NEW MECHANICAL TOYS.

BY JACQUES BOYER.

The eighth of the annual competitive exhibitions of toys and mechanical novelties, established by M. Lépine, was recently held in Paris. Many of the exhibits gave evidence of a keen desire to be fully abreast of the times so that the exhibition resembled an illustrated summary of current events and matters of public interest. Single, double, and triple aeroplanes, kites, and other aeronautical devices were shown in great numbers and variety. There were dirigible balloons of metal which merely revolved with fixed posts and others which were suspended by cords and described gradually diminishing circles, under the impulsion of tiny propellers. Some of these airships were really lighter than air, like real dirigibles.

Conspicuous among the aeroplanes were those shown by Mangin, the inventor of the "dragon fly," the "tortoise," and other mechanical toys which have become classic among Parisian children. The operation of these little aeroplanes (Fig. 1) is very simple. The mechanism, which can be started and stopped by moving a catch, is driven by the contraction of stretched rubber bands and is wound up by thirty turns of a crank at the bow. The aeroplane is attached, by means of a ring at the top, to a long cord, the other end of which is fastened to a hook in the ceiling or other elevated support. It is then set on the floor and the mechanism is started. The aeroplane, which is mounted on small wheels, first describes a spiral course on the floor, then rises and circles in the air.

Vallin showed self-propelling kites operated in a similar manner and so constructed that a broken stick is easily replaced. Vallin kites of three sizes were exhibited. The smallest is designed as a child's toy, the intermediate size for sport, and the largest for meteorological and photographic work. The largest kite has been successfully employed, at Havre, in carrying lines between vessels and the shore.

The Guillot automotor (Fig. 2) excited the liveliest interest and received a first prize. Its mysterious action has won for it the name of "perpetual motion." It consists of a disk of ground glass with a central hole, through which a rod passes, but without touching the glass. The rod is held perpendicular to the disk by twenty fine silk cords which are stretched tightly over the ends of the rod and the edge of the disk. The automotor is mounted in a frame with the rod, or axis, horizontal and resting on pivots or ball bearings, so that it can turn freely over a bowl into which the disk and some of the cords dip. When the bowl is filled with water the automotor begins to rotate and it continues turning indefinitely.

The principle of the automotor is illustrated by the diagrams (Fig. 3). The upper diagram represents the apparatus reduced to its simplest form, the disk being replaced by a straight bar *A* which passes loosely through a hole in the axle *B*, and at right angles to the axle, and is kept in position by the cords *D* above and the cords D_1 below. When the lower cords are immersed in water they contract and force the bar upward, so that the bar and cords assume the position indicated by the dotted lines. In this position, however, the center of gravity is above the axis and the equilibrium is consequently unstable. Hence the rod falls over and turns, with the cords and axle, until its longer end is below. Then the wet cords D_1, which have been raised to the top, dry and expand, and the cords *D*, which are now immersed, contract, again pushing the rod upward and causing a second half rotation of the apparatus. This series of operations is repeated indefinitely, but the successive and sudden half turns may be made in the same or in opposite directions, as accidental influences dictate. But when the rod is replaced by a number of spokes or a solid disk, and the cords are correspondingly multiplied, the action becomes more energetic and regular, and the differences in the times during which the various cords have been exposed to the action of the water and the air, respectively, produce a lateral as well as a vertical displacement, as indicated by the dotted line in the lower diagram, so that the apparatus continues to turn in the direction in which it has started.

The automotor exhibited made one revolution in four minutes. Great speed can be obtained by substituting for the water a more volatile liquid such as alcohol or ether. An automotor may be made with metallic wires, instead of silk cords, and arranged to dip into a very cold liquid in a warm room. In this case the lower wires contract because they are cooled by the liquid.

