Gyro Trail Hauler Makes Mules Blush

IRA C. FUNK

More than a decade ago, Herbert K. Harris slogged his way by foot and horseback over 200 miles of mountainous forest trails in planning the forest fire protection system for national forests in northern Idaho and Montana. As he plodded along, he often thought, "There must be a better way!" Now, thanks to Herb's persistence, there is a better way.

It is the gyroscopically stabilized cargo carrier. This looks like a cross between a large box and a motorcycle. The gyroscope, like a child's spinning top, keeps it upright even on steep, mountainous terrain. It carries the load of four pack mules, but unlike mules you don't have to feed it except when it's working.

Forestworkers, firefighters, miners, campers, hunters, farmers, and others will benefit from its use. It will speed rescue and firefighting operations when weather makes use of planes or helicopters unfeasible.

Largely through Herb Harris' urging, many people, privately and in public organizations, developed and tested machines for constructing forest trails and the vehicles for carrying men and cargo on them. Special scooters and motorbikes have been developed to transport one or two workmen and a few handtools over trails with only 18- to 24-inch tread width.

Special machines to take the place of handtools are now under test for constructing and maintaining these narrow trails.

Gasoline-powered cargo carriers with one wheel or with two wheels in line have been used for several years. These carriers require two husky men to operate and balance them with their 250- to 350-pound payload. Mules are still being used extensively, but can pack less than 200 pounds per animal.

Harris, who now directs the Forest Service Equipment Development Center at Missoula, Mont., was still not satisfied. "There must be a better way to transport cargo on trails," he told his small staff.

In 1959, he and his crew began studying gyroscopes and previous designs of gyroscopically stabilized vehicles. Although gyroscopes were successfully used in guidance of aircraft and missiles, no one had succeeded in developing a successful gyroscopically stabilized land vehicle. Nevertheless, Herb's studies of models of gyroscopic balancing systems and the cargo hauling problem showed that a gyro-stabilized cargo vehicle would give the most promise of success. A vehicle that could carry about 800 pounds and require only one operator was needed.

Realizing he and his staff did not have the outstanding capability in gyro-balancing system design needed to develop a successful vehicle, Harris made a countrywide search for the

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man or organization that could succeed where all others had failed.

He found Tom Summers, a gyroscope systems designer and inventor. Tom had over a hundred gyroscope patents to his credit and was president of a small organization in Van Nuys, Calif., called the Summers Gyro-Car Co. He was already actively engaged in developing a gyro-stabilized vehicle. It appeared that much of the work Summers had done could be applied to the trail vehicle.

Under a series of contracts, Tom Summers and his small organization teamed up with the Forest Service's Equipment Development Center at Missoula. An experimental model of a gyroscopic stabilizing system was designed and tested in 1963. This demonstrated that the needed stabilizing system was feasible.

The first pilot model of the carrier was completed in 1965. This brought an opportunity to study the problems in a full-scale working model and important progress in development of the gyro control system. After 5 years of teamwork, the second pilot model was undergoing 200 hours of grueling tests on the center's proving ground and along forest trails.

On July 7, 1967, at a gathering of civic and forestry leaders and officials at Missoula, the battered and worn second pilot model, refreshed with a new paint job, was unveiled to the public. It was described as the first successful gyroscopically stabilized land vehicle on record.

Those attending saw for the first time a trail vehicle that could pack four times as much as a mule over the same narrow forest trail. Since its speed was 2½ times the mule's speed, it could transport 10 times the amount of cargo a mule could transport in a given time. Its designers had done an excellent job.

The forces that hold a child's spinning top upright keep the gyro cargo carrier from tipping over. Its 20-inch

Cargo carrier's narrow tread and gyro stabilizer permit crossing on log bridge.

Gyro carrier climbs a steep slope.

diameter, 180-pound gyroscope spinning at 5,500 revolutions per minute is similar, but much more complicated than a toy gyroscope that balances on a string or tip of a pencil. A hydraulically operated parking stand keeps the vehicle upright when the gyroscope is not functioning.

