Nov. 1, 1966 F. K. COLEMAN 3,282,304

WIRE UNCOILING DEVICE

Filed Nov. 12, 1963

FIG_3

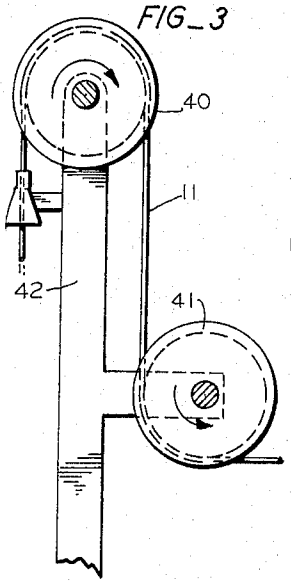

FIG_1

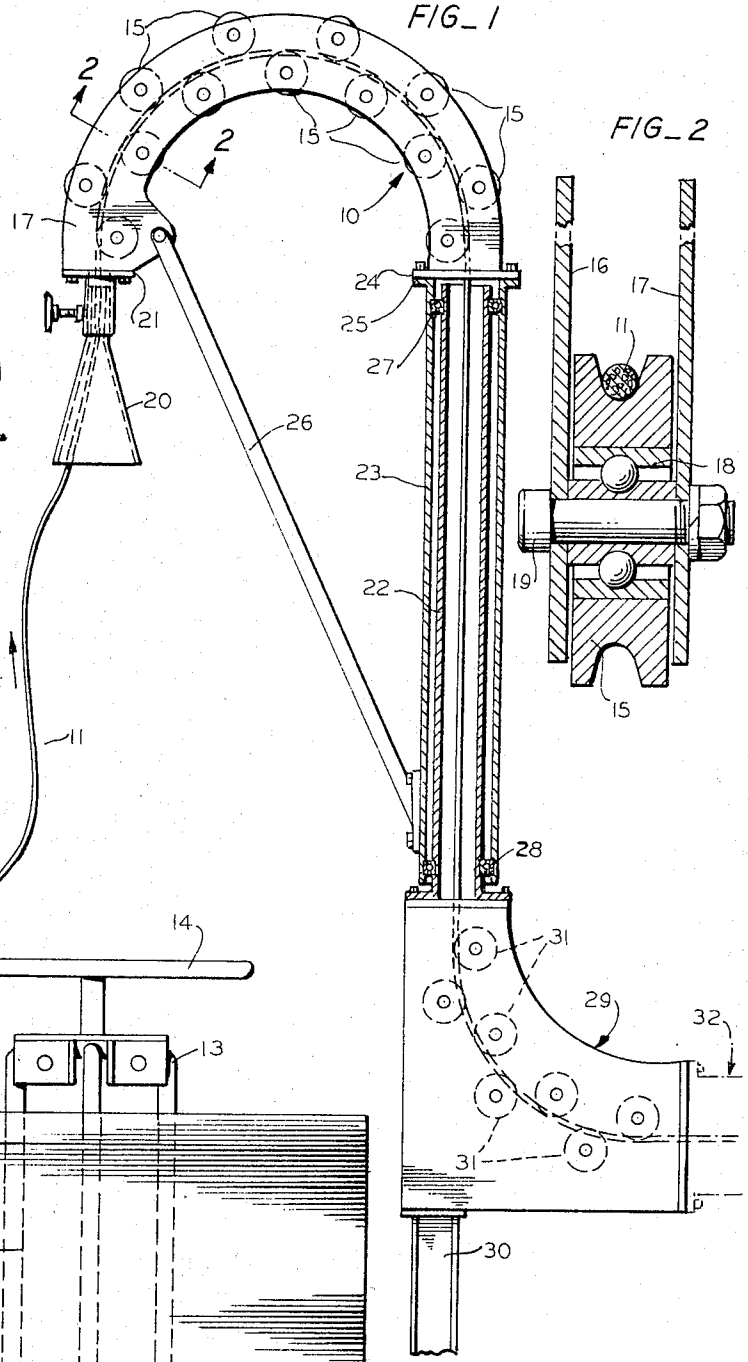

FIG_2

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WIRE UNCOILING DEVICE

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6 Claims. (Cl. 140—147)

This invention relates to devices for uncoiling wire from packaged rolls. The invention more particularly relates to an uncoiling apparatus having a moment of inertia far less than conventional devices now used.

