Nov. 26, 1963 C. J. KRÜGER 3,111,977

METHOD AND MEANS FOR PRODUCING HOLES IN METALLIC MEMBERS

Filed March 29, 1961 5 Sheets-Sheet 1

Fig 1

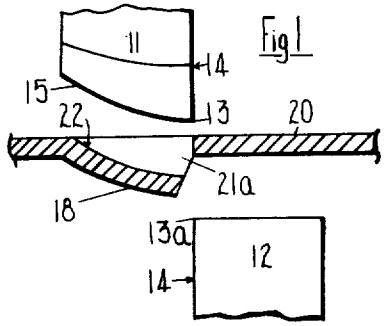


Fig 2

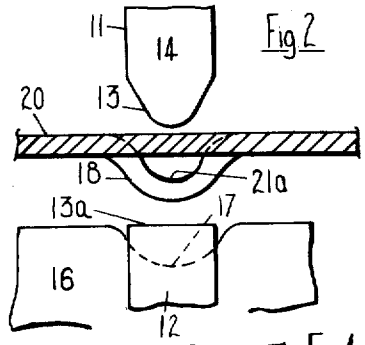


Fig 3

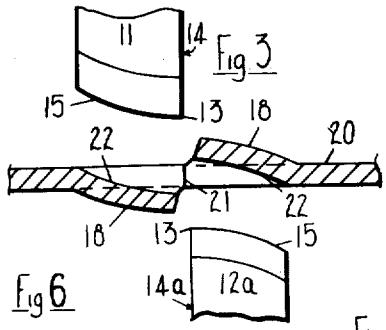


Fig 4

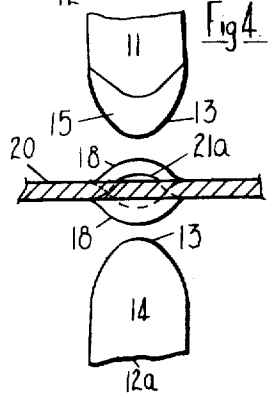


Fig 6



Fig 5

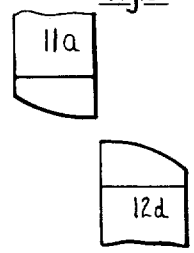


Fig 8

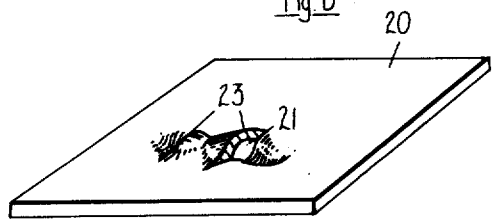
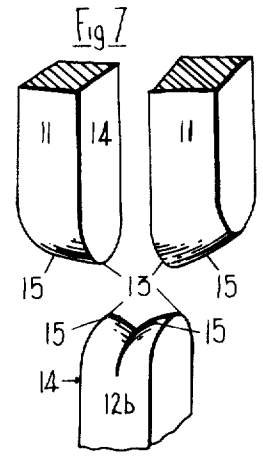


Fig 7



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Nov. 26, 1963 C. J. KRÜGER 3,111,977

METHOD AND MEANS FOR PRODUCING HOLES IN METALLIC MEMBERS

Filed March 29, 1961 5 Sheets-Sheet 2

Fig 9.

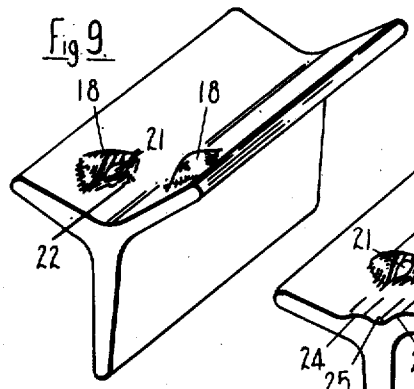


Fig 10.

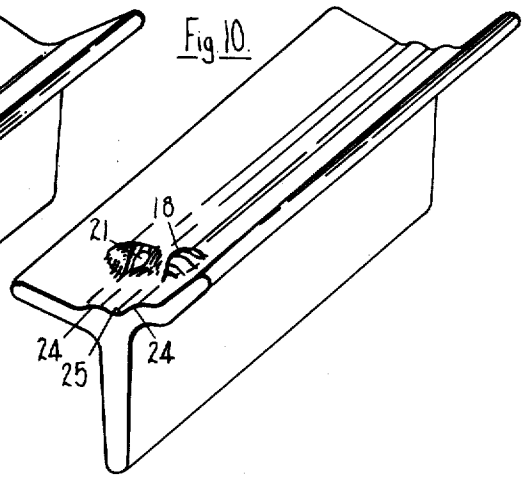


Fig 11.

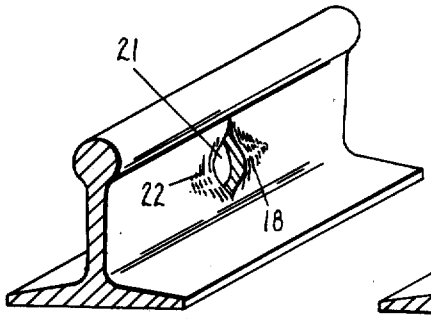


Fig 12.

