United States Patent

Jäger et al.

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[54] **CUTTING APPARATUS AND CUTTING HEAD THEREFOR**

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[52] **U.S. Cl.** **30/140,** 30/293, 83/171

[51] **Int. Cl.** **B26f 3/08**

[58] **Field of Search** 30/140, 293; 83/171

[56] **References Cited**

UNITED STATES PATENTS

2,701,835	2/1955	Anton	30/140
1,776,046	9/1930	Schmidt	30/293
2,007,395	7/1935	Howard	30/293
2,486,880	11/1949	Reynolds	30/293 X
2,572,791	10/1951	White	30/140
2,896,059	7/1959	Ruff	30/140
2,421,125	5/1947	Krebs	30/140

FOREIGN PATENTS OR APPLICATIONS

890,576	3/1962	Great Britain	30/140

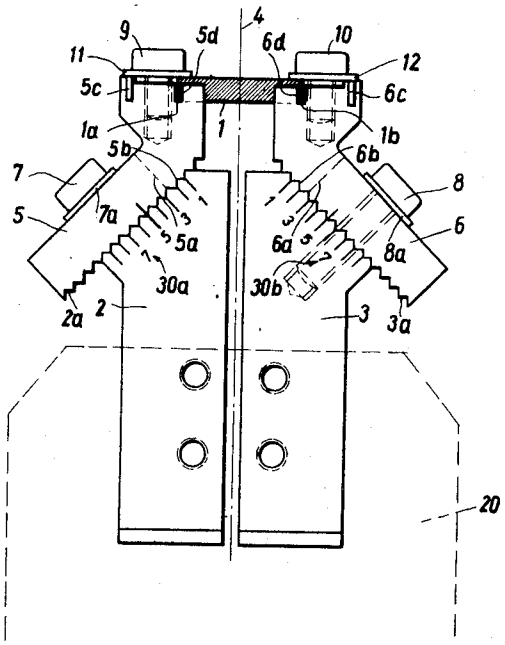
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[57] **ABSTRACT**

A cutting head for a cutting apparatus with a transformer for heating the cutting blade has a pair of mutually insulated contact members each carrying a contact bridge, the contact bridges extending at about 45° to the longitudinal central axis of the apparatus. When the blade is mounted in place, it short-circuits the secondary of the transformer and is heated rapidly.