All controls are at the rear of the machine. The operator may ride standing on a steplike platform or may fold the platform against the vehicle and walk behind it with his hands on the controls.

Each wheel is driven by a small hydraulic motor in its hub. A pump operated by a gasoline engine supplies hydraulic power to these motors and to the motor driving the gyro. The same power source also provides power steering. All three wheels are in line and have 9.50 x 8 low-pressure tires for maximum traction with minimum tread width.

Bogey or "rocking chair" suspension of the two rear wheels plus 10-inch ground clearance give good performance in climbing over the obstacles frequently found on trails. Overall dimensions (length, 8 feet, overall width, 32 inches, overall height, 59 inches) and 1,700 pounds empty weight permit easy transport via highway or forest road in a pickup truck. A narrow gangplank is all that's needed for the carrier to load or unload itself.

The carrier's forward speed up to 5 miles an hour, reverse speed up to 1½ miles an hour, and 6-foot turning radius are adequate and safe for mountain trail travel. It will climb a 60 percent slope on pavement and travel side hill on a 60 percent side slope. (A 60 percent slope is one that rises 60 feet in a horizontal distance of 100 feet. Maximum grades on mountain highways are generally 7 percent and rarely exceed 15 percent.) An 800-pound load can be carried on the carrier's 15 square feet of cargo deck.

Having successfully reached their original objective, Herb Harris and Tom Summers still were not fully satisfied. Since July 7, 1967, they have

made several major improvements in the gyro-stabilized cargo carrier. These include improvements in utility and reliability and reduction of cost. Essential refinements should be completed by the end of 1968, and production of the carriers started soon after.

When gyro cargo carriers become available, many will be faced with deciding the question, "Shall we use gyro carriers or pack animals?" The decision in most cases will be based upon cost versus benefit studies. In some private situations, cost may not be a consideration or mules will be used because of a person's love for the animals.

Use of motorized equipment in designated wilderness areas is prohibited. Therefore, in these remote areas, horses and mules will continue to be the main means of transportation. However, there are 88,000 miles of trails in the national forests exclusive of wilderness areas.

For those who must transport much cargo on the forest trails where use of motorized vehicles is permitted, the gyro-stabilized cargo carrier will probably become the favorite.

That Forests May Live— The Smokejumpers

WILLIAM C. WOOD

Twenty-eight years ago, a Ford trimotor airplane droned 2,000 feet above a forest fire smoldering in the Selway-Bitterroot Wilderness. The pilot cut its motors briefly. Rufus Robinson, Kooskia, Idaho, and Earl Cooley, Hamilton, Mont., stepped from the plane, parachuted earthward, became the world's first smokejumpers, and revolutionized firefighting in the back country. A month later, Francis Lufkin, Winthrop, Wash., and Glen H. Smith, Bakersfield, Calif., parachuted to a small fire in the Northern Cascades in the State of Washington. These young Forest Service aerial frontiersmen were pioneering a feat that would be repeated nearly 40,000 times by 1968.

In 1968, Cooley and Lufkin were still with the Forest Service as supervisors of smokejumping bases in Montana and Washington.

The key to successful forest firefighting lies in speed of attack. "Hit 'em while they're small" has been the byword among Forest Service firefighters since the organization was founded in 1905. Unless a forest fire is put out while it is still small, it can grow to catastrophic proportions with losses reaching millions of dollars.

Lightning is nature's own special fire starter. Each year, about 7,000 forest fires are caused by lightning throughout the Western United States. Many of these occur in remote, mountainous areas where helicopters cannot land, and ground travel is slow and difficult. Since the earliest days, foresters have searched for ways to speed the attack. Smokejumping was born of this need.

The art and science of parachuting to fires is truly a Forest Service innovation. The idea of parachuting men to fires in inaccessible back-country areas was conceived in Utah in 1931 by an imaginative early-day forester, T. V.