other half after thorough seasoning. A determination is made at the time of testing of the amount of water present in the test-piece, since this appears greatly to influence results.

From each tree there are cut two or three logs, from each log three or four sticks, two of standard size, the other one or two of larger size. Each standard stick is cut in two, and one end reserved for testing two years later after seasoning. The standard size for the sticks is 4 × 4 inches and 60 inches long for cross-breaking tests. There will, however, be made a special series of cross-breaking tests on a specially constructed beam testing machine, gauged to the Watertown testing machine, in which the full log length is utilized with a cross section of 6 by 12 up to 8 by 16 inches, in order to establish the comparative value of beam-tests to those on the small test-pieces. It is expected that, on the average, 50 tests will be made on each tree, besides 4 or 5 beam-tests, or 250 tests for each species and site.

All due caution will be exercised to perfect and insure the accuracy of methods; and, besides the records, which are made directly in ink into permanent books, avoiding mistakes in copying, a series of photographs, exhibiting the character of the rupture, will assist in the ultimate study of the material, which is also preserved.

Such work as this, if done as indicated, and well done, will never need to be done over again. The results will become the standard, the world over. The strength and value of a given species or even stick will then no longer be a matter of opinion, but a question of established fact, and we will learn not only to apply our timbers to the use to which they are best adapted, but also what conditions produce required qualities, thus directing the consumer of present supplies and the forest grower of the future.

The American Association for the Advancement of Science, in its Section of Mechanics and Engineering, has created an Advisory Board to assist in securing improved methods, and the co-operation of other authorities will be welcomed to make this a truly national work.

So far the work has been confined to southern pines and oaks (which, thanks to the courtesy of the Louisville and Nashville Railroad Company, could be obtained free of transportation charges); the scant appropriations available, and other unfavorable conditions, making such limitation necessary.

The work will be extended and its progress pushed in proportion to appropriations made by Congress, which depend upon the interest which the work may arouse among those to be benefited by it.

FIRE-RESISTING MATERIALS.

TESTS were held on Oct. 15, in two buildings erected in a vacant lot on Park Street, Boston, Mass., for the purpose of demonstrating the efficiency of slow-burning construction, and also of various materials designed to retard free combustion. In addition to asbestos paper and ordinary lath and plaster, the materials manufactured by the following companies were used, being contributed by their representatives,—King's Windsor Cement Dry Mortar Company, Clinton Wire Cloth Company, New Jersey Wire Cloth Company, Magneso-Calcite Fire-Proof Company (who manufacture a fire-proof paper), Boston Fire-Proofing Company (who manufacture porous terra-cotta lumber), New York Eastern Plaster Board Company (manufacturers of cellular blocks of plaster of Paris mixed with fibrous vegetable matter), Stark, Edson, & Co. (manufacturers of albamural, which is a fire-proofing material in general appearance similar to kalsomine).

The buildings were constructed of two-inch tongued and grooved spruce plank placed upright and held by a grooved plate at the top. They were covered by flat plank roofs tinned on the upper side.

The larger building was 12 x 16, divided into four cells, with a fire door in each partition and one at the eastern end. The other building measured 12 x 12, being divided into three cells, and situated three feet from the larger building. Scuttles about two feet square were placed in the roof over each cell, but they were opened when the fire was started. The entrance at the front of each cell was provided with doors made of two-inch plank tinned on the edges and on the side toward the fire.

For the purpose of obtaining approximate temperatures in the buildings at the test, four links furnished by Mr. Morris Martin of the United States Electric Fire Alarm Company were hung on steel wire in the upper part of each cell, and the melting points of these links were stated to be as follows: lead, 626°; antimony, 842°; aluminum alloy, 1,292°; brass, 1,850°. Each of the cells was lined with fire-retarding material.

After the buildings had been thoroughly examined by those present, the fuel was placed in each cell, consisting of kiln-dried hickory wood piled to a depth of nearly four feet, and also piled to the depth of over five feet in the space between the two buildings. This wood was thoroughly wet with kerosene oil, and the fires were lighted at 12.21 P.M., simultaneously in each cell. Although the fires burned very fiercely, the buildings resisted the flames admirably, and it was considered that up to 1.30 P.M., or an hour and ten minutes after the fires were started, any burning of the buildings could have been extinguished with a pail of water.

