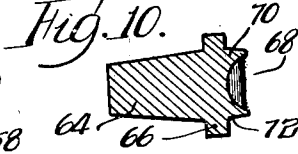
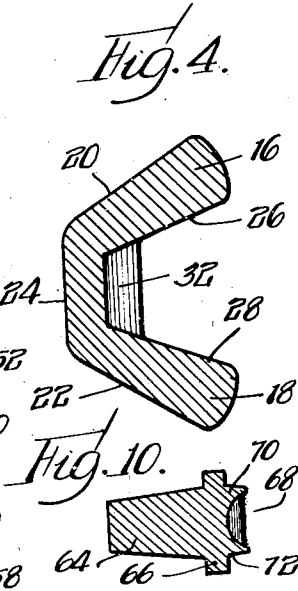
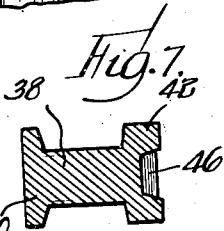
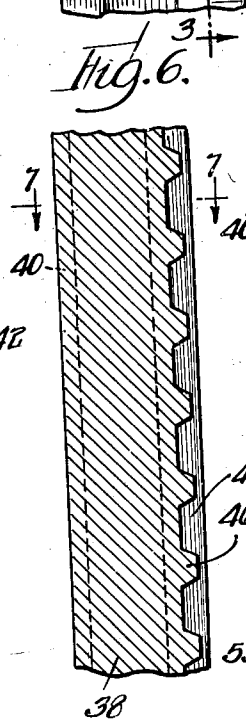
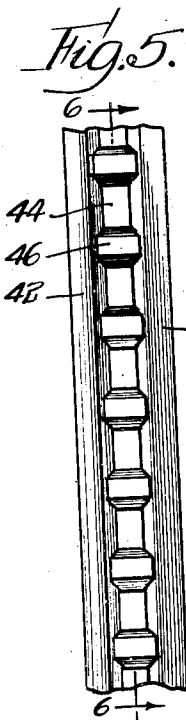
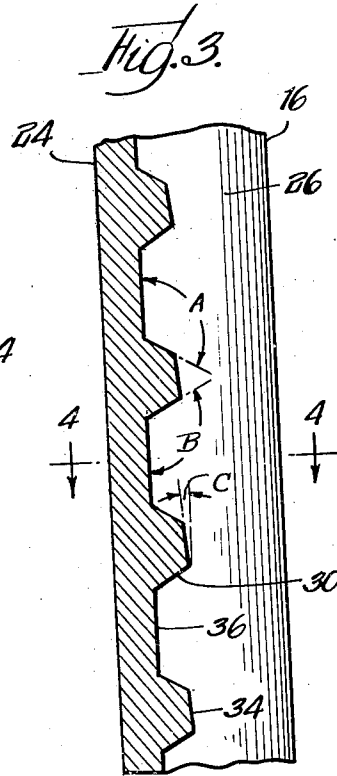
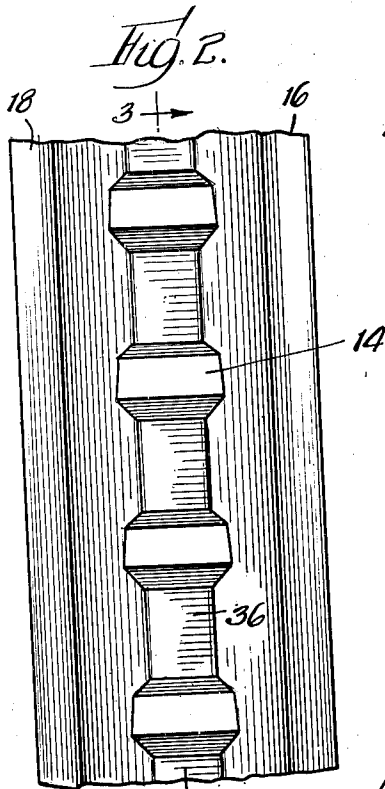
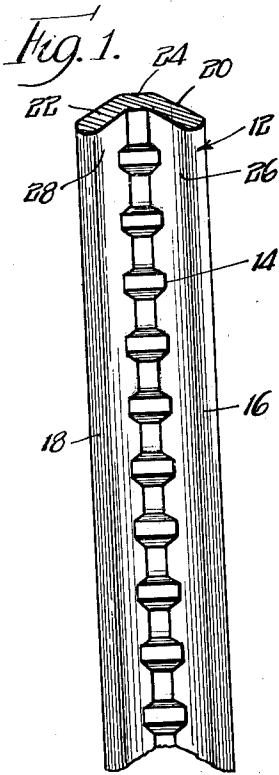


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ROLLED TOOTH RATCHET BAR
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UNITED STATES PATENT OFFICE

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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 continuation of my prior invention described in my co-pending patent application Serial Number 423,078 filed December 15, 1941 for a Rolled toothed bar, now Patent 2,397,965, patented April 9, 1946.

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.

Among the objects of the present invention is to provide a process for economically manufacturing a strong and rugged toothed bar, angle iron or other shape rolled preferably from high carbon steel stock and having teeth uniformly formed thereon.

