

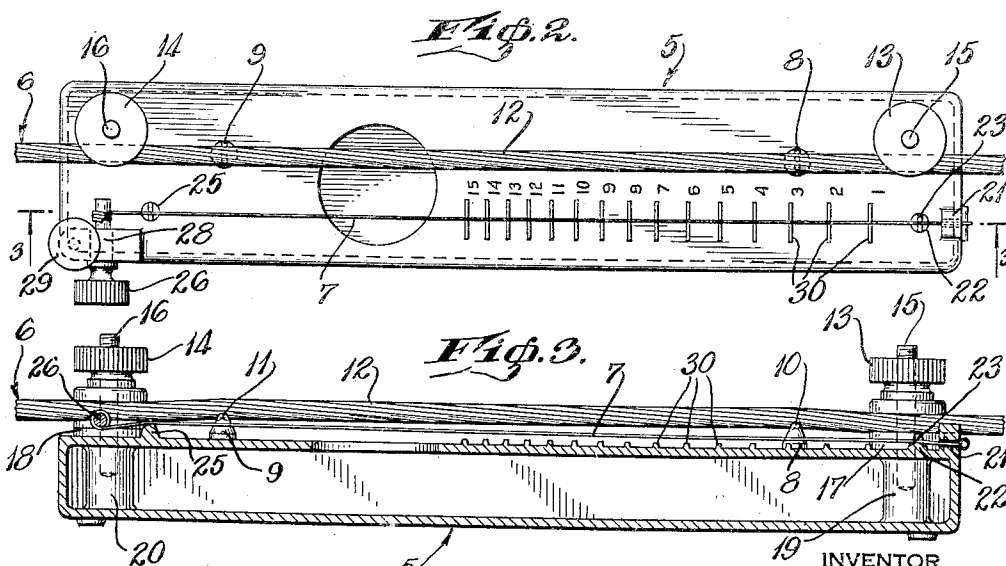
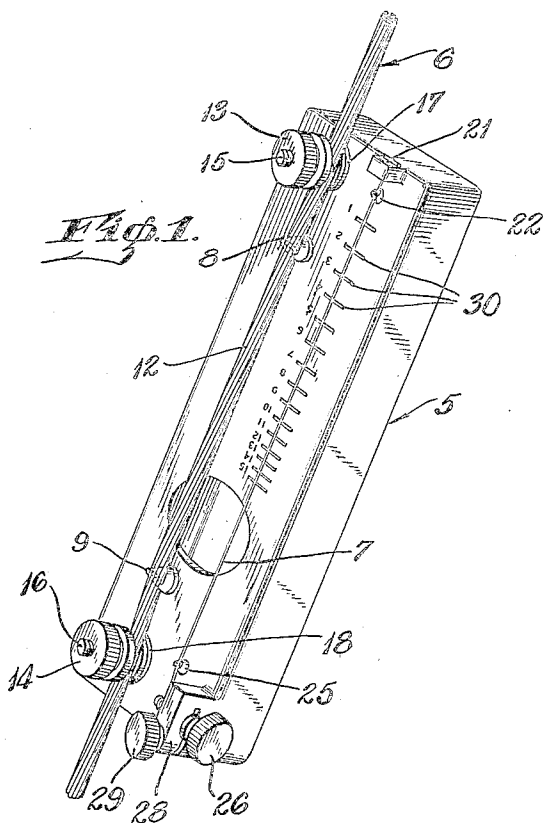
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APPARATUS FOR TESTING TENSION OF WIRE ROPES

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APPARATUS FOR TESTING TENSION OF
WIRE ROPES

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6 Claims. (Cl. 265—1)

This invention relates to means for testing tension of wire ropes or the like.

The main object of my invention is the provision of improved apparatus for testing the tension of wire ropes, cables, strands, wires or rods, etc., not only after they have been installed but also as they are placed and connected in position in the apparatus or device in which they are to be used.