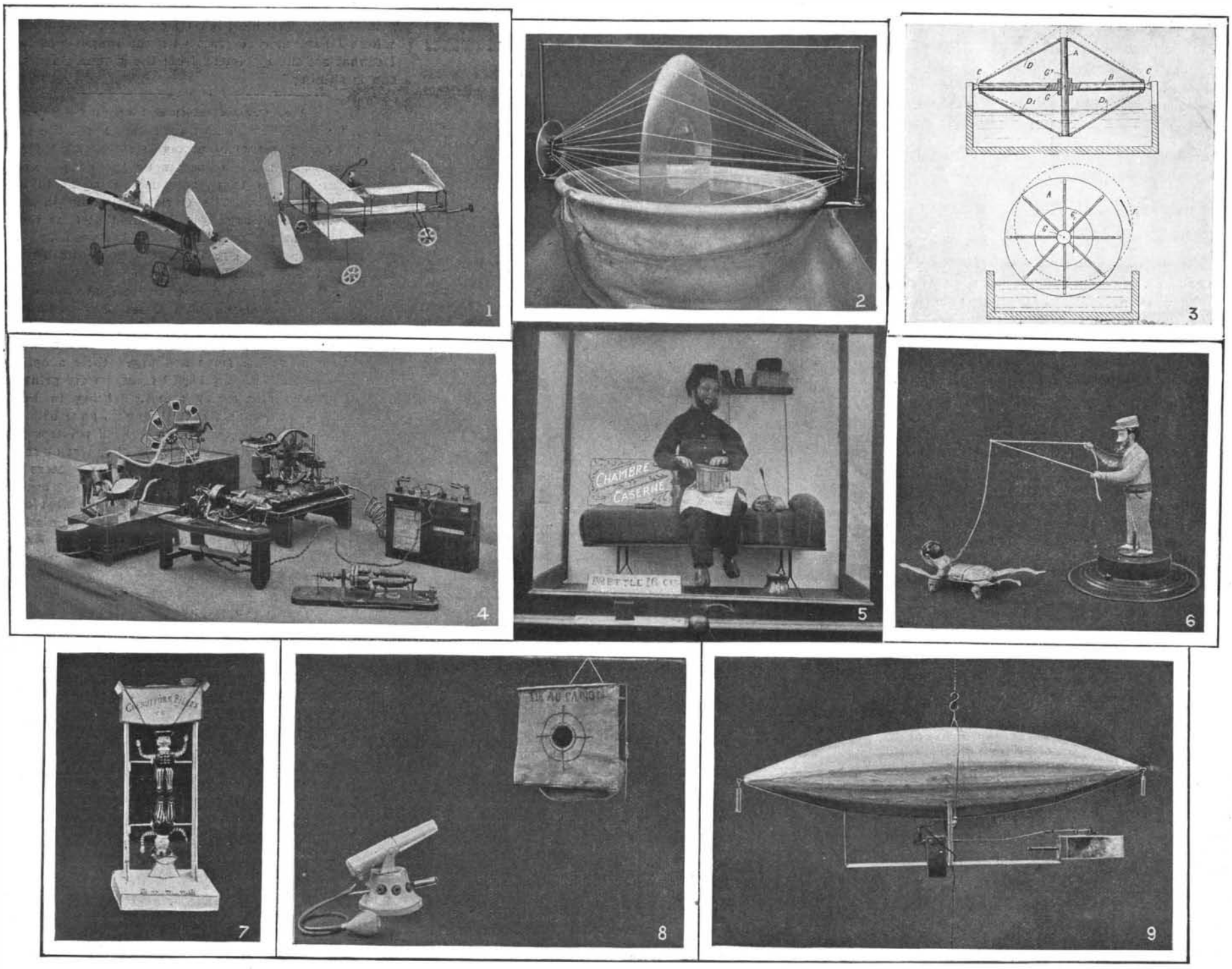
The accumulators which were employed to operate the little Lebrun electric motors (Fig. 4) have electrodes of pure lead, originally very soft, but hardened by hydraulic pressure and cut by machine into the form of a comb. They are enveloped in amianthus, which prevents disintegration and waste. The compression assures a long life of the electrodes, as the lead is attacked very slowly and the freedom from alloy and impurities gives a maximum capacity, 12 or 13 ampere hours per pound of lead.

The largest of the three Lebrun motors shown in the photograph (Fig. 4) operating a little bucket pump, is sufficiently powerful, in spite of its small dimensions, to run a sewing machine. It has eight poles, Niaudeb winding, and a horseshoe iron inductor, and is capable of great variation in speed.

Bressonet's mechanical soldier (Fig. 5) attracted especial attention because it was a caricature of the Socialist deputy Archimbaud, who was recently recalled to the army to complete his term of military service. When a coin is placed in a slot, music is heard and the soldier opens his kit and takes from it a carrot, an onion, and finally a toad.