A further object of the present invention is to provide different types of toothed bars or rods which have certain improved features and characteristics which facilitate the cooperation of such bars or rods with pushing and pulling devices and particularly lifting jacks.

It is a further object of the present invention to provide improved forms of toothed bars, angle irons or other shapes which are particularly suited for manufacture by an economical rolling process.

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

Figure 1 is a perspective view of an angle iron embodying the present invention;

Figure 2 is an enlarged front view of the device shown in Figure 1;

Figure 3 is a cross sectional view of the device

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shown in Figure 2 as seen in the direction of the arrows along the line 3-3;

Figure 4 is a cross sectional view of the device shown in Figure 3 as seen in the direction of the arrows along the line 4-4;

Figure 5 is a front view of another embodiment constructed in accordance with the present invention;

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

Figure 7 is a cross sectional view of the embodiment shown in Figure 6 as seen in the direction of the arrows along the line 7-7; and

Figures 8, 9 and 10 are cross sectional views similar to Figure 7 of further embodiments similar to Figure 7 but having different cross sectional configurations.

The present invention comprises an elongated toothed rack or ratchet bar 12 formed of suitable steel, preferably high carbon steel, which has been hot rolled to the required shape to produce a toothed bar which may be relatively light and small in cross section so that the weight of the bar is maintained at a minimum value while the strength and ruggedness are not sacrificed. The bar 12 is provided with a plurality of uniformly spaced teeth 14 which in the form shown in Figure 1 extend transversely of the angle bar 12 between angular flanges 16 and 18 which preferably are at angles less than ninety degrees to each other. In the preferred form the angle between the flanges 16 and 18 may be any value from fifty degrees up to ninety degrees, but preferably the angle should not be less than sixty-two degrees.

The toothed bar 12 preferably is formed by hot rolling a bar between two rollers. The upper roller engages and supports the outside faces 20 and 22 of the flanges 16 and 18 respectively and the apex surface 24 which interconnects these outer surfaces. The lower roll supports the inside surfaces 26 and 28 of the flanges 16 and 18 and applies a series of projections to the juncture of the surfaces 26 and 28 to form the teeth 14. The lower roll in conjunction with the upper roll causes the metal of the bar at the inner apex to flow laterally and longitudinally to form a series of uniformly and longitudinally spaced teeth 14 integral with the bar and extending transversely thereof.

In rolling a bar of this type it has heretofore been found difficult to prevent irregular elongation of the bar which thereby would result in irregular and unequal spacing of the teeth 14. To

further facilitate the rolling operation, it has been found in accordance with the present invention that the side surface 30 of a tooth 14, see Figure 3, may be at a different angle relative to a horizontal plane extending longitudinally of the bar 12 as compared to the opposite toothed side 32. It is also possible to form the top of the surface 34 at a very slight angle to the longitudinal plane of the bar to further facilitate accurate rolling of the teeth.

By reference to Figure 4 it will be noted that the angle which the sides 26 and 28 form with respect to the plane of the bottom of the teeth is a different angle from the outer faces 20 and 22 of the flanges 16 and 18. This gives greater strength to the structure. In short, the angle becomes about twenty per cent stronger by having the legs or flanges 16 and 18 thicker at their outer free ends.

For example it has been found that a configuration generally corresponding to that shown in Figure 3 may have one side of the tooth 30 at an angle of about 120° or less whereas the opposite side 32 of the tooth is at an angle of 120° or more. The top surface 34 of the tooth has a very slight angle C which for purposes of illustration in the drawing has been exaggerated. The surface 30 may be formed at any angle between 120° and 90°. The other two surfaces 32 and 34 are arranged at angles such as indicated so as to facilitate forming the teeth by the projections on the lower roller whereby these projections will readily leave the inter-dental recesses without distortion of the formed metal of the bar or undue friction or interference with the formed teeth.

In practice the midpoints of adjacent teeth are preferably formed from one-fourth to three-quarters of an inch apart. The teeth are preferably not greater in height than three-eighths of an inch, and the top of each tooth is preferably of the order of one-eighth of an inch measured along the longitudinal axis of the rod. The length of the interdental recesses at their bottoms, in a direction longitudinally of the bar, is of the order of at least two and one half times the height of the teeth. The increased spacing between the teeth relative to the size and mass of individual teeth facilitates hot rolling of the toothed bar since it has been found that tremendous heat on a small tooth will fire crack the tooth. The increased spacing obviates this effect. Utilizing configurations of the teeth as described, it is possible to form inter-dental recesses 36 which are substantially flat and in a common plane extending longitudinally of the bar.

By forming opposite sides of the teeth at different angles relative to the longitudinal plane of the rod, advantageous operation is obtained when the rod is used as a part of the pushing, pulling, or lifting devices of the type heretofore referred to and shown in United States Letters Patents 2,266,760 and 2,361,690.

