

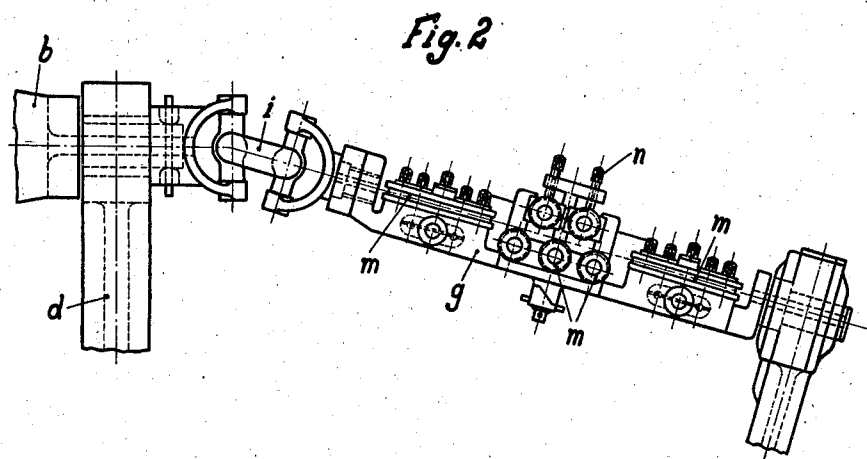
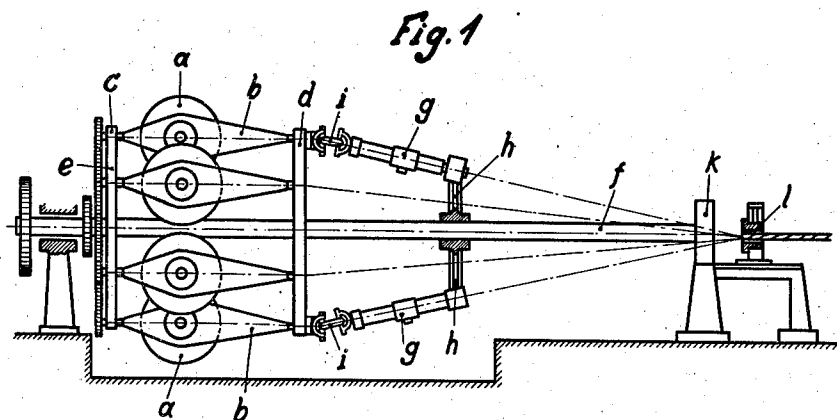
Dec. 7, 1937.

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2,101,630

MACHINE FOR PRODUCING ROPES FROM STEEL WIRES

Filed Feb. 1, 1937



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UNITED STATES PATENT OFFICE

2,101,630

MACHINE FOR PRODUCING ROPES FROM
STEEL WIRES

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Application February 1, 1937, Serial No. 123,496
In Germany June 26, 1936

3 Claims. (Cl. 117—20)

In spite of greatest care in the making of wire ropes it has up to the present not been possible to carry out the twisting of the wires so that in the event of breaking of the rope in the whole rope the sum of the tensile strength of the individual wires is even approximately attained. In the roping methods hitherto known not even the calculated breaking strength (tabular value), which is normally much lower than the combined tearing resistances of the individual wires of the rope is attained in the event of tearing of the whole rope. The tensile strength of a rope in the whole rope amounts to 70 to 90% of the calculated breaking strength according to the number of wires in the rope.

The wire ropes made in the manner hitherto customary behave in about the following manner when subjected to the tearing test in the whole rope: When the load on the test rope is gradually increased a relatively large number of wires first tear at short intervals and still more wires are stressed beyond the limit of elasticity so that in the case of wire ropes with a large number of wires up to one third of all the wires is eliminated from the endurance stressing. When the load is increased still further the remaining undamaged wires hold until the rope breaks.

The fact that, in spite of greatest care being taken in the manufacture of the ropes according to the modern methods, only a certain percentage of the wires is stretched in the desired manner, is due to the different actions of the resiliency of the individual wires, whereby the uniform stretching of the wires during the twisting becomes impossible. Thus, when the rope is stressed, a number of wires are overloaded, so that they partly tear or are stressed beyond the elastic limit and thus become of inferior quality.

For the purpose of avoiding the difficulties above mentioned it is proposed to relieve from stresses each individual wire on all sides in the rope making machine between its reel and the laying die by straightening it in a straightening device, so that each individual wire is absolutely free from stresses on entering the laying die.