Another object of the invention consists in the provision of an improved tension testing apparatus, comprising a base, means for clamping a section of the rope to be tested on the base, and means preferably in the form of a wire stretched over and supported on the base and which may be controlled in any well known manner, by frets to produce different tonal pitches, and including also numbers associated with said frets which may be used in determining the load on the rope by reference to a table for the apparatus and for the particular construction, diameter and weight of rope tested.

Other objects of the invention will appear from the following description taken in connection with the drawing, in which—

Fig. 1 shows a small view of the apparatus attached to the cable;

Fig. 2 shows the apparatus in plan view; and

Fig. 3 is a longitudinal section on the line 3—3 of Fig. 2.

For the purpose of disclosure I have illustrated in the drawing the preferred form of apparatus for carrying out the objects of this invention. This apparatus includes a base 5 which may be hollow to amplify the tone produced by the vibrating rope 6 that is to be tested and the tonal pitches produced by the vibrating wire or musical string 7. In case the base 5 is hollow, it may be perforated with one or more holes as indicated to assist in the amplification of the tones produced. The base 5 may be made of cast aluminum or any suitable material.

The upper face of the base is provided with two bridges 8 and 9 which may be cast integral with the base and which may be provided with concave seats 10 and 11 upon which a section 12 of the rope may be seated. The apparatus is anchored to the cable and the cable pressed on to the seats by means of knurled clamping nuts 13 and 14 threaded on bolts 15 and 16 anchored in projections 17 and 18 integral with the base and aligned

struts 19 and 20 connecting the top and bottom members of the base and integral therewith. When it is desired to test the tension of a rope the apparatus is clamped to any conveniently located section of the rope by the means described. The section of the rope between the bridges is then plucked and the tone produced by the vibrating rope will vary with the tension of the rope for a rope of given diameter, construction and material.

The wire or musical string 7 which is provided for producing tonal pitches with which the tones produced by the vibrating section of the rope to be tested are compared, is anchored in an integral projection on one end of the base as indicated at 21, and is strung over a bridge 22 which may be cast integral with the base and which is provided with a concave seat 23 to receive the wire and across a similar bridge 25 at the other end of the base beyond which it is connected to a wire tensioning and tuning key 26 mounted in a bearing in a split clamping member 28 integral with the base, a threaded thumb screw 29 being provided to clamp the key in adjusted position.

The wire or musical string 7 which is anchored at 21 to one end of the base extends over frets 30 numbered 1 to 15 and by means of the key at the other end of the base, the wire can be tensioned to produce when vibrated a definite tonal pitch which constitutes part of the adjustment of the instrument. This tonal pitch is obtained by comparison preferably with the tonal pitch produced by a vibrating tuning fork or the like and preferably lies within the middle range of the piano because tonal pitches of this range can be recognized more readily than those in higher or lower ranges and will also of course be selected with reference to the range of tones that are likely to be produced by ropes of particular diameters and constructions of rope to be tested under different tensions. Upon vibration of the rope section 12 a tone is produced and then the wire or musical string 7 is vibrated and the finger run up or down the frets until the tonal pitch produced by the wire is in tune with the tone produced by the vibrating rope. The nearest fret will then give a reading from which can be calculated the tension of the particular rope preferably by reference to a table which, if desired, can be stamped or printed directly on

one side of the base so that it will be always readily available.

The instrument disclosed has been constructed for testing the tension of ropes made of stainless steel of diameters ranging from $\frac{1}{8}$ of an inch diameter to $\frac{1}{4}$ of an inch in diameter and for ropes consisting of one or a plurality of strands. In the following table are given the diameters, number of strands and breaking strength of some of the ropes that may be tested by a single instrument.

