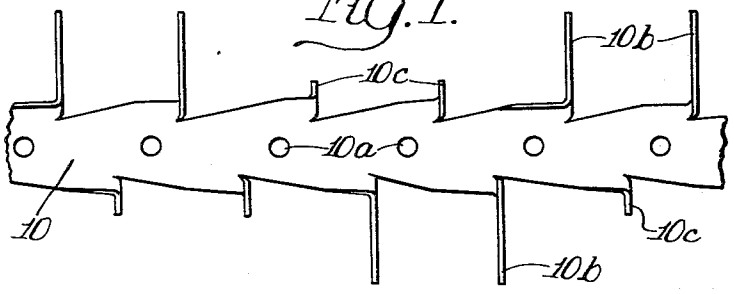
June 14, 1960 C. M. MacCHESNEY ET AL 2,940,732

BARBED METAL BAND AND METHOD OF FORMING SAME

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Fig. 1.



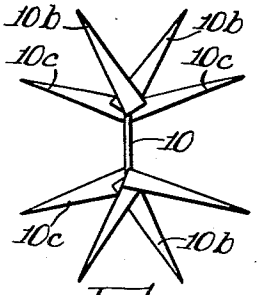


Fig. 2.

Fig. 3.

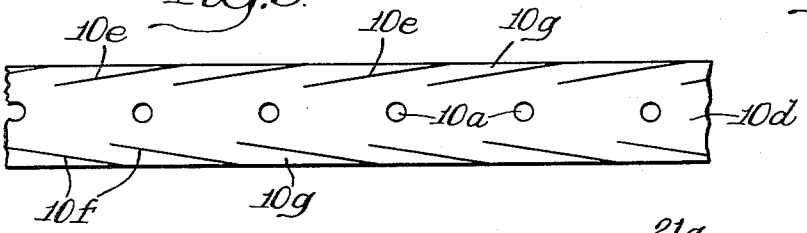


Fig. 4.

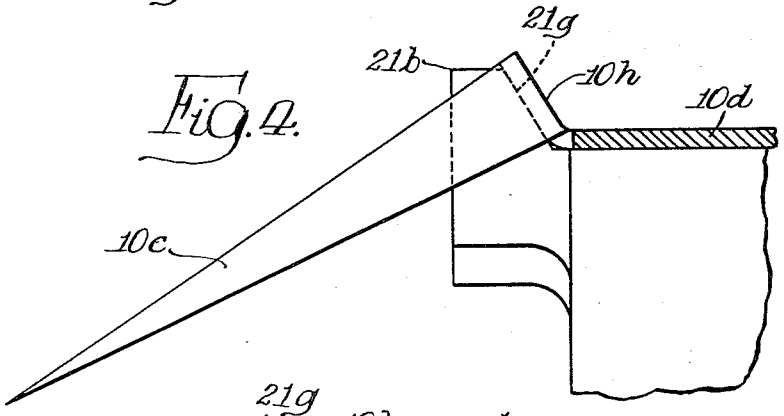
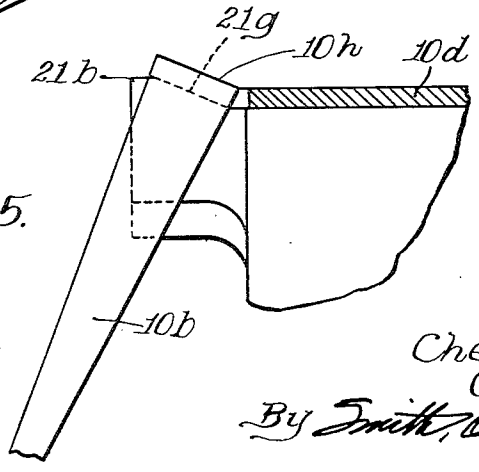


Fig. 5.