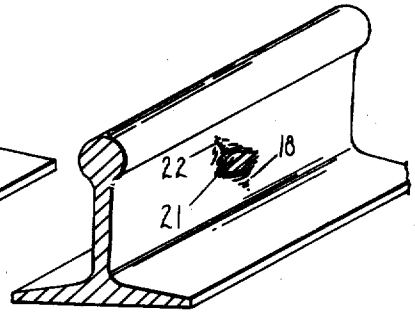


Fig 13.

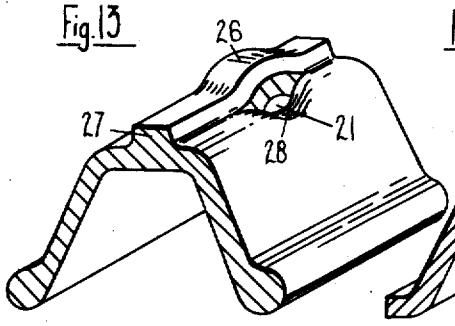
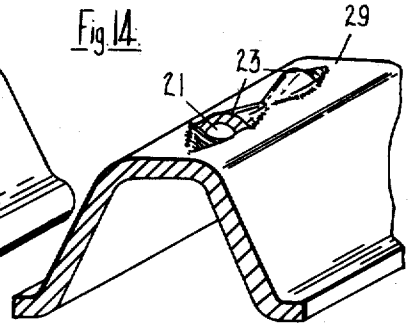


Fig 14.



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Nov. 26, 1963 C. J. KRÜGER 3,111,977

METHOD AND MEANS FOR PRODUCING HOLES IN METALLIC MEMBERS

Filed March 29, 1961 5 Sheets-Sheet 3

Fig. 15

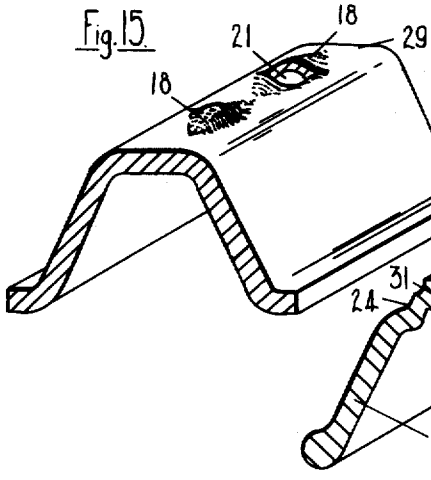
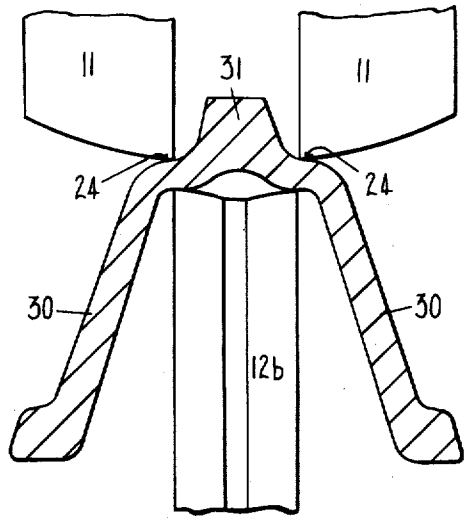


Fig. 16

Fig. 17



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Nov. 26, 1963 C. J. KRÜGER 3,111,977

METHOD AND MEANS FOR PRODUCING HOLES IN METALLIC MEMBERS

Filed March 29, 1961 5 Sheets-Sheet 4

Fig. 18.

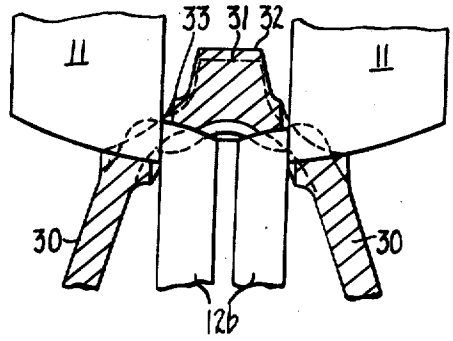


Fig. 19.

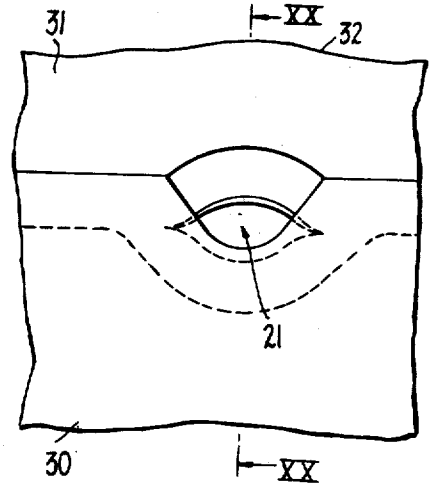


Fig. 20.

