

Roots o' Reels XVIII. Centrifugal Antibacklash Brakes

Steven K. Vernon

A centrifugal brake is a specialized type of mechanical governor, which adjusts the speed at which a mechanical process occurs through feedback. Ancient Chinese, Greek, and Muslim engineers devised governors for various machines, many of which, including clocks and mills, depended on water flow. In 1787, Thomas Mead, a British miller, patented a centrifugal regulator that lowered a millstone to the grain only when the windmill sails rotated rapidly enough (Fig. 1, left). Matthew Boulton and James Watt adapted Mead's governor to regulate a steam engine (Fig. 1, right), and "flyball" centrifugal governors quickly became essential components of many evolving machines of the Industrial Revolution. Thomas Edison would design one to regulate the speed of a phonograph turntable.

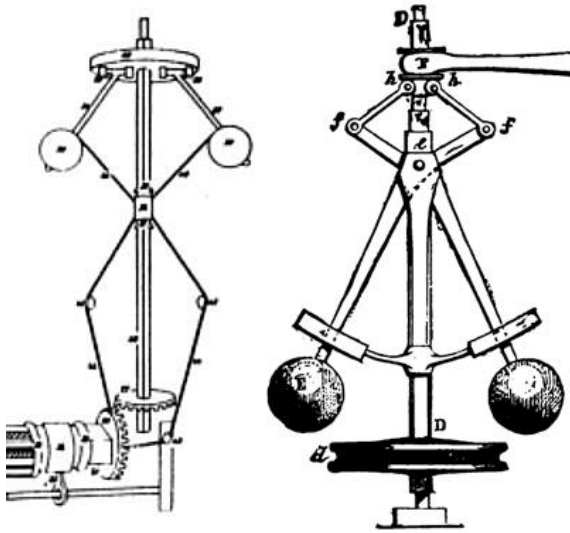


Fig. 1. The windmill governor of Thomas Mead (left) and the steam engine governor adapted from it by Boulton and Watts.

The centrifugal brakes used in fishing reels are used to combat backlashes during the cast. Most adjust the speed of spool rotation by varying the pressure of brake shoes against the inner surfaces of drums; the shoes are moved, usually radially, by centrifugal force. When Rensselaer Reynolds, Stockport, N.Y., invented his centrifugal friction clutch for looms and other machines in 1857 (Fig. 2), such devices were already well-known. Reynolds' clutch eliminated the need for springs, whose centripetal forces on the brake shoes had to be overcome before the brake shoes could contact the surrounding drums.

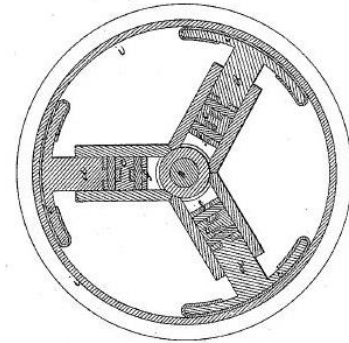


Fig. 2. Reynolds' springless centrifugal friction clutch for a loom.

Despite their probably widespread familiarity with centrifugal clutches, reelsmiths did not adopt the technology quickly. It was not until 1892 that Samuel L. Bean, Bean, N.D., patented what may have been the first centrifugal brake for a fishing reel. It was rather primitive, consisting of only a single, weighted brake shoe linked to the spool, whose momentum had to overcome spring pressure to make contact with the frame-mounted drum (Fig.3).

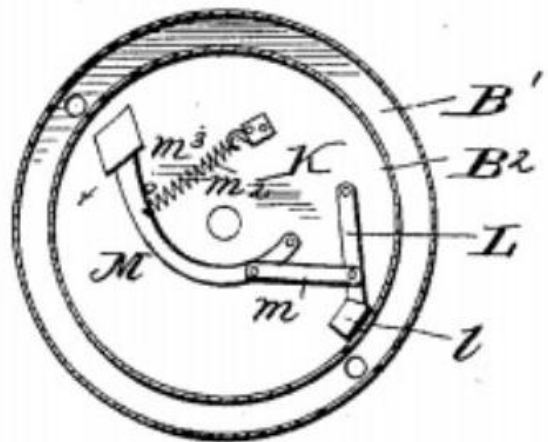


Fig. 3. Samuel Bean's single-shoe centrifugal brake for a fishing reel.

