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SKI TEST BENCH

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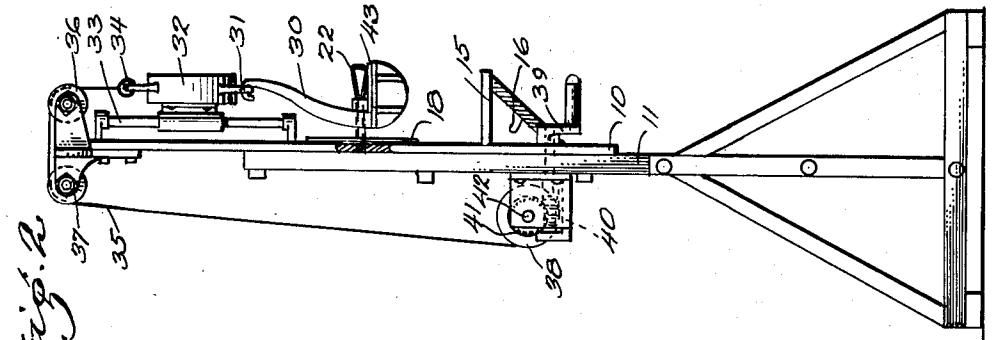

Fig. 2

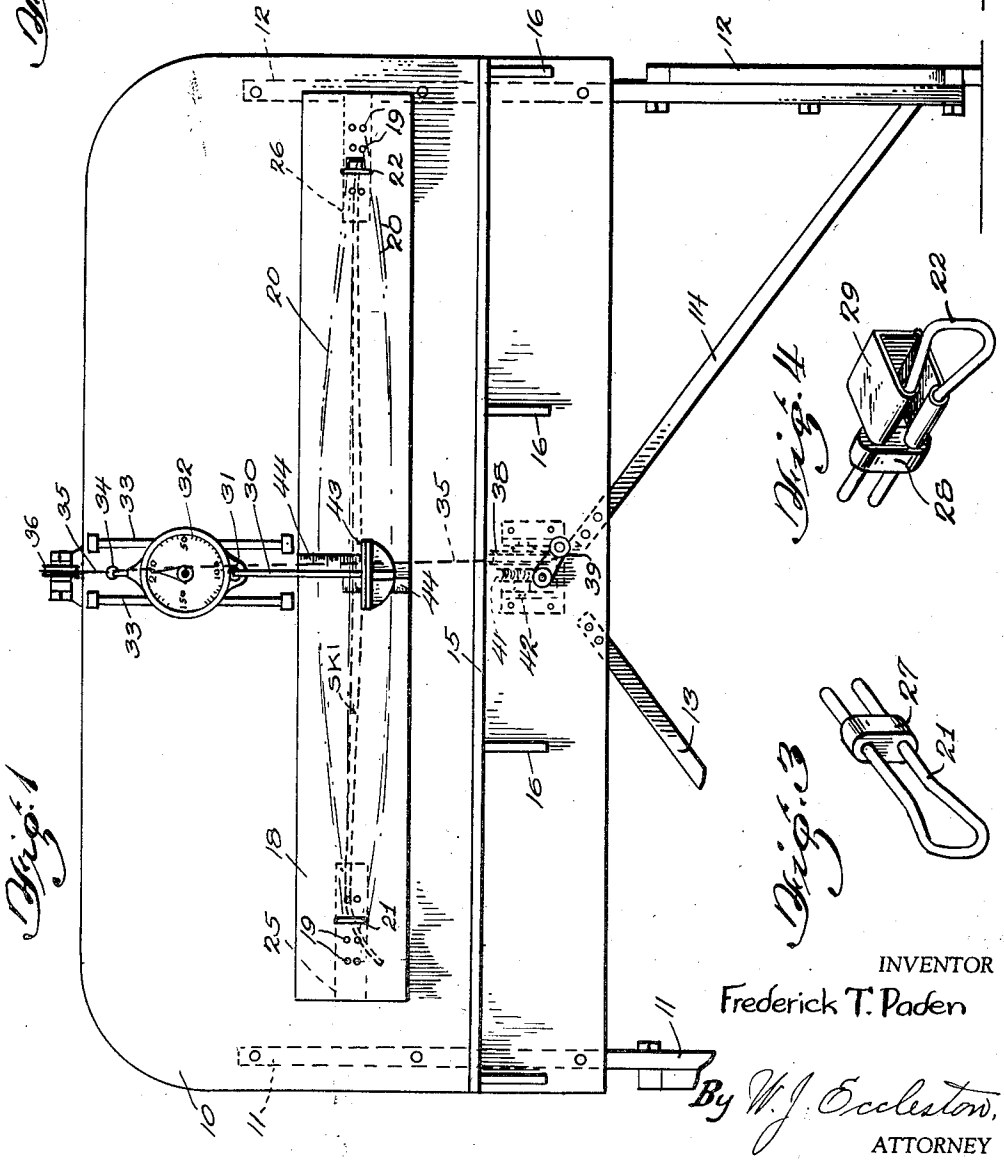

Fig. 1

Fig. 4

Fig. 3

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SKI TEST BENCH

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6 Claims. (Cl. 73—89)

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The invention described herein, if patented, may be manufactured by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to apparatus for testing the strength, shape and dimensions of skis.