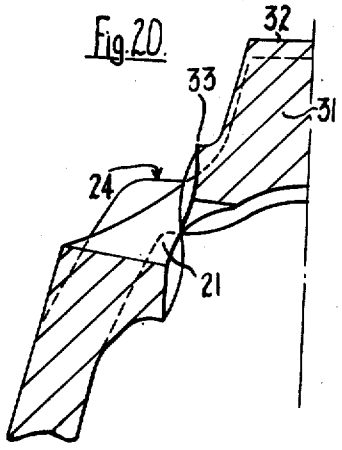


Fig. 21.

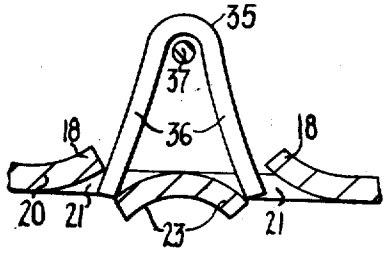
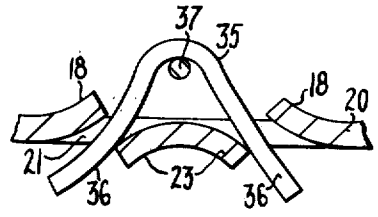


Fig. 22.



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Nov. 26, 1963 C. J. KRÜGER 3,111,977

METHOD AND MEANS FOR PRODUCING HOLES IN METALLIC MEMBERS

Filed March 29, 1961 5 Sheets-Sheet 5

Fig. 23.

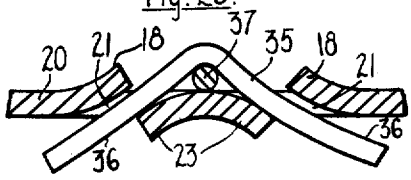


Fig. 24.

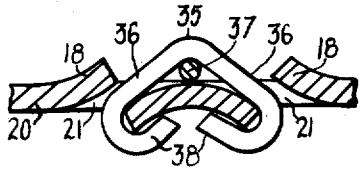


Fig. 25.

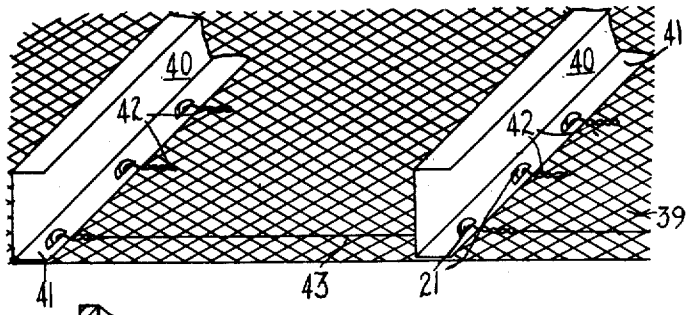
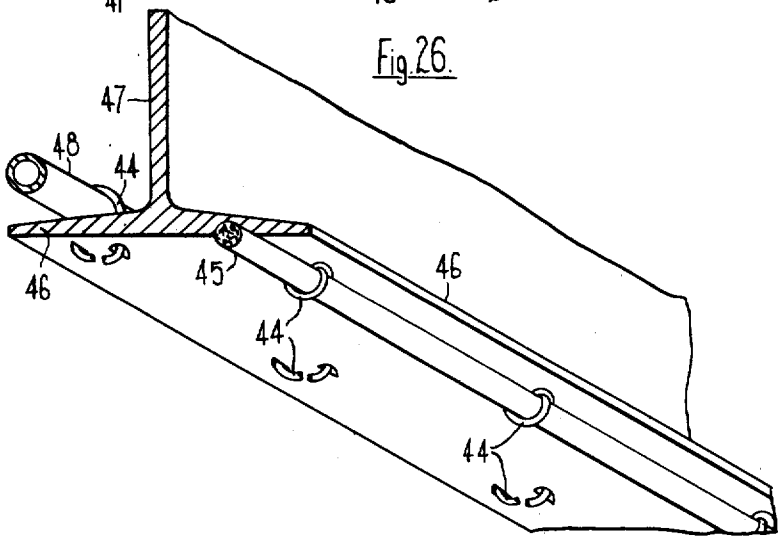


Fig. 26.



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United States Patent Office 3,111,977 Patented Nov. 26, 1963

3,111,977

METHOD AND MEANS FOR PRODUCING HOLES IN METALLIC MEMBERS

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Filed Mar. 29, 1961, Ser. No. 99,100
5 Claims. (Cl. 153—2)

This invention relates to an improved method and the means for producing holes in metallic members.

More particularly, the invention relates to an improved method and the means for producing holes in rolled metal plates, bars, structural sections and similar metallic members.

In the steel or other industry, where it is necessary to produce holes continuously in metallic members according to mass production, such holes are invariably produced by a punching process. Difficulties are encountered with the punching process when the holes are small in relation to the thickness of the metal. This applies particularly when holes of approximately the same size as or smaller than the thickness of the metal to be perforated are to be punched and when rather slender punches must be used. With slender punches, the thickness of the cut and the shearing forces become relatively large and consequently such slender punches must, therefore, withstand large forces with the resultant danger that they will wear quickly, become deformed and break easily thus causing at frequent intervals undesirable interruptions of operations.