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BARBED METAL BAND AND METHOD OF FORMING SAME

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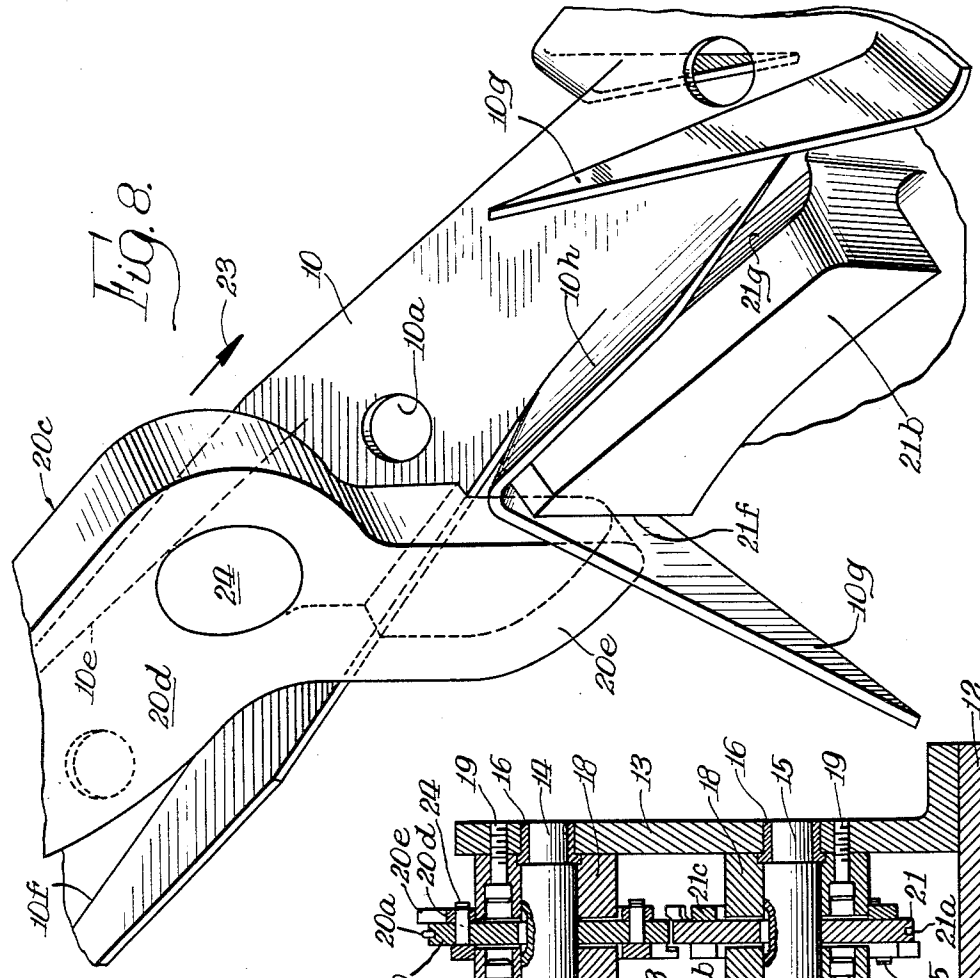


Fig. 8.

Fig. 7.

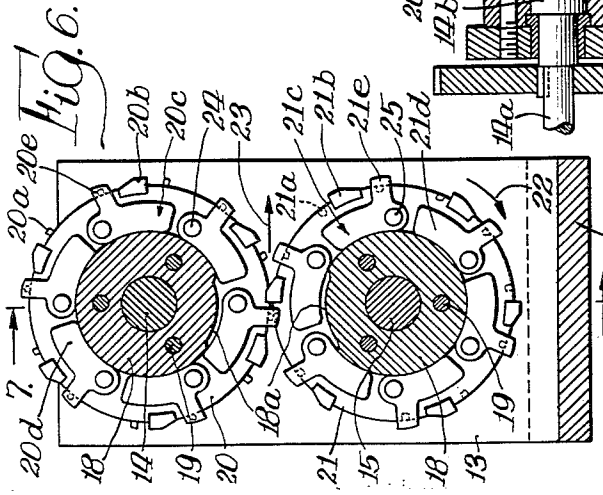


Fig. 6.