For carrying through the method a straightening device is provided in the rope making machine for each individual wire between its reel and the laying die. In order to avoid relative rotary movement between the straightening device and the wire running therethrough, the straightening device is rotatable about the wire as an axis and driven in the same directions and at the same speed as the reels; torsioning of the

wire by the straightening device is thus avoided. The individual devices are preferably coupled with the corresponding reel frames carrying the reels, so that reel and straightening device positively carry out the same rotary movement. The straightening devices are preferably arranged in such a manner that their axes of rotation intersect in the laying die in the central axis of the finished rope. Thus the wire is prevented from being again deflected between laying die and straightening device, which would result in stresses being laid in the wire which has been relieved of stresses by the straightening devices. In order to relieve the wire of stresses on all sides the wire must be loaded beyond its elastic limit in several planes. The straightening devices are therefore provided with several sets of rollers set at right angles to each other.

An embodiment of the invention is illustrated by way of example in the accompanying drawing, in which:—

Fig. 1 shows in side elevation partly in section a rope making machine for producing strands from six wires,

Fig. 2 shows in side elevation on a larger scale a reel frame coupled with a straightening device.

In the drawing the reels are designated by *a* and the reel frames by *b*, which are rotatably mounted in carriers *c* and *d* and the axes of these frames are driven by a spur wheel gearing *e*. The axle of the reel frame carriers is designated by *f*. *g* are the straightening devices; these are rotatably mounted at one end in a star-shaped member *h* keyed on the axle *f*, whereas their other ends are each coupled with the axle of the corresponding reel frame *b* by means of a cardan joint *i*. The end bearing is designated by *k* and the laying die by *l*.

The rope making machine above described operates in the following manner:—

During the production of the wire rope the reel frame carriers *c* and *d* are rotated by the driven axle *f*. The reel frames *b* are coupled with the rotating axle *f* through the intermediary of the spur wheel gearing *e*. By suitably selecting the ratio of transmission of the spur wheels the reels *a* can be rotated at such a speed that they, in circulating about the axle *f*, perform no rotary movement about the wire as an axis. As the straightening devices *g* are coupled with the reel frames *b*, they participate in the backward rotation of the reels and therefore do not carry out any turning movement about the wire as an axis during the circulating movement on a conical surface. Consequently, the wire unwound from

a reel α is drawn through its straightening device g as if the reel and straightening device were stationary. Thus, no relative rotary movement exists between the wire and the straightening device, so that the wire before entering the laying die l is perfectly straightened and thereby relieved from all stresses on all sides. In the laying die the absolutely straight wires relieved from all internal stresses are twisted to form a wire rope. Therefore in the laying die all the wires are bent in exactly the same manner into the shape which they assume in the finished rope. As during this bending operation all wires are uniformly bent, they all possess exactly the same stresses in the finished rope. Consequently, in tearing tests on a finished rope a premature tearing of individual wires is reliably avoided. The wire ropes made on the machine according to the invention, as they contain no wires with different preliminary stresses can be subjected to considerably heavier loads than the ropes made in the manner hitherto customary, or for producing on the machine according to the invention ropes with a certain carrying capacity, it is possible to employ wires having a lower breaking resistance than when the ropes are made in the usual manner.

In the drawing the application of the invention to a machine for twisting six wires or strands is shown. The invention can evidently be employed also in twisting machines in which more or less wires are united to form a rope, and the invention can also be employed particularly in machines, in which several reel carriers are arranged one behind the other in axial direction. In any case the straightening devices are arranged between the last reel frame carrier towards the laying die and the laying die, care having to be taken that the bearing of the straightening devices is situated exactly in the direction of the unwound wires so that deflections are positively avoided between the straightening device and the laying die.

In order to completely eliminate the stresses

in the individual wires by means of the straightening device, these are provided with several sets of rollers m by which the wire is bent beyond its elastic limit in two planes at right angles the one to the other. The rollers of the individual sets of rollers can be adjusted by screws n .

I claim:—

1. A machine for producing strands and ropes from steel wires, comprising in combination a rotary axle, carriers fixed near one end of said axle, reel frames rotatably mounted on said carriers, wire feeding reels one in each of said frames, a stationary laying die in the axis of said shaft, wire straightening devices one between each of said reels and said laying die, each straightening device rotatable about its wire as an axis, and means for driving the straightening devices in the same direction and at the same speed as the reel frames.

2. A machine for producing strands and ropes from steel wires, comprising in combination a rotary axle, carriers fixed near one end of said axle, reel frames rotatably mounted on said carriers, wire feeding reels one in each of said frames, a stationary laying die in the axis of said shaft, wire straightening devices one between each of said reels and said laying die, each straightening device rotatable about its wire as an axis, and each of the straightening devices being coupled with the corresponding reel frame.

3. A machine for producing strands and ropes from steel wires, comprising in combination a rotary axle, carriers fixed near one end of said axle, reel frames rotatably mounted on said carriers, wire feeding reels one in each of said frames, a stationary laying die in the axis of said shaft, wire straightening devices one between each of said reels and said laying die, each straightening device rotatable about its wire as an axis, and the extensions of the axes of rotation of the individual straightening devices intersect in the laying die in the central axis of the finished rope.

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