In order to avoid this, larger holes can be punched than are really required for the purpose but this procedure weakens the section unnecessarily and may be objectionable for other reasons and expenditure is needlessly increased.

Using a softer material, which is easier to work, to solve this problem, reduces the strength and load bearing capacity of the metallic member and is thus not always practicable.

Drilling of holes is expensive and uneconomical when a multiplicity of holes must be produced in a substantially continuous process.

The present invention is based on the recognition that in many cases, such as when wires have to be threaded through holes or clips have to be affixed, the holes need not necessarily be of circular shape nor is it necessary for the direction of the holes to be at right angles to the plane of the material being perforated and that indentation or deformation of the material adjacent the holes or perforations is not necessarily objectionable but may actually be so arranged as to be advantageous.

It is an object of this invention to provide a method and the means whereby holes of a special type and not necessarily circular in shape, are readily produced at an inclined angle in rolled steel fencing standards, structural sections or metallic members with the aid of robust means while the holes produced may be relatively small in comparison to the thickness of the material but can be readily and easily varied to suit different requirements.

Another object of this invention is to provide a method and the means to provide perforations of very small magnitude in metallic members where the shape of such perforations need not be circular and where no wires, clips or the like need be threaded through such perforations.

A further object of this invention is to provide methods of cheaply and readily producing holes of particular types in metallic members in such a way that such members are not substantially weakened at such locations as is the case with conventional punching of holes in rolled steel bars,

structural sections and like metallic members which become weakened at the positions of the holes.

A still further object of the invention is to provide a type of hole of which the sharpness of the cut edge to the hole is much reduced and the edges of the holes are provided with shoulders or faces thus presenting a broader or wider support than is the case with a conventional hole where only the thickness of the material perforated is presented to the wire or similar material which is required to be threaded through such hole. Where holes are punched in the conventional manner, the sharpness of the edges of the holes is a function of the thickness of the material punched. These sharp edges corrode easily and abrade or cut any wire or similar material which may be threaded through such hole.

According to the invention, the method of producing holes in rolled steel bars, structural sections and like metallic members comprises the shearing of the metal along a short distance and deforming the metal adjacent such shear cut, such shearing and deformation of the metal being effected simultaneously by punch-like shearing tools.

More particularly, the deformation of the metal adjacent the shear cut is by an indenting, bending, stretching and/or drawing action. Such deformation of the metal is according to a substantially hood-like scalloped shell shape and such deformation of the metal can be either on one side of the shear cut only or the metal on both sides of the shear cut may be deformed by such indentation. When indenting the material adjacent both sides of the shear cut, such indentations are in opposite directions and consequently project from both faces of the metallic member in which they are produced.

Such a hole is produced in the metal by means of two coacting juxtaposed and relatively movable punch-like shearing tools for shearing the metal along a short distance and simultaneously indenting the regions of the metal adjacent at least one side of the shear cut and simultaneously forcing or displacing the transverse face, formed by the shearing action, of the deformed region away from and out of alignment with the other face formed by such shearing action.

Twin holed protuberances may be readily formed in the metal from which a combination of coacting punch-like shearing tools is employed. To this end two cuts are made simultaneously, which are parallel to each other or symmetrical to a central plane between them. As required, the holes of a pair may face each other or may be directed away from each other.

More particularly, the method of this invention provides for the production of holes with the creation of protuberances in fencing standards, posts or other structural or metallic members in such a way that a minimum of cutting and no removal of the parent metal is effected. The formation of the holes and protuberances or scallops is done by shearing the material in one plane and simultaneously indenting, stretching or drawing the metal adjacent the shear cut line. The punch-like shearing tools are each provided with one cutting edge along one flat face for shearing of the material whereas the other part of each tool, adjacent the cutting edge, is adapted to exert pressure as required on the metal in order to indent or bend and draw or stretch the material adjacent the shear cut line. A specific rake of the metal deforming part of the punch-like shearing tool, extending from the cutting edge thereof, serves to provide for easy release of the tool after having completed its stroke, by causing during the punch-like action the displaced material to move away from the plane of the shear cut.

Each hood-like scalloped shell-shaped deformation may be deformed to such extent that the inner edge is within the outer faces of the metal which is not deformed or may extend beyond such faces.

The punch-like shearing tools used in the formation of holes according to the method of this invention may have a cross-sectional area which is large in relation to the size of the hole to be formed to thereby provide punch-like shearing tools which are robust. Furthermore, such punch-like shearing tools can easily be resharpened and reconditioned.

The specific shape of the deforming part of a punch-like shearing tool also creates in the indenting, deforming or drawing action an approach or lead-in to the hole which acts as a shoulder or support to a wire or similar element which may be threaded through the hole.

A hole having approximately the shape of a segment cut out of a circle is readily formed by indentation or deformation of the material on only one side of the shear cut and in which case the material on the other side remains more or less in the original position. The regions of the metal on both sides of the shear cut line are preferably displaced in opposite outward directions which is effected simultaneously with the shearing action thus forming a hole which is symmetrical about an axis parallel to the plane of the material in which the hole is formed and about an axis at right angles thereto. At the same time, the faces formed by the shearing action in the metal are forced away from each other so as to release the punch-like shearing tools after the completion of the operating stroke. Deformation of the metal on one or both sides of the shear cut is effected according to an indenting or drawing action.

