A NEW GAME OF TABLE BILLIARDS.

In addition to the great inventions that are of utility to man, there are certain minor ones that are designed to minister to his amusement. To this latter class belongs the game of table billiards recently devised by Herr Kögel, and illustrated in the accompanying picture. The apparatus consists of a circular flat-bottomed box supported by a stationary foot, two leveling screws, a spirit level, a set of balls, and a top.

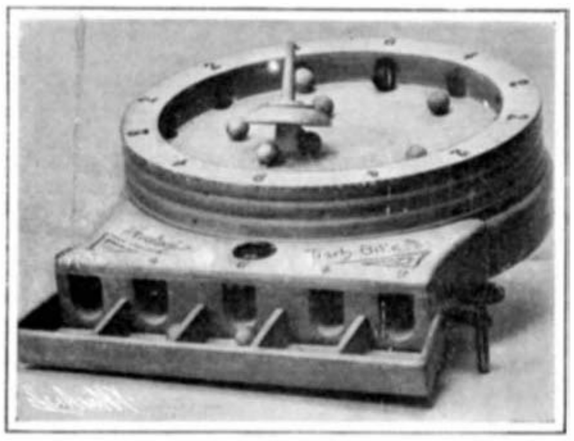


TABLE BILLIARDS.

The leveling screws and spirit level permit of quickly giving the box a horizontal position upon any sort of table. Along the periphery of the box, internally, there are apertures forming entrances to channels arranged beneath. The two series of these apertures situated on each side of the wall of the box communicate with corresponding channels, and the two situated in the median axis communicate with the median channel. The channels open into a partitioned case placed in front.

In order to play the game, eight or twelve balls are placed upon the bottom of the box, and the top is then spun by means of the thumb and forefinger. The top is of a square section beneath, and, during its revolution, throws the balls, which at the outset are assembled at the center of the box, to the sides of the latter, whence, rebounding, they traverse the bottom, and finally assemble anew at the center, whence they are again thrown by the top against the sides. During their motion, a certain number of the balls enter the apertures in the side of the box, and, following the corresponding channels, reach the compartments of the case beneath. After this the number of balls in each compartment are counted, and the player making the best score wins the game.

A NEW METHOD OF HANGING WINDOW SASHES.

Something decidedly original in the hanging of window sashes is illustrated in the accompanying engravings. It consists in linking together the two sashes of the window in such manner that the weight of one serves as a counterbalance for the other. No sash-cords, weights, or pulleys are necessary, and the disadvantages attending their use are thus entirely avoided. The space taken up by the sash weights is considerable, and in some cases architects find it almost impossible to make room for them. The cords, too, are in time weakened, either by wear on the pulleys or decay, and are liable to break. But aside from this the sash must fit loosely in its frame so that it will slide freely, with the result that the window is drafty and rattles in windy weather. That the new construction possesses none of these disadvantages will be apparent on studying the accompanying engravings. The sashes are connected at their sides by levers, *A*, fulcrumed at their centers to the window frame. The upper sash is provided near the top with a pin at each side adapted to travel in a groove in the window frame, and the lower sash is provided with bolts, *D*, which serve as pins but which may also be pushed home to lock the sash in various positions. When the lower sash is raised its upper end swings outward and the upper sash is lowered, owing to the lever connections, *A*. Fig. 4 shows the window open to its fullest extent; but if the levers, *A*, are made longer it will be evident that the window can be opened as wide as any sliding sash window. If desired, the lower sash may be swung out at the top without raising the bottom, which is bolted to the frame, as in Fig. 2. A window may be thus locked open at night, providing an ample circulation of air without fear of sneak thieves. This arrangement, it will be seen, opens the window at the center to admit fresh air which, owing to the inclined position of the sash, is directed upward to prevent a draft. The impure air at the same time flows out at the top. Fig. 3 shows the window open at top, center, and bottom. A false sill is hinged to the lower sash, and this may be swung down to close the opening at the bottom of the window, if desired. When the window is closed, as in Fig. 1, the levers, *A*, act to jam the sashes tightly against the parting bead, rendering the window watertight. If, in case of a driving rain, any water should leak past the parting bead, it would be caught in the grooves, *C*, and flow back to the sill. By avoiding the use of weights, the windows may be made 6 inches wider on each side, providing a material increase in the light area of such buildings as factories and the like. This window construction also offers the further advantage that the glass may be cleaned from the inside of the room. The bottom sash may be unbolted and drawn in to bring both sides within easy reach for cleaning. To clean the outside of the upper sash, a portion of the parting beading is removed by turning the thumb-screws, *B*, which permits the sash pins to slide out of the grooves, *C*. The sash may then be swung inward on the levers as a fulcrum to the position shown in one of our illustrations. The inventor of this improved window is an Australian, Mr. Alexander Knox, now at 703 Times Building, New York city, N. Y.

