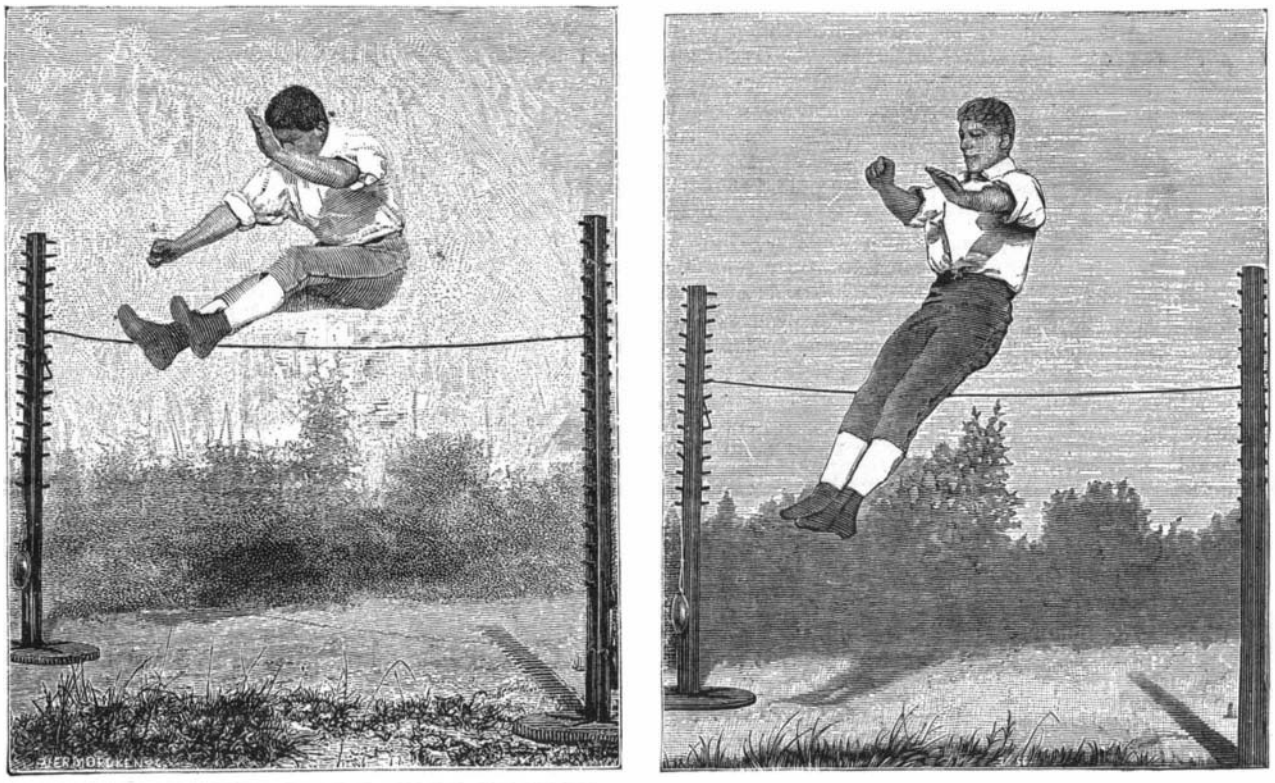
THE ART OF LEAPING.

Not every one can leap who wishes to, and those alone who exercise know how to do it. The gymnastic object of leaping is to pass over objects without touching or overturning them; its physical object is to accustom the muscles to receive hard blows without being incommoded thereby, so that at the moment of danger one shall run no risk of being wounded; and its moral object is to habituate the heart and head to bold and perilous acts, and, in case of danger, to take opportune and generous resolutions tending to save life, and to traverse wide spaces in the air without losing self-possession, as happens with those who do not exercise.