The indented parts of the protuberances or scalloped shell-shaped deformations form convenient guides for wires, clip devices or such other members to be threaded through the hole formed between them.

Holes of other shapes, such as for instance of oval shape or having the approximate shape of a segment of a polygon or the like, may also be created, with suitably shaped tools.

When producing holes according to this invention, the metal, of which the section to be perforated is made, is stressed only to a limited extent. This is particularly the case when two identations or deformations are made in opposite directions. Protuberance of the material can then, if so desired, be limited to such an extent that a shallow hole is formed and the inner edges of the identations do not protrude beyond the section of the material which has not been deformed. The central axis of the hole will then be at an oblique angle and the metallic member being perforated is subjected to minimum deformation. Such slight deformation can be used and may be particularly suitable in metallic members or sections of higher tensile strength steel, so that the invention is not limited in its application to metal of relatively low tensile strength. Slight deformation of the metal reduces the stress in the material and eliminates the risk of tearing or other damage. The invention is particularly useful for, but is not necessarily limited to, the punching in metallic members of holes of a size approximating to or smaller than the thickness of the material being perforated.

As it is preferable to avoid producing holes transversely across the fibre in rolled sections, it is preferable for the shear cut to be made in the direction of the fibre of the rolled material.

In accordance with this invention, an economic method has been provided for punching twin holes in a three bulb bell-shaped rolled section without cutting through and weakening the bulb at the apex. Said weakening would defeat the object of the shape, viz. to achieve a balanced and favourable strength about both axes.

The production of holes according to the invention is further advantageously carried out in a single stroke.

The means for producing a single hole according to the invention, comprises two punch-like shearing tools of which the one is arranged to be slidable past the other. If so desired, but not essentially, adjacent each punching shear a die may be provided for controlling or moulding the shaping of the outwardly directed face of the indented, deformed or displaced region of the metal whereas the pressure for the moulding action is effected by the non-cutting part of the coacting tool.

When the indenting-like deformation of the metal adjacent the shear cut is on only one side of the shear cut, the one tool presents a straight cutting edge whereas there will be a little or no rake on the adjacent non-shearing part of this tool which extends substantially at right angles to the plane along which the coacting tool moves. The cutting edge of the punch-like shearing and identing tool may be parabolic, converging or other suitable shape, depending on the shape and size of the hole to be formed. When deformation of the metal adjacent the shear cut is on both sides thereof and in opposite directions, the coacting tools are preferably both of similar shape.

The stroke of the punching machine should be readily adjustable so that the extent of travel of the punch-like shearing and indenting tool may be limited to the exact required extent.

The method of producing holes according to this invention results in no scrap or waste material while the section or metallic member is not reduced in weight. The shear cuts produced in the section or member reduce the strength of such section or member only to an insignificant degree, particularly when small openings or perforations are formed relative to the thickness of material.

Straightening, pointing and cutting of a rolled steel section, e.g. a fencing standard or post, can also be carried out with other tools on the same machine, if so desired, simultaneously with the creation of the holes according to the invention.

If a large number of regularly spaced holes according to the invention is to be made, the structural or like members or sections are best moved on at intervals between hole-forming actions or simultaneously multiple hole-forming actions can be performed to ensure a rapid and inexpensive operation. It is also possible to mount the hole-forming and metal deforming tools on a carrying holder rather like the so-called rotating flying shear. By way of example, the tool carrying holder can be rotated continuously and the sections or metallic members moved into position to be processed when holing is to be actually made.

Reference will now be made to the accompanying sheets of drawings from which the various features of the method and the means according to this invention will be apparent.

In the drawings:

FIGURES 1 and 2 are schematic representations of the method and the means according to this invention of punching a hole which for clarity is shown rather large but which can be relatively small compared with the thickness of material being perforated, while metal adjacent the shear cut is deformed outwardly in one direction only;

FIGURES 3 and 4 are views similar to FIGURES 1 and 2 and illustrate means whereby the metal adjacent both sides of the shear cut is displaced outwardly in opposite directions to form a hole which, for clarity, is shown larger than the thickness of the material in which it is formed;

FIGURES 5 and 6 are schematic representations of coacting punch-like shearing and metal deforming tools of modified shape;

FIGURE 7 is a fragmentary representation of punch-like shear and metal deforming tools to simultaneously produce two opposing holes according to the invention and presenting on one side of the metal perforated a single protuberance and on the other side two spaced protuberances;

FIGURE 8 is a pictorial representation showing twin holes in a plate-like member produced by the means shown in FIGURE 7 and providing entry and exit for, say, a threading wire, from one side of the plate;

FIGURES 9 to 16 are fragmentary pictorial views of rolled fencing standards, post sections, or the like, provided with single or twin opposing holes produced according to the present invention;

FIGURE 17 is a vertical cross-section through a fencing standard of bell-shaped section illustrating the application of the holing tools before punch-shearing of twin opposing holes;

FIGURE 18 is a similar vertical cross-section of the upper part of the section shown in FIGURE 17 at the completion of the action of the tools on such sections;

FIGURE 19 is an enlarged fragmentary side elevation of the section shown in FIGURES 17 and 18, showing a hole produced according to the present invention;

FIGURE 20 is a cross-section on line XX—XX of FIGURE 19;

FIGURES 21 to 24 are cross-sectional views showing successive stages of fixing a line wire to a standard or post provided with holes according to the present invention and embodying special clip means, also according to the present invention;

FIGURE 25 is a diagrammatic view showing an application of the invention for the attachment of ceiling wire netting to structural members; and

FIGURE 26 is a view showing an application of the invention for the attachment, with the aid of clips, of cables and piping to structural members.