Calibrations for tension meter

Fret No.	$\frac{1}{8}$ " dia. 1 x 19 Korodless B/S—550 lbs.		$\frac{3}{16}$ " dia. 1 x 19 Korodless B/S—1,200 lbs.		$\frac{1}{4}$ " dia. 1 x 19 Korodless B/S—2,100 lbs.	
	Load	Safety factor	Load	Safety factor	Load	Safety factor
0	55	10.0	100	12.0	150	14.0
1	70	7.9	125	9.6	190	11.0
2	78	7.1	143	8.4	220	9.5
3	87	6.3	163	7.4	255	8.2
4	97	5.7	185	6.5	285	7.4
5	110	5.0	208	5.8	325	6.5
6	125	4.4	237	5.1	370	5.7
7	140	3.9	265	4.5	425	5.0
8	155	3.5	300	4.0	480	4.4
9	175	3.1	340	3.5	545	3.9
10	195	2.8	385	3.1	620	3.4
11	223	2.5	440	2.7	705	3.0
12	252	2.2	500	2.4	810	2.6
13	285	1.9	565	2.1	940	2.2
14	325	1.7	650	1.8	1,100	1.9
15	367	1.5	750	1.6	1,320	1.6

Calibrations for tension meter—Continued

Fret No.	$\frac{1}{8}$ " dia. 1 x 19 Korodless B/S—3,300 lbs.		$\frac{3}{16}$ " dia. 1 x 19 Korodless B/S—4,700 lbs.		$\frac{1}{4}$ " dia. 1 x 19 Korodless B/S—8,200 lbs.	
	Load	Safety factor	Load	Safety factor	Load	Safety factor
0	190	17.4	220	21.4	250	32.8
1	225	14.7	310	15.2	310	26.4
2	260	12.7	355	13.3	355	23.1
3	310	10.6	410	11.5	410	20.0
4	365	9.0	485	9.7	490	16.7
5	430	7.7	585	8.0	580	14.1
6	500	6.6	690	6.8	690	11.9
7	590	5.6	810	5.8	815	10.1
8	690	4.8	960	4.9	960	8.5
9	800	4.1	1,110	4.2	1,110	7.4
10	940	3.5	1,285	3.6	1,285	6.4
11	1,090	3.1	1,480	3.2	1,480	5.5
12	1,230	2.7	1,700	2.8	1,700	4.8
13	1,445	2.3	1,940	2.4	1,940	4.2
14	1,665	2.0	2,200	2.1	2,200	3.7
15	1,950	1.7	2,570	1.8	2,530	3.2

Calibrations for tension meter—Continued

Fret No.	$\frac{1}{8}$ " dia. 6 x 7 Korodless B/S—2,100 lbs.		$\frac{3}{16}$ " dia. 6 x 7 Korodless B/S—1,400 lbs.		$\frac{1}{4}$ " dia. 6 x 7 Korodless B/S—800 lbs.	
	Load	Safety factor	Load	Safety factor	Load	Safety factor
0	150	14.0	115	12.2	60	13.3
1	182	11.5	140	10.0	75	10.6
2	220	9.5	165	8.5	88	9.1
3	255	8.2	190	7.4	100	8.0
4	290	7.2	218	6.4	113	7.1
5	330	6.4	245	5.7	130	6.2
6	380	5.5	278	5.0	150	5.3
7	435	4.8	315	4.4	167	4.8
8	495	4.2	355	3.9	188	4.2
9	565	3.7	405	3.5	210	3.8
10	645	3.3	465	3.0	240	3.3
11	735	2.9	532	2.6	275	2.9
12	840	2.5	610	2.3	315	2.5
13	960	2.2	695	2.0	358	2.2
14	1,105	1.9	785	1.8	410	1.9
15	1,290	1.6	890	1.5	485	1.6

Calibrations for tension meter—Continued

Fret No.	$\frac{1}{8}$ " dia. 7 x 7 Korodless B/S—920 lbs.		$\frac{3}{16}$ " dia. 7 x 7 Korodless B/S—1,700 lbs.		$\frac{1}{4}$ " dia. 7 x 7 Korodless B/S—2,600 lbs.	
	Load	Safety factor	Load	Safety factor	Load	Safety factor
0	85	10.8	140	12.1	200	13.0
1	100	9.2	175	9.7	255	10.2
2	113	8.1	203	8.4	300	8.7
3	127	7.2	233	7.3	345	7.5
4	145	6.3	267	6.4	390	6.7
5	165	5.6	305	5.6	440	5.9
6	190	4.8	350	4.9	500	5.2
7	215	4.3	393	4.3	565	4.6
8	247	3.7	440	3.9	640	4.1
9	280	3.3	500	3.4	730	3.6
10	320	2.9	560	3.0	825	3.2
11	365	2.5	635	2.7	935	2.8
12	415	2.2	720	2.4	1,090	2.5
13	470	2.0	815	2.1	1,220	2.1
14	530	1.7	920	1.8	1,410	1.8
15	595	1.5	1,040	1.6	1,670	1.6