It is useless to say that the progressive exercises that lead to leaping well must be conducted with much method and circumspection. We shall not enter into a detail of the rules that govern leaping; it suffices to say that it is necessary to study separately what relates to the mode of bending the legs and of lifting them at the moment of the spring and what relates to the manner of striking the ground again, and bending and rebounding. Afterward, what relates to the motion of the arms during the leap is taught; and, finally, all the motions that have been taught separately are united.



Figs. 1 and 2.—MAN LEAPING. (From an Instantaneous Photograph.)

In order to diminish the danger of leaping, says Dr. Bourdon, it is necessary to look after the respiration when one falls upon the point of the feet, that is to say, it is necessary that the lungs shall have been filled with air before the fall, and that it be allowed to escape when one touches earth, because the shock is diminished by reason of the quantity of air that the open glottis has allowed to be expelled.

Physicians and philosophers have striven to give a rational theory of leaping, and, from the time of Aristotle, passing through Boerhaave and Haller up to Barthez, each has given his explanation of it. Barthez's theory seems to be the best. At the moment a person is about to leap he bends the joints of his lower limbs, and maintains such flexion by contracting his muscles. Before the straightening of the body that precedes the leap, the body braces against the earth with one foot bent obliquely; the leg bends over the foot, the thigh over the leg, and the trunk over the thighs. The body is shortened and the center of gravity lowered. The flexor muscles diminish their action, and the extensors, entering into play, give the bones of the lower extremities an upward motion. At the same time that the extensors of the lower extremities are straightening the leg and thigh, the extensors of the vertebral column are rendering the same office to that (Fig. 1). The upper extremities act then as balances or as wings. The arms carry the body along so well that it is necessary to take care to double up the fists in order to increase their weight (Fig. 2), after the manner of the ancients, who, in order to pass over a greater space, held dumb-bells in their hands when they leaped.

In the practice of leaping, care should be taken not to attempt excessive leaps regardless of the hour of the day or the weather. The bodily condition varies, and a person who to-day should leap a distance of six yards, might to-morrow injure himself in leaping but two, on account of being in poor condition. Cold renders the bones brittle, and high leaping in cold weather is always more dangerous than in warm.

We cannot enumerate in this place the names of all the celebrated leapers, but we may cite a few examples of leaps famous for their length.

The Grecian athletes, according to Abbot Barthelemy, leaped a distance of no less than sixteen yards, a fact that proves that we have degenerated, for a leap of six yards without a springboard is now not usual, and necessitates a strong effort. There is cited the case of a fireman named Semson, who, at the burning of the Franconi Circus in 1826, leaped from a window 39 feet above ground. This leap was made backward in holding on to the window by the arms. As he jumped according to the correct principles that he had been taught, this man received no harm.

We do not wish to dwell here upon the leaps that are made in circuses and hippodromes by means of accessories that, on the one hand, diminish their danger, and, on the other, increase their length, since such leaps are not made during the ordinary course of life. Yet we advise those who desire to leap well to practice with the springboard. They will derive the greatest advantage from this exercise, especially if they practice somersaults thus. This sort of leap has the great advantage that it gives him who often executes it as an exercise an imperturbable confidence and a skill that can scarcely be acquired by any other means. A man accustomed to turn somersaults never loses his head on any occasion, and, if he happens to fall from the top of a carriage to the pavement, he does it with as much grace as if he were performing one of the most natural of acts.

The exercise of leaping with the pole is likewise a most useful one. The pole, in fact, allows one to leap to distances that could not be reached without its aid (Fig. 3). We find an old document that comes to the support of our assertion. A letter dated Lauffenbourg (Switzerland), Feb. 5, 1846, says: "We have just been witnesses of a leap that may be truly qualified as at once great and perilous, and the like of which the annals of gymnastics offer no example of. A student of the University of Tubingen, Mr. Goehlert, who was here last week, had bet with some of his friends that he would cross the Rhine at a single leap, and that he would thus pass from Switzerland to the Grand Duchy of Baden. Friday noon, Mr. Goehlert, provided with a long and heavy pole, and accompanied by a hundred young people, appeared in front of the Rheinstein, a rock which is situated at a little distance from our city, in the middle of the Rhine, and which was then high and dry on account of the low tide.

