Dec. 6, 1960 E. RIEGLER 2,963,233

TRAVERSING REEL

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Fig. 1

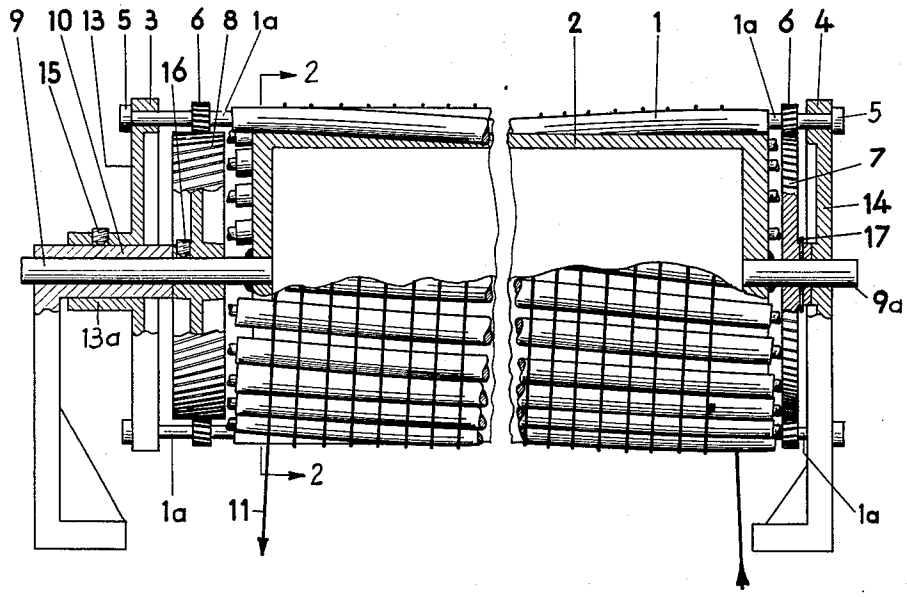
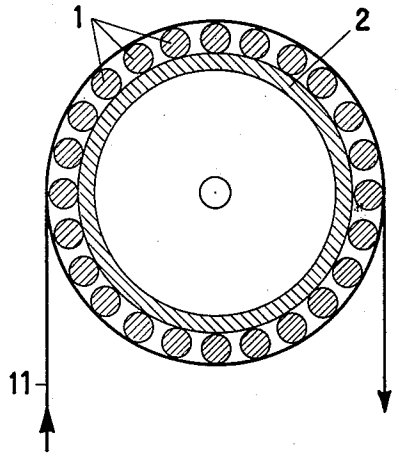


Fig. 2



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Fig. 3.

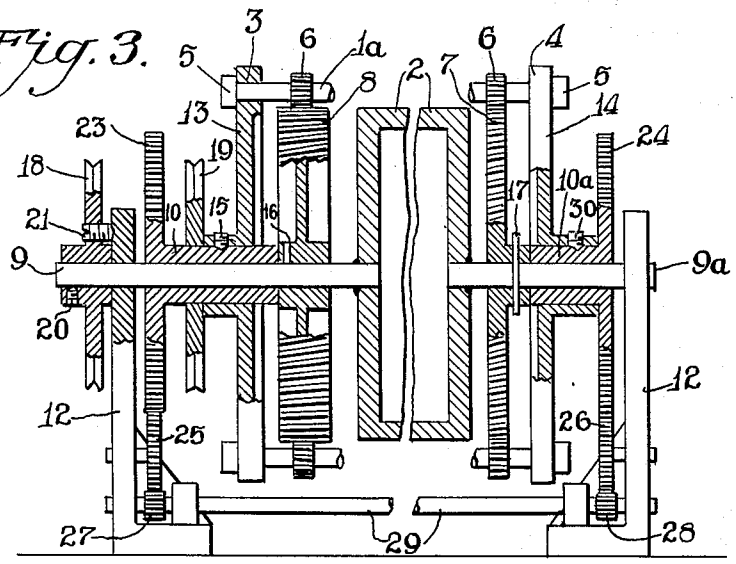
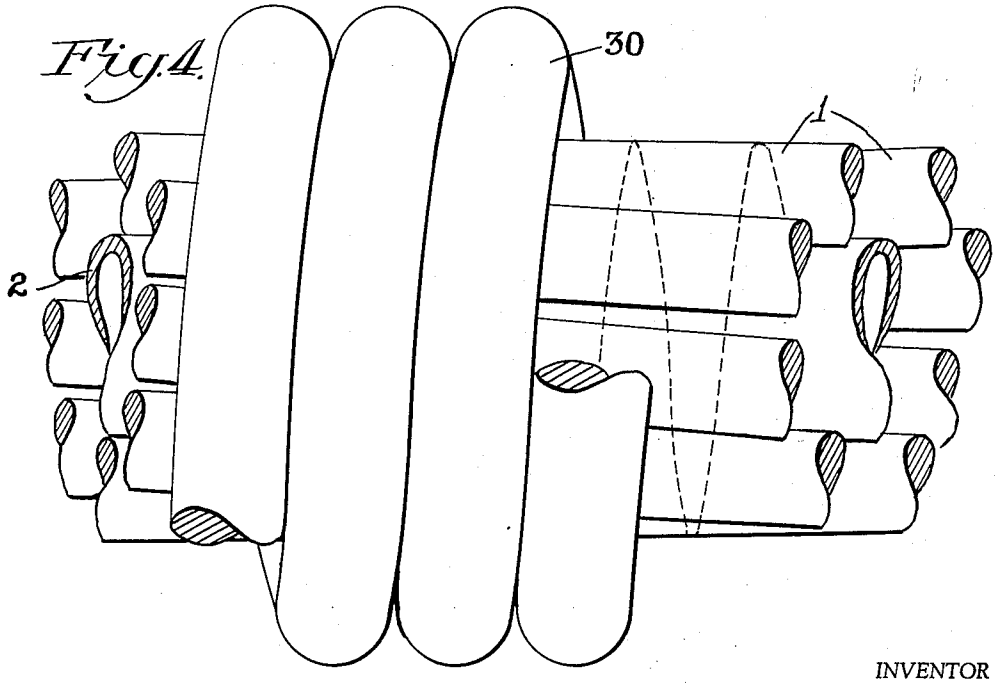