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BARBED METAL BAND AND METHOD OF FORMING SAME

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3 Claims. (Cl. 256—8)

This invention relates to improvements in barbed metal bands and methods of forming the same and its purpose is to provide a novel metal band having outwardly projecting spikes or barbs and adapted to be produced efficiently and at relatively small cost for use in forming barricades or barbed entanglements employed in military operations and in forming fences and other structures.

According to the prior practice in military operations barbed entanglements or barricades have been formed mainly of ordinary woven wire made up of two metal wires twisted together longitudinally in helical fashion and having interlocked therewith at intervals barbs formed by curled sections of wire having projecting sharp ends. Such barbed wire has also been extensively employed in building fencing to confine cattle and other animals and for other similar uses. While such barbed wire is satisfactory in many respects it is somewhat difficult to handle and has the disadvantage that it must be manufactured at a location far removed from the place of use.

The principal object of the present invention is to provide a novel form of barbed band produced by slitting the edge portions of a flat metal strip and bending these portions transversely to form projecting barbs or spikes. A further object of the invention is to provide an improved barbed metal band comprising a flat flexible metal strip having spikes projecting in varying directions from its opposite edges. Still another object of the invention is to provide a novel method of forming a barbed metal band comprising the steps of slitting the edges of a metal strip at spaced intervals along its edges and at acute angles to said edges to form inclined pointed portions and then bending said portions outwardly to provide projecting spikes. Other objects relate to various features of construction and arrangement and to various details of the method, all of which will appear more fully hereinafter.

The nature of the invention will be understood from the following specification taken with the accompanying drawings in which one embodiment of the improved barbed metal band and one example of the method of forming it are illustrated. In the drawings,

Figure 1 shows a plan view of the improved barbed metal band of the present invention;

Fig. 2 shows an end elevation of the barbed metal band shown in Fig. 1;

Fig. 3 shows a plan view of a flat metal strip which is slitted diagonally along its edges to form pointed portions which are subsequently bent outwardly to form barbs or spikes such as those illustrated in Figs. 1 and 2;

Fig. 4 shows an enlarged transverse section through a portion of the completed barbed metal band shown in Fig. 1, illustrating in elevation a portion of the barb bending apparatus;

Fig. 5 is a view similar to that of Fig. 4, showing a section through the band taken at a different place, spaced from that shown in Fig. 4 and illustrating a barb projecting from the body of the strip at another angle;

Fig. 6 shows a vertical section through one form of apparatus which may be employed in forming the barbed metal band illustrated in Figs. 1 and 2;

Fig. 7 shows a vertical section taken on the line 7—7 of Fig. 6; and

Fig. 8 shows an enlarged perspective view of a portion of the forming apparatus illustrating the operation of parts thereof in bending a slitted portion of a metal strip.

The completed barbed metal band of the present invention is illustrated in Figs. 1 and 2 of the drawings where it is shown as comprising a flat metal band **10** provided along its center line with a series of spaced index holes **10***a*, which are adapted to position the band in the machine by which it is formed, and having along its edges two series of radiating spikes which are similarly constructed and similarly located at each edge of the band. These radiating spikes or barbs at each edge of the band include barbs **10***b* which are arranged at relatively small angles to the plane of the band and which diverge in opposite directions from that plane. Each series of barbs also includes two barbs **10***c* which diverge in opposite directions from the plane of the band **10** at substantially greater angles, as shown in Fig. 2. The barbs are spaced apart longitudinally of the band and each pair of barbs **10***b* which are directed in opposite directions from the plane of the band are preferably located adjacent each other and between two pairs of barbs **10***c* which diverge from the plane of the band at greater angles. There is thus formed a flat metal band **10** having two series of divergent spikes or barbs located along its opposite edges and arranged in the same manner at each edge. Due to the distribution of the barbs substantially around all parts of the band **10**, this barbed metal band is well adapted for use in military operations where it is desired to provide a barricade to prevent the passage of troops and this construction is also well suited for the construction of fences and the like where it is desired to prevent the passage of cattle or other animals with a minimum use of fencing material.