Fig. 3.—LEAPING WITH A POLE. (From an Instantaneous Photograph.)

Mr. Goehlert suddenly leaped toward the summit of the Rheinstein, and, resting his pole upon it, shot forward toward the opposite shore, where he landed safe and sound amid the plaudits of the curious."—*Science et Nature.*

Agriculture and Industries of Japan.

The Commissioners of Japan to the New Orleans Exposition have, with their catalogue, given some interesting descriptive notes on the agriculture, arts, and industry of that country. Perhaps the most striking statement in this monograph is that which introduces the mention of agriculture in Japan. We all know Japan is made up of a chain of volcanic mountains, which cover a large portion of the surface, but the entire arable land of the empire is officially put at only 11,215,000 acres—less than one-half the area of the State of New York—and this is so fertile and thoroughly cultivated that it feeds a population of 37,000,000—about that of France. Rice is one of the principal crops, and of this some 200,000,000 bushels are raised annually, but among other leading products are wheat, barley, beans, potatoes, sugar cane, and cotton, and nearly all agricultural work is denominated "spade husbandry," from the fact that hand labor is generally used, to raise large crops and keep the land in the finest condition, two or three crops a year being raised on the same land. Artificial irrigation is general, being necessary over more than one-half of the cultivable area, and it is frequently the case that the water is taken from streams from twenty to thirty miles distant. Steam plows and reaping machines naturally find little room for employment here, and all agricultural implements are of the most primitive forms. The total number of horned cattle is 1,115,000, and of horses 1,605,000. Wood of all kinds is cheap and abundant, nearly all the buildings being of timber, and wood constituting the principal fuel; the area of forest land is nearly three times as great as that under cultivation.

Japanese industries, although in many cases their origin may be traced back to China and Corea, have changed somewhat in recent years, but they have not yet been sufficiently developed to be carried on as a rule in what we call manufacturing establishments. They are mostly conducted in small workshops, with possibly the aid of a primitive water wheel, fan making, and the manufacture of porcelain, paper, pigments and lacquers, constituting a large portion of the whole. Nearly all kinds of ores and minerals are abundant in Japan, but mining and metallurgy, although practiced to some extent for centuries, do not take the prominence that would be expected, when we remember that some of the most exquisite specimens of hammered iron and bronze work to be found in important collections to-day are the productions of Japanese artisans of a thousand years ago. The government, however, is extending aid to these and to many other industries, in a spirit as intelligent as it is liberal, good evidences of which are to be seen in the extensive display made by Japan at New Orleans.

Hearing the Earth's Magnetic Induction.

Dr. Schaper recently demonstrated to an audience the magnetic induction exercised by the earth. A number of telephones were arranged in series upon one circuit, which was rapidly made and broken by an interrupter. A telephone was then repeatedly turned end for end in such a way that its north and south poles were alternately the uppermost, and at each reversal a crack was heard in all the telephones, resulting from the induction of the earth on the central magnet. If the experiment be made with an induction bobbin, only the crack is extremely feeble, due in that case to the induction of the earth on the bobbin. The telephone may be replaced by a magnet wrapped with insulated wire. The degree of sensibility of the telephones can be determined, if the axis of rotation of the magnet employed in the experiment be brought little by little nearer to that of the inclining apparatus.

Feather Fur.

Fur made from feathers has been used for five or six years for the borders of ladies' cloaks and dresses; muffs, capes, bonnets, etc., are made of it; even seal-skin cloaks have been imitated in this material. The article is almost as suitable for this purpose, and sometimes more so than real fur; its principal advantage is that it forms an even surface which may be torn into suitably small strips without loss of substance, while in the case of real fur the breast, back, and every other part of the animal has different qualities; another advantage is that it is light, pliant, and apparently insensible to pressure and blows; and lastly, it may be moistened and even treated with hot water without its solidity being altered.