5 Claims, 9 Drawing Figures



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SHEET 1 OF 5

Fig. 1

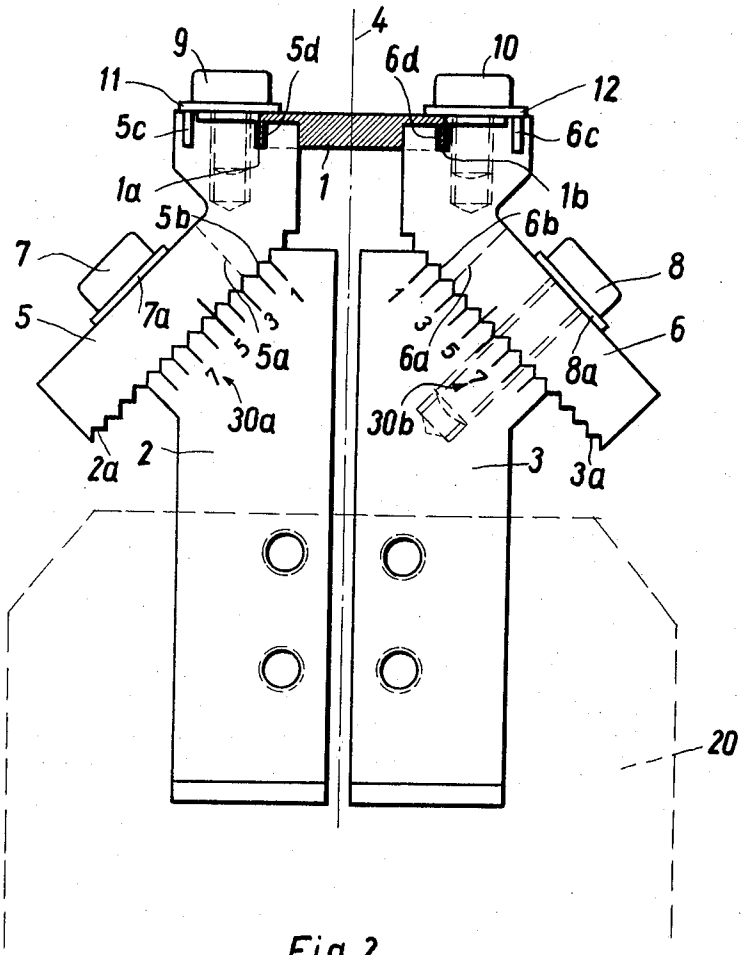
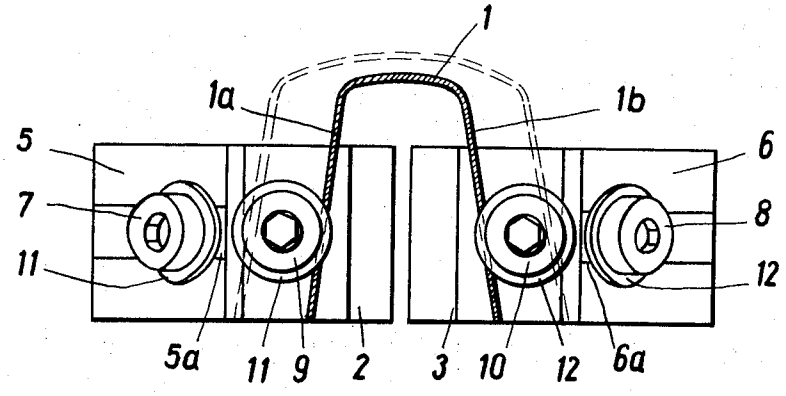
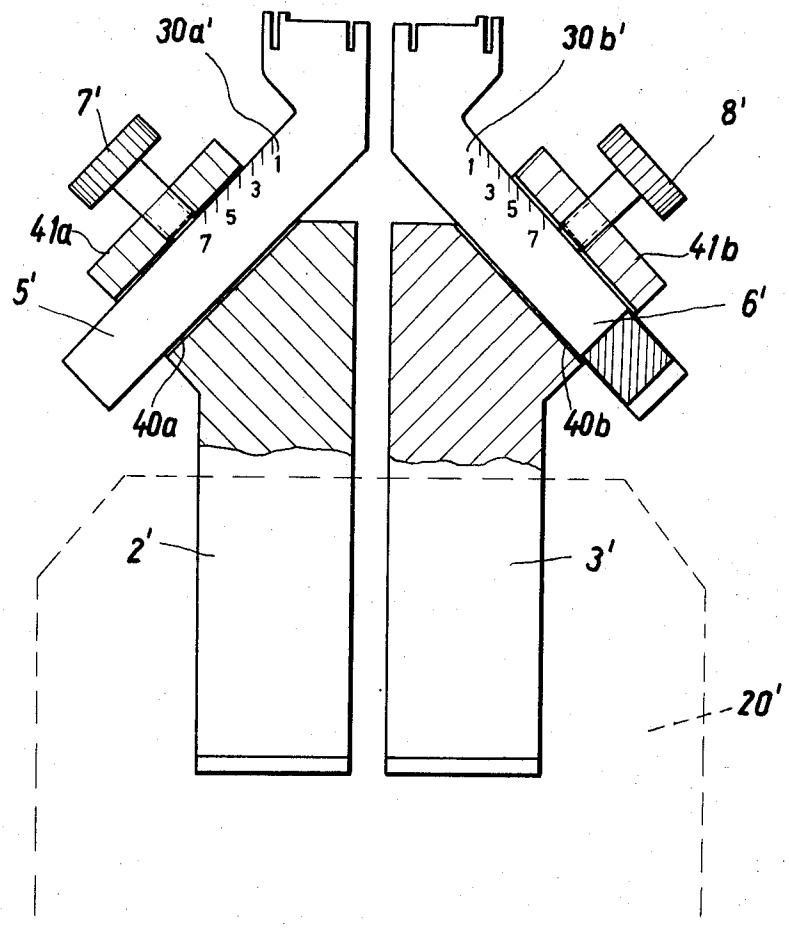


