This document is a request for a patent from the Canadian Intellectual Property Office.

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Agent:

No patent agent has been retained for this application.

Small Entity Declaration:

I am representing myself as a sole proprietorship and am, therefore, declaring myself to be in the category of a small entity.

Title:

Snare Wire Testing Machine

Snare Wire Testing Machine

Abstract

The invention is a machine for testing wire used for making snares to catch animals. The machine provides variable size wire supports which simulate a captured animal on one end and the anchor support on the other. One embodiment of the machine is manually activated by rotating a levered handle which rotates one support causing the wire to twist while under the tension of a supported weight. The rotation also causes the weight to be lifted and dropped a set distance to simulate the tugging action of a snared animal. Thus the machine simultaneously twists, draws and jerks a wire creating stresses and strains analogous to those of a snared animal attempting to free itself. The machine may be light weight, portable, easily manufactured, and may not contain electronic parts. Measurement in the manual embodiment is affected by an analog rotation counter.

Field of the Invention

The invention pertains to the scientific measurement of mechanical properties of wire. The invention relates to hunting practices, specifically the regulation of snare setting and the stewardship and conservation practices for animals in the natural environment. It also pertains to the establishment of an inexpensive standardized testing platform which may be used to benchmark mechanical performance of materials in specialized applications.

The concept of the invention has arisen from a need identified in a study commissioned by Government officials in response to feedback from hunters. Some hunters reported premature failing of 22 gauge brass wire for rabbit snaring. Others, while rabbit snaring, report retention of pine martin, a protected species whose strength and action was thought by officials to be sufficient to break the specified rabbit snare wire. An investigation of the various brands of 22 gauge brass wire sold as snare wire revealed significant variation in mean and standard deviation of wire gauge, and significant differences in metallurgy. The relationship between snare performance and standard mechanical property measurements was highly complex and frustrated scientific attempts to provide regulatory guidelines for officials. Evidently, similar problems exist for regulation snare wire intended to selectively capture other species - negatively affecting broader conservation efforts. It was concluded that a better approach to testing wire performance would be to develop a testing device which specifically simulates the complex loading imposed on snare wires in the field. Through the use of said new device the performance of snare wires may be evaluated against benchmarks established through use and field corroboration over time.

Related Background Art

Prior art that relates to the present invention are described in Canadian Patents as follows:

3002277 describes an adhesive testing system. It is comprised of a pull testing machine and rigid spine. The pull testing machine includes first and second attachment devices, and a drive assembly configured to move one of the attachment devices relative to the other along the pulling axis.

1322469 describes a shear testing device in which samples are held axially between jaws and subjected to a twisting force by rotation of a handle and the force and angle of deflection are measured. The device is primarily for testing corrugated board, significantly it is shown that the shear stiffness thus measured is a more reliable measure of board damage resistance that board thickness.

1244672 discloses an invention concerning a testing machine for applying a tensile load to a test specimen, for example fine wire or adhesive tape. It embodies specialized clamps for gripping the wire and a motorized rack and pinion system for applying the loads and resetting the machine.

798598 describes an unconventional tensile testing machine which has the capability of applying a tractive force at a very high rate. The invention uses compressed gas to rupture specimens.

1117759 describes a new simple snare trap with improvements in the trigger mechanism, weight and concealment. 1219125 describes another snare trap variation in which the device retains the animal but does not choke it to death. 1225830 describes a spring snare trap which sets a wire around an animals paw after the animal pulls on bait within an enclosure.

These patents claim various means of testing materials or configurations of snare traps for animals. None of these embody a wire testing machine which simulates an animal in a snare. The specification of the wire used in the snare patents above is unclear and no method of ensuring performance is provided.

United States patents that relate to the present invention are described as follows:

4895028 describes a method of pull-testing wire connectors on an electrical device. The device creates an upward pulling force on a wire loop by a motor-driven loading arm through a hook which is connected to the free end of a flexible cantilever beam in the arm. Strain gauges are used to measure the load on the pulling arm.