Referring to FIGURES 1 and 2 of the drawings, reference numerals **11** and **12** denote the upper and lower punch-like shearing and metal indenting or deforming tools, hereinafter termed "punching shears." The punching shear **11** provides in this embodiment a parabolically-shaped cutting edge **13** on the face **14** and an indenting or deforming part **15** with curved rake, while the lower punching shear **12** provides a straight cutting edge **13***a* on the end face **14**. The lower punch holder **16** may be provided, if so desired, with a contoured recess **17** (shown in broken lines in FIGURE 2) to limit the stroke of the upper punch **11** to ensure the positive desired shaping of the metal region **18**, which is bent or deformed outwardly by the non-cutting part **15** of the upper punching shear **11**.

During the operating action, the metal **20** is cut along a plane by the cutting edges **13** and **13***a* of the upper and lower punching shears **11** and **12**. The size of the hole **21***a* formed is determined by the amount of overlap of the two punching shears. The part **15** of the upper punching shear **11** does not cut the metal but exerts a deforming pressure on the metal so as to assist in creating the hole **21***a* and thus forming an approach or lead-in towards such hole.

FIGURES 3 and 4 illustrate a variation of the method and means shown in FIGURES 1 and 2. The lower punching shear **12***a* is also provided, in this preferred embodiment, with a contoured cutting edge **13** and the raked non-cutting part **15** as in the case of the upper shear **11**. Such part **15** of both the upper and lower punching shears **11** and **12***a* press downwards and upwards simultaneously whereby a short stroke is required for the formation of the hole **21**, as the regions **18** of the metal **20** are forced outwardly in opposite directions. With this arrangement, approaches or lead-ins **22** to the hole **21** are also formed on both sides of the shear cut by the raked non-cutting parts **15** of the punching shears.

The shape of the cutting edges **13** of the faces **14** of the punching shears can be provided with a different contour, such as, for instance, converging straight lines, as are shown by FIGURES 5 and 6, to provide blunt pointed V-shaped punching shears. A rounded contour of the cutting edge **13** will result in a rounder hole while converging straight edged punching shears will result in a more or less square hole. Rounded contours are required for material of higher tensile strength to provide a broader cut and press and thus prevent rupture of the material.

The formation of a twin holed protuberance **23**, see

FIGURE 8, is produced with the aid of two spaced upper punching shears **11** which are arranged to form two parallel shear cuts by their cutting edges **13**, see FIGURE 7. The lower punching shear **12***b* comprises a member presenting two parallel vertical faces **14** and protruding cutting edges **13**. The lower punching shear **12***b* is actually a combination of two punching shears in a single member and can be considered as two punching shears **11** arranged in abutting back-to-back relationship. The side faces of the lower punching shear **12***b* form spaced cutting edges for producing with the cutting edges **13** of the upper punching shears **11** two parallel shear cuts and, with the protruding non-cutting parts **15** of the lower shearing punches the deformation of the material between such shear cuts produce the single protuberance **23**. The raked non-cutting parts **15** of the upper punching shears **11** deform the material outwardly adjacent the two shear cuts and indent the material downwards on either side thus forming approaches or lead-ins to the holes **21**, and two protuberances or scallops on the lower side of the material. Such holed protuberance **23** provides means through which tying wires, tying clips or other means can be inserted. The method described and shown in FIGURES 7 and 8 may be applied on a flat surface or any suitable surface of a rolled steel section such as a fencing standard, post, structural section or the like.

It will be obvious that a single hole, as shown in FIGURE 3, can also be made in a plate but then the entry and exit to and from the hole are on opposite sides of the material in which the hole is formed.

The application of the methods of providing single or twin holes can be extended to fencing standards or posts, structural members or the like.

In FIGURE 9, an application of the method according to this invention is shown on a Y-section member in which holes **21** are formed in opposite limbs by shearing such limbs adjacent or in spaced relationship to the region of connection of the third limb and forcing the adjacent metal regions **18** outwardly. If it is not desired or found inconvenient to punch holes against or in inclined surfaces, the Y-section may be modified, as is shown in FIGURE 10, to introduce steps or shoulders **24**. The punching shears will then meet faces at right angles to the direction of operation and such operative action is thus simplified whereas the thickness of the material to be cut is reduced. The stroke of the punching shears may be arranged, if so desired, to continue until the deepest point or the nadir **25** is reached. The deformation by a stretching or drawing action thus takes place wholly on the opposed limbs of the section and not on the third limb or stem.

