IMPROVED WINDMILL.

In the windmill shown in the accompanying engraving, the wheel converts the power of the wind into available power and requires no vane to keep it properly faced toward the wind. The construction of the wheel is peculiar and well calculated for constant use.

The wings, of iron, are secured at their outer ends to a wide iron hoop, and the shaft to which the wheel is attached is supported in an inclined position by two conical rollers, which are placed on opposite sides of the spherical bearing, which keeps the shaft in place. The conical rollers bear on opposite sides of an annular plate, supported by the enlarged upper end of the vertical shaft of the mill.

As the wheel is revolved by the pressure of the wind, the conical rollers impart motion to the vertical shaft, by rolling on the annular plate, and the wheel will automatically face itself to the wind, whatever its direction.

The motion of the upper part of the vertical shaft is communicated to the lower portion through a friction clutch, operated by a centrifugal arrangement something like a centrifugal ball governor. The levers to which the balls are attached are carried by the upper part of the shaft, and press the sides of a cone on the upper end of the lower portion of the shaft. When the action of the wheel is normal, the levers of the regulating apparatus press the cone, and the lower portion of the shaft is driven with the same speed as the upper portion; but when the speed of the wheel increases, the balls rise by centrifugal force, and the lower portion of the shaft is released, while the upper part of the mill may revolve at any rate of speed without endangering it or the machinery below.

The centrifugal apparatus is provided with means by which it may be made to preserve the connection between the two parts of the shaft, when the speed of the wheel is above the normal.

This mill is very simple in its construction, and may be built and kept in order at a comparatively small expense. Further information in regard to it may be obtained by addressing the inventor, Mr. David A. Smith, of Greencastle. Pa.

A Home-made Telephone.

The *American Farmer* gives the following directions for making a cheap home-made telephone:

To make a good and serviceable telephone, good from one farm house to another, only requires enough wire and two cigar boxes. First select your boxes, and make a hole about a half an inch in diameter in the center of the bottom of each, and then place one in each of the houses you wish to connect; then get five pounds of common iron stove pipe wire, make a loop in one end and put it through the hole in your cigar box and fasten it with a nail; then draw it tight to the other box, supporting it when necessary with a stout cord. You can easily run your line into the house by boring a hole through the glass. Support your boxes with slats nailed across the window, and your telephone is complete. The writer has one that is 200 yards long and cost forty-five cents that will carry music when the organ is played thirty feet away in another room.

Callaud's Sulphate of Copper Battery.

L'Electrician says: In this battery, made by Messrs. Dumoulin and Froment, the sulphate of copper is placed in a glass jar, in the bottom of which there are two holes. By this arrangement the sulphate of copper can easily be removed, and the liquid be more or less stirred up, without bringing the solution in immediate contact with the zinc. The piercing of the two holes can be easily done, and at very little cost.

The positive pole is formed by a copper wire, rolled in the shape of a spiral at its lower end, and consequently is without weld, solder, or any possible break in its continuity. A protection of rubber, sufficiently thick, formed by a simple tube slipped over the end of the copper wire, covers it from the bottom to outside the outer jar. The zinc is suspended by two hooks, which are simply passed through two holes made in the top of the jar, and which rest on the edge of the outer jar.

This battery has one peculiarity which can be of a certain use as regards attending to it—namely, the difference generally noticed between the level of the liquid inside and outside of the glass jar. If the battery is in good condition, the liquid in the jar is lower than that with the zinc, thus showing that the solution of sulphate of copper is concentrated, or nearly so, and that of zinc sulphate is not so; this case proves the battery to be in good working condition. If, on the contrary, the heights of the liquids are equal, or even if the sulphate of copper should be higher than the other, it is because the copper solution is not concentrated enough, or that the sulphate of zinc solution is overcharged with salt.

The constants of the battery thus made do not differ at all from those of the ordinary callaud (E=about 1 volt, R=6 to 8 ohms), because the positive pole is always kept in the solution of sulphate of copper, which escapes from the jar through the two holes.

Mitchell's Atlas of the World.

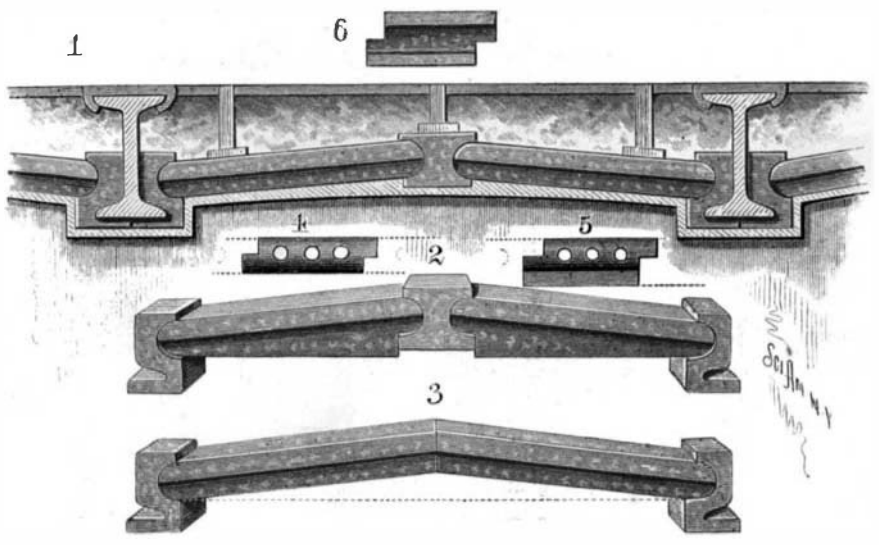
This is a well known standard book, large quarto pages, containing maps of the various countries of the world, in all 147 maps and plans, embracing, especially, most excellent maps of the United States. The maps are printed from copper plates, and the nomenclature is clear and good, the whole finished and colored in admirable style. Plans of the principal cities are also given; together with valuable tables, showing population, post offices, etc. This book forms one of the most useful and convenient works for general reference, and should have a place in every business establishment and in every household. Mr. P. O. Smith is the general agent for the work, headquarters at the Cosmopolitan Hotel, New York.