Fig. 4.



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TRAVERSING REEL

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Claims priority, application Germany July 10, 1954

3 Claims. (Cl. 242—47.1)

This application is a continuation-in-part of my application, Serial No. 520,471, filed July 7, 1955, now abandoned.

The present invention is concerned with a traversing reel, i.e., a reel for continuously receiving an advancing length of elongated material, such as filaments, ropes, bands, or flexible tubes, and simultaneously and continuously delivering the received material, the material being moved along the axis of the reel between the point where it is received to the point where it is delivered. Such reels are used in the manufacture of synthetic yarn for example and generally have a set of rolls which are arranged around a central or reel axis, the roll axes being skewed relative to the central axis. These rolls are supported in bearings at both ends to allow rotation about their own axes. Reels of this type are used for treating continuously running yarn a length of which is helically moved on the reel as the yarn advances. A treating mechanism such as a hot air blower can be mounted within the reel to blow against the helically moving yarn.

In the use of reels of the specified type, the yarn is moved around the reel from one roll to the next, and encircles the reel repeatedly. The degree of traverse, i.e., the distance between adjacent turns of the yarn, increases as the skew angle (the angle of the rolls with respect to the axis of the reel) increases.

The diameter of such reels is not constant but diminishes from the ends of the reel towards its middle, the rate of decrease being greater, as the skew angle becomes greater. With such reels the distance between adjacent turns of yarn wound on the reel also diminishes towards the middle of the reel. Moreover, there is a limiting angle at which the rolls of these reels can be skewed, and the limiting angle decreases as the diameter of the rolls increases in comparison to the diameter of the reel. Hence, with these reels there is an upper limit to the distance between adjacent turns of the material being coiled, so that they are unsuited for coiling and advancing wider material.

Among the objects of the present invention is the provision of a traversing reel the cross-sections of which in planes vertical to the axis of the reel are uniform in contour and width. Still another object of the present invention is a reel which is adapted for coiling material in turns of relatively large distance from each other and hence for coiling and advancing material of relatively large width.

According to the present invention, a traversing reel of the type described has a central cylindrical supporting drum section and a plurality of elongated flexible rolls each held against the cylindrical surface of the drum section from one end of the drum section to the other in skewed relation with respect to the axis of said drum section, and mounting structure adjacent each end of the drum section connected to the corresponding roll ends, holding them in position for such skewed relation and including driving mechanism connected for rotating

the individual rolls around their individual axes. In view of the fact that the rolls are arranged obliquely where they are supported by the drum section, each roll axis tends to follow the line of a helix of very steep pitch, only a fragment of each of such helices being included between the two ends of the drum section. The rolls rotate about their individual axes, and because they bear against the cylindrical surface of the drum section they can roll around that surface. A rolling movement on the drum surface may take place with all of the rolls simultaneously rotating around fixed axes, the supporting drum section rotating on its axis. Alternatively all of the rolls can move simultaneously as a body about the axis of the supporting drum section while that section is stationary, or rotating.