In FIGURE 11, the result of the action with two opposing punching shears **11** and **12***a*, to form a single hole, is shown on the web of the well-known T-bulb fencing standard or post section. Providing the hole **21**, as shown in FIGURE 11, however, cuts across the rolling fibres, and thus the method of providing the hole as shown in FIGURE 12 is preferred.

As shown in FIGURE 12, the direction of the shear cut is arranged at right angles to that shown in FIGURE 11. This has the advantage that the cut line lies in the direction of the rolling fibres of the member. It will be obvious that the same type of holing as shown in FIGURE 11 or 12 can also be carried out on the double bulb or dumbell fencing standard or Y-section stem and other sections. If desired, twin holes may be punched instead of a single hole **21**, shown in FIGURES 11 and 12, on the various sections mentioned.

In FIGURES 13 to 16, the application of the method and means according to this invention is shown on fencing standards or other sections, and on the types disclosed in the specification of our prior patent application Serial No. 30,492.

Twin hole punching, with outward deformation **26** of the apex ridge **27**, as is clearly shown in FIGURE 13,

may also be carried out on the section shown. The material adjacent both sides of the apex ridge **27** is deformed inwardly, as at **28**, to provide the aforesaid approaches or lead-ins to the two holes.

Twin hole punching, as described with reference to FIGURES 7 and 8, may also be provided in the apex face region **29** of a section, see FIGURE 14, which is void of a longitudinal apex ridge **27**.

Single holes or pairs of holes in a standard, post or such section presenting openings directed towards one another and as is shown in FIGURE 15, may be provided to enable fixing clips to be engaged therein, as will be subsequently described with reference to FIGURES 21 to 24.

In FIGURE 16, another application of the invention is shown where steps **24** are purposely provided in the limbs **30** joining the central heavier part **31** of the section shown with the aim of less upward pressure with the lower punching shears on this central part of material concentration of the section. The downward and upward deformation and stretching are done wholly or mainly on the limb material adjacent the central area of concentration **31** of the section. It will be obvious that a hole **21**, as shown in FIGURE 16, can be brought about at any desired position on the side limb or limbs of the section by the method of producing holes, as described. To facilitate the punching, although not essential, shoulders or flattened portions **24** can be provided at any desired position on the limbs **30** of the section.

With sections as shown in FIGURES 9, 10, 13 and 16, due to their shape and the fact that the limbs being cut fall or taper away rapidly from the initial point of cut, less rake on the deforming parts of the punching shears is necessary. Sufficient rake should, however, be provided to release the punching shears easily, and to force the punches against each other to obtain a cut free from burr or fin. The lead-ins or approaches to the hole on such sections are thus nearer to being at right angles to the plane of the shear cut, i.e. to the holes, thus facilitating threading of line or tying wires or attaching clips.

If particularly desired, a hole somewhat smaller than the final required size can be formed, according to the method and means of this invention, while by a subsequent operation the direction of the hole can be reorientated and the hole enlarged and also changed in shape, if so desired. Such reorientation and enlarging or such-like action can be effected by drifting, in which case the already deformed material is supported at the opposite side of the entrance of the drift to prevent stretching further away from the parent material, thus allowing deformation in this subsequent operation in a direction along the plane of the material being punched. To create sufficient entrance for the drift, the rake on both upper and lower shearing punches **11** and **12***a* must be sufficient so as to allow the displaced material to move further away from the plane of shearing and so creating a hole at a greater angle to the plane of the material being punched.

The major advantage arising from using the method and means according to this invention of punching relatively small holes in relatively thick metallic members is that such small holes can be punched with relatively robust punching shears. The size of the hole is determined by the inclinations and shapes of the punching shear cutting contours combined with the stroke of the punching or cutting action and the extent of overlap of the punching shears. For example, if the two punching shears **11***a* and **12***d*, see FIGURES 5 and 6, are used, then it will be apparent that with a very slight overlap in stroke a very small hole can be cut with relatively robust punching shears according to the method as described with reference to FIGURES 3 and 4.

As shown in FIGURES 17, 18, 19 and 20, twin opposing holes can be formed on either side of the bulb **31** at the apex of a bell-shaped fencing standard section without weakening the bulb at the apex.

FIGURE 17 shows a vertical cross-section through the section with the punching shearing tools **11** (upper) and **12** (lower) in position prior to the operation of punch shearing of a pair of opposing holes.

FIGURE 18 shows a vertical cross-section through the centre line of the twin holes formed after completion of the punch shearing stroke by the tools **11** and **12***b*. Only the upper part of the section is shown.

FIGURE 20 is also a cross-section through the section, drawn to a larger scale and through a shear punched hole according to the invention after retraction of the punching shears.

FIGURE 19 is a side view of FIGURE 20 showing the hole **21**. It will be noticed that there is an upsetting action in a downward direction on the limbs **30** of the section by the pressure of the upper tools **11**. The lower tools **12***b* force the centre region of the section **31** upwards, to some extent, as at **32**, as well as bending of the portions **33** of the limbs **30**, next to this central area **31**, also in an upward direction.