SMITH'S IMPROVED WINDMILL.

FIREPROOF FLOOR AND CEILING.

We give an engraving of one of the latest and best forms of filling for fireproof structures, which consists of buttresses planted against the beams resting on the lower flanges and extending partly across the lower edge of the beam, and struts which with a central or key piece form a toggle arch between the beams. The engraving shows three forms of this filling.

In Fig. 1 the struts are flat, with rounded ends fitting in corresponding bearings in the buttresses and in the key piece. The device shown in Fig. 2 is nearly the same, the only difference being the horizontal face on the under surface of the arch. Fig. 3 shows an arch in which the key is dispensed with, the struts abutting in the middle. Fig. 4 is an end view of the strut shown in Fig. 1; and Fig. 5 shows the inner end of the strut shown in Fig. 2. Fig. 6 is a side view of the key piece.



NEW FIREPROOF FLOOR AND CEILING.

The floor is laid on strips placed on the struts or buttress blocks and key, and the spaces between its strips and above the struts are filled with concrete. The under face of the arch is finished in any desirable way. The great advantage of this system is that the arch can be placed without the use of scaffold or stages of any kind, thus greatly cheapening the construction. A pair of buttresses and a pair of struts with the key are placed, then other buttresses are placed on the beams, and another pair of struts placed in position with their ends resting on the buttress and on the rebate and key projecting from the first pair of struts, the buttresses being arranged to break joints with the struts. Another pair of buttresses is now inserted, then another pair of struts placed, and so on. This filling adjusts itself automatically to its bearings, and is strong and well calculated to perfectly insulate one floor from the effects of heat in another. To make the filling as light as possible without impairing its strength, it is apertured lengthwise.

This device is the invention of Mr. Andrew J. Campbell, of 552 to 558 W. 33d St., New York city.

Water Rights Maintained.

In a suit recently brought in Rhode Island by one manufacturing company to restrain another manufacturing company located on a stream above the first, to prevent the polluting of the stream with dyestuffs, chemicals, etc. The court granted an injunction.

Judge Potter, in the opinion, said: "Every owner of land has the right to have the water which passes his land come to it in its pure, natural state. The offending company here contends that while this might be very good law in former days for an agricultural people who used the water for washing, drinking, and watering animals, there has been a complete change of circumstances; that we are largely interested in manufactures; and the wealth of the State depends mainly on their prosperity, and that the more valuable use should prevail. The right of the riparian owner, farmer, or mill owner, to have the water pass his land in its natural state and to a use of it to any extent which shall not injure it for the use of others, is as much his property as the land itself. This court cannot alter the law, neither can the Legislature itself take the right away any more than it can take its land. If needed for the public use, the State can take this right on making compensation, but it cannot be taken from one man and given to another even if he pays for it; that must be left to private agreement."

Water Supply for Cities and Towns.

At a recent meeting of the American Society of Civil Engineers, in this city, the supply of water for cities and towns, from subterranean sources, or ground water, as developed in the United States since 1870, was described by Mr. J. J. R. Croes, C.E. It was at first supposed that such supply could be obtained by filtration of river or lake water through the gravel of its banks. It was discovered, however, that in fact much more water came from the land side than from the river, and that wherever such a source of supply is successful, the water really comes from the underground reservoirs or streams which are found generally in all valleys containing much gravel.

The wells, galleries, and basins constructed in various places were described, and their success or failure indicated. It was stated that experience was generally against the construction of open galleries or canals, on account of the vegetable growth which always occurred in such cases.

Screw in Tunnel.

The Lightning, one of the earliest torpedo boats supplied by Messrs. Thorneycroft to the British service, has been lately subjected to a series of progressive speed trials at Portsmouth, under the superintendence of Chief Engineer Castle, of the Steam Reserve. The steering power of the craft, which is otherwise satisfactory, has always proved defective in consequence of the wide circle which she required to turn in. In order to surmount the difficulty the propeller has recently been incased in a tunnel; but while it was thought that the device might improve her handiness in going round, it was feared that might detract from her speed. Trials were accordingly ordered to be made upon the measured mile in Stokes Bay, for purposes of comparison with the speed which she realized with the original propeller. Four runs was made at full speed, 14 knots, 12 knots, and 10 knots. When tested to the utmost a mean speed of 16·5 knots was obtained, or about half a knot less than under the old conditions. The horse power developed, however, was also less, and as this is supposed to be due partly to the inferior character of the coal used, and partly to the fuel being forced over the bridge and so choking some of the boiler tubes, it is probable that further runs will be ordered. The steering in circling and going ahead was better than before, but in steering with the engine going astern the results were less satisfactory than with an open screw.

In France in 1881 there were more than a million residents of foreign birth, chiefly Belgians, Germans, Swiss, and Italians. England, with 27,000,000, has only 140 000 foreigners; Germany, with 45,000,000, only 270,000; while France, with 37,400,000, has 1,000,000.