Fig. 2



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Fig. 3



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Fig. 4

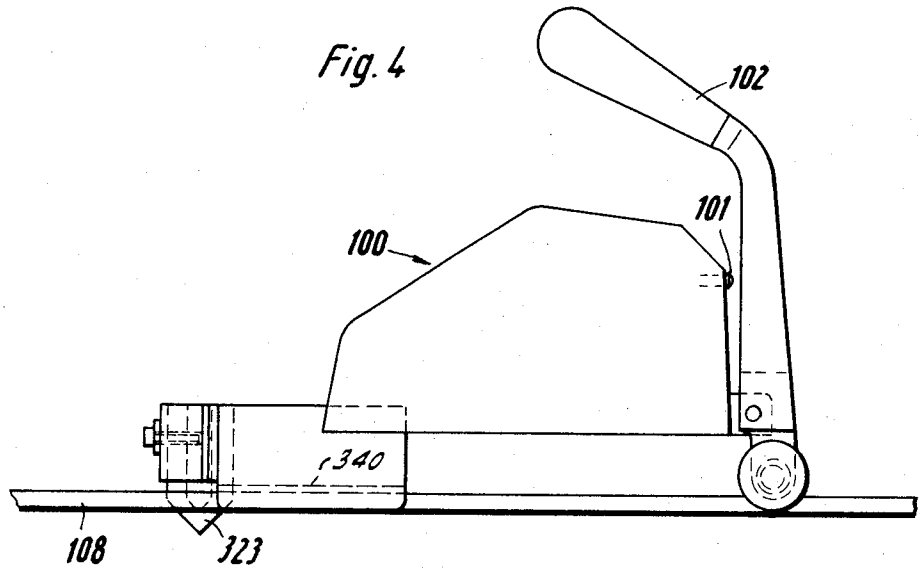
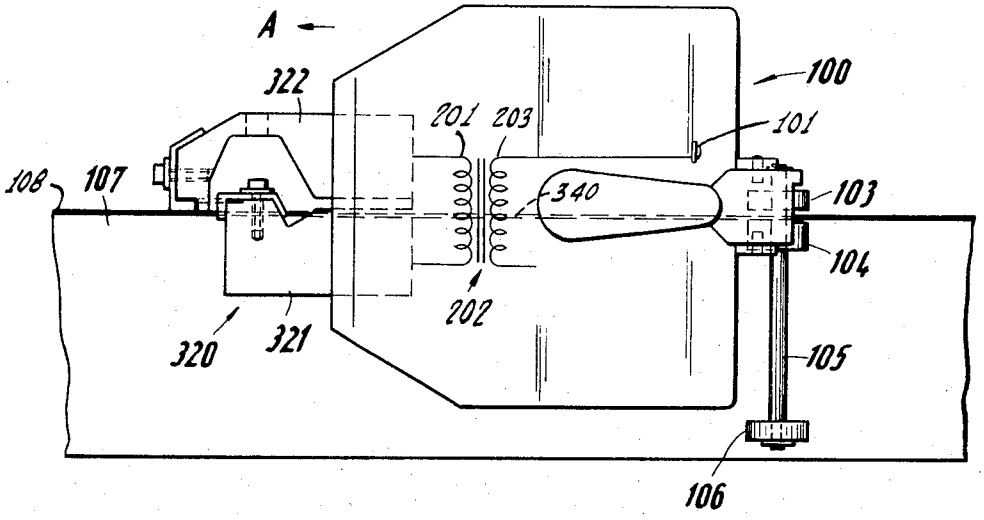
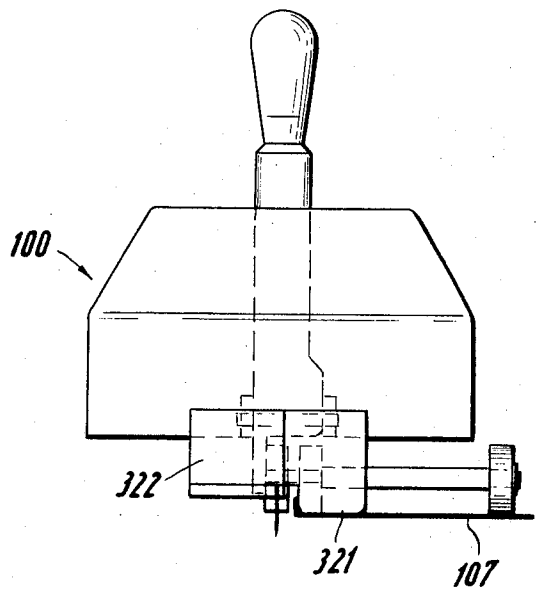


