Nov. 8, 1949 A. W. HUNZ 2,487,553

ROLLED TOOTH RATCHET BAR

Filed March 8, 1946

Fig. 1.

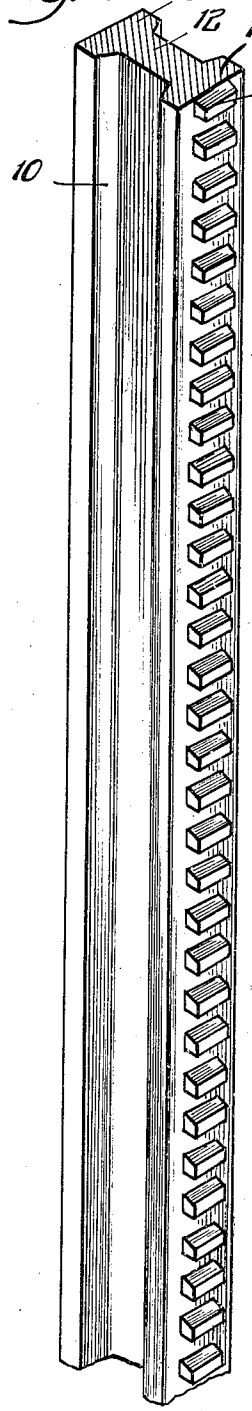


Fig. 2.

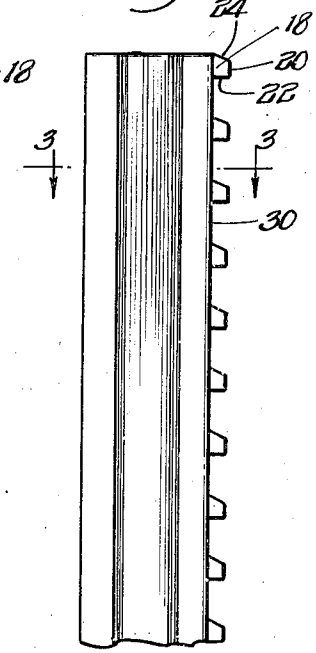


Fig. 3.

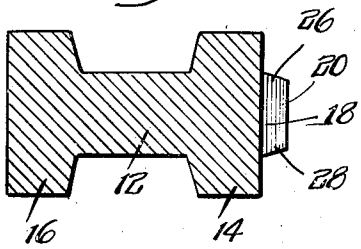


Fig. 4.

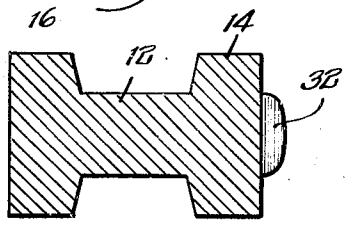


Fig. 5.

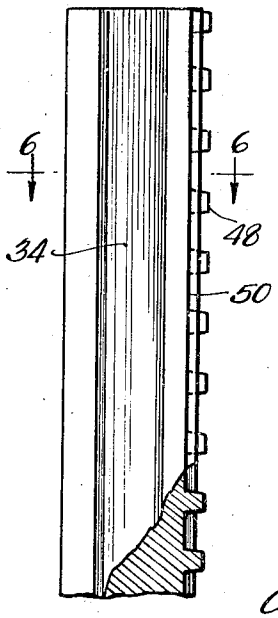


Fig. 6.

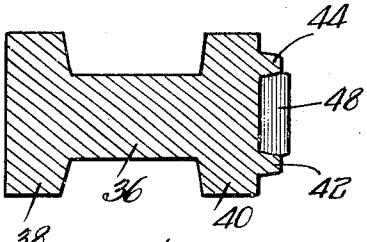
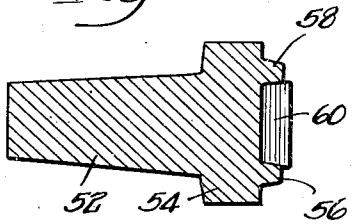


Fig. 7.



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ROLLED TOOTH RATCHET BAR

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6 Claims. (Cl. 74—575)

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The present invention relates to elongated toothed bars or rods of variant cross section rolled from metal in such manner as to be economically made and yet relatively light in cross section and weight with adequate strength.

This invention is a modification of my prior invention described in my co-pending patent application Serial Number 423,078 filed December 15, 1941 which matured into Patent #2,397,965 and my co-pending patent applications Serial No. 652,842 which matured into Patent #2,463,771 and No. 652,844, filed March 8, 1946, now abandoned, for a rolled toothed bar.