Apparatus of the type herein contemplated are used for guiding coils of wire from a packaged roll preparatory to feeding the wire into a wire-straightening machine or other machines which may use the wire in its coiled form. In the process of stripping wire from a roll, it is often necessary to repeatedly increase and/or decrease the speed at which the wire is uncoiled. Since it is customary practice to guide the wire by means of large sheaves or guide rolls having rather large moments of inertia, the torque required to accelerate these large sheaves (while increasing the speed of the wire) may be great, resulting in tension forces that cause wire breakage. Furthermore, the high moment of inertia of the sheaves tends to overfeed the wire when the speed of uncoiling is lessened, thereby causing a backlash of snarled wire.

In brief, the present invention involves an uncoiling apparatus comprising a plurality of small pulleys or sheaves rotatably supported in an arcuate arrangement resembling the curvature of a conventional larger sheave. It has been found that by keeping the mass and radius of the sheaves to a small value the total torque of the plurality of sheaves will be much less than the torque of the larger sheaves. It follows, therefore, that the operating power required to drive the plurality of small sheaves will be less than that required to drive the larger sheave; and the small sheaves can be accelerated and decelerated between given peripheral speeds in a shorter time interval for any given turning or braking force.

Therefore, it is one primary object of this invention to provide an improvement in apparatus for uncoiling wire from a packaged coil; an apparatus that will reduce the chances of wires breakage and curtail or eliminate an overfeeding of the wire during periods of deceleration.

Other objects of this invention will, of course, become apparent in view of the following detailed description and the accompanying drawings.

In the drawings forming a part of this application and in which like parts are identified by like reference numerals throughout the same,

FIG. 1 is a preferred embodiment in apparatus for uncoiling wire from a roll and constructed according to the teaching of this invention;

FIG. 2 is a portion of an enlarged section taken on lines 2—2 of FIG. 1; and

FIG. 3 illustrates a conventional type of wire uncoiling device.

Referring to FIG. 1 of the drawing, there is shown a preferred embodiment of the invention, an apparatus **10** for uncoiling wire **11** from a standard roll **12**. The roll of wire is supported upon a conventional stem palate **13** having an annular guide **14** superposed and coaxial relative to the roll.

Apparatus **10** more specifically comprises a plurality of first sheaves **15**, each mounted between a pair of semicircular ring plates **16** and **17** by means of a roller-bearing **18** and a support pin or bolt **19**. Sheaves **15** are disposed in an arcuate arrangement, the periphery of each sheave providing points of contact along a uniformly curved pathway of approximately 180° through which the

wire **11** is guided. Adjacent sheaves are located on opposite sides of the curved pathway to provide a positive guide as well as a support. A funnel **20** is utilized to guide wire **11** into the groove of the first contacted sheave **15**, said funnel being adjustably supported relative to a mounting plate **21** secured to the ends of plates **16** and **17**.

The assembly of sheaves **15** and plates **16** and **17** are pivotally supported upon a vertical axis by means of a pivot tube comprising an inner tube **22** and an outer coaxial tube **23**, plates **16** and **17** being secured to outer tube **23** by means of abutting ring plates **24** and **25**. A strut member **26** interconnects tube member **23** with the front end of plates **16** and **17** to provide vertical stability. Tube **23** is pivotally supported from tube **22** by means of an upper roller bearing **27** and a lower roller bearing **28**.

Tube **22** is rigidly supported from a stationary sheave housing **29** supported on a column **30**. A plurality of second sheaves **31**, mounted within housing **29**, are pivotally supported in a manner similar to sheaves **15**, said sheaves **31** also being arranged in an arcuate pattern and on both sides of a curved pathway extending from the bottom end of tube **22** through an angle of approximately 90°. The end of housing **29** which serves as a terminus of the pathway defined by pulleys **31** abuts against the end of a conventional wire straightening machine shown only in broken line and indicated by the reference numeral **32**. Wire straightening machines of this kind are well known and form no part of the present invention.

In operation, tension applied to the forward end of wire **11** is used to uncoil the wire from roll **12**, sheaves **15** and **31** merely serving to guide and support the wire as it leaves the roll until the time it enters machine **32**. Friction contact between the wire and the sheaves will, of course, induce contacted sheaves to rotate.