Even after Bean's invention, reelmakers ignored the idea of centrifugal brakes for years. Edward L. Gilmore, Youngstown, Ohio, patented a one-shoe device similar to Bean's in 1907, but it was not until 1908 that the first truly practical, effective brake appeared. Benjamin Flegel's simple brake consisted of two curved brake shoes that were thrown outward by centrifugal force to rub against the side of a recess in the tailplate (Fig.4). The brake, used in the well-known Redifor "self-thumbing" reels, popularized the

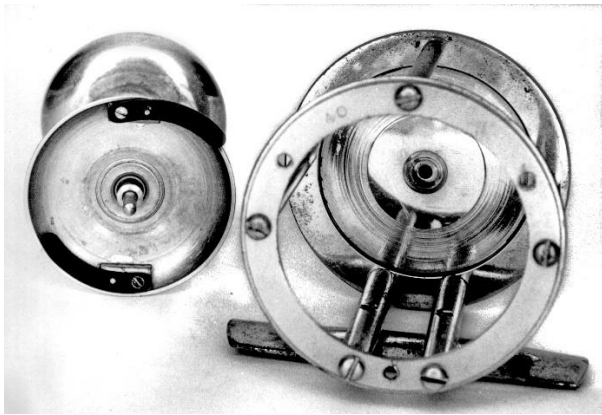


Fig. 4. A Redifor reel with Flegel's brake, with two pivoting shoes.

idea of a centrifugal antibacklash brake. Pflueger's purchase of the patent and inclusion of the brake in their Redifor reels certainly must have furthered its reputation.

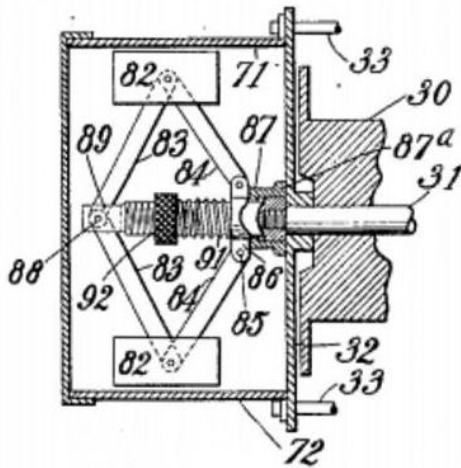


Fig. 5. Wherry's brake, allegedly strong enough for a drag.

A number of other centrifugal brakes were patented over the next decade or so. One, a modified version of a flyball governor, was heavy enough to act as a drag—in contrast to an antibacklash device—according to its inventor, John A. Wherry, of New Orleans, La. (Fig. 5)

Another brake found its way into the Indiana-style Graham No-Lash reel during the mid-1920s (Fig. 6). Milton Graham's brake included two spring-loaded arms that pivoted a couple of large brake shoes. Al Foss patented three centrifugal brakes from 1926 to 1931.

The use of centrifugal brakes in fishing reels gradually caught on. In 1938, Hardy Brothers was granted a patent for a brake similar to Flegel's, and it was used in their early Elarex and Jock Scott casting reels (Fig. 7). Edward G. Willison, Cincinnati, Ohio, went so far as to add a flyball regulator to a casting reel in

1942, providing a huge dome on the tailplate to house it (Fig. 8).

What was perhaps the most elegant-in-its-simplicity centrifugal brake for casting reels was the brainchild of Göte Ingvar Borgström, Svängsta, Sweden, son of the founder of AB Urfabriken.

Borgström's brake consisted of nothing more than two small sleeves that slid radially along two pins extending from the spool shaft to contact the drum. The ultimate brake pressure could be varied by using sleeves of different weights. Patent applications were filed in 1944 and 1945 in Sweden and the U.S., and ABU introduced the Record 2100 after the war, equipped with its brake. Over time, the ABU brake would be adopted by other makers, and I hope the adoption was licensed in every case. Examples include the Penn Levelmatic (Fig. 9) and various Japanese reels. Even the Hardy Elarex would switch to the simpler design.

Centrifugal brakes were used increasingly



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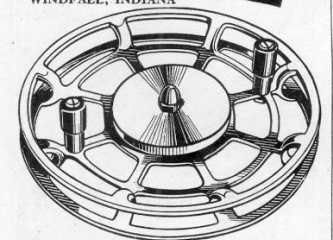
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Graham No-Lash

"THE GOVERNOR DOES IT"

Fig. 6. A 1926 ad for the Graham No-Lash, an Indiana-style reel.

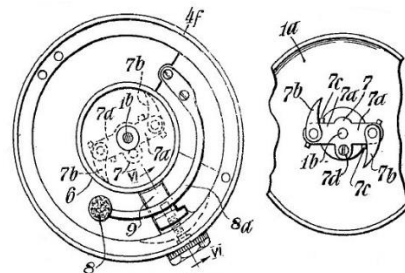


Fig. 7. The Hardy Bros. brake used in the Elarex and Jock Scott reels.

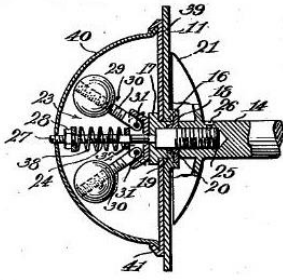


Fig. 8. Willison's flyball clutch.

after World War II. In 1946, Gordon F. Laing, Delavan, Wis., filed the first of several patent applications for what would become the Cycloid Micromatic reel, which was introduced in the late 1940s. Laing's brake was another flyball-based governor, but instead of using weighted balls, it pressed cylindrical brake pads against an immobilized plate to slow the spool (Fig. 10). Cycloid Corporation received an honorable mention in 1949 from the Chicago Federated Advertising Club for its radio promotion of the reel.