For illustration of the present invention reference is made to the appended drawings in which:

Fig. 1 is a side view, partly in section and partly in elevation, of a reel embodying the present invention, the reel being shown broken away at the center;

Fig. 2 is a cross-sectional view of the reel of Fig. 1 taken along line 2—2;

Fig. 3 gives an example of a driving arrangement for a reel according to the present invention; and

Fig. 4 is a broken-away showing of part of a reel according to the present invention with part of a relatively thick rope wound thereon.

The reel shown in Fig. 1 has twenty-four flexible rubber rolls 1 which bear against the supporting drum 2. For better movement in the bearings, the rolls 1 have pieces 1*a* of a nonflexible material attached to their ends. Short lengths 1*a* of a metallic round bar may, for instance, be inserted in and vulcanized or cemented to their ends. The rigid pieces 1*a* are at one end of the reel supported in bearings 3, at the other end in bearings 4. For better clarity, only two bearings 3 and two bearings 4, of the twenty-four bearings at each end, are shown in Fig. 1.

The bearings 3 and 4, which support the rolls 1, may be journal or roller bearings. In some cases, it may be advantageous to use bearings which are movable or self-adjusting so that they can align themselves or can be adjusted to conform to the helices of the rolls 1 on the drum 2 as referred to above.

During reeling, the rolls 1 are kept under longitudinal tension as by having the bearings of each roll provided with enlarged heads 5 mechanically biased away from each other. In Fig. 1 this tension is procured by mounting the roll bearings 3 on a common disc 13 slidably mounted as by an integral sleeve 13*a*, around a central journal 10 to which it can be fixed by a set screw 15. The opposite set of roll bearings 4 can be correspondingly mounted on a disc 14, although in the figure this disc is not adjustable, being an integral portion of a mounting bracket 12. By loosening the set screw 15, shifting the disc 13 carrying the bearings 3 towards the left side of the reel until the rolls 1 are of desired tautness, and tightening set screw 15, the tension is provided and maintained.

Supporting drum 2 is rotatably mounted by means of a journal pin 9 at the one side of the reel and of a journal pin 9*a* at its other side. Journal pin 9 may be driven for rotation in known manner by a driving means such as a pulley. Journal pins 9 and 9*a* are respectively supported in journal 10 and disc 14. Journal 10 is integral with the frame 12. Journal pins 9 and 9*a* are fixedly connected to supporting drum 2 and present with the latter a rotatable unit. Gear wheels 7 and 8, e.g., sprocket or worm wheels, are fixedly mounted on the journal pins 9 and 9*a* by means of a cotter pin 17 and a set-screw 16, respectively, and transmit rotation from the journal pins to the rigid end portions 1*a* of the rolls 1, by means of pinions or spur gears 6. Hence rolls 1,

although as a set remain in the same stationary location, are rotated about their individual axes while supporting drum 2 is rotated about its axes. The dimensions of gear wheels 7 and 8 and of pinions 6 are in such ratio that the peripheral speed of supporting drum 2 equals that of rolls 1. Thus, on rotation of supporting drum 2, rolls 1 are caused to roll on its surface by the gear drive as well as the frictional engagement between the supporting drum 2 and the rolls 1. Instead of the above-mentioned pinions 6, other elements such as bevel wheels, friction wheels, chains or flexible shafts may be used for transmitting rotation to the rigid end portions 1*a* of the rolls 1.

As indicated above, in operating a reel according to the present invention both the supporting drum 2 and the set of rolls 1 may rotate about the axis of the reel. Fig. 3, as an example, demonstrates an arrangement of driving means for this kind of operation. The construction of Fig. 3 incorporates many of the components of the construction of Fig. 1, and these components are identified by the same reference characters.

In Fig. 3, the journal pins 9 and 9*a* and the supporting drum 2 as a unit are driven by a pulley 18 affixed to the journal pin 9 by a set-screw 20. The disc 13 is provided with a pulley 19 which may be integral with the disc or securely connected to it. A gearing comprising the gear wheels 23, 24, 25, 26, 27 and 28 and a shaft 29 are connected for rotating discs 13, 14 in unison. Each of the gear wheels 23 and 24 has an extended hub 10 and 10*a* respectively, on which the discs 13 and 14 are affixed by the set-screws 15 and 30, respectively. The gear wheels 23 and 24 are freely rotatable about the journal pins 9 and 9*a*, respectively. The gear wheels 25, 26, 27 and 28 are freely rotatable idlers supported in the frame 12.