Tubes **22** and **23** permit sheaves **15** to pivot as an assembly about a vertical axis coincident with the inlet opening of housing **29**. This structure allows the assembly of sheaves to be pivoted into various positions above any one of several rolls **12** (although only one roll is shown), each roll being positioned at substantially the same radial distance from housing **29**. After one roll has been expended the assembly of sheaves **15** may then be pivoted to a position overlying a second roll so that the operation may be continued with very little interruption.

Referring to FIG. 3, there is shown a conventional form of uncoiling apparatus comprising a pair of pulleys or sheaves **40** and **41** mounted upon a stationary support **42**. Due to the torque required to accelerate these relatively large sheaves (by means of tension applied to the wire), the wire **11** may be subjected to excessive strains during the acceleration period, and as a result the wire **11** is often broken. Moreover, it will be further apparent that the increased moment of inertia of large pulleys, such as **40** and **41**, will tend to overfeed the wire during periods of wire deceleration, and this usually produces a backlash of snarled wire.

Apparatus **10** eliminates many of the difficulties of conventional apparatus by keeping the mass and radius of the rotating sheaves to comparatively small values. More specifically, the aggregate value of the moments of inertia of a series of small pulleys will be far less than the moment of inertia using a single pulley to guide the wire around an identical arcuate passageway. Thus, the operating power required for driving sheaves **15** and **31** of apparatus **10** will be much less than the power required to drive sheaves **40** and **41**, assuming standard makes of sheaves are used in both instances. For example, it has been found that approximately 0.0414 horse power is required to accelerate two conventional thirty-inch diameter guide sheaves as to feed wire at the rate

of 1625 feet per minute in a period of approximately one-third of a second. Compared with that figure, it requires only 0.00027 horse power to drive apparatus **10** using twenty-two half-inch diameter sheaves arranged around thirty-inch diameter curves. Thus, it will be seen that the horse power requirements of apparatus **10** may be approximately $\frac{1}{150}$ of the horse power required by conventional apparatus. Moreover, it will be appreciated that the reduced horse power requirement indicates that a lower strain is being applied to the wire and, therefore, excessive strains are avoided. In addition, since the aggregate moment of inertia of twenty-two half-inch diameter sheaves is far less than that of two conventional thirty-inch diameter guide sheaves, the problem in overfeeding the wire is greatly reduced, if not eliminated.

Although a preferred embodiment of this invention has been illustrated and described, it is to be understood that the various changes may be made without departing from the spirit of the invention or the scope of the attached claims, and each of such changes is contemplated.

What I claim and desire to secure by Letters Patent is:

1. A device for uncoiling wire from packaged coils comprising: a plurality of sheaves rotatably supported in an arcuate arrangement, the periphery of each sheave providing points of contact along a curved pathway, said sheaves being disposed on both sides of said pathway to retain the wire within the grooves of said sheaves, and means for guiding the wire into the groove of the first contacted sheave; said sheaves having a total torque substantially less than the torque of a single sheave having the radius of said curved pathway.

2. A device for uncoiling wire from packaged coils comprising: first and second groups of sheaves, each group rotatably supported in an arcuate arrangement, the periphery of each sheave providing points of contact along a curved pathway, means for pivotally supporting the first group of sheaves relative to said second group of sheaves, and means for guiding the wire into the groove of the first contacted sheave in said first group of sheaves; said sheaves having a total torque substantially less than the torque of a single sheave having the radius of said curved pathway.

3. A device for uncoiling wire from packaged coils comprising: a vertical pivot tube, a first group of sheaves mounted to said pivot tube, said sheaves being rotatably supported in an arcuate arrangement, the periphery of each sheave providing points of contact along a curved vertical pathway, the terminal end of said pathway communicating with one end of said vertical pivot tube.

4. A device for uncoiling wire as set forth in claim 3 wherein said pivot tube comprises inner and outer tubular members, one of said members being fixed and the other pivotally supported therefrom, said first group of sheaves being mounted to the pivotally supported tubular member.

5. A device for uncoiling wire as set forth in claim 3 and further including a second group of sheaves mounted to said pivot tube, said sheaves being rotatably supported in an arcuate arrangement, the periphery of each sheave providing points of contact along a curved vertical pathway, the front end of said pathway communicating with the opposite end of said vertical pivot tube.

6. A device for uncoiling wire as set forth in claim 5 wherein the curved pathway of said first group of sheaves extends approximately 180° and the curved pathway of said second group of sheaves extends approximately 90°.

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