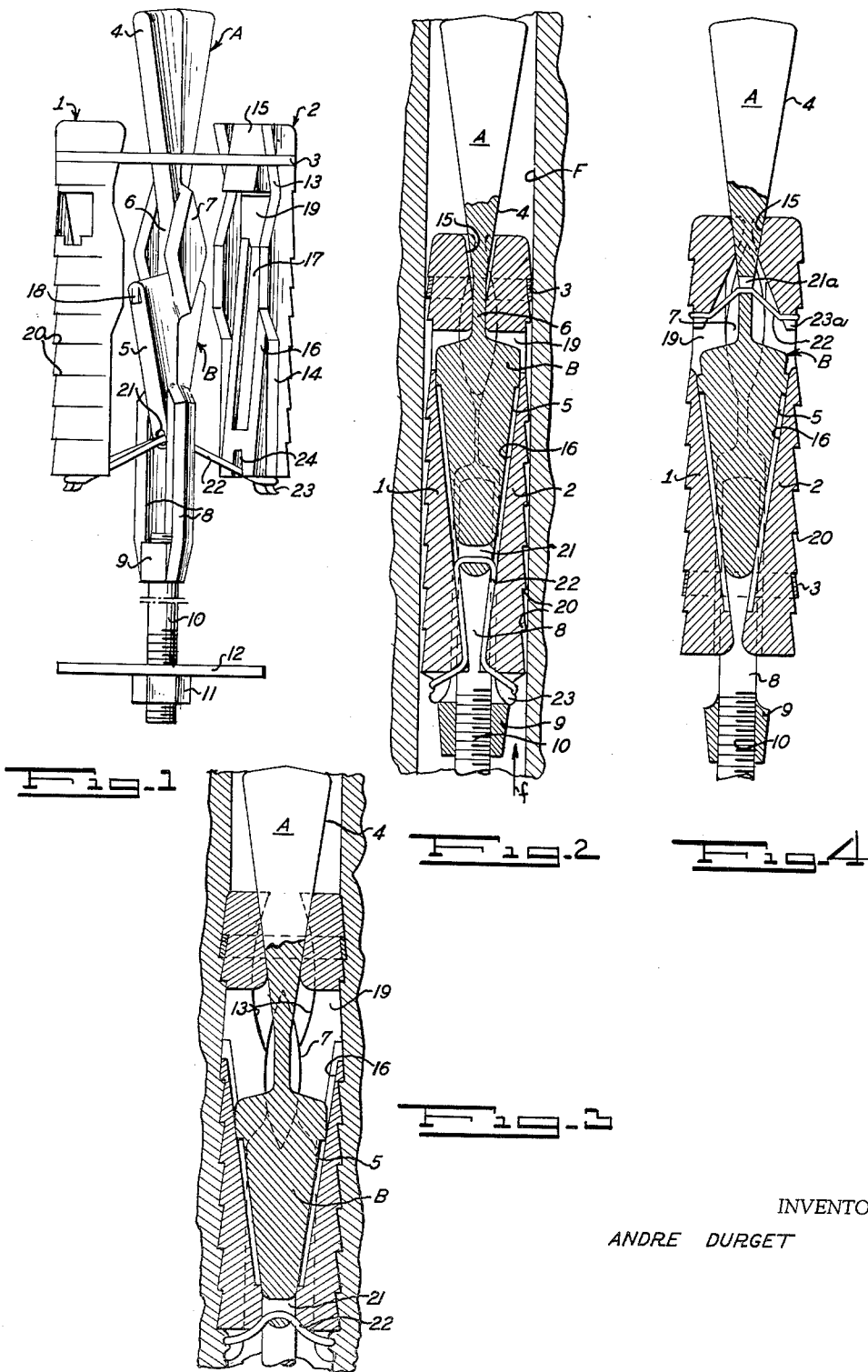


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ANCHORING DEVICE WITH RESILIENT TIE
MEANS FOR AUTOMATIC PRE-ANCHORING
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**ANCHORING DEVICE WITH RESILIENT TIE
MEANS FOR AUTOMATIC PRE-ANCHORING**
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The present invention relates to anchoring devices and, more particularly, to anchoring devices of the type comprising a traction rod carrying one or more groups of cams cooperating with corresponding groups of ramps provided on shells enclosing the rod.