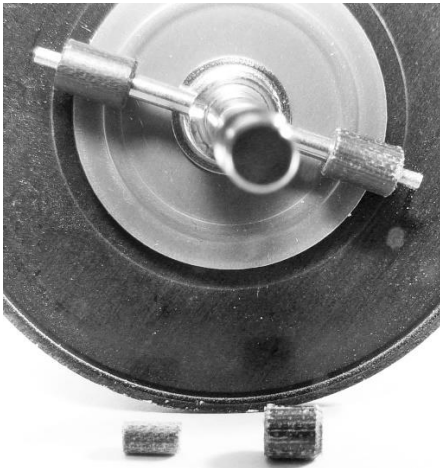


Fig. 9. The simple brake in a Penn Levelmatic, almost identical to Borgström's ABU brake. Two smaller-sized weights are shown below.

Other inventors jumped on the bandwagon for what must have been a bumpy ride. In 1953, Mary W. Elliston, Chicago, Ill., one of the very few female reel patentees I've encountered, patented a brake that

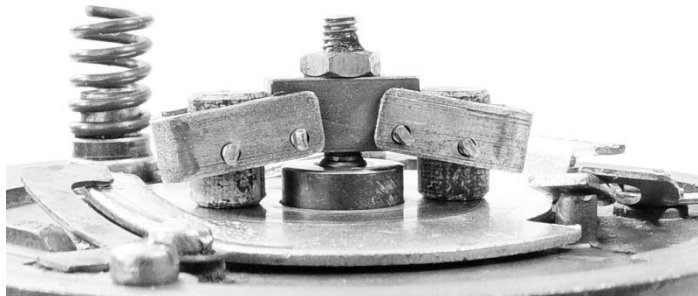


Fig. 10. The centrifugal brake in an early Cycloid Micromatic. An external knob rotates the drag plate, moving it closer to, or farther from, the brake pads.

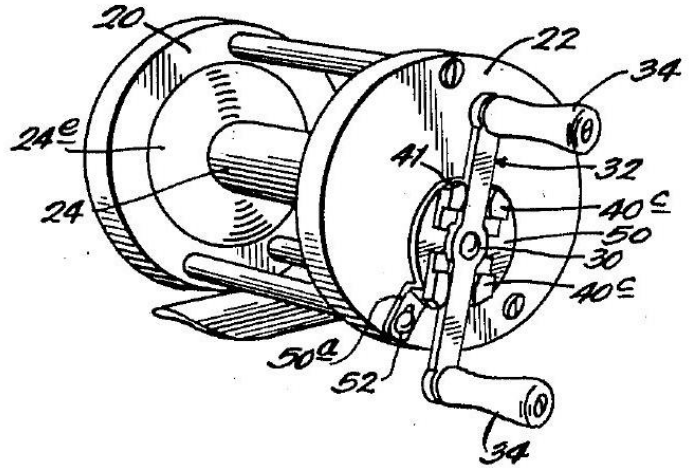


Fig. 11. Mary Elliston's crank-mounted brake.

could be attached below the crank of "any" casting reel (Fig. 11), instead of working inside the tailplate. Its four weights slid outwards during the cast to contact a cupped "braking disc." Three years later, Frank A. Janousek, Hutchinson, Minn., patented another crank-mounted device with a sliding weight that tightened a spring around the crank collar (Fig. 12). It was a centrifugally-operated drum brake.

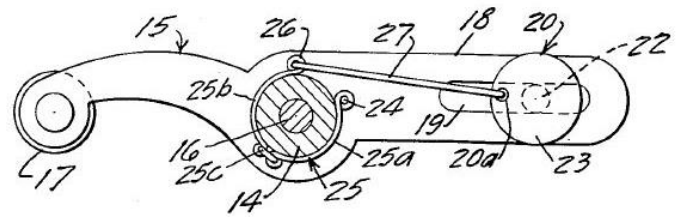


Fig. 12. Janousek's crank-mounted brake.

The race was on. Centrifugal brakes became common during the 1950s, used, for example, in Noble Nelson's Gentleman Streamliner and for speed regulation in various automatic reels. At the same time, anglers were able to begin comparing the relative merits of centrifugal brakes and magnetic brakes, which had been introduced by Ocean City and Horton in 1948 (*The Reel News*, Sept., 2003, pg. 15). Anglers are still comparing them, and both types of antibacklash brakes, improved in both design and materials, are ubiquitous today. Amazingly enough, we still get backlashes.