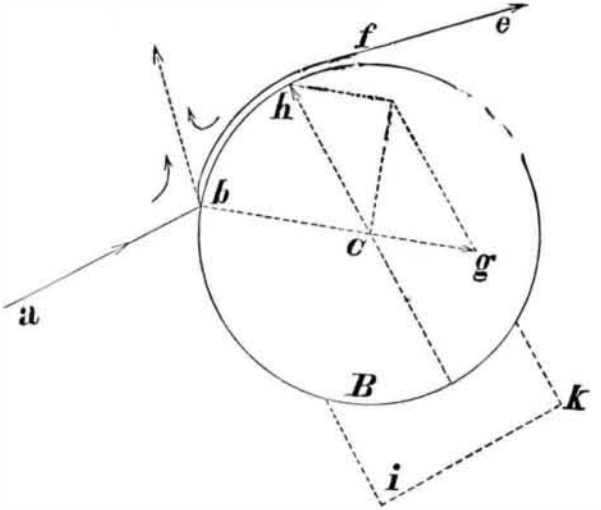


**A THEORY OF THE BALL PUZZLE.**

Mr. Hugo Bilgram, of Philadelphia, has written the following explanation of the ball puzzle described in the SCIENTIFIC AMERICAN SUPPLEMENT, page 576, volume II :

A current of air, *a b*, striking the ball, *B*, will not, as might be expected, be reflected in the line from *b*, nearly at right angles to *a b*, but will follow the course, *b f e*. The reason can be explained as follows: Any current of air has a tendency to carry along with itself the surrounding air; but the current, *b d*, can be supplied from one side only, while on the other side, in the angle, *d b f*, a rarefaction of air takes place. The current will therefore be deflected by the pressure of the atmosphere, and take the course as shown. The impact of the air, at *b*, produces the force, *c g*, while the surplus pressure of the column of air, *i k*, over the rarefied conditions under the current, *b f*, exerts the pressure, *c h*. These two forces united produce a vertical force equal to the weight of the ball. The rarefaction of



air, between *b* and *f*, as well as the deflection of the current, can easily be demonstrated by experiment.

**Ourselves as Others See Us.**

We all like to know what others think of us, even if their opinion makes us wince; and recognizing this fact, a bright newspaper man has been chatting with the representatives of the foreign nations at the Centennial show to learn their notions of our country and ourselves. The phlegmatic Turk is astounded at our inquisitiveness. "They come up to your stand, handle your goods, ask you all sorts of impertinent questions, never apologize for troubling you, but address you invariably with the inevitable 'how much.'" We fear the Turk makes a fair criticism. The Frenchman thinks our mode of life, so far as eating is concerned, is detestable. "Your mode of living," said one of the commissioners, "is the cause of illness among your women, which must affect the whole race. The undue use of ice water, ice cream, iced drinks of all kinds, the abuse of pepper and salt, are all injurious. You need a public school to teach the art of proper feeding." The Belgian also detests our mode of living and our cooking. He thinks our national stomach must be out of order—not far out of the way—and we eat too much meat. While we are exceedingly sociable, we have no *cafés*, and drink too often and too quickly; this is also the Belgian's criticism. The Frenchman, so far as our character is concerned, thinks "the high appreciation of number one does much to stunt the development of morality." The Spaniard declares us to be "the most cordial and hospitable people in the world." The Italian thinks we lack sentiment and principles. "To achieve what you have done," said one of the Italian Commission, "you have had to make a god—the dollar—and a machine of your country, a money-making apparatus." But the American women puzzle the Italian the most. Says this same commissioner:

"I ask myself concerning them: Is it innocence, virtue, ingenuousness, or what? They are the most impertinent creatures I ever saw. They go up to a foreigner with the most perfect *sang froid*, stare him out of countenance, ask him if he is married, how many children he has, where he comes from, and I know not what. Their excessive freedom of manner to our hot-blooded people seems what I hope it is not. But they take the most extraordinary liberties. Fancy a pretty girl of eighteen laying her little dimpled hand on your arm and asking you, naively or boldly, I know not which, how you like the American ladies? What the deuce can one think?"

Like the Frenchman and Belgian, the Italian is disgusted at our cooking. "You need a thorough reformation of your *cuisine*," said one. "You have little or no variety of food, and oh! you lack good wines! If you only had our wines, you would have less public drunkenness." The German laments the absence of domestic life; but he seems to regard America as a sort of promised land, and thinks it especially a paradise for working men. The Austrian, like the Turk, is disgusted with the national impoliteness. Said one: "The people are pleasant enough, but they do not know the use of the words 'please' and 'thankyou,' and seem to imagine that for the admission price of fifty cents they purchase the services, as guides, instructors, and playthings, of all the exhibitors." And then we are woefully ignorant. "Most of the American visitors here," said the same Austrian, "don't know the difference between Austria and Australia, and ask me how I like living in the bush. One old lady asked me, just now, where is the Belgian and Brazilian stands? You know, the place where they make bug jewelry, jewelry out of bugs, and that is only one instance from many hundreds."

The Dane thinks our middle classes not so well educated as those of his own country. The Mexican is particularly struck by the abuses of our street car travel and our hacks. He would have stringent laws to prevent the overcrowding of the street cars, and, to stop the extortion of the hackmen, capital punishment. The Dutchman doesn't like our women, thinks they are weak and puny, compared with their buxom girls. And the opinion of the Chinaman is compressed into the following expressive sentences: "Much likee Melica. Costee muchee money livee in Melica, costee little money livee Chilee. Chilee man make muchee money in Melica; Melican man make d—n little money in Chilee."—*Boston Weekly Globe*.