Fig. 5



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Fig. 6



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Fig. 7

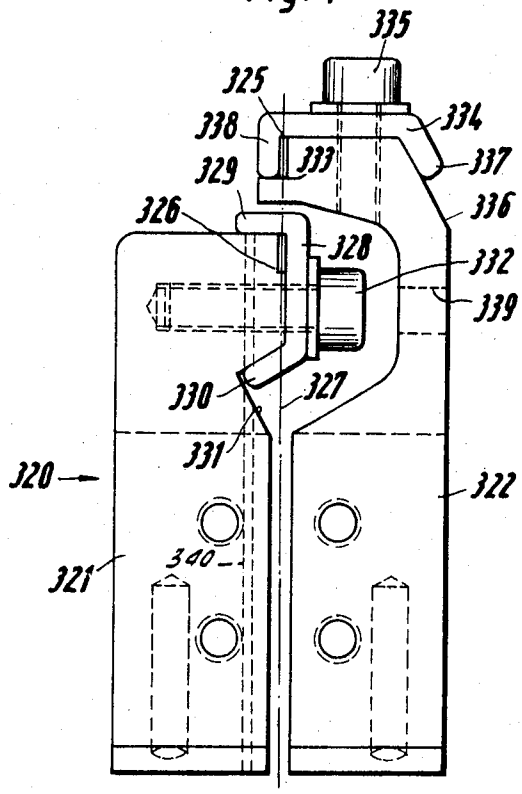


Fig. 8

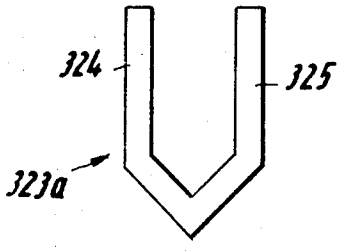
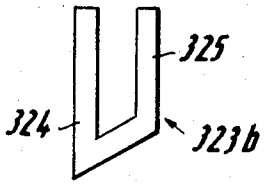


Fig. 9



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CUTTING APPARATUS AND CUTTING HEAD THEREFOR

This invention relates to a cutting apparatus and cutting head therefore. The apparatus is particularly but not exclusively suitable for recutting smooth tires and generally for cutting rubber or similar materials, e.g., floor coverings of plastics material, rubber or linoleum.

It is known that bald tires can be made to grip again by recutting the profile so that the running performance of the tire is substantially increased. According to the size of the tire, the recutting requires cuts of different depth and width, and this is achieved by changing or adjusting the cutter blade in the cutter head. With known cutting devices, the profiles still remaining in the tire cannot be detected.

According to the present invention, in one aspect, there is provided a cutting head for electrically heating a blade which is adapted to be mounted in said cutting head, the said cutting head comprising a pair of contact members which are electrically insulated from each other and which are disposed symmetrically about the longitudinal axis of the apparatus, and a respective contact bridge adjustably mounted on each of said contact members so that it extends at an acute angle to said longitudinal axis, each said contact bridge having means for receiving a leg of said blade.

The arrangement according to the invention makes it possible to detect during continuous cutting the still remaining outlines of the profile. In addition, the cutting head of the invention is also suitable for cutting transverse cuts into the running surface of tires, without necessitating the cutting of rubber from the tires.

According to another aspect of this invention, there is provided a cutting apparatus provided with a cutting head as set forth above, and further including a housing in which is disposed a transformer having primary and secondary windings and constituting the electric heating means, and a cutting blade adapted to be mounted in said head so that its legs in operation short-circuit the secondary, whereby the blade will be rapidly heated up on energization of the primary windings.

