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# POPULAR MECHANICS

## MAGAZINE

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SEE PAGE 533

Young Jake Schaefer, World's 18.2 Balk-Line Billiard Champion and Son of a Famous Champion of the Last Generation, is Noted for the Coolness of His Nerve and the Perfection of the Bridges He Employs in Such Difficult Shots as This Massé, in Which the Cue Ball Twice Describes the Arc of a Circle, Striking Both Object Balls



## Magic in Ivory Balls Solved by Diamonds Which Make Amateurs Experts

By J. EARLE MILLER

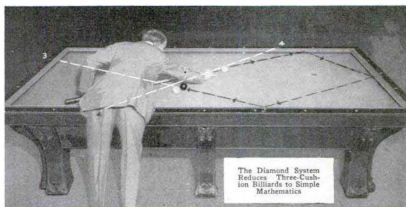
**M**AKING a trio of ivory balls perform weird gyrations around a green-felt table by the application of simple mathematics bids fair to make three-cushion billiards the leading favorite of all the ivory-ball games. Through the application of an ingenious "diamond system" any inexperienced player can determine off-hand where to shoot to make the necessary three caroms off the cushion before the second object ball is hit.

The mathematical diamond game is so fascinating that, at the University of Chicago, a class of college professors, including Albert H. Michelson, the famous mathematician, has been formed to study it under a professional coach.

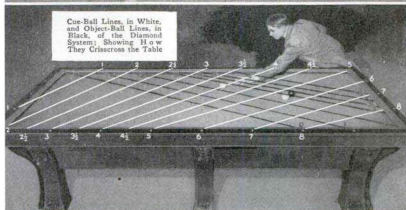
Three-cushion billiards thrills the spectator and amateur player for the same reason that a free-hitting baseball game or a "Red" Grange on the gridiron does—there is more action to it. The tournament game of 18.2 balk-line billiards is like a no-hit, no-run baseball game, a fine example of great skill, but not very thrilling for the spectators, or the opposing players.

Young Jake Schaefer, the balk-line champion, and Edouard Horemans, the Belgian, from whom Schaefer recently regained his title after losing it the month before, frequently run from 100 to 200 or more points at a time, displaying remarkable skill, but such long runs rather lack excitement for the balls are grouped together and then nursed along with the minimum amount of movement required by the rules. The three-cushion game, on the other hand, affords plenty of action, but, until the diamond system was perfected, many amateurs found it too difficult.

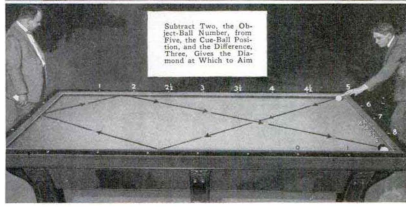
The mathematical system of computing angles at which shots must be made to get the necessary bank from three cushions, derives its name from the use of the ivory diamonds inlaid in the table edge as guide markers. It is only necessary to memorize two sets of numbers, one for the cue-ball position and the other for the object balls, and then subtract the latter from the former, the



The Diamond System  
Reduces Three-Cushion  
Billiards to Simple  
Mathematics



Cue-Ball Lines, in White,  
and Object-Ball Lines, in  
Black, of the Diamond  
System; Showing How  
They Crisscross the Table



Subtract Two, the Ob-  
ject-Ball Number, from  
Five, the Cue-Ball Posi-  
tion, and the Difference,  
Three, Gives the Dia-  
mond at Which to Aim

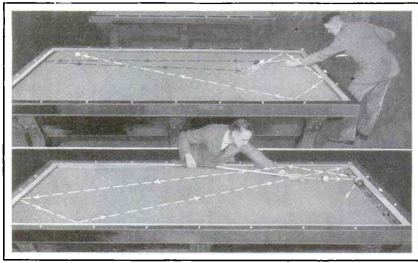
difference indicating the position on the table at which the cue ball should be aimed to strike three cushions before the object balls.