4095465 describes a method and mold apparatus for testing adhesion of cord or wire in rubber which measures “intrinsic” adhesion. Each test specimen is formed of two uncured preformed or premolded blocks. Wires are embedded and pulled in opposite directions.

6185999 describes a mini tension testing device. The apparatus has a force gauge mounted on an apparatus using low friction air bearings to allow the force gauge to self-align with the peeling location of the line or film thereby providing orthogonal positioning relative to the substrate.

These United States patents describe various wire testing machines that are not suitable for snare testing. There are no machines described in the literature which produce the loading conditions of a snare wire in the field.

Summary of Invention

The invention is a machine for testing wire used for making snares to catch animals. It is useful and beneficial for conservation and wildlife officials tasked with setting regulations for the safe and efficient prosecution of hunting practices that also minimize bycatch and reduce suffering. The mechanical properties of the wire, the configuration of the wire supports and preparation, and, the behavior of animals all contribute to the success or failure of a snare. Failure means the unintended release of the target species or the unintended retention of non-target species. The wire must not prematurely fail when the target animal is ensnared, nor remain intact if a non-target animal were to become ensnared. Standard wire testing for tensile strength, torsional resistance, friction and ductility requires specialized equipment and results cannot be easily interpreted in terms of predicting snare performance in the field. It is therefore out of necessity that a new machine be proposed that exclusively simulates the simultaneous loading intensity and action seen in the field so as to gauge the relative performance of prospective wires.

The machine in one of the manually operated embodiments provides vertically-aligned variable size wire supports which simulate a captured animal size and body orientation on one end and the anchor support (tree, branch, stake etc.) on the other. The machine is activated by rotating a levered handle which rotates the upper support causing the wire to twist while under the tension of a suspended weight affixed to the lower anchor support. The rotation models the spinning of the caught animal believed by officials to be a crucial factor in the weakening of the snare wire prior to rupture by tension. The rotation also causes the weight to be lifted, dropped, halted and re-lifted cyclically to simulate the tugging action of a snared animal. Thus the machine simultaneously twists, draws and tugs a wire under support conditions which mimic a snared animal attempting to free itself. Measurement is affected by a rotation counter so that when the wire fails the cumulative twisting action for a given weight, drop height etc. is recorded in terms of revolutions.

Fig. 1 is a side view of a manually operated embodiment of the apparatus

Fig. 2 is a set of guide bushings for the apparatus shown in Fig. 1

Fig. 3 is an oblique view of a manually operated embodiment of the apparatus

Detailed Description of the Invention

The device for which exclusive property and privilege is claimed is illustrated in a manually operated embodiment form in Figures 1 to 3, elements of which are therein labeled to support the following description:

A handle 1 is attached to a rotatable and translatable shaft 2 with pivotable linkage connections at 1a and 1b. The shaft 2 has a fixed through-member 10 which rests on bushing 9. The lower end of shaft 2 is affixed with bracket 3a and wire support spool 3b. The bracket 3a sets the inclination and offset of the spool 3b. The spool 3b models the shape and size of the seized part of the ensnared animal. Parts 3a and 3b may be replaced with other parts not shown that provide for different diameters, shapes, offsets and inclinations.

The snare wire 4 is bound to spool 3b using a tightened snare loop - the same wire preparation as is set in the field. The lower end of wire 4 is attached to wooden dowel 6 at a specified location using the same wire preparation used in the field for anchoring the snare trap. Set guides 5 may be placed to prevent the wire from working or sliding down the dowel during testing. The dowel 6 may be repositioned at its pivot end 8a along the support frame 8b so as to accommodate shorter or longer snare wires while maintaining a near level posture for the dowel prior to testing. Weight 7 is added to the end of the wooden dowel at a set distance from the pivot point 8a. In the preferred embodiment shown in Fig. 1 the means of attaching weight is to clamp a plate between two nuts on a threaded rod embedded in the wooden dowel. Weights may be made of steel plate of common thickness but varying diameters so that heavier or lighter animals may be simulated.