Such anchoring devices have multiple uses, in particular for setting objects in walls, bedding down machines and any other applications requiring the integral securing of any piece on any assembly capable of having a hole formed therein. Moreover, such devices are extensively used in mines for bolting the roof, the facings and the walls thereof.

It has already been proposed to provide such anchoring devices with a resilient means bearing simultaneously on the shells and the traction rod, in order to effect a self-operating pre-anchoring of the device upon its insertion into the bore.

By "self-operated pre-anchoring" it is meant that the anchoring device should become self sustaining as soon as it has been inserted in the bore and prior to any expansion of the device effected by means of a traction exerted on said rod.

However, all previously known devices are comparatively complex and are accordingly objectionable from the point of view of the increased cost thereof.

The invention aims at overcoming the aforesaid drawback by providing an anchoring device of the above-mentioned type, achieving the self-operated pre-anchoring by the provision of extremely simple means.

This device is essentially characterized in that the resilient means providing the said self-operated pre-anchoring is comprised by a resilient tie bearing by both ends thereof on the shells and extending through an aperture provided in the traction rod or one of the cams carried thereon.

The simplicity of the device providing the self-operated pre-anchoring is evident from the above-given definition thereof. On the other hand, its efficiency can be explained as follows: when the anchoring device is inserted into a bore by exerting a push on the traction rod thereof, the said resilient tie is tensioned and, when the pushing is discontinued, returns the rod between the two shells; these shells are thus spread apart by the cams carried on the rod and are sturdily pressed against the wall of the bore, thus achieving an automatic self-maintenance of the anchoring device.

Further features and advantages of the present invention will become apparent from the ensuing description, when read in connection with the accompanying drawing, given merely by way of example and in which:

FIG. 1 is an exploded view of one embodiment of the anchoring device designed in accordance with the invention;

FIGS. 2 and 3 are longitudinal sectional views of said anchoring device, shown as positioned in a bore and at two successive operational stages thereof; and

FIG. 4 is a view similar to that of FIG. 2 but showing an alternative arrangement of the anchoring device.

In accordance with the embodiment shown in FIGS. 1 to 3 of the drawing, the anchoring device comprises two shells 1 and 2 forming when juxtaposed a segmented tube, in which position they are maintained by a resilient

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tie 3. The thus-formed tube is adapted to enclose an assembly consisting of a traction rod and cams operative to expand the segmented tube.

This assembly comprises, starting at the top, a first group of cams provided by the side faces 4 of a wedge member A, a second set of cams provided by the side faces 5 of a second wedge member B, both wedges A and B being connected by a cross-sectionally reduced portion 6, having on the side-walls thereof reinforcing blocks 7 obtained by forging. The unit B is unitary at its lower portion with a stirrup or bracket 8 having its two arms disposed on either side of said wedge B, and on the lower portion of which is provided a nut 9. This nut has screwed therein a threaded end of the traction rod, proper, the other end of this rod 10, which is likewise threaded, having screwed thereon a nut 11 retaining a back plate 12 mounted on the rod 10.

The shells 1 and 2 are arranged so as to be adapted to the various components of the above described assembly. Thus, the longitudinal edges of the shells each comprise an arcuate cut-out portion 13 to accommodate the reinforcing blocks 7, and a second rectilinear cut-out portion 14 adapted to have the arms of the bracket 8 located therein.

Moreover, each shell has formed in the inner wall thereof a first ramp 15 adapted to cooperate with the corresponding face 4 of the block A, and a second ramp 16 adapted to cooperate with the corresponding face 5 of the block B.

It will be appreciated that each ramp 16 has formed therein, along the longitudinal axis thereof, a groove 17 into which can be engaged a projection 18 integrally formed on the corresponding face 5, so as to provide a guiding means for the block B.

Intermediate the ramps 15 and 16 there is provided a window 19 formed in the shells 1 and 2, with the view to afford a passage for the upper end of the block B and for the projections 18, when the shells are in the minimum spreading position thereof (see FIG. 2).

The outer wall of the shells has further the usual notches 20 formed thereon in order to grip the wall of the bore.

Finally, in accordance with an essential feature of the invention, the base of the block B has bored therein a transverse aperture 21 through which extends an endless resilient tie 22 having its ends bearing respectively onto the base of each shell. To this end, each shell is provided at the base thereof with a gripping finger or lug 23 of curved cross-section and into which is inserted the tie 22. The inner wall of the shell bases is further provided with a groove or notch 24 to prevent the tie 22 from being sheared by the bases of the shells.