If the manufacture of skis is to be undertaken on a mass production basis, obviously substantial uniformity must be realized. At the same time, it will be extremely desirable to speed up and facilitate inspection, which should take place at the factory to obviate the expense of shipping to the purchaser skis which will not pass inspection and hence must be returned.

The present invention aims to provide a practicable apparatus usable at a ski factory for inspecting skis for uniformity of dimensions and shape, and adapted to impose variable loads on the skis to test their flexibility or resilience. Among the advantages of the invention are simplicity of construction, ease of operation or use, and the small amount of floor space required for the apparatus.

In the accompanying drawings forming a part of this specification,

Fig. 1 is an elevation of the preferred ski test bench, the ski being shown in dotted lines;

Fig. 2 is an end elevation of the test bench omitting the ski;

Fig. 3 is a perspective view on an enlarged scale of one of the ski-holding loops used with the test bench of Fig. 1;

Fig. 4 is a perspective on the scale of Fig. 3 of another form of loop used with the test bench.

Referring particularly to the drawings, the preferred form of test bench comprises an upright flat board **10**, which may be of plywood or other suitable material secured to and supported by a pair of pedestals or standards **11, 12** which have braces **13, 14** respectively. If preferred, the flat board may be rigidly secured against a wall, in which case the pedestals or standards will not be required. A flat horizontal ski-supporting shelf **15** is mounted by means of brackets **16** on the vertical board **10** and extends preferably for the entire length of said board. Shelf **15** may be about four feet above the floor on which the pedestals stand, but obviously may be supported at any elevation which will meet the convenience of the operator using the test bench. If preferred, the brackets **16** may be made vertically adjustable (not shown) to facilitate raising or lowering of the shelf to accommodate its height to that of the operator. This shelf may be about eight or nine inches wide. It is used in checking the lateral shape of the ski, which is laid flat on it: if the ski is warped or twisted, such defect will be immediately apparent when it rests on the flat shelf. The camber of the ski is also checked. By means of a template **18**, which is a thin, flat metal plate having perforations **19** by which it is secured flat against the board **10** as will be described, the flexibility characteristic can be ascertained. Template **18** is marked with paint or in other ways, as indicated at **20**, to show the manufacturing tolerances. It is preferred that the exposed surface of the template be black, with white marks (not shown) for indicating the tolerances. It is also preferred that a single template be marked for skis of two different lengths, being turned upside down when short skis are to be tested, or vice versa. If desired, several differently marked templates may be used.

To hold the template in position, also to support the ski when it is being flexed while under test, a pair of loops **21, 22** are used, each of which will loosely surround an end of a ski being tested. Each loop has two end prongs for insertion in sets of apertures in the board near its opposite ends. These sets of apertures register with the perforations **19** and are arranged in horizontally running pairs, the apertures of each pair being disposed in a vertical plane, and each pair being spaced uniform distances (e. g., 1½ inches) from the pairs of holes on either side. The loops **21, 22** may be adjusted longitudinally of the board **10** by insertion of their prongs in selected pairs of apertures, thus adjusting the support points to skis of different lengths. The approximate position of a ski supported by the loops is shown in dotted lines, Fig. 1. Thin metal plates **25, 26** are screwed onto the board **10** and have apertures registering with the holes in board **10**; these metal plates provide escutcheons or protective shields for the apertures, preventing abrasion and disfigurement of the wooden board by the ends of the pronged loops, which must be removed and reinserted each time a template is to be turned over or changed.

The two loops **21, 22** are of nearly the same construction, both being of heavy wire or a thin rod bent in the form of a loop with an opening amply large enough to admit an end of a ski. The ski is turned upside down for testing, and its toe end is inserted through loop **21** which has been previously mounted on the board **10**, while its rear end is inserted through loop **22** at the opposite end of the board. Loops **21** and **22** have metal blocks **27, 28** respectively through which the loop wire extends to hold the wire ends against movement and also to serve as stops to limit endwise insertion of the wire prongs. In addition, loop **22** has a U-shaped sheet metal stop **29** whose ends are curled around the wire of the loop so as to hold the stop rigidly thereon, said stop acting to limit endwise or longitudinal movement of the ski in one direction when the ski is supported by the two loops.