Gasselin's swimming lesson (Fig. 6) is more interesting. The teacher is only an accessory, the interest attaches to the pupil, who travels on dry land, supported by wheels, but imitates very neatly the movements of a swimmer. Four iron wires, attached to the arms and legs, jointed together to form a parallelogram, and moved by one of the wheels, constitutes the entire mechanism.

The same inventor has introduced an innovation in his acrobats (Fig. 7), which are caused to turn about horizontal bars by the weight and impact of bicycle balls. The balls are stored in a box at the top of the apparatus, and roll, in a row, down an inclined channel until the first ball strikes a cam, which can be retracted by pressing a button. The first ball, having been released by this means, rolls down a series of



1. Aeroplanes. 2. The automotor. 3. Diagrams of the automotor. 4. Accumulators and electric motors. 5. The soldier at dinner. 6. The swimming lesson. 7. The acrobats. 8. Artillery practice. 9. A dirigible balloon.

NEW MECHANICAL TOYS SHOWN AT THE EIGHTH LÉPINE COMPETITION IN PARIS.

inclined planes inside the box and falls into a cavity in the head of the upper acrobat, causing the figure to make a complete turn around the bar and, in passing, drop the ball onto the head of the figure below, which executes a similar movement, dropping the ball into a funnel at the base of the apparatus. The ball, in falling, strikes a lever which, operating through a rod concealed in one of the posts, again retracts the cam and releases a second ball. So the acrobats swing alternately round their bars until all the balls have reached the bottom.

The same inventor exhibited a pneumatic cannon and target (Fig. 8). The cannon is discharged by compressing a rubber bulb and, if it has been correctly aimed, the projectile passes through a hole in the target and is caught in a canvas bag behind. The projectile is tubular and the breech is perforated, so that the piece can be aimed by sighting along the axis.

Among other interesting novelties were Boisard's boat and airship, equipped with practicable rudders (Fig. 9), Mizault and Papin's auto-sphere, which recalls a famous device of antiquity, and Teantet's "flip-flap," a miniature copy of one of the notable attractions of the Franco-British Exposition, which has been fully described in the SCIENTIFIC AMERICAN of October 31, 1908.

In conclusion, let us glance at Blondinat's remarkable repeating gun, in which the usual mechanism of automatic toys is combined with a very ingenious device which enables the gun to advance, fire two shots, and return to its original station. The shots are represented by the explosion of two percussion caps which are fixed on hammers beneath the chassis of the gun. These hammers are released, successively, by the movement of a rod bearing a peg which enters a spiral groove on the front axle. This rod also causes the vehicle to turn while the shots are being fired, sufficiently to reverse its direction, and then allows it to pursue a straight course to the starting point.

The interest shown in these competitions by French manufacturers and inventors (to whom, by the way, the competition is restricted) increases from year to year. Inventors have learned that it is useless to exhibit an undeveloped idea. Every detail must be worked out in practical form if the invention is to find a manufacturer who will take it up. Hence the members of the "*Société des petits fabricants et inventeurs français*," under whose auspices this annual exhibition is held, have learned to combine their efforts and, as a result of this harmonious arrangement, they are every year becoming more formidable competitors of the German toymakers of Nuremberg.

In the current number of the SCIENTIFIC AMERICAN SUPPLEMENT will be found descriptions of other toys which were to be seen at the exhibition.

To Our Subscribers.

We are at the close of another year—the sixty-third of the SCIENTIFIC AMERICAN's life. Since the subscription of many a subscriber expires, it will not be amiss to call attention to the fact that the sending of the paper will be discontinued if the subscription be not renewed. In order to avoid any interruption in the receipt of the paper, subscriptions should be renewed before the publication of the first issue of the new year. To those who are not familiar with the SUPPLEMENT, a word may not be out of place. The SUPPLEMENT contains articles too long for insertion in the SCIENTIFIC AMERICAN, as well as translations from foreign periodicals, the information contained in which would otherwise be inaccessible. By taking the SCIENTIFIC AMERICAN and SUPPLEMENT the subscriber receives the benefit of a reduction in the subscription price.

Detection of Gelatine.