The player still must estimate the proper amount of "English" to use, and can display his skill at calculating the direction the cue ball will take after striking the first object ball, when the two are separated. The diamond system only solves the first, and purely mental, problem of where to shoot, leaving the rest to the individual skill of the player.

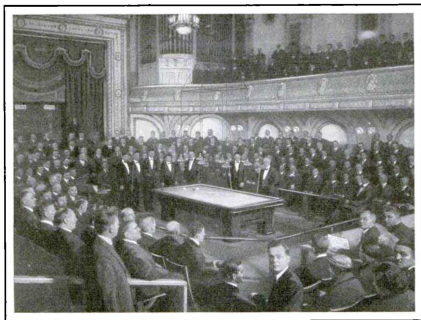
The simplest of all three-cushion shots, with the cue ball in one corner and the two object balls together in another, illustrates the basis of the system. The cue-ball numbers, starting with the first diamond at the other end of the table, run from one to five for the corner diamond, and up to eight for the three end diamonds. The object-ball numbers, starting around the end of the table, run from zero to four and a half, the two coming in the corner. Thus, the cue-ball number in the corner being five and the object-ball number two, the difference is three, and the player, counting diamonds from the opposite end of the other side of the table, aims at the third diamond. The ball caroms off the side cushion, strikes the end, banks straight for the second diamond on the other side, and from there to the opposite corner, striking the two object balls.

When the balls get out into the middle of the table, the game becomes more complicated, unless the imaginary numbered lines are well memorized, since the lines are not parallel, half numbers resulting in converging lines. The opposite end of the cue-ball line is always determined, however, by subtracting two from the number for the near end, and counting back from the other end of the table for the resulting number. Thus the number-three cue-ball line, after subtracting two from three, should end at the first diamond on the opposite side.

The fascination of pool and billiards is largely due to the mathematical exactness with which the most erratic-appearing gyrations can be duplicated time and again by an expert player. Masse shots, at which Horemans, the Belgian player, is an expert, often apparently defy all the laws of reasonable conduct. A masse is a curved ball which starts in one direction, changes its mind and ends up somewhere else, like a boomerang. When young Schaefer won the title from Willie Hoppe, he was forced to use one of the most difficult of all masses, with all three balls in line along the rail, the two object balls being so close together that it was impossible to hit the first and send it out at an angle while the cue ball would follow through to complete the point by hitting the second. Instead Schaefer massed the cue ball out in a curve that circled around,



Two Difficult Fancy Shots, a Three-Cushion Kiss Shot off the Red Ball, Above, and a Three-Cushion Tuna Shot, Below, Demonstrated by Al Taylor, One-Time Challenger for the World's Balk-Line Championship



International Billiard Tournament Staged in a San Francisco Church Auditorium; Huge Galleries of Billiard Fans Gather Each Year to Watch the Ranking Stars Play for the Title

came back, struck the farthest object ball and glanced on to the nearest one. The shot, as Schaefer played it, is illustrated in the center picture on page 631, while, just below and to the right, is the simpler form, where the distance between the balls is sufficient to drive the first one out of the way.

Many of these complicated shots require intricate "bridges" formed by the fingers. Schaefer is noted for the perfection of his bridges, his long flexible fingers bending easily backward, but steadying in the most difficult positions and holding there without a tremor while the shot is being made.

Schaefer's history is the story of a young man who followed in his father's footsteps so well that he has won the same championship, the world's balk-line title, which, incidentally, is no empty honor since it is worth \$6,000 a year to the holder. It also carries with it exhibition tours and special opportunities for demonstrating one's skill, all of which pay well.

The elder Jacob Schaefer was one of the first great billiard players and did much to establish the position of the game. His son, born in 1894, was only 27 when he defeated the veteran Willie Hoppe for the

title by running up a grand average of  $51\frac{10}{16}$  points to an inning, which almost reached the record of  $55\frac{1}{2}$  which Hoppe had set seven years before.

How far billiards have advanced in the five years since Schaefer won his first title is indicated by the fact that he averaged  $93\frac{1}{4}$  for sixteen innings, when he defeated Horemans in January of this year, while even the loser beat Hoppe's old record by a fraction of a point.