The subject matter of the present invention is directed to an elongated toothed bar or rod which is of particular utility in connection with pushing and pulling devices, particularly lifting jacks of the types disclosed in United States Letters Patent 2,266,760 and 2,361,690. In devising jacks of the types referred to one of the problems encountered is the economical manufacture of a toothed bar or angle iron. It is desired to provide an angle iron, bar or rod having teeth so shaped that when cooperating with a ratchet, pawl or other element forming a part of the pushing or pulling device, the teeth will be self-cleaning so that they will not become readily clogged with dirt, scale, rust particles or other foreign matter which otherwise would prevent proper operation of the ratchet, pawl or other cooperating element.

An object of the present invention is to provide improved forms of different types of toothed bars or rods which have certain improved features and characteristics particularly suited for cooperation with pushing and pulling devices and lifting jacks and which also are economically manufactured.

Other and further objects of the present invention subsequently will become apparent by reference to the following description taken in conjunction with the accompanying drawing wherein

Figure 1 is a perspective view of a toothed bar embodying the present invention;

Figure 2 is a side view of the bar shown in Figure 1;

Figure 3 is a cross sectional view of the bar as seen in the direction of the arrows along the line 3—3 of Figure 2;

Figure 4 is a cross sectional view similar to Figure 3 illustrating a modification of the tooth shape;

Figure 5 is a side view similar to Figure 2 of another embodiment;

Figure 6 is a cross sectional view as seen in the direction of the arrows along the line 6—6 of Figure 5; and

Figure 7 is a cross sectional view similar to Figure 6 showing a modified cross sectional shape.

The present invention comprises an elongated

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toothed rack or ratchet bar formed of suitable steel which has been hot rolled to the required shape as shown in Figure 1. The shape selected is such that the weight of the bar is maintained at a minimum value while the strength and ruggedness are not sacrificed. The bar 10 may have an I beam cross section having a web portion 12 with relatively massive flanges 14 and 16. The one flange 14 is provided with a plurality of uniformly spaced teeth 18. As may be seen from Figure 2 each of the teeth 18 preferably has a flat top surface 20 and opposite side surfaces 22 and 24 which are at different angles to the plane of the flange 14. The teeth extend transversely of the bar a distance substantially equal to the transverse dimension of the web 12. The outer extremities, in the transverse direction, of each of the teeth are preferably formed with inclined sides 26 and 28.

The toothed bar 10 is formed by hot rolling a bar between two rollers. The one roller engages and supports the inner sides and edges of the flange 14 while the other roller engages the top surface of the flange 14 and applies a series of projections which serve to form the inter-dental spaces between the teeth 18. The lower roller causes the metal of the bar to flow laterally and longitudinally to form a series of uniformly and longitudinally spaced teeth 18 integral of the bar and extending transversely thereof.

To facilitate the rolling operation and to prevent irregular elongation of the bar, the inter-dental spaces in a direction longitudinally of the bar being of a length at least two and a half times the maximum height of the teeth. The rolling operation is further facilitated by the difference between the angles of the sides 22 and 24 relative to the plane of the flange 14.

In a pushing and pulling apparatus of the type referred to in the foregoing patents, it may be desirable to have the one side 22 of each of the teeth 18 at a relatively steep angle which may be approximately ninety degrees or somewhat greater. The angle of the other side of the tooth 24 relative to the horizontal plane preferably is of the order of one hundred twenty degrees or greater. By having the one side 24 of the tooth 18 at this increased angle, the projections on the lower roller which form the inter-dental spaces may clear the formed teeth without undue friction or distortion of the teeth.

In practice it has been found convenient to have the mid-points of adjacent teeth arranged from one-fourth to three-fourths of an inch apart. The greatest height of the teeth employed is preferably not more than three-eighths of an inch and the top of the tooth is preferably of the order of one-eighth of an inch as measured along the longitudinal axis of the rod. The increased space between the teeth as compared to

the size and mass of the individual teeth not only facilitates the removal of the inter-dental projections on the lower roller during the rolling operation, but also avoids the possibility of tremendous heat on a small tooth fire cracking the tooth. The increased space between the teeth also makes it possible to form the inter-dental recesses or spaces **30** substantially flat and in a plane extending longitudinally of the bar. By limiting the transverse dimension of the base of each tooth to substantially the width of the web **12** as measured in the transverse direction there furthermore is avoided any further possibility of introducing undesired distortion of either of the teeth or the length of the bar during rolling operation. The formation of the teeth as projecting members along the bar **10** provides a self-cleaning arrangement which does not readily retain dirt or other foreign matter. Any slight accumulation of foreign matter will automatically be cleaned out by the pushing and pulling devices which have a holding pawl or ratchet which effectively cleans or scrapes the inter-dental surface.