In such apparatus a holding pawl, or ratchet member moves along the bar from one tooth to the next and in operation it automatically cleans out the dirt or other foreign matter which has lodged in the inter-dental spaces and therefore maintains the tooth bar in effective operating condition. This self-cleaning action is obtained because the bottom surface 36 of the inter-dental spaces lies in a direction extending along the longitudinal axis of the bar parallel to the plane of the front of the bar so that the pawl moves down into the inter-dental space and scrapes the

dirt therefrom toward the adjacent tooth. The adjacent tooth having an angle A permits the pawl to remove the foreign matter.

Another embodiment of the present invention is shown in Figures 5, 6, and 7. It is apparent from the latter figure that the cross sectional configuration is one of a bar having a web or body portion 38 provided with relatively massive flanges 40 and 42. The flange 42 along its face is provided with the plurality of inter-dental spaces 44 and a plurality of teeth 46. From Figure 7 it will be noted that each of the teeth 46 is of a height slightly less than the distance from the bottom of the tooth or the inter-dental space 44 to the outer surface of the flange 42 so that it is contained within the confines of the flange. Each of the inter-dental spaces 44 is provided on all sides with inclined sides, the sides which form the sides of the teeth preferably being at greater angles than the other two sides. The teeth 46 preferably at their base have a transverse dimension not in excess of the cross sectional transverse dimension of the web or beam portion 38 of the bar. The side surfaces of the teeth preferably are arranged at angles to the horizontal plane of the bar in a manner similar to the angles of the teeth described in connection with the preceding embodiment illustrated in Figures 1 to 4.

Figure 8 shows a further arrangement wherein a bar is provided which has a web or body portion 48 provided with a single flange 50. The flange 50 has its outer surface formed so as to provide teeth 52 within the confines of the flange 50 in a manner similar to corresponding teeth 46 in the preceding embodiment shown in Figures 5 to 7. The teeth 52 of the embodiment shown in Figure 8 have a maximum base dimension not in excess of the transverse dimension at the center of mass of the bar or rod.

Still another embodiment is shown in Figure 9 where the bar has a central body portion 54 which is provided with two relatively massive flanges 53 and 56. The flange 56 in this instance is provided with walls 60 and 62 extending laterally outwardly therefrom and the outer faces of these walls 60 and 62 lie inwardly of the outer faces of the flange 56. The walls 60 and 62 are formed with centrally located teeth 58. These teeth lie within the body of the flange and within the body of the walls 60 and 62. The construction and arrangement of the teeth 58 are similar to the construction and arrangement of the teeth as described in the preceding embodiments in Figures 5 to 8.

Still another embodiment is illustrated in Figure 10 where the bar has a body portion 64 provided with a flange 66. The body 64 has a somewhat trapezoidal cross section. The outer surface of the flange 66 is provided with teeth 68 which extend between side walls 70 and 72. The interdental spaces between the teeth 68 have concave bottom surfaces. The sides of the teeth 68, however, are formed in accordance with the teachings set forth in connection with the embodiment in Figures 1 to 4.

Applicant makes reference to his copending applications Serial Nos. 652,843 and 652,844, filed March 8, 1946.

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

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with the true spirit and scope of the invention defined in the following claims.

This invention is hereby claimed as follows:

1. A toothed bar having integral teeth in spaced relation longitudinally of the bar and integrally formed therewith, said teeth being substantially wider at the top than at the bottom in cross section transversely of the length of the bar, said teeth having tapered sides at different angles to the longitudinal plane of the bar, the height of the teeth at the top of said sides being approximately equal and said height being less than the length of the bottoms of the inter-dental recess in a direction longitudinally of the bar.

2. A toothed bar having integral teeth in spaced relation longitudinally of the bar, the inter-dental recesses having substantially flat bottom surfaces, the opposing inter-dental walls forming said recesses spreading outwardly in directions away from said bottoms, the teeth each having an altitude less than the length of the bottoms of the inter-dental recesses in a direction longitudinally of the bar.

3. A rack comprising an elongated bar of solid metal having a recess substantially longitudinally of the bar, spaced teeth formed in said recess, the length of the bottoms of the inter-dental spaces in a direction longitudinally of the bar being of the order of two and one-half times the height of the teeth, said bottoms all lying substantially in a common plane longitudinally and transversely of the bar and the inter-dental spaces being in cross section transversely of the bar wider at the top than at the bottom, said teeth having opposite sides at different angles to the plane of the bottoms of the inter-dental spaces.

4. A toothed bar having integral teeth in spaced relation longitudinally of the bar, the spacing between the adjacent teeth being relatively greater than the size of the tooth in a direction longitudinally of the bar, the tops of the teeth being at slight angles to the plane of

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the bar and opposite sides of the teeth being at different angles which respectively are greater than and less than one hundred twenty degrees with respect to the longitudinal plane of the bar.

5. A rack or ratchet bar of high carbon steel having opposed spaced apart flanges, said bar between the opposed flanges being provided with spaced apart teeth formed integrally with the flanges, the opposed side walls of each flange being angularly disposed.

6. A rack or ratchet bar of high carbon steel having opposed spaced apart flanges, said bar between the opposed flanges being provided with spaced apart teeth formed integrally with the flanges, the opposed side walls of each flange being angularly disposed, and the opposed side walls of each flange converging toward the main body of the bar.

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