In testing the ski, its mid portion is supported on an L-shaped arm **30** hooked onto an eye **31** which is attached to the spring-supported member of a spring balance or scales **32**. Said scales are slidably supported on a pair of parallel guides **33** removably fixed to board **10** and extending vertically. A ring or other attaching means **34** fixed to the casing of the scales is attached to one end of a wire cable **35** which passes over sheaves **36, 37** mounted at the top of board **10**; and the wire cable extends down along the back of said board to and around a sheave or winch **38** which may be power-driven but is shown as turned by a hand crank **39**, a worm **40**, worm wheel **41**, and shaft **42**. Such a reduction gearing is advantageous in that it is irreversible. In actual practice the worm and worm wheel will be enclosed in a casing (not shown) containing lubricant. The ratio of reduction gear **40, 41** may be 30:1 or greater to give an output of 1000 inch pounds or more. To prevent scarring of the ski finish, a rubber pad **43** having a roughened or non-slip upper surface (not shown) is fixed to that part of arm **30** which is in contact with the ski. The described construction will permit an operator by turning the hand crank **39** to impose a lateral stress of the desired poundage on the middle of the ski in a direction which is upward relative to the upside down ski and therefore downward relative to the normal position of the ski. A pair of graduated scales **44** are marked on the template near arm **30** so as to permit measurement of the vertical deflection of the ski when under a certain load as indicated on the dial of the spring scales. Obviously, the spring scales will move upwardly when loaded, but the extent of such movement will be less than the displacement of the ski-engaging arm **30**. Guides **33** prevent the spring scales when loaded from assuming any position other than a vertical position, while the rubber pad **43** and the two loops **21, 22** prevent the ski from slipping off the arm when under a load. The loops **21, 22** receive the ski ends loosely so that the ski is free to move slightly at said ends, as it must do when its normal camber is flattened by an imposed load. A test chart (not shown) may be attached to the flat vertical surface of board **10** and may include legends and directions guiding the inspector using the test bench, so that he will

know when to reject and when to accept a ski. If a certain number of inch pounds are required to flatten a ski of standard strength, obviously any wide departure from the standard of flexibility should cause a rejection.

What I claim is:

1. Apparatus for testing ski flexure comprising a support; plural means fixed on the support for loosely supporting a ski near its ends with the ski turned upside down; an arm directly engaging the middle portion of the ski on the underside of the upside down ski; a spring balance having its spring pivotally supporting the arm from above; guide means fixed on the support with which said spring balance slidably engages; a flexible power-transmitting member supporting the upper end of the spring balance; an operating crank; a reduction gear operated by the crank; and a sheave driven by the reduction gear, with the flexible member adapted to be wound around the sheave thereby to impose a measurable load on the ski through the intermediation of the spring balance and the arm.

2. Apparatus for testing ski flexure comprising an upright support; a pair of loops mounted on the support and extending outwardly therefrom substantially at right angles and in substantially the same horizontal plane, said loops being adapted to receive and loosely embrace the opposite ends of a ski placed upside down; an L-shaped arm engaging the mid portion of the upside down ski from underneath; a spring balance pivotally supporting the upper end of said L-shaped arm so that any pull on the arm is readable on the scale of the spring balance; guide means fixed to the support and extending vertically; said spring balance having means slidably engaging said guide means; a wire cable from one end of which the spring balance is suspended; and means on the support affording a considerable mechanical advantage and operable by an operator to wind up the wire cable thereby to impose a load on the ski when held by said loops, said load being measurable on the spring balance.

3. The invention defined in claim 2, wherein there is a sheave at the upper end of the support, the wire cable being trained over said sheave and extending down alongside the back of the support, the means affording mechanical advantage consisting of a hand crank, reduction gearing driven by the hand crank, said reduction gearing being constructed and arranged so that the reaction of the load on the gearing is impotent to turn the hand crank, and a sheave driven by the reduction gearing, the wire cable being wound up on the last-mentioned sheave when a load is to be imposed on the ski.

4. Apparatus for testing ski flexure comprising a support; plural means fixed on the support for embracing and loosely supporting a ski near its ends with the ski turned upside down; means on the support to hold said plural means in adjusted positions to accommodate skis of different lengths; means movably mounted on the support for engaging the ski substantially midway between said supported ends, said ski-engaging means consisting of an arm contacting the ski in the region where the foot of the user normally rests; means affording a considerable mechanical advantage and mounted on the support and operated by the operator for imposing a load on the ski by upward movement of the ski-engaging means against the upside down ski on said support; means to measure the imposed load consisting of a spring balance which pivotally supports the upper end of said arm so that any pull on the arm is readable on the scale of the spring balance; and a graduated scale fixed on the support in such a position that a measurement may be made of the extent of flexure of the ski when so loaded.

5. Apparatus for testing skis comprising an upright support; ski-supporting means fixed to the upright support, said ski-supporting means holding the ski in horizontal position and being constructed and arranged to permit longitudinal movement of the supported ski in response to flexing; a template having markings thereon for indicating manufacturing tolerances; means to secure the template to the upright support with the template lying vertically so that the ski when flexed by a predetermined load may be viewed against the markings on the template; and operator-controlled means on the support for imposing transverse loads on a ski supported by said ski-supporting means.

6. Apparatus for testing ski flexure comprising an upright support; a marked template fixed vertically on and lying flat against said support; removable means to hold the template removably on the support, said removable means consisting of a pair of loops each adapted to receive and loosely surround an end portion of a ski, each loop having end prongs; the upright support having two horizontally extending and horizontally aligned series of apertures adapted to receive the end prongs of the loops; the template having registering apertures and the loops holding the template in place when their prongs are inserted in the apertures; one of said loops carrying a stop against which an end of the ski abuts to prevent longitudinal movement of the ski in one direction, the other loop being open to permit longitudinal movements of the ski in either direction responsive to lateral flexing of the ski under imposed loads and after such loads are relieved.

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