Schaefer has set many records in tournament play, but one of the most unusual was during the 1925 tournament, when he eliminated Hagenlacher by the unique score of 400 to 0, his opponent never having a chance to climb down from his stool and try his luck. Schaefer won the bank at the start and ran out the 400 points without a stop.

In the closing game of the tournament, which marked Hoppe's retirement, Schaefer again made a remarkable run of 296 points.

The skill required to make several hundred successive plays without faltering is enormous, and the nerve necessary to do it before a crowded auditorium of wildly enthusiastic billiardists still greater.

His coolness served Schaefer well in his

last match with Horemans, who is inclined to be excitable, but failed to help him the month before when the challenger won the title. On that occasion Horemans got away to a good start, and the champion was forced to sit on his stool most of the evening. At one stage, the Belgian had run up a score of 467 to 11, but Schaefer finally got started and collected 301 before his opponent was able to run out the 500 score for the evening.

The men who become champions, or of sufficient caliber to play in championship games, have a remarkable mastery over the ivory balls. Perfect balls on a perfect table always perform the same way under given conditions, so there is no uncertainty about the expert's shots. Some of the fancy shots, rarely seen in tournaments, are marvels of accurate timing, two or three balls in motion meeting at predetermined positions to touch and rebound on new courses, whence they strike other balls to complete the shots.

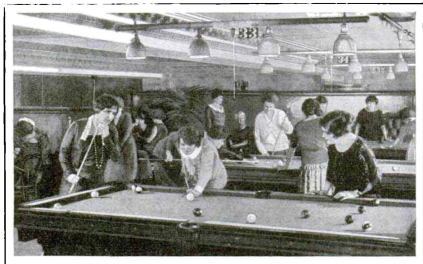
In one shot, for example, the white cue ball, lying against the red object ball, drives the latter down the table, to rebound from the end cushion and strike the cue ball, which in the meantime has remained almost motionless because of backspin applied by the cue. The cue ball, rebounding from the returning red ball, makes three cushions and eventually strikes the second of the object balls near

the other end of the table. The whole shot, taking a matter of seconds, is so accurately timed that a billiard expert can perform it over and over again.

The old-time pool room with its unsavory reputation has been largely eliminated through the efforts of the billiard manufacturers and state organizations, and both straight and pocket billiards, once threatened with general disfavor, put back on a higher plane. One result of the change is the growing popularity of billiard rooms devoted exclusively to women.

#### FABRIC FOR CHASSIS BEARINGS MAINTAINS OIL FILM

Bearings of a fiber composition instead of metal for the auto brake gear, steering and suspension system, and other parts, are said to be a suitable substitute for bronze or white metal, to keep an even lubrication and, even when not oiled, produce little frictional resistance. The material is capable of withstanding a pressure of two tons to the square inch without perceptible yielding, it is reported. The composition is not intended for highly important engine bearings, which are all inclosed and highly lubricated, but especially for the minor parts of the chassis, where heavy loads are borne, adequate lubrication is difficult and squeaks and rattles are likely to arise.



Billiard Parlor for Women Only. One of the Newer Developments of the Game Which Has Found Favor in Larger Cities, Where Both the Pocket and Cushion Game Have Many Feminine Followers



Al Taylor Showing How to Make a Three-Cushion Shot off One Rail, a Difficult Feat Which Takes the Amateur Many Long Hours of Practice to Master



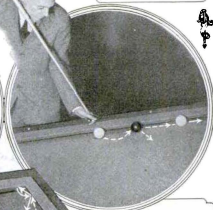
Masse Shot off the Farther Ball, Requiring Perfection of Bridge, Knowledge of "English," and Iron Nerve



Three-Cushion Masse, in Which the Back-Spinning Cue Ball Makes Two Cushions on One Rail and the Third on the Other before Losing Its English



Three-Cushion Draw Shot, Using Reverse English, the Ball Making All Three Cushions in the Corner after Rebounding from First Object Ball



Variation of the Shot in the Center Above; Here the Object Balls Are Farther Apart, So the Red One Is Forced Out of the Way