The teeth formed on a bar of the type shown in Figures 1 to 3 may have a somewhat different configuration as is apparent from Figure 4 where the top and the sides of the tooth **32** have a continuous curved configuration. The tooth **32** in other respects may be formed in a manner similar to the tooth **18** of the preceding figures.

Another embodiment of the invention is illustrated in Figures 5 and 6 where the bar **34** has an I-beam cross section with a relatively heavy web **36** interconnecting two relatively massive flanges **38** and **40**. The flange **40** during the rolling operation is formed with two longitudinal ridges **42** and **44** arranged on opposite sides of regularly spaced teeth **48**. The teeth **48** again preferably have side surfaces arranged at different angles to the horizontal plane of the bar. The teeth **48** in this instance extend a short distance above the longitudinally extending ridges or flanges **44**. Thus the teeth in this arrangement are provided with a certain amount of protection and reinforcement, but otherwise the teeth again may be said to project above the surface of the outer plane of the flange **40**. The inter-dental spaces **50** are preferably of the same arrangement as the inter-dental spaces **30** of the preceding embodiments.

A still further embodiment of the present invention is shown in Figure 7 where the bar as of a T cross sectional configuration having a web or stem portion **52** and a flange **54**. The flange **54** is provided with longitudinally extending ridges **56** and **58** which correspond to the ridges **42** and **44** shown in Figure 6. The teeth **60** are also formed in a manner similar to the teeth **48** of Figure 6. The body **52** as shown may have a somewhat trapezoidal cross section and the maximum transverse dimension of each of the teeth preferably does not exceed the maximum transverse dimension of the web or beam portion **52**.

While for the purpose of illustrating and describing the present invention, certain specific forms have been shown in the drawing, it is to be understood that such other variations are contemplated in accordance with the teachings of the present invention as may be commensurate with the true spirit and scope of the invention defined in the following claims.

This invention is hereby claimed as follows:

1. A rack or ratchet bar of relatively high carbon steel of I beam cross section provided with a relatively large flange having formed thereon spaced apart teeth projecting substantially above the outer plane surface of the flange, said teeth being spaced at intervals not more than ¾ of an inch apart and the height of a tooth being 2½ times less than the distance of the bottom of an interdental recess in a direction longitudinally of the bar.

2. A toothed bar of I beam cross section having a heavy transverse flange provided with transversely arranged spaced apart teeth separated by inter-dental recesses having substantially flat bottoms and having longitudinal dimensions two and one half times greater than the height of the teeth, said teeth projecting from the adjacent plane surface of the flange.

3. A toothed bar comprising a steel beam having an I cross sectional configuration and having integrally teeth projecting from the outer plane surface of one of the flanges, said teeth having opposite sides at different angles to the longitudinal plane of the bar and having dimensions transversely of the bar of the order of the transverse dimension of the web of the I beam.

4. A toothed bar of I beam cross section having relatively heavy transverse flanges, one of said flanges being provided with transversely arranged spaced apart teeth separated by inter-dental recesses having substantially flat bottoms and having a length greater than two and one half times the height of the teeth.

5. A toothed bar of I beam cross section having a relatively large flange having integral teeth formed therein at uniform intervals of at least two and a half times the height of each tooth, each tooth on opposite sides being at different angles to the longitudinal plane of the bar, the base dimension of each tooth being of the order of the transverse dimension of the beam.

6. A toothed bar of I beam cross section having transverse flanges one of which has formed thereon transversely arranged spaced apart teeth having a transverse dimension of the order of the transverse dimension of the web of the bar, said teeth being separated by inter-dental recesses having substantially flat bottoms and having lengths of at least two and a half times the height of each tooth, one side of each tooth being at substantially ninety degrees to the plane of the outer surface of the bar, and the opposite side of each tooth being at an obtuse angle to the outer surface of the bar, each tooth projecting outwardly above the plane outer surface of the bar.

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