In Fig. 3 of the drawings there is illustrated the flat metal strip **10***d* from which the finished product shown in Fig. 1 is formed. This flat metal strip is run endwise through a punch press or through suitable slitting rolls to form along the center of the strip a series of equally spaced index holes **10***a* and also to slit the strip along diagonal lines at its opposite edges to form the cuts **10***e* and **10***f* which are located at acute angles with respect to the edges of the metal strip, thus forming along both edges of this strip a series of attached sharp portions **10***g* which are adapted to be bent from the plane of the strip to produce the barbed band which is shown in Figs. 1 and 2, the sharp portions **10***g* becoming the barbs **10***b* and **10***c* which have previously been described. The metal strip **10***d* may be a comparatively thin steel strip, having a thickness, for example, of about thirty-five thousandths of an inch (0.035″), and it should be quite flexible so that the finished band may be readily manipulated when it is put into use.

Although the barbed metal band of the present invention might be formed in various ways, there has been illustrated in the drawings one form of apparatus which is particularly adapted for carrying out at any convenient time and place the steps which are performed subsequent to the slitting of the metal strip as shown in Fig. 3, for the purpose of bending the sharp portions **10***g* transversely to the plane of the strip. This apparatus is shown in Figs. 4 to 8 inclusive, and is described and claimed in the copending application of George Rassmussen, Serial No. 551,674, filed concurrently herewith. This band forming machine comprises a base **12** on which are mounted two upstanding parallel frame members **13** in which are journalled two shafts **14** and **15**. These shafts are journalled in bushings **16** mounted

in the frame members and they extend parallel to each other in horizontal planes. The shafts have projecting portions **14***a* and **15***a* extending beyond one of the frame members **13** and having secured thereon two gears **17** which mesh with each other so that the shafts rotate in unison. Although the shafts **14** and **15** may be manually operated, one of them is preferably connected by apparatus (not shown) to power actuated driving mechanism so that the machine may be continuously operated when it is in use.

The shafts **14** and **15** have enlarged central portions **14***b* and **15***b* located between the bushings **16** and journalled in surrounding cylinders or drums **18**, two of which are provided for each shaft. These drums are secured to the frames **13** by studs **19**, the heads of which are located in recesses formed in the inner faces of the drums as shown in Fig. 7. Each shaft is thus journalled in its own bushing **16** and also in its associated drums or cylinders **18**.

The inner faces of the two drums **18** of each shaft are spaced apart and in these spaces there are mounted two disks **20** and **21** which are fixed upon the shafts **14** and **15**, respectively, and which are adapted to rotate in the direction indicated by the arrows **22** shown in Fig. 6. The upper disk **20** is provided on its peripheral surface with a plurality of radially projecting pins **20***a* which are adapted to engage the index holes **10***a* in the metal strip when this strip is passed between the two disks in the direction indicated by the arrow **23** in Fig. 6. The pins **20***a*, after passing through the index holes **10***a* are adapted to be received by recesses **21***a* formed in the lower disk **21**. Of course, this registration of the pins **20***a* and recesses **21***a* with respect to the holes **10***a* in the metal strip occurs only when these parts are at, or in proximity to, a vertical plane containing the axes of the shafts **14** and **15**. By this registering means, the metal strip **10***d* being operated upon and its sharp portions **10***g* are located always in proper relationship to the parts carried by the disks **20** and **21** which operate upon the sharp projections **10***g* to bend them transversely to the strip.