Preferred embodiments of the invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 is a plan view of one embodiment of a cutter head according to the present invention;

FIG. 2 is a front elevation of the cutter head of FIG. 1;

FIG. 3 is a plan view of a further embodiment of a cutter head according to the present invention;

FIG. 4 is a diagrammatical side elevation of the cutting apparatus according to the invention;

FIG. 5 is a plan view of the apparatus of FIG. 4;

FIG. 6 is a front elevation of the cutting apparatus according to the present invention;

FIG. 7 is a view from above of the cutter head according to the present invention;

FIG. 8 is a side elevation of an embodiment of a cutter blade and

FIG. 9 is a further embodiment of a cutter blade.

Referring to the drawings, and more particularly to FIGS. 1 and 2 first, a cutter head has two contact members 2, 3 extending symmetrically about the longitudinal axis 4 of the cutting apparatus of this invention. The contact members 2, 3 are parallel and are spaced apart and are provided with uniform toothing 2*a* and 3*a* respectively. The contact members 2, 3 are adapted to be screwed for operation to the cutting apparatus 20 described further below with reference to FIGS. 4 to 6.

The cutter heads shown in FIGS. 1 and 2, as well that shown in FIG. 3 serve to mount U-shaped cutting blades, to be used particularly for reconditioning motorcar tires. The cutter head of FIG. 7 serves particularly for adjustably mounting cutting blades shown in FIGS. 8 and 9, for use especially in cutting floor coverings.

Returning to FIGS. 1 and 2, the toothings 2*a*, 3*a* are formed on the respective front faces of the contact members 2, 3 and extend substantially at an angle of 45° to the longitudinal axis of the cutting apparatus 20, so that the normals to toothings 2*a*, 3*a* intersect on the longitudinal axis 4 at an angle of substantially 90°. The end face of each contact member 2, 3 carries a contact bridge 5 or 6, respectively, having toothings 5*b* or 6*b*, respectively, of the same pitch as those of the contact members 2, 3. The angle under which adjustment is made is approximately 40°.

Each contact bridge 5 or 6 has, in its toothed portion a lateral, longitudinal slot 5*a*, 6*a*, through which pass respective screws 7 and 8, adapted to be screwed into the contact members 2 and 3. By tightening these screws 7 and 8, which are provided with respective washers 7*a* and 8*a*, the contact bridges 5 and 6 are pressed with their toothing firmly against the contact members 2 and 3 with their matching toothings 2*a*, 3*a*, thus ensuring good electrical contact therebetween.

Each contact bridges 5, 6 has a respective end member extending in the direction of the longitudinal axis of the apparatus 20, and having in its end face one or more recesses, such as 5*c*, 6*c*, respectively adapted to receive the legs of a blade.

The blade 1 has two feet 1*a* and 1*b* receivable in respective recesses 5*d*, 6*d*, which are in said end member and are immediately adjacent to the longitudinal axis 4. Respective screws 9, 10 are adapted to be screwed into the end face of each contact bridges 5, 6 in order to press the blade 1 firmly against the contact bridges 5, 6. Each screw 9 or 10 is provided with a washer 11 or 12, respectively. The washers 11, 12 rest, on one hand, on a projection on the end face of each contact bridge 5 and 6 and on the other hand on the blade legs 1*a*, 1*b* projecting somewhat beyond the end face.

The blade 1 acts as a short-circuiting means when the current supply is switched on and it is strongly heated, thus facilitating the cutting of rubber, plastics, and the like.

As shown more clearly in full lines in FIG. 2, the cutter blade of comparatively narrow width, whilst the dotted lines indicate an alternative, substantially wider blade, adapted to rest in the respective recesses 5*c* and 6*c* of the contact bridge 5, 6.

The recesses 5*c*, 6*c* converge slightly towards the bottom in the embodiment of FIG. 2.

Each contact member has, adjacent the respective toothing 2*a*, 3*a*, a respective scale 30*a*, or 30*b*, numbered for example from 1 to 7; this scale may be stamped into the metal of the contact members. Each

contact bridge has a corresponding line marking for the uniform adjustment in width of the cutter head. If, for example, the contact bridges **5, 6** are set with the marking against the marking "3" of the contact members **2, 3**, a cutter blade No. 3 may be fitted into the recesses in the end face of the contact bridge.

FIG. **3** shows a second embodiment of a cutter head in partial cross-section; wherein for the sake of simplicity, the cutter blade and its mounting means are not shown.

