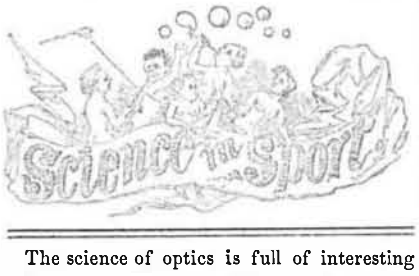
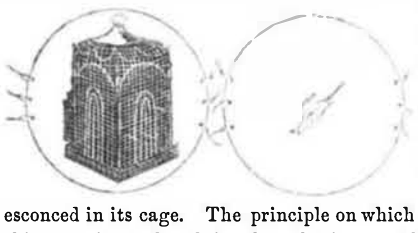



The science of optics is full of interesting and extraordinary facts which admit of many amusing demonstrations. We need only mention the magic lantern, an instrument that should be possessed by every school; the kaleidoscope, whose changes are not to be counted and by whose means a few bits of broken glass and pearl buttons, in fact any small things having color, may be made to assume the prettiest of shapes, always changing and never twice the same. These and some others are beyond the reach of many, and therefore we illustrate the thaumatrope or wonder-turner, because every child can make one for himself.

Cut out a piece of card-board of circular form and affix to it six pieces of string, three on each side. Paint on one side of the card a bird and on the other a cage; taking care to paint the bird upside-down, or the desired effect will not be produced. When showing the toy, take hold of the center-strings between the fore-finger and thumb and twirl the card rapidly round, and the bird will appear snugly

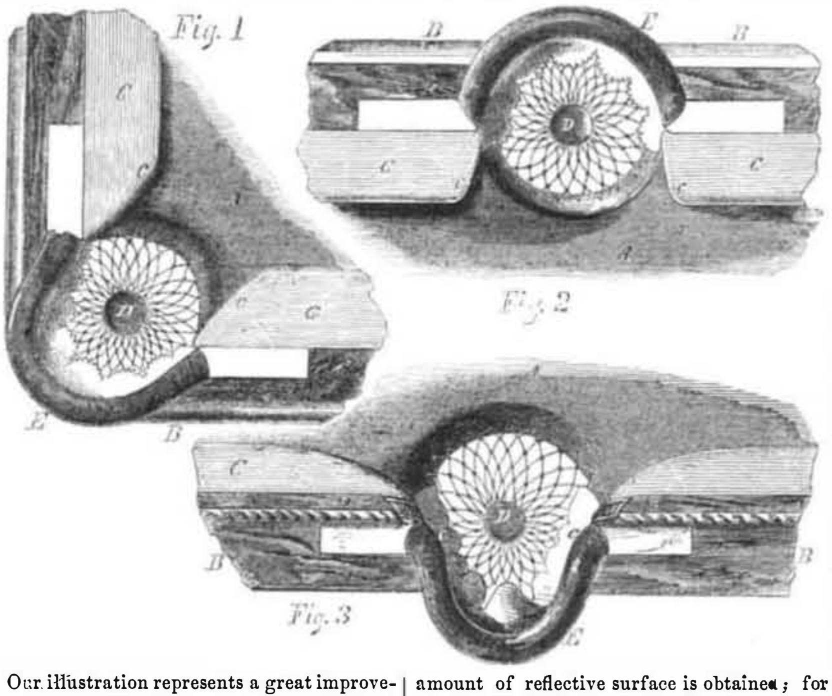


esconced in its cage. The principle on which this effect is produced is, that the image of any object received on the retina or optic nerve is retained on the mind about eight seconds after the object causing the impression is withdrawn, being the memory of the object; consequently the impression of the painting on one side of the card is not obliterated ere the painting on the other side is brought before the eye. It is easy to understand from this fact how both are seen at once. Many objects will suit the thaumatrope, such as a juggler throwing up two balls on one side, and two balls on the other; and according to the pairs of strings employed, he will appear to throw up two, three or four balls; the body and legs of a man on one side, and the arms and head on another; a horse and his rider; a mouse and trap, but we leave it to the ingenuity of our readers to devise for themselves.

Who would ever think that a bottle can be lifted by a straw? But it can be done in the following manner: take a stout unbroken

straw, and bend the thickest end of it, between the knots, into an acute angle, and put it in a bottle so that its bent part may rest against the side of the bottle, as in the above engraving; then take hold of the end of it and you will be able to lift up the bottle by the straw, and the nearer the angular part of the latter comes to that which passes out of the neck of the former so much the more easy will be the experiment. In this case, the force being distributed in straight lines, the straw, if it be perfect, cannot break by compression, and there is no tendency to bend it.