Gelatine can be detected in solution by boiling the liquid with a mixture of equal parts of Nessler's reagent and a solution of tartaric acid. If gelatine is present a lead-colored precipitate is deposited, but no precipitate is produced by gum arabic, dextrine, cane sugar, extract of saponaria, or licorice. Hence this method may be used for the detection of gelatine in solutions of those substances. Nessler's reagent is an alkaline solution of potassium iodide and mercuric chloride, which assumes an orange color in the presence of even a trace of ammonia.

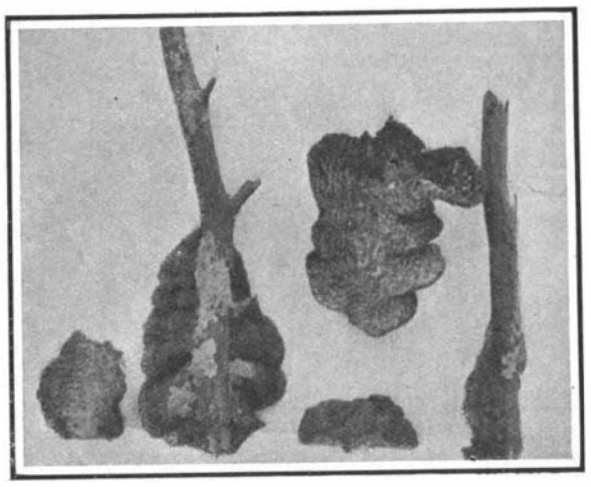
A $500 Prize for a Simple Explanation of the Fourth Dimension.

A friend of the SCIENTIFIC AMERICAN, who desires to remain unknown, has paid into the hands of the publishers the sum of $500, which is to be awarded as a prize for the best popular explanation of the Fourth Dimension, the object being to set forth in an essay the meaning of the term so that the ordinary lay reader can understand it.

Competitors for the prize must comply with the conditions set forth in the current number of the SCIENTIFIC AMERICAN SUPPLEMENT.

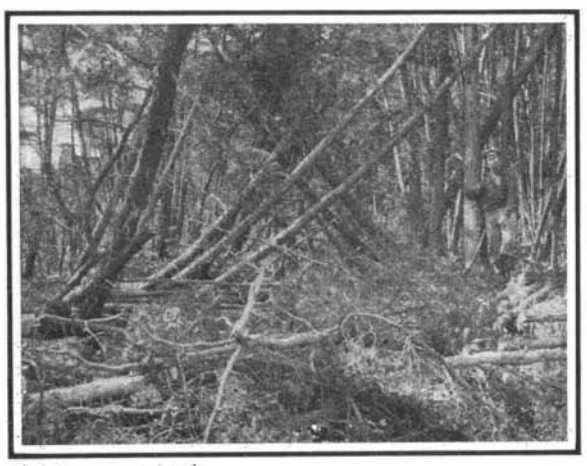
DESTRUCTIVE FUNGUS OF WHITE CEDAR.

The fungus which destroys commercial white cedar trees, *Chamæcyparis thyoides*, has at last been discovered by William Hosea Ballou of New York in the forests of Ocean County, New Jersey. For a half century, almost every fungist and botanist of America and Europe has overrun the Atlantic coastal plain,



Steecherinum Ballouii, the parasite of the white cedar of commerce.

looking for the deadly parasite of the swamp cedars, one of the most important woods used in vessel construction. Mr. Ballou, who gives much attention to expert field photography of the fungi, made repeated examinations of the swamps without result. Finally, he commenced a systematic search, tree by tree, his efforts being facilitated by the prevalent drought. Still failing in this effort, he commenced over again, this time examining the canopies of the trees. Almost at



White cedar killed by the new species of fungus.

once he was rewarded by seeing golden yellow fungi growing very near the tops of the trees on the branches, near and extending somewhat down, on the trunks of the living trees. An examination showed the specimens to be hydnums, a class of fungi named after the hedgehogs, on account of their spines, often resembling the quills of the porcupine. Specimens were therefore submitted to Dr. Howard J. Banker of De Pauw University, specialist of the *Hydnaceæ*. Dr. Banker declares the species new to science and has named it *Steecherinum Ballouii*. The generic name

Typical white cedar swamp.

DESTRUCTIVE FUNGUS OF WHITE CEDAR DISCOVERED BY W. H. BALLOU.

Steecherinum is tentative, as the fungus at present appears to be an entirely new genus.

