham, of the Aëronautical Society, whose skill in experimental research, and more particularly in inquiries depending on mechanical considerations, will give a high value to their deductions. The question of securing the equipoise of flying machines has also received attention; and it is probable that the principle of the instrument called the gyroscope will be call into action to secure steadiness of motion, at least in the experimental flights. What this principle is, need not here be scientifically discussed. But it may be described as the tendency of a rotating body to preserve unchanged the direction of the axis about which the body is rotating. The spinning top and the quoit (well thrown), afford illustrations of this principle. The peculiar flight of a flat missile, already referred to, depends on the same principle; for the flight only exhibits the peculiarities mentioned when the missile is caused to whirl in its own plane. But the most striking evidence, yet given of the steadying property of rotation, is that afforded by the experiments of Professor Piazzi Smyth, the Astronomer Royal for Scotland. During the voyage to Teneriffe (where, it will be remembered, his well known Astronomer's Experiment was carried out), he tested the power of the gyroscope in giving steadiness by causing a telescope to be so mounted, that the stand could not shift in position without changing the axial pose of a heavy rotating disk. The disk was set in rapid rotation by the sailors, and then the Professor directed the telescope towards a ship on the horizon. A fresh wind was blowing, so that everything on deck was swayed in lively sort by the tossing vessel; nor did the telescope *seem* a whit steadier—the motion of objects round it giving to the instrument an appearance of equal instability. But the officers were invited to look through the tube, and to their amazement, the distant ship was seen as steady in the middle of the telescopic field as though, instead of being set up on a tossing and rolling ship, the telescope had been mounted in an observatory on *terra firma*. The principle of the gyroscope has also been used for the purpose of so steadying the stand of a photographic camera placed in the car of a balloon, that photographs might be taken despite the tendency of the balloon to rotate. As applied to flying machines, the gyroscope would to be so modified in form that its weight would not prove an overload for the machine. This is practicable, because a flat horizontal disk, rotating rapidly, will support itself in the air if travelling horizontally forward with adequate swiftness. In other words, since travelling machines *must* travel swiftly, the gyroscopic portion of the machine may be made to support itself.

It is this property of enforced rapidity of motion which renders the probable results of the mastery of our problem so important. It has been well remarked that two problems will be solved at once, when the first really successful flying machine has been made—not only the problem of flight, but the problem of travelling more swiftly than by any contrivances yet devised. In the motion of a flying machine, as distinguished from the flight of man by his own exertions, the swiftness of the bird's flight may be more than matched. It is a mere mechanical problem which has to be solved; and few mechanicians will deny that when once the true principles of flight have been recognized, the ingenuity of man is capable of constructing machines in which these principles shall be carried out. Iron and steam have given man the power of surpassing the speed of the swiftest of fourfooted creatures—the horse, the grayhound, and the antelope. We have full confidence that the same useful servants place it in man's power to outvie in like manner the swiftest of winged creatures—the swallow, the pigeon, and the hawk.

The Pigeon's Wonderful Flight.

In September last a certain pigeon was heralded forth as having been let off the deck of a vessel near Cape Hatteras, and bearing to its birth nest, at Montclair, a message from Harry C. Bleecker. The distance and speed said to have been made by the bird, were so great as to create the gravest doubts as to whether they had really been done, but lately the distrust culminated in downright unbelief when a second bird was made to perform 1,004 statute miles at an average rate of over 196 miles an hour, and still a third, a distance of 1,596 statute miles at an average of 202 miles an hour; the last bird, appropriately named "Typhoon," exhausting itself by the effort and blowing out his last gasp as he reached his nest.

These birds all came from Harry C. Bleecker and to Montclair, and at once a rush was made to Montclair to find the consignee pigeon man. It got to be quite the thing for the depot hackmen to be asked to drive strangers to Harry C. Bleecker's, and one hackman is reported to have driven a stranger all day, and to the tune of $25, looking for the mythical H. C. B. But alas! he was found not. At the Post Office, the official was fain to confess he knew no such man, and to add that he wished he did, for letters were accumulating for him, and the box accommodations for stray letters were getting overcrowded. At last in Montclair forbearance ceased to be a virtue, and the man who whispered pigeon or H. C. B. to a citizen of that town did it at the risk of his life. But when celebrated pigeon fanciers, men of science, and others of the believing and unbelieving stock, pretty equally mixed, began to call at the *Daily Advertiser*, and ask for further facts, pointing to the columns of that paper from which they had gained their first information, it became time for a representative of this paper to plunge into the pigeon war.