## PHELAN'S IMPROVED BILLIARD CUSHION.

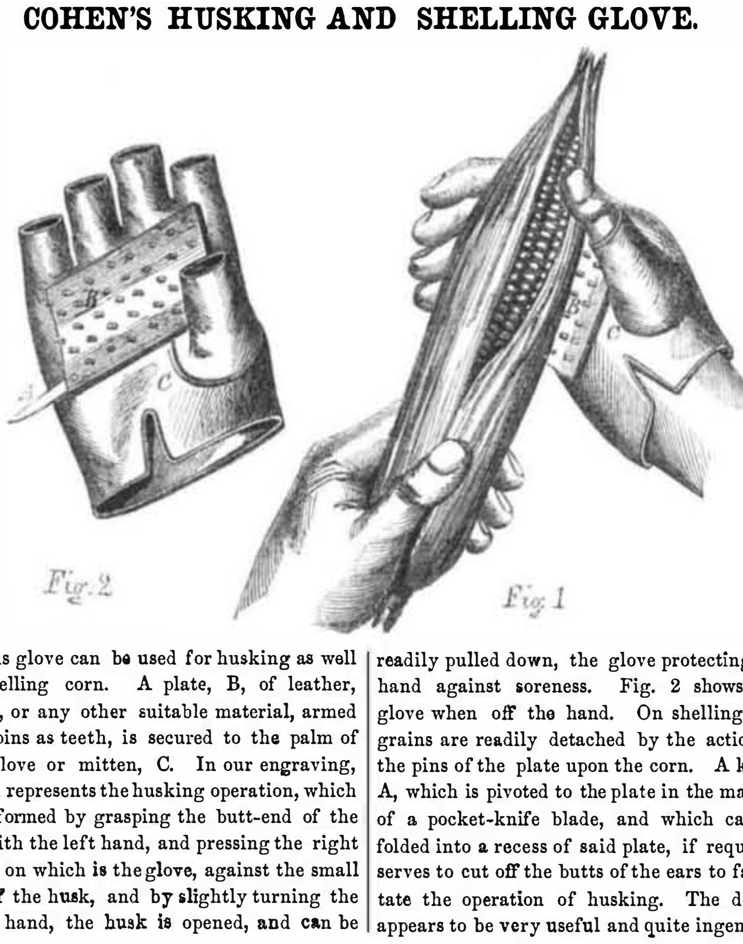



Our illustration represents a great improvement in the form of billiard cushions, which is intended to overcome two great evils that attend the ordinary construction. Fig. 3 is the old form of cushion and pocket. A is the table, B the side, and C the cushion; D the pocket, and E the pocket-iron, covered as usual with leather. In this form of cushion it will be seen that it is gradually sloped off from its proper width to the pocket, and the player when his ball strikes any portion of the sloped part, can never be exactly certain of the angle at which the ball will rebound, by this means a great quantity of accurate reflecting surface is lost to the player; again, when a ball enters the pocket, it is almost sure to strike the pocket-iron at one of the points marked *e*, and in practice, it is found that the leather covering of the pocket-iron quickly wears away from those points, leaving the metal bare against which the ball strikes, and becomes in consequence quickly worn out and injured, so as to be unfit for playing.

Fig. 2 shows a side pocket on the new principle, the same letters referring to the same parts as in Fig. 3, in which it will be seen that the cushions, C, are extended perfectly even in their width close to the pocket-hole (as will also be observed in Fig. 1, which is a corner pocket on this plan), so that a greater amount of reflective surface is obtained; for the game of billiards is not one of chance, but one of mathematical precision and accuracy. The cushions turn off abruptly at a slight angle to the pocket, just enough to give a clear entrance to the ball, and of such a shape from the corner of *c*, that should the ball once strike these, it cannot fail entering the pocket, and they also project about one-eighth of an inch in front of the pocket-iron. The shape of the pocket-iron has also undergone a material change in shape; it is, as will be seen, perfectly concave, and there is no part which can possibly be touched by the ball, but the moment it enters the space between the cushions, it is sure to fall into the pocket without touching the iron at all. We regard this as a great and important improvement in the billiard table, and will no doubt be thoroughly appreciated by the numbers who take delight in this popular and almost universal game.

It is the invention of Michael Phelan, of New York, who has assigned the invention to H. W. Collender, No. 53 Ann street, New York. A patent was secured January 12, 1858, for the shape of pocket irons and angular cushions, combined or separate, and was previously noticed on page 155 of the present volume of the SCIENTIFIC AMERICAN.

## COHEN'S HUSKING AND SHELLING GLOVE.




This glove can be used for husking as well as shelling corn. A plate, B, of leather, metal, or any other suitable material, armed with pins as teeth, is secured to the palm of the glove or mitten, C. In our engraving, Fig. 1 represents the husking operation, which is performed by grasping the butt-end of the ear with the left hand, and pressing the right hand, on which is the glove, against the small end of the husk, and by slightly turning the right hand, the husk is opened, and can be readily pulled down, the glove protecting the hand against soreness. Fig. 2 shows the glove when off the hand. On shelling, the grains are readily detached by the action of the pins of the plate upon the corn. A knife, A, which is pivoted to the plate in the manner of a pocket-knife blade, and which can be folded into a recess of said plate, if required, serves to cut off the butts of the ears to facilitate the operation of husking. The device appears to be very useful and quite ingenious.

It was invented, and patented Jan. 8, 1858, by Emil Cohen, of Washington, D. C., who will give any desired particulars.

### Iron Production.

The Pottsville *Journal* states that the total production of iron in England, in 1740, amounted to seventeen thousand tuns; the returns of 1855, however, show a total production for that country of more than three and a half millions of tuns. The present annual production of iron in the world is, in round numbers, seven millions of tuns. In 1782, the total quantity of hammered iron exported from England was 427 tuns. In 1854, the total quantity of pig iron exported was 293,000 tuns; of puddled and rolled iron, 883,000 tuns. There are now in England 599 furnaces, with an average yield each of 6,000 tuns per annum. Two hundred and thirty thousand men and two thousand steam engines are constantly employed in the manufacture. The value of the gross product is equal to $125,000,000. In the United States, ten years ago, no iron rails were made. Two years ago, 135,000 tuns were manufactured. The product of the Lehigh region in 1855, was 140,000 tuns. The valley of the Schuylkill produces annually 100,000 tuns. The Susquehanna valley produces 200,000 tuns; the valley of the Potomac, 80,000; and the Southern States, 40,000; Western Pennsylvania, Ohio, Tennessee, Kentucky and Missouri, 300,000 tuns. The aggregate value of United States manufactures, by the return of 1855, was $50,000,000.