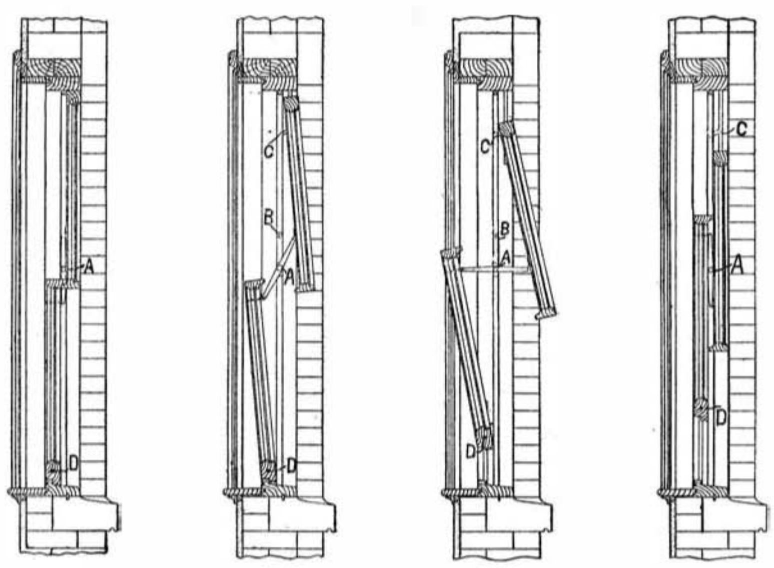


Fig. 1. Fig. 2. Fig. 3. Fig. 4.

Various Positions Occupied by the Counterbalanced Windows.

Top Sash Swung in for Cleaning.

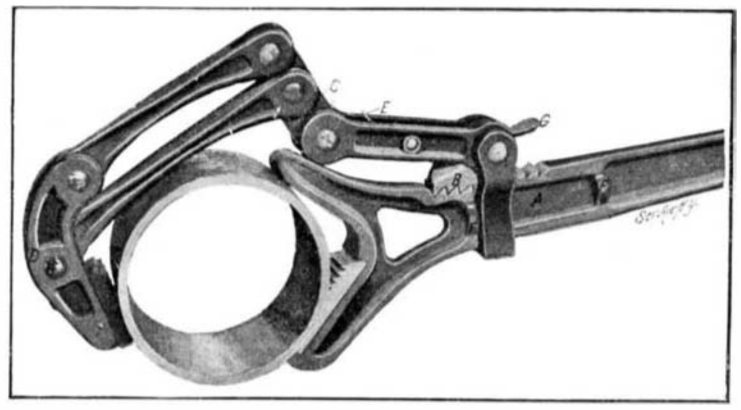
Cleaning the Lower Sash.

A NEW METHOD OF HANGING WINDOW SASHES.

When the long-distance wire now being laid between Denver, Omaha, and Kansas City has been completed, there will be a direct telephone communication between New York and San Francisco, which are nearly 4,000 miles apart.

AN IMPROVED PIPE WRENCH.

An improved pipe wrench has recently been invented, which may be quickly adjusted to take various sizes of pipes or nuts, and which will act with a maximum of power without unduly mutilating or marring the article gripped. Furthermore, the gripping jaws will be readily disengaged from the article when pressure is released from the handle. In the illustration a portion of the handle, *A*, is shown. This, it will be observed, terminates in a Y-shaped jaw, in which a serrated steel piece is set. A yoke strap on the handle carries a pawl, *B*, which engages teeth formed in the upper edge of the handle. The strap also carries a pair of arms, which at their outer ends are pivoted to the rear yoke head, *C*. The latter is connected by two links with the forward yoke head, *D*, which at its lower end carries a jaw pivoted thereto. In use, to adjust the wrench to any desired article, the pawl, *B*, is lifted by depressing the end, *G*, then the jaws are moved against the article. On releasing the pawl the spring, *E*, presses it into engagement with the teeth on lever, *A*. Then, when the lever, *A*, is moved, the jaws are brought together with a powerful gripping action, due to the leverage of the yoke heads and links. The wrench has a wide range of adjustment, which is limited only by the stops, *F*, coming in contact with the yoke strap. The inventor of this improved wrench is Mr. Patrick F. Duross, of 57 North Pierce Street, Flushing, New York.



AN IMPROVED PIPE WRENCH.

Mine Explosions.

There is a peculiarity often manifested in regard to the evidences of violence at different points. Too often it is assumed that a fresh body of firedamp or a keg of powder has been exploded at such points. The greatest violence is generally manifested at the point developing the greatest resistance, when that resistance gives way under the pressure. The expanding air of an explosive blast may cushion from one point in the mine to another. A temporary cushioning of the blast by a contracted passageway, or other heavy obstruction, may have the effect of transferring the pressure from the starting point, where destructive violence is usually manifest, to a point where the obstruction was met. This cushioning effect may be so complete that between these two points there is perhaps little sign of the passage of the blast in that direction. There is seldom any evidence of violence manifested inby or toward the face from the initial point of an explosion, owing to the cushioning of the air in this direction.—Mines and Minerals.

Until 1847, when Squire Whipple, the modest mathematical instrument maker, who, without precedent or example, evolved the scientific basis of bridge building in America, correct methods of computing the strains in framed structures were not known. A few years later, in 1851, Herman Haupt published a book on the theory of bridge construction. About 1850, after the building of railroads had advanced, the educated engineer commenced to exert his influence in the art of bridge building, and, from that time forward, steady progress was made. The period from 1850 to 1860, therefore, may be regarded as an epoch in the history of American bridge building; the time when the bridges designed by Fink and Bollman first came into use.