Not at Montclair, but near Whippany, a small village some five miles north of Morristown, Harry C. Bleecker was found at last, and proved to be a bright faced intelligent lad of 14, the son of a farmer. Both Mr. Bleecker and his son willingly gave all the information in their power, and laughed heartily at being told of the excitement caused by H. C. B. and his pigeons.

Mr. Bleecker having determined to send Harry on a sea voyage, arranged for him with Capt. William Bacon of the brigantine George W. Chase; and, on the 8th of September last, that vessel sailed from pier 17, East River, New York, with Harry on board and bound for Galveston. With Harry was a small coop, in which were three slate colored pigeons, perfect models of symmetry and beauty. These were brought to the vessel by a friend of Harry's father, a resident of Montclair, who instructed the lad to let off a pigeon on accomplishing each 500 miles of his journey. Poor Harry was a landsman and got very sick, but on September 10, the vessel being then beyond Cape Hatteras, he scribbled a note to his father, fastened it to his youngest pigeon, and amid the sneers and jeers of the ship's crew, placed the bird Tempest on the deck of the vessel. In an instant it arose perpendicularly, and, when at an immense elevation, took a direct homeward course. The captain would not countenance such folly as letting a fine bird be lost at sea, and did not see it start, but entered the fact in the log to please the lad. This bird was but six months old, was a male, and had never had any practicing flights whatever. During its two day's sea voyage it had been sea sick, had eaten little and was thought to be too weak to fly. Yet it accomplished its journey with ease, and reached its dove cot in the quick time given.

On the 15th, the vessel being off Key West, the female bird Tornado was let loose, and also made a direct course, first upward and then homeward. This bird was two years old and had made short journeys around its neighborhood, having also flown from Troy and Syracuse. Like the first bird, it had been sick and refused to eat, and again captain and crew laughed at the plucky lad who was so wilfully slaughtering his pets. Yet the ship's log bears the entry, giving latitude and longitude, with the hour of the start. This bird flew the 1,004 statute miles at an average speed of 196 miles per hour, and was in perfect condition on reaching home, eating and drinking freely.

On the 21st, the vessel being then in the middle of the Gulf of Mexico, and 1,596 miles from home by the captain's reckoning, the veteran bird Typhoon was let loose. This male bird was three years of age, and had made several trips flying last year from Chicago. It had not been sick at all but had eaten greedily, all the voyage, pieces of meat and wheat, with bread crumbs and anything the men fed to it. The crew had become attached to it, and it was with the greatest trouble that Bleecker persuaded them to let him release it. They were positive no bird could reach land, but the lad determined to obey orders and let it go at all hazards, although in consequence of a gale blowing off the shore, he had thought it best not to let the bird go when the vessel was at 1,500 miles distance. Again the entry was made in the log, the Captain still protesting against such foolishness. The noble bird safely accomplished its fearful voyage, but, after alighting at his coop, refused food and soon died of exhaustion, experts saping that he had been over fed and was too fat. His average speed was 202 miles per hour.

As to the question: Were these flights accomplished? they may now be safely believed, the testimony of the captain and his log all going to prove this. As a further proof, however, young Bleecker is soon to start on a much longer journey, and is to be provided with a large coop of birds. Among these are to be Tempest and Tornado, the latter of which is to be let loose at five hundred miles distance, and its owner is prepared to bet heavily on its flying the same in under two hours. Tempest is to fly at 1,000, and other birds at 1,500, 2,000, 2,500, and even 3,000. Experts have denied *in toto* that a bird can sustain itself in continuous flight over 1,500 miles. Typhoon has done it, and more too, and his owner is confident that he has others, of the same breed, who will still further outdo him.—*Newark Daily Advertiser*.

Fireproof Roofs.

A wash, composed of lime, salt, and fine sand or wood ashes, put on in the ordinary way of whitewash, is said to render shingles fifty fold more safe against taking fire from falling cinders, or otherwise, in case of fire in the vicinity It pays the expenses a hundred fold in its preserving influence against the effect of the weather. The older and more weather beaten the shingles, the more benefit derived. Such shingles are generally more or less warped, rough, and cracked. The application of wash, by wetting the upper surface, restores them to their original or first form, thereby closing the spaces between the shingles; and the lime and sand, by filling up the cracks, prevents the warping.—*Fireman's Journal*.

THE mind, as well as the body, needs its gymnasium. Each faculty should be developed to its appropriate power, and the whole molded into symmetry.