Other stuffs of a similar appearance have been made and used which, however, have this in common with each other, that the quills of the feathers are sewn in a more or less primitive way on to a lining or woven into one. The quill must naturally make the fur stiff and full of breaks; and, therefore, spoils the appearance of the flowing folds of a lady's cloak. In the material we are describing the fiber is detached from the quills and fastened to a lining, so that the fur retains the whole of the pliancy of the material chosen for the lining.

The process of the improved manufacture is as follows: Long blocks are formed of pieces of cardboard, which are placed parallel to each other, and between these stalks of feathers are put in such a way that only ⅛ to ¼ of an inch of them projects over the upper edge of the cardboards; the surface, consisting in reality of these feather tops, is then covered with an India rubber solution, after which a tissue, over which also rubber solution has been spread, is stretched over it, brushed, and rolled. If then the pieces of cardboard be taken out, the result will be that the fibers will adhere to the lining, and form a fur.

As to the details of the manufacture, the comb is the most important of the tools used. It consists of a piece of hardened steel, the front edge of which is provided with fine wire teeth perpendicular to it. The feathers to be used are placed near each other along the whole length of the comb in such a way that the quill lies behind the teeth, and one-half of the soft part of the feather hangs out of the comb. When the latter is filled with feathers lying near each other, the part of them which hangs out forms a continuous fringe, which is now ready for laying between the pieces of cardboard. For this purpose the pieces of cardboard are placed on a frame inclined at an angle of 45°, and are pressed together in it by a sledge sliding on rollers, which carries on its front an edge parallel to the cardboards. On the planed sides of the frame slides a second sledge, which carries two open angle bearings. The comb is laid with its pivots on these angle bearings, so that the stalks of the feathers hang down behind the last piece of cardboard; then by means of a treading arrangement the sledge is raised, another piece of cardboard put behind the fringe, and the sledge again let down. If now the comb, which swivels round its pivots, is let down at an angle of 180°, the stalks held fast by the sledge are stretched so tightly round the edge and front of the comb that it is quite easy to separate them from the comb by cutting them; the front edge of the comb has a groove in it which serves as a guide to the knife when cutting. This operation is continued until the whole frame, which holds a block of about 12 inches thick, is filled with alternate rows of feather fibers and sheets of cardboard. The block on which this work is carried on is in the middle of a table, at which eight other girls are working besides the one attending to the block; these eight have to attend to the filling of the combs, and together with the former form a column.

When the frame is full it is locked tightly, so as to be portable, and then taken to another part of the manufactory, where the blocks are joined to longer tables. The latter are then put on a wagon and taken to the drying room to be covered with a solution of rubber in naphtha, which is spread over the whole length of the table by means of a knife.

After that the solution is dried, the naphtha being removed before the India rubber cloth is put on. The drying apparatus, into which the table with the cardboard is put, is a long box open at the front; on the bottom are the rails on to which the tables are placed. A system of steam pipes is situated near the top, under which the part which has been covered with India rubber is placed at a short distance. The back part is perforated, and forms the communication between the box and a flue behind it leading to an exhauster, which sucks up the evaporated naphtha, and in this way hastens the drying process. When the coating has been dried, which will take from 18 to 20 minutes, the plate is taken out and a tissue spread over with rubber solution stretched over it; the whole is then brushed and rolled in a mangle weighted with about 3 cwt., until both rubber surfaces are completely joined. Finally the table is turned round to take the cardboard out, which operation must be performed with special care. At the beginning of the manufacture it was found that the stuff had a kind of grain, *i. e.*, that the fibers, while they should stand perpendicular to the lining, inclined to one or the other, or even several directions from the perpendicular, and that this oblique position was not to be remedied by any mechanical means; this grain was merely the consequence of the way in which the cardboard was taken out. A small ridge, which, while the pieces of cardboard are being turned round their basis, assumes a particular inclination, is formed at the place where one piece of cardboard touches another. As the feathers are embedded in these ridges, the turning of the pieces of cardboard causes this oblique position of the feather stalks. It is therefore a matter of importance that the cardboard should be taken off in a perpendicular direction to the lining. To do this the long blocks of cardboard are stretched over tables whose surface forms a section of a circle, the pieces of cardboard are taken hold of singly with fine pliers and only pulled to one side just far enough to loosen the rubber, but remain in their place until they are taken away together, and therefore serve as a guide until they are placed perpendicularly. When the whole block is loosened, the pieces of cardboard are lifted off to clean and steam the now finished piece, the steaming being done to restore to the feathers their elasticity, which was partly lost by the dyeing process.—*Tex. Manuf.*