For operating the device, the pulley 19 is driven and rotates the discs 13 and 14 and the bodily unit of all of the rolls 1 about the axis of the reel. The angular speed of pulley 19 can be different from that of pulley 18 which rotates the supporting drum 2. A set screw 21 threaded in pulley 18 and bearing against the frame 12 is utilized to lock the drum 2 against rotation if desired.

Fig. 4 further illustrates the invention in a reel provided with eight flexible rolls 1 for winding a rope 30 having a cylindrical cross-section with a considerable diameter, i.e. about 30% of the overall reel diameter.

As explained above, the rolls 1 bear against the surface of the drum 2 in the form of screw lines of very high pitch or lead; e.g., in Fig. 1 the rolls 1 bear against the surface of the drum 2 in the form of right-hand screw lines of such steep pitch that each extends only about a fiftieth of one complete revolution around drum 2.

Advantageously the rolls 1 of the reel, according to the present invention, are mounted in such a way that the lead of the steep screw lines is variable in pitch and if desired also in direction, so that it is possible to vary the distance between the single turns of material wound on the reel, and if desired also the direction of traverse.

In order to change the pitch of the rolls 1, only a relatively simple adjustment is required. This is acomplished by loosening the set-screws 15, 16 and then rotating disc 13 on the bearing member 10 to the desired position. Since the bearings 3 are integral with the disc 13, they are moved therewith to the desired position, after which the set-screws 15 and 16 are tightened to hold the disc 13 with the bearings 3 and the rolls 1 in their adjusted positions. The flexibility of the rolls 1 permits the rolls to assume a new pitch between the bearings 4 on disc 14 and the adjusted bearings 3 on disc 13. For example, with the right-handed pitch of Fig. 1 the rolls, in rotating on their individual axes while the drum rotates in one direction, they advance the coiled material 11 from right to left of the reel, as viewed in Fig. 1. If the disc 13 is rotatably adjusted to reverse the pitch of the rolls relative to the drum, the rotation of the drum in the same direction as before will effect an advance of the coiled material 11 from left to right. On the other hand, the disc 13 may be rotatably adjusted only to an extent sufficient to change the angle of pitch of the rolls without actually reversing the pitch itself. As can be readily understood, the variation of the pitch of the rolls will cause a corresponding variation in the lateral shifting of the material being wound and, consequently, of the number of turns of such material that can be taken up on a specified length of the reel. An intense treatment of the material coiled around the reel with a liquid or a gas is attained by supplying the treating agent to the coiled material from the interior of the supporting drum 2, e.g. by feeding the treating agent through a hole drilled through shaft 9 into the interior of the hollow supporting drum 2 and from there through a plurality of holes provided in the surface of the supporting drum 2 to the coiled material.

The reels according to the present invention are advantageously used for treating endless material of considerably greater width, such as, for instance, bands, cables, ropes or tubes. With the reels according to the present invention it is easier to feed the treating agent equally to all turns of the material coiled around the reel than was possible with the known reels with rigid rolls. With the latter the distance of the single turns and their diameters were considerably unequal, if such materials had to be coiled. The reels according to the present invention make it possible to continually submit endless material, such as tubes, to a longer treatment, while the material is coiled in turns of equal diameters. Moreover, the reels according to the present invention are capable of continually advancing bands, tubes or similar material along an approximately spiral way, even if the diameter of the reel is not very great with respect to the width of the band, tube or the like. This makes it possible to use a reel with relatively small dimensions even if material of considerable width has to be coiled.

The flexible rolls of the reel according to the present invention may be made of rubber, plastic or other flexible material with or without reinforcing linings of hemp, leather or other natural material. Flexible tubes which may be reinforced with linings of flexible metallic hose are as suitable as solid flexible round bars. Suitably the flexible rolls lying on the supporting drum are arranged at equal distances from one another.

Obviously many modifications and variations of the present invention are possible in the light of the above teachings. It is, therefore, to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

What is claimed is:

1. A traversing reel comprising a cylindrical supporting drum section and a plurality of elongated flexible rolls each held against the cylindrical surface of the drum section from one end of the drum section to the other in skewed relation with respect to the axis of said drum section, and mounting structure adjacent each end of the drum section connected to the corresponding roll ends, holding them in position for such skewed relation and including driving mechanism connected for rotating the individual rolls around their individual axes.

2. The combination of claim 1 in which the driving mechanism includes rigid roll ends for the flexible rolls, said rigid ends having spur gears, and a driving gear is meshed with the spur gears at each end.

3. The combination of claim 1 in which the mounting structure is adjustably held for rotation around the axis of the drum section so that the skewed relation can be altered by merely changing the rotational position of said mounting structure.

References Cited in the file of this patent

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