The configuration of the apparatus results in the test wire supporting a tensile load proportional to the added weights 7 and supported at both ends in way that models field conditions. The member 10 supports the wire/weight assembly and the weight of the handle/shaft/spool assembly. Member 10 transfers this load vertically onto bushing 9 which distributes the load into frame 12. Bushing 9 is shown in two embodiments in Fig.2. It is comprised of a base plate 9e with holes 9d for attaching the bushing to the frame 12 using bolts. The hole 9f provides a snug low friction bearing surface for the shaft 2 thus providing lateral stability and longitudinal mobility. The raised ramp 9c is the bearing surface along which member 10 slides and climbs as it rotates. When member 10 passes over step 9b the shaft and all that it supports falls suddenly and is then arrested abruptly as member 10 lands on the lower portion of the ramp 9c and the cycle repeats for every revolution. The sudden drop induces impulsive loads on the snare wire analogous to a tugging animal. The intensity of these impulses may be varied by adding more weight 7 and/or by adjusting the ramp slope and step size of the bushing. The bushings in Fig.2 have different step sizes 9b versus 9g. Because the bushings in the preferred embodiment shown in Fig. 1 and Fig. 2 act as lateral bearing for the rotating shaft 2 and vertical bearing for the sliding member 10 they are most preferably to be made of a high strength low friction dense synthetic material like Delrin or Teflon.

The frame 12 may be formed many ways but in a simple embodiment of a self-enclosed and portable version of the machine as shown in Fig. 1 the frame is tubular metal and rigid enough to prevent unwanted deflection or vibration during use. It also has feet which provide a stable base upon which weight may be added or mechanical clamps used to keep the machine in position on a table when in use. The resettable manual counter 11 is positioned on the frame 12 so that it is advanced once per revolution by the passing of member 10.

Claims and Embodiments of the Invention in Which an Exclusive Property or Privilege is Claimed Are Defined As Follows:

1. An apparatus for the destructive testing of wire used for snare hunting. The device being capable of twisting, hauling and jerking on a wire in a way that simulates ensnared animals in the field. A device that is optionally portable and optionally manual and easily operated so that a count of rotations from test commencement to wire failure may be used as a benchmark or standard for wire performance relative to other wires and calibrated with field experience. A device which may be readily adjusted or adapted to model animals of various sizes, weights and ensnared behavior.
2. An apparatus described in claim 1 that is comprised of a vertical shaft rotatable by hand, the lower end of which supports various components for affixing the test wire in a way that approximates a snare on an animal. The upper end of the shaft has a through member which rides on a sloped and stepped bushing so that rotation of the shaft results in its gradual rise and abrupt fall once or twice per rotation. Additionally the apparatus is comprised of a lower assembly which the test wire supports in tension. That lower assembly is comprised of a wooden dowel modelling a natural anchor in the field around which the test wire is attached. The dowel has at one end a pivot which permits vertical lifting and falling of the opposite end where weights of varying mass may be affixed.
3. A device as described in claims 1 and 2 except that an alternative mechanism be used for affecting the cyclic impulsive load on the wire and/or the tension on the wire. Springs, cams and other fundamental mechanical components may be used to do so in an array of embodiments which still capture the fundamental loading mechanism described in claim 1.
4. A device described in claim 1 that is to varying degrees motorized and automated in its actions and measurements to affect the same loading and support combinations that model animals of varying size and species that are ensnared and attempting escape.

Drawings:

Fig. 1

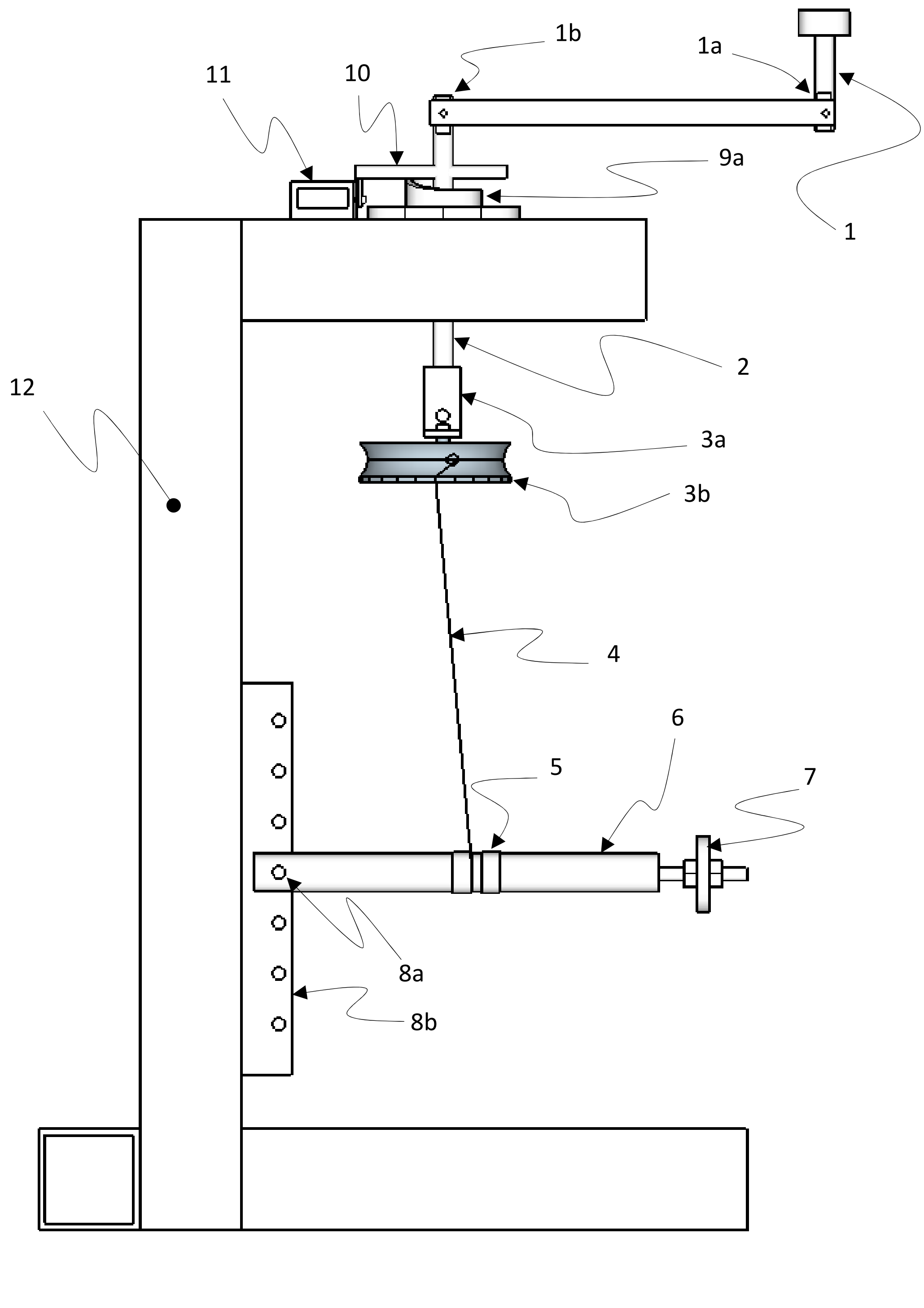

Fig. 2

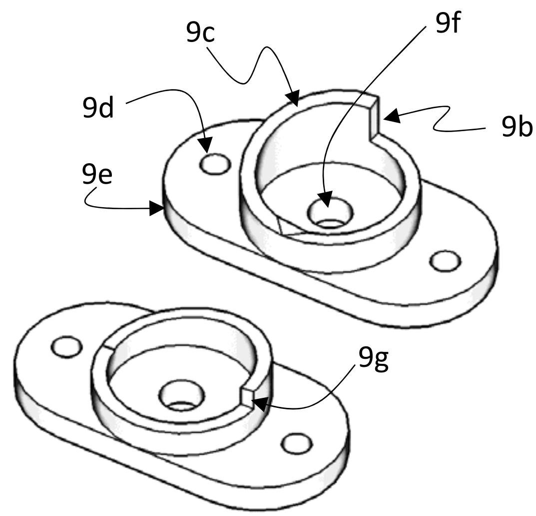

Fig. 3