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R SCHMIDT

2,216,758

TWISTING REINFORCEMENTS FOR CONCRETE

Filed Oct. 20, 1936

Fig.1

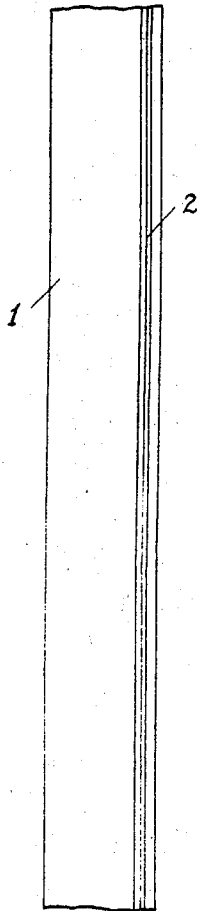


Fig.3

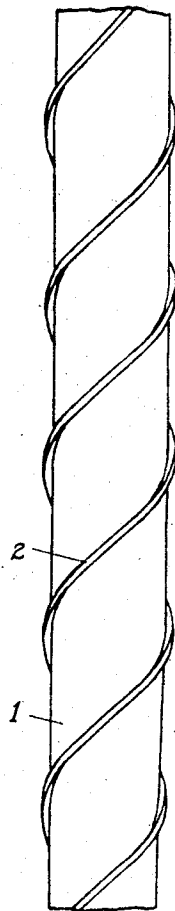


Fig.4

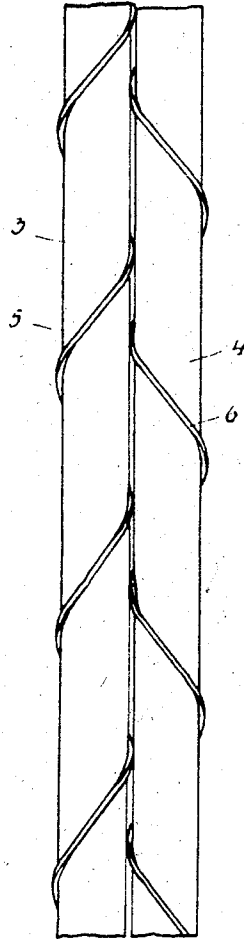


Fig.6

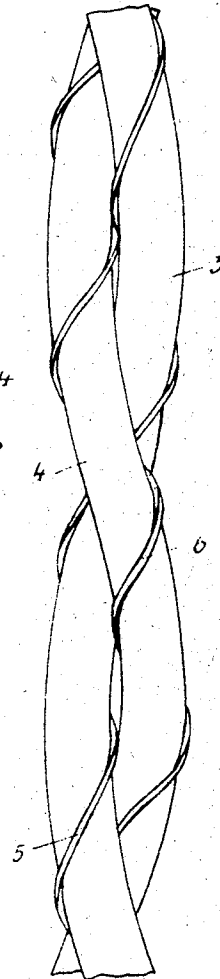


Fig.2

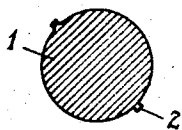
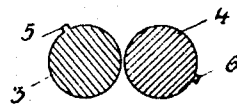


Fig.5



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UNITED STATES PATENT OFFICE

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TWISTING REINFORCEMENTS FOR
CONCRETE

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In Austria October 30, 1935

1 Claim. (Cl. 153—78)

It is known that the strength of rolled iron may be very considerably increased by twisting in the cold state. The present invention makes use of this fact for the manufacture of metal reinforcements for concrete, in such manner that a substantially round section bar, having continuous or interrupted ribs or projections, is subjected to twisting in the cold state, with the result that the profile obtained has increased bonding capacity and also a very considerably increased elastic limit without harmful effects arising and without the modulus of elasticity being modified.

Such a result cannot be obtained with square or triangular section bars, since if these are employed in cold twisted condition, cracking effects in the concrete arise, apart from the tendency of crack formation at the edges of the bars.

An embodiment comprising a substantially round section bar with two diametrically opposite ribs is preferable. In this connection it is to be noted that there is no advantage in practice in increasing the number of ribs beyond two, which in rolling and in the application of reinforcement for concrete appear to be most favorable.

According to the invention the twisting in the cold state, cross-sectional swelling being preferably avoided, is carried to an extent at which the desired elastic limit is attained, the convolutions being made as flat as possible because the flatter they are the greater the bonding capacity. Examination of the structure enables one to ascertain if the bars have been twisted in the cold or the warm state. If the latter, then only the bonding capacity is increased; but increase in the bonding capacity, accompanied by little or no increase of the elastic limit, has no practical advantages. Only by also increasing the elastic limit is any practical advantage obtained.

Experiments have yielded the following data:

Pitch	σ_F kg./mm. ²	σ_B kg./mm. ²	Increase, per cent	
			σ_F	σ_B
20	29	43	—	—
15	42	50	45	16
10	46	53	59	23
5	55	61	89	42

Thus, reinforcing material made according to the invention has properties which have not been achieved hitherto by any known process. It af-

fords the possibility of achieving a considerable saving in weight and costs in a reinforced concrete construction without reducing its carrying capacity and in spite of the use of the cheapest reinforcing material.

Substantially round bars with ribs as aforesaid made of metals other than iron may be subjected to the method according to the invention to obtain an increase of the tension and compression elastic limits with simultaneous increase of the bonding capacity.

It has also been found to be of advantage to twist together, or twist together and stretch, two or more round section bars (with ribs as aforesaid) which have themselves been twisted in the cold state, the elastic limit being thereby increased beyond the extent which has been known so far in connection with bars twisted together.

The invention is illustrated in the accompanying drawing, in which:

Fig. 1 illustrates a bar in accordance with the present invention prior to the twisting operation.

Fig. 2 is a transverse section of the same.

Fig. 3 is a view in elevation showing the bar after twisting.

Fig. 4 shows two bars, side by side, each twisted and the ribs of the respective bars offset at their meeting planes.

Fig. 5 is a transverse section through the bars of Fig. 4.

Fig. 6 shows the bars of Fig. 4 intertwined following their independent twisting.

In Figs. 1 to 3, the bars 1 are provided with two longitudinal diametrically opposed ribs 2. When the bar has been longitudinally twisted, as in Fig. 3, the ribs 2 are in spiral form.

In Fig. 4 two bars 3 and 4 are shown each, as will be plain from the sectional view in Fig. 5, having a single rib, the bar 3 having a rib 5 and the bar 4 having a rib 6. These bars are independently twisted and are then relatively intertwined, as indicated in Fig. 6.

I claim:

A method for the manufacture of steel reinforcements for concrete, consisting in providing bars of round section with at least one longitudinal rib on each, twisting the bars individually so that the ribs each take a spiral shape, intertwining said bars while in a cold state, and simultaneously subjecting the bars to a positive axial stress for lengthening the bars during inter-twisting operation.

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