As in the embodiment described above, also here two contact members **2', 3'** are mounted on the underside of a cutting apparatus **20'** indicated by dotted lines. Near the end face of the contact member **2'**, there is an opening **40*a*** having square cross-section. This opening extends at an acute angle of about **45°** relative to the longitudinal axis of the apparatus **20'**. The contact member **3'** has a opening **40*b*** also of square cross-section, similar to that of opening **40*a***, respective, the openings having contact bridges **5', 6'** with square cross-section slidably mounted therein. The end leg of each contact bridge may have the form described in conjunction with the embodiment shown in FIGS. **1** and **2** and serves to receive the cutter blade **1**, not shown in FIG. **3**. A clamping screw **7'** is screwed into the outer wall **41*a*** of the opening **40*a***. This screw **7'** serves to fix the contact bridge **5'** in any desired position. Symmetrically, a further clamping screw **8'** is fitted into the outer wall **41*b*** of the contact member **3'**, serving to locate the contact bridge **6'** the lower end of the screw **8'** pressing against one side face of the contact bridge **6'**. The adjustment of the two contact bridges **5',6'** corresponds to the first embodiment, using scales **30*a'*** and **30*b'***, respectively.

The openings **40*a*** and **40*b*** may have, as an alternative, a rectangular cross-section; in this case, the contact bridges must have a corresponding cross-section. The openings **40*a*** and **40*b*** may have other cross-sections, e.g., such as to prevent the contact bridges **5', 6'** from twisting or rotating.

The adjustment of the contact bridges **5', 6'** to the desired width of the cutter blade is effected by slackening the screws **7', 8'** and adjusting a corresponding value of the scale on the front edge of the associated contact member. Then, the contact bridges **5', 6'** are fixed by tightening the screws **7', 8'**.

FIGS. **4** to **6** shown an embodiment of a cutting apparatus **100** according to the invention. The front end of the cutting apparatus **100**, adapted to be moved in the direction of the arrow A (FIG. **5**), carries a cutter head **320**, shown in more detail in FIG. **7**. The cutter head **320** consists of two contact members **321, 322**, between which is mounted a cutter blade **323**. The cutter head **320** may be screwed to the underside of the housing of the cutting apparatus **100** and is connected to the secondary **201** of a transformer **202** arranged within the housing, the primary **203** of which may be connected by a switch **101** and a lead, not shown, to the mains. The switch **101** is operated automatically,, when a lever **102**, mounted pivotably on the housing, is operated. The lever **102** is cranked in the direction of movement A so that during the movement a pressure is exerted on the cutter blade **323** and the same is pressed into the material to be cut. On the side remote from the cutter head **320**, two guide rollers **103, 104** are mounted on the housing. Coaxially with the two rollers **103, 104**, a further roller **106** is mounted for rotation on a rod **105** which has a length substantially equal to one half of the length of the housing. This roller **106** is located substantially in the extension of one side edge of the housing of the cutter (see FIG. **5**). The rollers **103, 104, 106** enable, in conjunction with the cutter head **320**, sliding of the cutter along the material to be cut, and satisfactory guiding thereof.

One contact member **321** projects further downwardly (as viewed) than the other contact member **322**. Furthermore, in order to produce a satisfactory rectilinear cut, a slide rail **107** is provided, having a vertically upwardly bent web **108** (FIG. **4**). The slide rail **107** is placed on the material to be cut and the blade **323** is guided in exactly parallel relationship by the guide rollers **103, 104** and **106** and the inner surface of the contact member **321**, resting on the web **108** (FIG. **6**).

FIG. **7** shows the cutter head **320** in plan view. This head consists of the two contact members **321, 322** which are screwed to the housing, and the front ends of which carry the cutter blade **323**. The cutter blade **323** is flat and has two legs **324, 325**, extending along the plane of the blade. The plane of the blade — see also FIG. **4** — extends in the direction of cutting.