The upper disk **20** has fixed thereon and projecting laterally therefrom in opposite directions two series of equally spaced fixed dies **20***b* and each disk **20** also has pivotally mounted thereon, and on each side thereof, an annular series of relatively movable die members **20***c* which are pivotally mounted on the disk by means of pins **24** and spaced equal distances apart. Each pivotally mounted die member **20***c* has a body portion **20***d* which has an inner curved surface adapted to rest normally upon the outer cylindrical surface of one of the drums **18** and each die member **20***c* also has a radially extending part **20***e* adapted to cooperate with the fixed die members carried by the disk **21**. In effecting the bending of the sharp edge portions **10***g* of the metal strip, the portions **20***d* of the die members **20***c* trail behind the pivot pins **24** as the disk is rotated.

Similarly, the other disk **21** is provided with two series of relatively fixed dies **21***b* which are spaced apart equal distances around the periphery of the disk and which project laterally from both edges of the disk for cooperation with the movable die members **20***c* which are mounted upon the other disk **20**. The disk **21** also has mounted thereon two series of pivoted die members **21***c* which are pivoted on the disk by means of pins **25**. These die members **21***c* are similar to the die members **20***c*, each comprising a body portion **21***d* having an inner curved surface adapted to coact with the peripheral surface of a drum **18** and having also an outwardly extending portion **21***e* adapted to cooperate with the stationary die members **20***c* of the other disk in effecting the sharpened portions **10***g* which have been formed along the edge of the metal strip.

In the operation of the machine, the metal strip **10***d*, which has been slitted along the lines **10***e* and **10***f*, is moved through the disks **20** and **21** in the direction of the arrow **23**, being moved by the engagement of the pins **20***a* of the disk **20** with the holes **10***a* in the strip and by the engagement therewith of the die members which are then operating to bend the portions **10***g* of the strip. Assuming that one of the sharp slitted portions **10***g* is approaching the adjacent parts of the disks **20** and **21**, and assuming that this part **10***g* is in position to be engaged by a die member **20***c* on the upper side of the strip, as viewed in Figs. 6 and 8, the portion **20***e* of the pivoted die member **20***c* engages the upper side of the metal strip and bends it downwardly and outwardly against the adjacent die **21***b* which is carried by the disk **21**, as shown particularly in Fig. 8. The die member **21***b* has a face **21***f*, extending in a general radial direction in relation to the axis of the disk **21**, against which portion **10***g* of the metal strip is bent at substantially a right angle with respect to the plane of the laterally extending planar projection **10***h* of the strip, as best seen in Fig. 8. At the same time, the laterally extending projection **10***h* on the edge portion of the strip **10***d* at and adjacent to the base of the portion **10***g* coacts with an inclined surface **21***g* of the die **21***b*, as shown in Fig. 8, with the result that the projection **10***h* of the strip is bent upwardly as shown in Figs. 4, 5 and 8. This upward bending of the planar projection **10***h* along the edge portion of the strip determines the direction in which the part **10***g* extends to form one of the barbs **10***b* or **10***c*. Some of the die surfaces **21***g* are inclined in such a direction that they cause the laterally extending projections **10***h* to be bent to cause the barbs to be directed in the manner of the barbs **10***b*, as shown in Fig. 2, and other die surfaces **21***g* are inclined so as to cause the projections **10***h* to be bent to cause the barbs to be directed in the manner of the barbs **10***c*. The inclined faces **21***g* of the dies **21***b* are shown in Figs. 4 and 5 and their different inclinations result in the different angles of the resulting barbs due to the different bending of the laterally extending projections **10***h*. It will thus be understood from the foregoing description, and particularly from Figs. 1, 4, 5 and 8 of the drawings that the finished strip, as it leaves the machine, is a single-piece barbed metal band comprising a longitudinally extending flat metal strip **10** having along its opposite edge portions a plurality of longitudinally spaced apart laterally extending planar projections **10***h* which are bent out of the plane of the strip at different predetermined angles. In each case the plane of the projection **10***h* is substantially parallel to the longitudinal axis of the strip **10** but intersects the plane of the strip at an obtuse angle. A barb **10***b* or **10***c* is integrally formed on one end of each projection **10***h* and extends therefrom in a plane that is substantially normal to both the plane of that projection **10***h* and the longitudinal axis of the strip. Stated in a different manner, the barbs **10***b* or **10***c* extend from their respective projections **10***h* and are joined thereto along lines substantially normal to the longitudinal axis of the strip but lying at an obtuse angle with respect to the plane of the strip. These obtuse angles—that is, the angles at which the planes of the projections **10***h* intersect the plane of the strip—are different for different ones of the projections **10***h* so that the barbs radiate in a plurality of different directions with respect to the plane of the strip.

