

Rapid Spinning of Tiny Steel Spheres Tool for Scientists

New York, N.Y.—(Scientific American Feature)—Steel spheres no larger than those that tip ball-point pens are now being made to spin fast enough to roll from New York to San Francisco in less than an hour, about 1.5 million revolutions per second. At such speeds the minute spheres develop a billion times the force of gravity and when urged to spin even a little faster they explode. Why spin little spheres so fast?

The answer is simple according to Jesse W. Beams, professor of physics at the University of Virginia. "It's fascinating," he says.



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In the late 1920s, according to Dr. Beams, he and Ernest O. Lawrence were looking for a way to make high-speed photographs of the breakdown of electric sparks and of other phenomena of very brief duration. They finally hit on the idea of mounting a mirror on a high-speed turbine that was spun by a jet of compressed air. "The Belgian scientists," Dr. Beams explains, "had conceived the simple idea of spinning a small fluted rotor on a jet of air. The rotor is raised from its resting place by a stream of air and automatically seeks a position in space where its weight is just counterbalanced by the pressure of air from below. By this scheme, the Belgians were able to spin small rotors, an inch or less in diameter, to several thousand revolutions per second and to produce centrifugal fields of force about 1 million times greater than gravity. Adapting their rotor to our needs constituted my introduction to high-speed rotation."

"The question then arose as to whether we could use a simple air-driven rotor for spinning solutions and thereby increasing the rate at which materials in suspension would settle to the bottom, such as the large organic molecules that interest biologists. The answer proved to be yes. But we soon encountered limitations to the upper speeds that could be attained. Air friction created serious heating problems. We then undertook to build 'ultracentrifuges' in which the rotor (up to a foot in diameter) could be spun in a high vacuum. One of the most difficult problems was the development of a practical vacuum-tight oil gland for the shaft that linked the air turbine to the rotor. This was finally solved and ultracentrifuges of this general type have been the principal work horses of molecular sedimentation experiments in this country for the past 25 years."

involved work of many. "It was only a step from this development to the use of electrical drives and magnetic bearings, although taking that step has involved the work of many scientists and graduate students for more than two decades. The rotors of our current machines take the form of steel spheres. They are supported in an evacuated space by electromagnets, the strength of which is controlled by the position in space of the sphere. If the sphere tends to drop, more current is sent through the electromagnet; to fall, less current. Rotary motion is

Back Stairs: The Red Fox Tavern

By MERRIMAN SMITH
UPI White House Reporter
Washington — UPB — Back stairs at the White House:

Down in Middleburg, Va., where President and Mrs. Kennedy spend the week ends, those who are not fox hunting or tooling around the country lanes in their Jaguars may be found frequently in an ancient establishment known as the Red Fox Tavern.

The history of the Red Fox dates back to the 18th Century, the latter part, naturally, when George Washington

Refrigerator Cars Derailed in Yard

Wenatchee — UPB — Five Great Northern refrigerator cars were derailed in the train yard here Wednesday. No one was injured.

The cars jumped the tracks when two connected cars started rolling and ran into three others which were not yet clear of a rail switch. Heavy damage resulted to at least two of the cars.

A Great Northern spokesman said the damage total would be "no slight bit." However, he declined to make an estimate.

CALLING ALL CARS

Columbus, Ohio — UPB — Police here received a telephone call Wednesday from an excited man who said, "there's a man with a gun at 90 W. Gay st." Alert radio dispatchers immediately ordered two patrol cars to the scene. Then they grew more alert and canceled the order; 90 W. Gay st. is Columbus' police headquarters.

imparted to the sphere by an alternating magnetic field, of the same sort that drives the rotors of ordinary induction electric motors. It turns out that the friction of our magnetic support 'bearing' is too small to be measured. A 30-pound rotor coasting at 1,000 revolutions per second in a high vacuum loses only about one revolution per second per day. In other words, the rotor could coast for more than two and a half years after the power is shut off.

"What good are high-speed rotors? In addition to providing biologists with a powerful tool for separating giant molecules, they can also be used for fractionating nuclear fuels and for determining the mass of other materials. They provide the highest sustained speeds that can be achieved mechanically in a small laboratory, as well as the highest sustained accelerations attainable by any means. These two attributes make it certain that scientists and engineers will continue to find new uses for the techniques of ultrahigh-speed rotation."

may have dropped in to have an ale while his wig was being powdered.

The Red Fox usually has eight or ten rooms available for weary travelers, plus a large brick-walled and oaken-beamed dining room. This opens into a subterranean taproom with the architectural sturdiness of a colonial powder magazine. The front office is a small enclosure at which one is tempted to step to the wicket and place a couple of bob on her majesty's entry in the Balmoral Cup.

The second floor of the Red Fox is a rather doubtful area; doubtful in the sense that the

hour. Woe betide the night traveler, dusty and weary he may be, who presents himself after the door-bolting. Many may call, but few are admitted. The night clerk who also is the day clerk quite understandably does not like being fetched down the melodious stairs from his chambers far above.

The sleeping rooms are on the third and fourth floors of the Red Fox and most of the furniture is genuinely antique, some pieces to the point of charming frailty. A room with a view of the main street of Middleburg is not regarded as particularly fortunate because large trucks rumble through the village at night, giving the front room sleeper

a momentary sensation of having been ridden down by the cavalrymen of centuries past.

About the only concessions to modernity have been electric lights, running water and foam rubber mattresses on the quaint, canopied four-poster beds which once led a ciliated visitor to inquire, "Who sleeps in those crazy upper?"

Ham and Frog Legs

The President and the first lady to date have had no direct connection with the Red Fox, although their influence is unmistakable and since most of the people around Middleburg sooner or later visit the Red Fox, the Kennedy's probably will drop by in due time, possibly while the President's wife is running down early American furniture for the White House.

The Kennedy influence seems most reflected at the Red Fox in the tavern's recent acquisition of a rather well-known French chef whose souffles were so excellent that two Washington restaurants once sued for his services.

The Red Fox is managed by Mrs. Nettie Michaels who looks much more like a college senior's dream for prom week than a Revolutionary War innkeeper. Mrs. Michaels sees nothing inconsistent in having a French chef and haut cuisine on the menu in an inn so otherwise steeped in basic Americana. Nevertheless, it is down-

right disconcerting to see on the same menu with baked Virginia ham such things as frog legs provencale and bouillabaisse. It might help if they called it "Ye Olde Bouillabaisse."

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