The front end of the contact member **321** carries one leg of the cutter blade **323** in a readily removable and replaceable manner. To this end, the front inner edge is provided with a recess **326** in which the blade **323** is located so that it protrudes somewhat beyond the inner edge **327** of the contact member **321**, and a clamping plate **328** rests thereon. The clamping plate **328** embraces with its front face **329** the front edge of the contact member **321** and rests with its rear edge **330** on a sloping surface **331** formed in the contact member **321**. The center of the clamping plate **328** has a tapped aperture formed therein; a screw **332** extends through this opening and engages in said aperture.

The front end of the contact member **322** extends so far beyond the front edge of the contact member **321** that one blade leg **325** is arranged in front of the other blade leg, as viewed in the direction of cutting. To this end, the front edge of the contact member **322** has a recess **333**. The leg **325** of the blade is also located by means of a clamping plate **334**, pressed by means of a screw **335** against the frusto-conical front side of the contact member **322**. The leg **337** of the contact member **334** is arranged to slide on an oblique guide surface **336** so that the leg **338** of the contact member is firmly pressed against the blade leg **325**.

FIGS. **8** and **9** show two preferred embodiments of the blade, **323*a*** and **323*b*** respectively. The blade shown in FIG. **8** may be used for cutting both in the forward and reverse directions. The cutter blades **323*a*** and **323*b*** are preferably made of steel.

According to a further preferred embodiment, a straight (linear) slot (not shown) may be made in the underside of one of the contact members **321** which may slidably receive and co-operate with the web **108** to guide the cutting head accurately.

We claim:

1. A cutting apparatus including a cutting head, a housing containing a transformer having a primary and secondary windings disposed in said housing and con-

stituting the electric heating means; said cutting head including a pair of contact members which are electrically insulated from each other and are connected to respective ends of said secondary winding; and a cutting blade of substantially uniform thickness over its length having two legs and adapted to be mounted in said head such that each leg is in electrical engagement with one said contact member so that said blade legs in operation short-circuit said secondary winding, whereby said blade will be rapidly heated up on energization of said primary winding, said blade being flat in the plane of cutting;

said cutting head being disposed at one end of said housing, a pivotally mounted cranked actuating lever being carried by the other end of said housing; pivotal movement of said lever causing said blade to move relative to the cutting plane;

an electric switch which is so disposed at said other end of the housing that pivotal movement of said lever in one angular sense causes said switch to be operated to switch on the heating for the blade.

2. A cutting apparatus including a cutting head, a housing containing a transformer having a primary and secondary windings disposed in said housing and constituting the electric heating means; said cutting head including a pair of contact members which are electrically insulated from each other and are connected to respective ends of said secondary winding; and a cutting blade of substantially uniform thickness over its length having two legs and adapted to be mounted in said head such that each leg is in electrical engagement with one said contact member so that said blade legs in operation short-circuit said secondary winding, whereby said blade will be rapidly heated up on energization of said primary winding, said blade being flat in the plane of cutting;

rotatable guide rollers mounted on said housing; said rollers including three co-axial rollers mounted at the rear of the housing relative to the direction of cutting; a shaft extending laterally from the housing, one of said rollers being mounted on said shaft.

3. Apparatus as claimed in claim **20** wherein the other two of said rollers are adjacent the said longitudinal axis, while said one roller is disposed at the end of said shaft; said shaft having a length substantially equal to half the width of the housing.

4. A cutting apparatus including a cutting head, a housing containing a transformer having a primary and secondary windings disposed in said housing and constituting the electric heating means; said cutting head including a pair of contact members which are electrically insulated from each other and are connected to respective ends of said secondary winding; and a cutting blade of substantially uniform thickness over its length having two legs and adapted to be mounted in said head such that each leg is in electrical engagement with one said contact member so that said blade legs in operation short-circuit said secondary winding, whereby said blade will be rapidly heated up on energization of said primary winding, said blade being flat in the plate of cutting;

said cutting head further comprising a pair of clamping plates, one for each said contact member, for clamping one said blade leg against the respective said contact member; said housing having an internal recess between said contact members; one of said clamping plates being located in said recess and being adjustably secured to one of said contact members, while the other said clamping plate is rigidly secured to the other contact member on the side thereof remote from said internal recess.

5. Apparatus as claimed in claim **4**, wherein said side of the other contact member is formed with an oblique guide surface, one end portion of the other clamping plate engaging said guide surface while the other end portion clamps the blade.

* * * * *