The heat of the fire was too severe to allow near enough approach to make very careful or accurate observations of the interior until after the fire was extinguished by the fire department, who applied a hose stream upon the fires, beginning at 1.52 P.M. After the fires were extinguished, careful observations were taken of the conditions of each cell as it was at the time, and later further examinations of the floors were made after the ashes had been removed.

There were shutters placed upon the ends of the buildings. The wooden shutter covered with tin was somewhat injured and the wood badly charred. The shutter covered with one-eighth of an inch magneso-calcite, before the tin was applied, was in excellent condition. The fire doors in the partitions in the larger building all yielded during the fire. The immediate cause of their failure appeared to be the use of screws in attaching the hinges, and in this respect as well as others they all differed from what is known as the standard tin-covered fire doors, which require that all attachments to the doors shall be made by bolts and not by screws.

The doors in the partition were held in position, after the hinges gave way, by the mass of fuel piled on either side. The doors covered with asbestos paper or with magneso-calcite, before applying the tin, were somewhat distended by the gas generated by the heated wood, which could not escape readily, as was the case in the doors not covered except by the tin, where the gas could escape at the seams.

The doors at the front of the cells were tinned only on the edges and the side toward the fire, and were able to resist the heat of the fire for only about an hour, the cause of the failure in each case being the conduction of the heat along

the lines of the screws at the hinges. These doors would undoubtedly have fallen earlier had they not been open a great portion of the time during the fire.

The heat of the fires apparently exceeded that of an ordinary burning building.

Among the principal facts established at this test, the committee conducting the experiment, consisting of C. J. H. Woodbury, C. M. Goddard, and D. L. Lord, wish to call attention to the great resistance to fire afforded by the solid plank construction, the walls being in themselves adequate to prevent the spread of a fire until it has reached a quite large extent; and such construction should in many instances be used in place of ordinary joisted partition. While it is not claimed that such solid plank partitions are equal to a brick division in resistance to fire, yet there are many places where the difficulty of supporting a brick wall would render such a division out of the question, and yet a plank partition could be placed as readily as one supported on joist.

The porous terra-cotta lumber and the Eastern plaster board both presented a high resistance to heat, and were unaffected by exposure to the fires.

The secure bond of the wire lath, especially when re-enforced by band iron, proved the value of this material in securely holding plasters when exposed to fire.

The magneso-calcite proved its value for re-enforcing tinned fire doors and shutters, resisting the fire, and yielding only when the material to which it was attached fell.

The King's Windsor cement dry mortar resisted the fire in a most efficient manner when the support of the back remained, and, moreover, did not crumble as a result of heat or of streams of water played upon it when hot, as was the case with the ordinary lime mortar.

NOTES AND NEWS.

THE difficulty of keeping Irish potatoes in edible condition after March 1 is well known to Southern housekeepers, farmers, and merchants. Professor Schribaux of the National College of Agriculture of France has recently devised a very simple, cheap, and successful method by which he has been able to preserve potatoes in edible condition for over a year and a half. This process has been adopted by the French government for preserving potatoes for the army. The French Minister of Agriculture publishes the details of the process in the official *Bulletin du Ministére de l'Agriculture* for March, 1891. The following is a translation of the essential part of the scheme. The method of preservation consists in plunging the tubers, before storing them away, for ten hours into a two per cent solution of commercial sulphuric acid in water, two parts of acid to 100 parts of water. The acid penetrates the eyes to the depth of about one-fortieth of an inch, which serves to destroy their sprouting power; it does not have any appreciable effect upon the skin of the potatoes. After remaining in the liquid ten hours the tubers must be thoroughly dried before storing away. The same liquid may be used any number of times with equally good results. A barrel or tank of any kind will do for the treatment. The acid is so dilute it does not affect the wood. Chemical analysis shows that potatoes treated by this process are as nutritious and healthful after eighteen months as when freshly dug; but they are of course worthless for planting. Attention is called to this method by Gerald McCarthy, N. C. Experiment Station, Raleigh.