Mr. Ballou says: "The new fungus has escaped attention heretofore because of its lofty tendencies, and the density of the canopies of evergreens crowded together makes it almost impossible to see what they conceal, nor is it comfortable to wade in a miry cedar swamp bog gazing upward, taking chances on deep holes concealed under the carpet of sphagnum mosses.

"Dr. Banker will later issue a full scientific description of the new fungus, which has wiped out many square miles annually of the finest boat timbers, leaving large areas of dead trees. The fungus is a parasite which expires when it kills a tree, apparently drying up instantly and dropping off, so that no trace of its fruit is found on dead trees and scarely a trace of its mycelium. It is semi-resupinate (lying on its back) and semi-pileate (having a cap). As seen in the illustration, the limb appears to grow across the top of it and a lichen on top of the limb. When drying, it forms into a series of cup shapes, resembling a bumblebee's honeycomb. One tree found had apparently just expired, together with the fungus. The fruit bodies in this case clung to the bark along the trunk of the tree, in form of single small cups, upside down. The least touch brought them all to the ground, rattling like peas in a pod. Unless one finds the living fruit bodies of the fungus on a living tree, he may never have a similar opportunity to find dead specimens on a dead tree. It is a fungus of mystery, the most beautiful as well as the most deadly I have ever come in contact with. Its spines are of a gorgeous golden yellow, visible high up only on a leaden day. Where I have marked trees with the fungus growing, I cannot see the specimens from the ground when the sun is shining."

Red Cross Christmas Stamp.

A little red and white penny stamp about the size of a two-cent government postage stamp, with "Merry Christmas" and a red cross among the holly leaves, would hardly seem to be a promising agent to use against tuberculosis. The Christmas stamp in America started in Delaware, but before that time there was a Christmas stamp in Denmark issued by the government and sold at all post offices for the benefit of a hospital for children afflicted with the white plague. The Red Cross Society of Delaware, with the approval of the National Red Cross, decided to try this Danish idea last Christmas. The plan was backed by many influential people, and Jacob A. Riis took up the subject of such stamps and urged their adoption in America. At first only 50,000 stamps were printed, and the whole community seemed willing to help. The dry goods merchants of Wilmington gave bolts of muslin to print street car banners; local printers did the work of printing the posters and banners at cost; the street cars displayed the advertising posters on their fenders day after day; the protected bill boards were placarded without expense; department stores and drug stores sold the stamps without commission, and even the school children took up their sale. Every penny for the stamps, after the expense of printing and distribution was paid, went to the anti-tuberculosis work in Delaware. Interest in the plan spread, and in a short time it was taken up by the North American in Philadelphia. The Pennsylvania Red Cross backed the plan and helped to sell the stamps. In the short space of eighteen days nearly 400,000 Christmas stamps were sold, and nearly $3,000 of clear profit resulted. The stamp had proved its possibilities in so short a space and in so conservative a section.

The National Red Cross has now taken up the Christmas stamp in a formal manner. A stamp has been designed by Howard Pyle and is printed in three colors by the Bureau of Engraving and Printing and is issued by the National Red Cross. The stamp will be offered for sale in every State this Christmas season. They can be procured in any quantity from the Red Cross headquarters in any State, or the central one in Washington, for cash only at one penny for each stamp. It will not carry mail, but any kind of Christmas mail will carry it, and they are most appropriate as stickers on Christmas presents. Every cent will go toward tuberculosis work in the State where the stamp is sold.

Experiments by the Forest Service, at its timber testing station at Yale University, show that green wood does not shrink at all in drying until the amount of moisture in it has been reduced to about one-third of the dry weight of the wood. From this point on to the absolutely dry condition, the shrinkage in the area of cross-section of the wood is directly proportional to the amount of moisture removed. The shrinkage of wood in a direction parallel to the grain is very small; so small in comparison with the shrinkage at right angles to the grain, that in computing the total shrinkage in volume, the longitudinal shrinkage may be neglected entirely. The volumetric shrinkage varies with different woods, being about 26 per cent of the dry volume for the species of eucalyptus known as blue gum, and only about 7 per cent for red cedar. For hickory, the shrinkage is about 20 per cent of the dry volume, and for long-leaf pine about 15 per cent. In the usual air-dry condition, from 12 to 15 per cent of moisture still remains in the wood, so that the shrinkage from the green condition to the air-dry condition is only a trifle over half that from the green to the absolutely dry state.