The end faces **21***f* and the inclined faces **21***g* of the dies **21***b* are arranged differently on alternate die members and the die members **20***b* carried by the disk **20** are similarly formed to cooperate with the pivoted die members **21***c* on the disk **21**. The slits **10***e* and **10***f* in the metal strip **10***d* are staggered with respect to each other on opposite sides of the strip and the arrangement of the dies **20***b*, **20***c*, **21***b* and **21***c* on the disk is such that the portions **10***g* of the strip on opposite sides of the strip will be engaged and bent alternately in succession as the strip moves between the disks, with the result

that the slitted portions 10*g* are rapidly bent from the plane of the strip to the various positions which are shown in Figs. 1 and 2, thereby resulting in the rapid production of a flexible barbed band capable of the uses which have been referred to above.

In the operation of the machine, the pivoted die members 20*c* and 21*c* normally contact the cylindrical surfaces of the associated drums 18 and, in order to prevent the parts 20*e* and 21*e* of the pivoted die members from catching on the relatively fixed die members 21*c* and 20*c*, respectively when a pivoted die member and a fixed die member are moving away from the zone where the bending operation takes place, the drums 18 are provided with recesses 18*a*, extending through considerable distances on both sides of the vertical plane passing through the axes of the shafts 14 and 15, so that the tail portion of a pivoted die member 20*c* or 21*c* is permitted to move into the adjacent recess to allow the pivoted dog to tilt so that the arm 20*e* or 21*e* thereof will pass by the adjacent relatively fixed die 21*b* or 20*b*.

Although one form of the invention has been shown and described by way of illustration, it will be understood that it may be constructed in various ways which come within the scope of the appended claims.

What is claimed is:

1. A single-piece barbed metal band comprising a longitudinally extending metal strip having along its opposite edge portions a plurality of longitudinally spaced apart planar lateral projections extending at obtuse angles with respect to the plane of said strip, and a pointed barb extending from each of said lateral projections in a direction normal to the plane of the projection and joining the projection along a line substantially normal to the longitudinal axis of the strip, said obtuse angles being different for different ones of said projections so that said barbs radiate in a plurality of different directions with respect to the plane of said strip.

2. A single-piece barbed metal band comprising a longitudinally extending metal strip having along its opposite edge portions a plurality of laterally extending planar projections, each projection residing in a plane substantially parallel to the longitudinal axis of the strip but intersecting the plane of the strip at an angle, and a barb on an end of each projection and extending therefrom in a plane substantially normal to both the plane of that projection and the longitudinal axis of said strip.

3. A single-piece barbed metal band comprising a longitudinally extending metal strip having along its opposite edge portions a plurality of laterally extending planar projections, each projection residing in a plane substantially parallel to the longitudinal axis of the strip but intersecting the plane of the strip at an angle, and a barb on an end of each projection and extending therefrom in a plane substantially normal to both the plane of that projection and the longitudinal axis of said strip, the angles between the planes of said projections and the plane of said strip being different for different ones of said projections so that said barbs radiate in a plurality of different directions with respect to the plane of said strip.

References Cited in the file of this patent

UNITED STATES PATENTS

118,135	Judson	Aug. 15, 1871
368,014	Schmidt	Aug. 9, 1887
386,742	Grellner	July 24, 1888
642,109	Green	Jan. 30, 1900
1,454,584	Gosser	May 8, 1923
1,654,837	Schmid	Jan. 3, 1928
2,392,223	Brickman	Jan. 1, 1946

FOREIGN PATENTS

72,789	Switzerland	Nov. 1, 1916