— Dr. B. A. Gould, president of the American Metrological Society, writes from Germany that at the quinquennial session of the Geographical International Congress held in Berne Aug. 10–17 there were about 280 delegates and representatives from all countries. At this congress was passed the following resolution on Aug. 14: "The Geographical Congress entreats Englishmen of science to desist in future from the use of their ancient units of weight and measure in scientific and technical publications, and to employ those of the metric system only." This resolution was passed with immense enthusiasm; the applause and cheering lasting for nearly five minutes, and the vote was unanimous. In connection with this the American Metrological Society has prepared a petition asking Congress to pass the following act: "That on and after July 1, 1893, the metric system of weights and measures authorized by the act of Congress approved July 28, 1866, shall be used exclusively in the customs service in the United States." This petition they desire to circulate widely among those desiring to sign it, and they ask each signer to mail it to his representative in Congress. The American Metrological Society has prepared a simple chart of the metric system which, for educational purposes, it will mail to any one asking for it for 10 cents in stamps. Address Secretary of American Metrological Society, No. 41 East 49th Street, New York City. Copies of the petition can be had at the same address.

— Dr. Wiesendenger describes a new method of producing anæsthesia by the application of cold, the characteristic feature of which is that it is not the cold-producing agent which touches the desired part, but a metallic tube or chamber which is cooled by carbonic acid. The cold may, according to the requirements of the case, be regulated from the temperature of cold water to one sufficiently low to cauterize. The first symptom of this artificial cold is anæmia of the cellular tissue, producing a slight sensation of burning, which is followed by anæsthesia, which lasts from one to two minutes and then disappears without any ill effects. As the instrument may be manufactured of almost any shape, it is evident that this new method may be used for a variety of purposes. The simple turning of a tap will regulate the stream of carbonic acid to any degree of temperature down to four degrees Fahrenheit. No moisture is produced. In using this cold for the purpose of cauterizing the surgeon has the advantage of producing anæsthesia at the same time. When applying it to any of the internal cavities, such as the mouth, it is necessary to have the parts carefully dried, as the tissues would otherwise adhere to the instrument. Dr. Kummel applied the method, according to *The Lancet*, in the case of a boy in the Maria Hospital at Hamburg with such complete success that the boy looked on without moving a muscle while a deep incision of twelve centimetres in length was made in his thigh.

— The hospice of the great St. Bernard (7,609 feet above the sea-level) is said to have been founded A.D. 962 by St. Bernard of Menthon, while, according to some authorities, it rose a century earlier, under Charlemagne. Neither saint nor emperor is likely to make good his claim, as the archives of the hospice have been completely destroyed in two successive conflagrations. But, like other Christian institutions, it had undoubtedly a pagan predecessor. The Romans on the self-same spot built a temple to the Pennine Jove, and that, in turn, occupied the site of a still earlier shrine of prehistoric antiquity. The truth is, the Alpine passes were in common use from the remotest ages — the Christian world treading the same route which had been trodden by the Romans, who also availed themselves of the track made by the aborigines. At its highest point the tutelary deity had his place of worship, and this was served by the local priesthood, who rendered assistance to the distressed or ailing traveller and received votive tributes in return for its good offices. The existence of a temple of Jupiter on the spot, with its staff of priests, is well known; and the relics that have turned up near it attest its uses to have been similar to those of the present hospice. A discovery of importance, says *The Lancet*, has just been made in its vicinity — a bronze statue in excellent preservation of Jupiter himself. Its artistic value is very great; its height, forty centimetres. At the same time other treasure-trove was brought to the surface, including a number of medals and a statuette of a lion measuring sixteen centimetres, also of fine workmanship. These are now the property of the monks, and will attract to the hospice a public more able to keep them in funds than the proper recipients of their kindness. Sad to relate, the revenues of the monastery, heavily drawn upon by the travellers (from 16,000 to 20,000 annually) who throw themselves on its bounty, are diminishing, the contributions left by these comfortably accommodated guests being