Fatal Leap from the East River Bridge.

Since the famous leap of 125 feet by Sam Patch, at Genesee Falls, in 1828, no other so desperate feat of that kind has been attempted until that of May 19, when Robert E. Odlum jumped to his death from the New York and Brooklyn Bridge. The details connected with the first incident have had an attraction for the curious the world over ever since—the daring exploits of its principal before that last fatal attempt, and the explanation that intoxication was the most probable reason for its then causing his immediate death. In the case of Odlum there was no charge of this kind. He was a tall, athletic young man, an expert swimmer, which he had taught as a profession, and had come on from Washington three days previously expressly to make this leap from the bridge; he had before performed similar feats, though with the distance not so great, and seemed to have no apprehension of any serious result to himself. The police endeavored to prevent him from accomplishing his object, and their watchfulness made postponement necessary, but Odlum succeeded in eluding their watchfulness, and made the leap, at a point about 200 feet from the New York pier, and 140 feet above the water.

He held his right hand high above his head, and seemed to go down straight as a spear for nearly the whole distance, but, about forty feet from the water, his head and body appeared to bend backward, and to the left, and he struck the water with a great splash. The body was out of sight but a moment, when it was taken into a boat, and consciousness, after hard work, was restored for a moment. The doctor's report was that the injuries were such as would be found in a man crushed to death by the caving in of a sand bank; the internal organs were so pressed together as to rupture the left lung, liver, spleen, and kidneys, while five of the ribs were fractured on the left side, the first high up on the chest and the others irregularly down the side and back, although his spine was not broken.

It is reported that the time occupied in the descent was 3¼ seconds, which is very close to what it should have been theoretically. The distance through which a body falls the first second is very nearly 16 feet, and the distances for equal consecutive times are as 1, 3, 5, 7, etc., which would give for three seconds $16 + 48 + 80 = 144$ feet, the figures varying slightly, according to the resistance of the air. The velocity which the body had attained at the end of the third second was 96 feet per second, and, its weight being 175 pounds, the force of striking would be $96 \times 96 = 9{,}216 \div 64 = 144 \times 175 = 25{,}200$ pounds. The only theory on which it is maintained that such a jump could be safely made is that the body may be held perfectly perpendicular, with the toes so bent down that the body will enter the water as a wedge, and thus distribute the impact over a large surface, operating through a longer time, until the downward momentum is overcome. In this instance, from the way in which the body struck the water, it is impossible to say how great a surface was exposed to the principal force of the blow at the moment of impact, but the body itself barely went under water, and so received the direct blow with a force quite sufficient to explain the doctor's statement that "Odlum was simply mangled to death."

This trial also points out the difficulty of maintaining the body in such equilibrium as could alone afford any possibility of success; the principal weight being in the trunk, the natural tendency would be for the body, were it a rigid, inert mass, to turn over, and descend head first. Odlum seems to have had some conception of this, from his holding his right arm straight up, but this did not prevent his body from partly turning over before it struck the water, a movement which he in vain attempted to check.

It is to be hoped that the fatal results of this last bid for notoriety will effectually put a stop to such attempts for a good while to come. Its success could hardly have been other than accidental, and in that case no one knows how many lives would have been ultimately lost by the foolhardiness of would be imitators.