**THE "MODEL" SCROLL SAW.**

We illustrate herewith a new scroll saw, excellently suited for amateur use. It is capable of cutting wood up to one and a half inches in thickness, of holding blades of all sizes, from one fourth inch down to the finest made, without adjustment, and it works rapidly and smoothly. It offers beside the advantage of not being driven by a crank motion from the treadle, but by devices which have no dead centers, and which therefore maintain the machine in continuous movement. By pressing down the treadle, the strap attached thereto is caused to rotate a noiseless clutch, Fig. 2, by which the balance wheel is driven. The latter, by means of an eccentric, moves the arms to which the saw is attached. The clutch merely touches the balance wheel when driven forward, but becomes entirely disconnected therefrom when it is stopped, so that the wheel is thus left to run free. When the motion of the balance wheel slackens, the treadle, which has been drawn up by the reverse

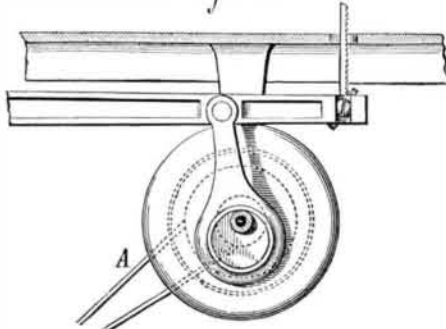
Fig. 1



rotation of the clutch shaft, by the spring arm and strap, *A*, Fig. 1, into its normal position, is again pressed down and the wheel receives fresh impulse. The saw starts at once in the right direction; and the thinner the material cut, the less frequently is it necessary to work the treadle.

The upper saw arm is jointed at *B*, so that it can be raised entirely out of the way of the work when changing the blade from one hole to another in sawing inside portions. To hold the saw, the elasticity only of the upper arm is used; and in fastening the upper end of the blade, it is therefore merely necessary to push down the arm until the desired strain is obtained. This of course can be varied to suit the

Fig. 2



size of saw and the kind of work. The machine, we are informed, is made in quantities on special apparatus and to standard gages. It is entirely of metal, and has no adjuncts beyond the six saws which are supplied with it. The arm holding the saw works on steel points, and is jointed to the connecting rod by an adjustable bearing which takes up the

wear. The main shaft is of Stubs' steel. The space under the arm is fifteen inches in the clear, and thus allows of sawing to the center of a piece thirty inches in diameter. The balance wheel is so adjusted that there is scarcely any vibration even when the machine runs at from 1,000 to 1,200 revolutions per minute. The finish is ornamental, and the workmanship is neat and good.

For further information address the manufacturers, Messrs. Bush & Smith, West New Brighton, Staten Island, N. Y.

**RUBBER OVERSHOE MAKING AT THE CENTENNIAL.**

The inventors of the rubber overshoe were the Indians



RAW RUBBER. THE VULCANIZING OVEN. VARNISHING THE SHOES.

who inhabited those portions of Brazil where the caoutchouc tree most abounded. Their method of manufacture consisted in making a rude last of clay, which was covered repeatedly with layers of the juice, each coating being allowed to dry before the next was applied. When a proper thickness was attained, the mold, with its elastic covering, was held over the smoke of a wood fire for a time, and the clay was then broken out. It was not until 1825 that the rubber shoe made its appearance in the United States; and then Thomas C. Wales, a Boston merchant, imported a few of the crude Indian productions from Brazil. Rough and ungainly as these feet coverings were, their superiority over goshes, which were nothing more than wooden shoes or clogs, and which furnished the only means, beyond extra thick leather boots, of protecting the feet during wet weather, was soon perceived. Mr. Wales thereupon sent to Brazil a large number of American lasts of better shape than those used by the native makers; and such a trade in the shoes speedily arose that, at the end of three years, no less than half a million pairs were exported from Brazil to Europe and America.

Several years before this time both English and American inventors had been seeking for means of utilizing the caoutchouc gum. In 1797, one Johnson obtained a patent in England for waterproofing cloth by covering it with rubber in solution. Hummel, of Philadelphia, followed in 1819, with a gum elastic varnish. Then Macintosh, in England, made in the same year waterproof garments which still bear his name. These efforts were, of course, known in the United States; and the rubber overshoe had no sooner become almost an article of necessity when the results of the cogitations of American inventors over the subject began to appear, in the shape of attempts to make the shoes cheaply by the processes already understood. In 1832 Wait Webster, of New York, patented a process for attaching soles to gum elastic shoes; in the following year the first American factory for the making of rubber shoes, hose, etc., was established in Roxbury, Mass.; but the mode of manufacture in those days differed greatly from that now in vogue, a fact proved by an exhibition of leather boots at the Fair of the American Institute of 1833, which had previously been sent by J. M. Hood, of New York, to South America, to be varnished with the fresh juice from the tree. The Roxbury factory created a wonderful impetus in the trade, shares of its stock sold for many times their original value, and at once six more companies embarked in the manufacture. In 1835 Charles Goodyear invented his nitric acid process for depriving rubber of its adhesiveness, and this was at once applied to the fabrication of the shoe, effectually supplanting other modes of production. It was itself, in turn, supplanted by Goodyear's great invention of the vulcanizing process; and this last, although it has been greatly modified since its origination, is now employed. Such is the briefly told history of the rubber overshoe, an article of apparel now almost indispensable, and one that is manufactured in this country at the rate of some six million pairs per year.

It was an excellent idea on the part of the National Rubber Company, of Providence, R. I., to exhibit not merely their goods at the Centennial Exposition, but also to transport thither a set of machinery, and to show to the visitor the manner in which rubber shoes are made. The annexed engravings represent the different operations, now in progress in Machinery Hall, by means of which the rough lumps of crude rubber are converted into the handsomely finished shoe. A mass of raw rubber is represented in Fig. 1. This, cut