The operation of the device will now be described with particular reference to FIGS. 2 and 3 of the drawing.

In order to locate the anchoring device, there is formed a bore F of a diameter substantially equal to the minimum diameter of the anchoring device.

When the tube formed by the shells 1 and 2 is at its smallest diameter, the various components of the anchoring device take the relative positions illustrated in FIG. 2, which are as follows:

The bases of the cam faces 4 are in contact with the ramps 15;

The reinforcing blocks 7 are housed within the recesses 13 and the arms of the stirrup or bracket member 8 are engaged in the recesses 14;

The upper portion of the wedge B with its projections 18 is engaged into the windows 19;

The resilient tie 22 is in its position of maximum tension.

When the anchoring device is introduced into the bore F by exerting a push on the traction rod 10 in the direc-

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tion indicated by the arrow *f*, the outer portion of the shells 1 and 2 and the notches 3 frictionally engage the wall of the bore, thus exerting a rapid braking action on the movement of the shells, whereby the traction rod pursues its stroke on its own and reaches the position shown in FIG. 2, i.e. the position corresponding to the minimum diameter of the shells. As has already been mentioned, the resilient tie 22 is by then under tension.

Thus, when the push exerted on the traction rod is discontinued, the latter is strongly urged by the resilient tie 22 and is lowered between the shells, as can be seen in FIG. 3. In the course of this downward stroke, the cams 4 and 5 respectively cooperate with the ramps 15 and 16, thus causing the shells to be spread apart by an amount sufficient to bring them into a gripping engagement with the wall of the bore. Accordingly, the anchor device becomes self-sustaining as soon as the traction rod 10 is released.

Thus an automatic pre-anchoring is achieved. The device is then ready to have imparted thereto the expansion proper, which is effected in the usual way, i.e. by tightening the nut 11 on the rod 10. The plate 12 comes to bear against the front face of the bore and thus any additional tightening of the nut 11 causes the traction rod to descend, which in turn causes the cams to be lowered on their respective ramps and the shells to be spread apart.

In the course of the expanding process, the resilient tie 22 can jump-off the lugs 23 or be sheared, but this is of no importance since it has already fulfilled the function for which it was intended.

It appears from the foregoing description how simple is the means which provides, in accordance with the invention, the automatic pre-anchoring of the shells.

It is to be understood that the invention is not confined to the thus-described embodiment thereof, which was given merely by way of an example.

Thus, for instance, there is illustrated in FIG. 4 a modification which differs from the foregoing embodiment merely by the following points:

Instead of bearing on the bases of the shells, the tie 22 is fixed adjacent the apex thereof. To this end, lugs 23^a are provided at the upper portion of the windows 19, whereas the base of the block A has formed therein a hole 21^a having the resilient tie 22 extended therethrough.

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The operation of the device shown in FIG. 4 is substantially identical to that of the earlier-described arrangement, except that the tension which can be imparted to the tie 22 is smaller than in the first embodiment.

Having now described my invention what I claim as new and desire to secure by Letters Patent is:

1. An anchoring device comprising shells constituting a segmented tube adapted to be inserted into a bore provided in a wall and defining an internal chamber, said shells having leading and trailing edges, a unit including a traction rod mounted in a longitudinally movable relationship within the chamber in said tube and at least one group of cams on said rod, at least one group of ramps on said shells internally thereof for cooperating with said group of cams, traction means at the outer end of said rod to displace the latter axially relative to said tube and to cause said tube to expand, resilient means holding the shells in assembled relation, a resilient tie extending diametrically through said unit via an aperture provided in the latter and spaced from said cams, and a lug on each shell spaced radially inwards of the outer periphery thereof and spaced from the leading edge toward the trailing edge thereof for engaging said tie and supporting the same substantially within said chamber, said tie connecting said shells with one another and with said traction rod whereby, when the anchoring device is inserted into the bore by a force exerted on said traction rod, said resilient tie is tensioned to effect an automatic pre-anchoring of said anchoring device upon release of said rod.

2. An anchoring device as claimed in claim 1 wherein said resilient tie extends through said group of cams, said aperture being provided in said group of cams.

3. An anchoring device as claimed in claim 1 wherein each shell is provided with a window and the lug on each shell is positioned in said window.

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