Choice of Occupation.

Much is said in "writings for youth" as to the importance of choosing such an occupation for life as nature's inclinations appear to favor; and in some instances resort has been made to professional head and face readers to indicate the line to which the unformed mind should be directed. But it is often the fact that even a thinking and sensible boy is unaware of any decisive "call" to a particular pursuit. Much of this indecision probably comes from the fact that the call for a choice occurs at about the time in years and development when the subject is unfitted to make a choice—"not a man, nor a boy, but a hobbledehoy," as an old saw has it.

It is foolish to "strike out," "map out," or "arrange" for a boy's future calling by means of his expressed desire at the callow age; the boy will naturally gravitate to his proper line—if the circumstances do not hinder—if those who have to deal with him do not interfere. It is not difficult to ascertain if there is a "bent" in the boy's inclination. If it is decided, then the influences and circumstances should be brought to bear in that direction. But it is best to start. Many make mistakes because they did not understand, and sometimes these early mistakes extend through the lifetime; but Burritt was a fair blacksmith, Collyer was a good one, Lincoln was a good rail splitter, and Johnson was a good tailor. It would be assumptive to say that the course of these men would have been better if at the beginning they had become linguists, preachers, statesmen, and presidents. Perhaps it was better that they were what they were at the beginning.

A friend of ours was to be an artist—if he could have governed circumstances; he became a machinist and mechanical engineer because it was in his way. Certainly he has done more useful work as a mechanic than he ever could have done as an artist.

If there is any moral to facts, as to fables, it might be that the best thing an ambitious young man can do is to do the first thing that comes to him, the first thing he can reach by going for it, and watch and wait opportunities for better things.

The Unhealthfulness of Large Apartment Houses.

Dr. E. G. Loring, of Madison Avenue, New York, who lives opposite an enormous apartment house, is reported as saying in a recent interview: "When I first took this house, that corner was occupied by a row of ordinary brown stone houses, one of which still remains. As you can see, the apartment house is more than double the height of the old houses, the last remaining of which now looks like a little child by the side of the Chinese giant. Before that place was built, I had the sun shining into my reception room from 9 in the morning until 12 or even 1 o'clock. Now my reception room gets no sunlight at all, while this room in which we are, and which is directly over the reception room, has sun for a few minutes only. The change in the atmosphere of the house is perceptible. My bedroom, which is in front, strikes a chill into me as soon as I enter it, and I am going to change to the back of the house, which has a northern aspect. It used to be the cold side of the house, now it is the warm. My light is seriously interfered with, and I have had to rearrange my office on that account. Then look at that street. As you see, this side, which never sees the sun, is damp and muddy. The opposite side is nearly dry. It is absolutely essential, in order to get rid of the microbes and germiniferous matter which are to be found in the damp streets of a city, that the sunlight should strike the gutters for some hours during the day. It is just as essential that the living and sleeping rooms of human beings should receive the direct rays of the sun. As to the interior sanitary condition of these apartment houses, I have no statistics which will enable me to speak positively. The massing together of so many families in itself tends to promote disease, while the multiplication of drainage pipes and plumbing affords yet another foothold for disease. Among my own patients I know of some who suffer from the wholesale system of heating. Even if they shut off the steam, the presence of such immense steam ducts in the walls renders their rooms unhealthily hot, and they have to pull the beds into the middle of the room before they can hope to sleep.

A Warning to Drinkers.

Le Journal d'Hygiene publishes a comparative table of the probabilities of life for moderate drinkers and total abstainers. According to this, a moderate drinker at twenty years of age may expect to live 15·6 years; at thirty, 13; at forty, 11·6; at fifty, 10·8; at sixty, 8·9. The probability for total abstainers is: At twenty years, 44·2; at thirty, 36·5; at forty, 28·8; at fifty, 21·25; and at sixty, 15·285.