The aforesaid clips for attaching line wires to fencing posts, standards or droppers, and as shown in FIGURES 21, 22, 23 and 24, comprise staple-like metallic elements **35** of V-shape which are driven in respect of their prongs **36** into twin holes **21** formed, as shown in FIGURE 15, after being placed transversely across a line wire **37**. The prongs **36**, when driving the clip **35** home, spread outwardly and are subsequently bent inwardly towards one another, as shown at **38** in FIGURE 24. The inward final bending of the prong ends can be effected by a hammering action. If desired, the outwardly directed protuberances **18** may subsequently be hammered back again so as to close the holes somewhat and to grip the clip.

The clip fastening, in accordance with FIGURES 21 to 24, is intended mainly for fastening fence wires to posts, poles and the like. This, however, is not the only application of the invention. FIGURE 25 shows the fastening of ceiling netting **39** for a dummy or sub-ceiling or lining to channel members **40** provided with holes produced according to the method and means of this invention. In bottom flanges **41** of channels **40**, holes **21** are cut in the manner described. The wire netting **39** is placed against the bottom flanges **41** of the channels **40** from below and kept in position by wires **42** which thread through the holes **21**. Reinforcing wires **43** can be used as well and also tied by binding wires **42**.

In the application of the invention, as shown in FIGURE 26, the holes are used for receiving clips **44** which may be employed to hold cables **45** underneath flanges **46** of beam **47**, or pipe lines **48** on flanges **46**. An advantage of this invention is obvious from the applications shown in FIGURES 25 and 26. The bottom flanges **41** of the channels **40** in FIGURE 25 and the bottom flanges **46** of the beam **47** in FIGURE 26 are usually in tension as structural members. The method of providing a cut along the rolling fibres without removal of metal reduces the strength of such flanges to an insignificant degree as compared with the position when circular holes are made in the section.

Lighting fittings, ornaments or such-like items can be fastened in a similar manner.

The invention can also be used for further applications such as for putting up scaffolding, fixing of reinforcements in concrete or other material. It offers in addition, special advantages both for the inexpensive production of holes in structural members and the tooling thereafter as well as for various other applications.

Another major advantage arising from using the method and means of shear punching holes according to this invention is that material of harder quality or higher tensile strength than mild steel can be punched where conventional means are difficult or not practicable. The contours of the cutting edges of the punch-like shearing and metal de-

forming tools, i.e., widths of cut and bluntness of point together with the adjustment of the rake of the non-shearing parts of the tools, must be varied to suit the hardness of the material to be cut. A sharp point with steep sides to the tool, resulting in a narrow cut, will cause rupture of the indented material more readily than a blunt point with a broad cut, where the pressure and deformation is spread over a greater area of material to be cut.

It will be obvious that if higher tensile material is used for, say, rolled steel fencing standards, posts or droppers, the strength of the section is very much increased over mild steel. Furthermore, it is a great advantage to the manufacturer to have a wide range of steel qualities from which such products can be manufactured.

Another advantage obtained by providing holes with the method and means according to this invention, is that the member is weakened to a much lesser extent than when holes of conventional type are punched clear out of the member. There is no metal removed from the member according to the method and means of this invention and the metal deformed adjacent such hole or holes remains to contribute towards the strength of the member. There is also no loss in weight of the member due to the punching of the holes therein.

I claim:

1. A method of producing holes in metallic profiled members, comprising the steps of shearing the member at two spaced associated positions to form short juxtaposed shear cuts, and deforming the metal adjacent the shear cuts in at least two zones, said two zones being deformed in the same direction from the metallic member and one zone being located on one side of one of the shear cuts and the other zone being located on the other side of the other of the shear cuts, each zone being deformed to a maximum extent adjacent the shear cut of substantially the thickness of the metal at the shear cut and decreasing smoothly and gradually transversely away from the shear cut until it merges smoothly with the undeformed metal, the shearing and deformation being effected substantially simultaneously without removal of metal to form a pair of associated holes.

2. The method as claimed in claim 1 in which the metal in a deformed zone is deformed so as to have the shape of a substantially hood-like scalloped shell.

3. The method as claimed in claim 2 wherein the inner concave edge of a scalloped deformation at its point of maximum deformation lies within the outer surfaces of the non-deformed portion of the metal.

4. The method as claimed in claim 2 in which the inner concave edge of a scalloped deformation at its point of maximum deformation extends only slightly beyond an outer surface of the non-deformed portion of the metal.

5. A method of producing holes in metallic profiled members, comprising the steps of shearing the member at two spaced associated positions to form short juxtaposed shear cuts, and deforming the metal in zones adjacent the shear cuts, the two zones on the sides of the shear cuts which are adjacent each other being deformed in one direction and the two zones on the sides of the shear cuts which are remote from each other being deformed in the other direction, each zone being deformed to a maximum extent adjacent the shear cut of substantially the thickness of the metal at the shear cut and decreasing smoothly and gradually transversely away from the shear cut until it merges smoothly with the undeformed metal, the shearing and deformation being effected substantially simultaneously without removal of metal to form a pair of associated holes.

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