In the use of this apparatus any section of the rope to be tested either during or after installation and during normal or abnormal conditions is clamped upon the bridges of the apparatus and is strummed and the fingers passed up or down on the wire 7 until the tonal pitch produced by the wire 7 is the same or substantially the same as the tone produced by the vibrating section 12 of the rope. Reference is then made to the number of the fret in the table which identifies the first fret upon which the wire is pressed to determine the load on the rope and the safety factor. The apparatus may be used also in installing ropes to obtain the desired tension in the rope or to check as to whether the rope is of the required strength for the functions it is to perform in its particular location. The rope may be tightened or loosened to produce a tone when strummed to harmonize with any one of the 15 tonal pitches, which may be "fretted" on the musical string, these pitches corresponding precisely to various tensions and factors of safety of the rope tested.

While I have described what I consider to be the preferred form of apparatus for carrying out the objects of this invention, it is to be understood that after understanding my invention modifications of my apparatus will become apparent to those familiar with this art and it is therefore my intention to cover all such changes in the apparatus as fall within the principles of my invention and the scope of the appended claims.

I claim:

1. An apparatus for determining the tension in ropes or the like comprising a base, a pair of bridges fixedly mounted on said base, means for securing a section of rope on said bridges and means on said base for producing a tonal pitch corresponding to the tone produced by vibrating said rope when the rope is under different tensions.

2. An apparatus for determining the tensions of ropes or the like of different diameters comprising a base, a pair of bridges on said base spaced apart a given distance, means for securing a section of one of said ropes in seated position on said bridges, a wire or musical string mounted on said base, and a plurality of frets associated with said wire for producing tonal pitches corresponding to the tone produced by the vibration of such section of the rope under any one of a plurality of different tensions.

3. An apparatus for determining the tensions

of ropes or the like of different diameters comprising a base, a pair of bridges on said base spaced apart a given distance, means for securing any one of said ropes in seated position on said bridges, a wire or musical string mounted on said base, and a plurality of frets associated with said wire for producing tonal pitches corresponding to the tone produced by the vibration of said section of said rope under any one of a plurality of different tensions, said frets being identified by characters for reference to tables specifying the tension in the rope when producing a given tone.

4. An apparatus for determining the tension of ropes or the like, the combination of a base, a pair of rope seating bridges spaced a given distance apart and mounted on said base, means for clamping a section of a rope passing over said bridges on said base, a second pair of wire or musical string bridges on said base, a wire secured to said base and tensioned over said bridges to produce a predetermined tonal pitch, and a series of frets on said base associated with said wire to produce other tonal pitches, said predetermined tonal pitch being chosen to render possible by means of the wire the production of any tonal pitch that may be produced by plucking said section of the rope.

5. An apparatus for determining the tensions

of ropes or the like of different diameters comprising a base, a pair of bridges on said base spaced apart a given distance, means for securing any one of said ropes in seated position on said bridges, a wire or musical string mounted on said base, and a plurality of frets associated with said wire for producing tonal pitches corresponding to the tone produced by the vibration of said section of said rope under any one of a plurality of different tensions, the base being hollow and perforated to amplify the tones produced by the rope and wire.

6. An apparatus for determining the tensions of ropes or the like of different diameters comprising a base, a pair of bridges on said base spaced apart a given distance, means for securing any one of said ropes in seated position on said bridges, a wire or musical string mounted on said base, and a plurality of frets associated with said wire for producing tonal pitches corresponding to the tone produced by the vibration of said section of said rope under any one of a plurality of different tensions, the base being hollow and being provided with a hole below the rope and wire to amplify the tones produced by the rope and wire.

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