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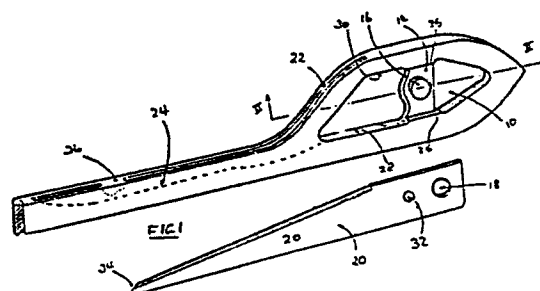
54 A pile wire blade holder and blade.

57 A pile wire blade holder includes a holding portion 10, arranged to receive and locate a blade 20 on the holder, and a wire 12 extending from the holding portion, only a part of which is shown.

The holding portion includes a stud 16 which extends through a hole 18 in the blade in order to prevent the blade attempting to move in either direction along the wire when the wire reverses its direction of travel.

The blade extends through a milled opening 22 at the end of the holding portion and into the strut 24 running along the wire, with the tip of the blade being wholly located within the slot under a bridge 26.

Any tendency for the blade to pivot about the stud relative to the holding portion is prevented or limited by a pair of parallel guides 36 which are accurately located above and below the stud being engaged by the blade.



A PILE WIRE BLADE HOLDER AND BLADE.

The present invention is concerned with a pile wire blade holder for use in looms for weaving cut pile fabrics.

5 In known pile wire blade holders, the blade is located at one end of the pile wire and includes a cutting edge inclined upwardly towards that end of the pile wire. As the pile wire is passed in one direction across the loom through the loops formed by the wire the  
10 cutting surface of the blade slices through the warp yarn loops located above the pile wire to produce the cut pile fabric. The pile wire is constantly moved backwards and forwards across the loom at high speed and accordingly the pile wire is continually being subjected  
15 to vicious acceleration and deceleration which in turn causes the blade to exert to-and-fro forces in the blade holder during operation. Wear tends to occur in the blades and holders due to fretting, impact and friction.

20 In moquette or epengle applications, with very low pile wires and fine pitch, the size of the pile wire is severely limited and this can cause the pile wire to flex under the acceleration and deceleration and other forces encountered in weaving.

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In one prior proposal, the blade is prevented from moving beyond the end of the pile wire under rapid acceleration and cutting forces by engagement with an abutment of the pile wire. The tip of the blade extends  
30 along the pile wire and is located in a socket portion formed actually in the pile wire. Engagement of the tip of the blade with the socket over an extremely small area prevents the blade from moving along the pile wire, under inertia forces, and also prevents the tip of the blade  
35 from rising up above the pile wire. The rising up of

the tip of the blade could ruin a fabric as the action is impaired or terminated by complete loss of the blade from the blade holder. Obviously the blade has to be made of extremely hard metal because of the tough cutting job which it has to perform. It has been found that the hard blade tends to wear away the blade holder around its small contact areas and ultimately cuts through the top or bottom of the socket with ruinous results to the fabric. If a fabric is not to be so ruined then the pile wires have a limited life and must be replaced before the wear of the socket has progressed too far. It will be appreciated that the wire holder gradually becomes worn and the fit of successive replacement blades becomes more slack thus resulting in even more rapid wear.

In a previously proposed pile wire blade holder, the blade has been inserted by first locating the tip of the blade in a closed, angled socket and then pivoting the blade downwards about the socket. Engagement of the tip of the blade with the socket prevents the blade moving relative to the wire in one direction, but because of the relatively small area of contact between the tip and the socket these parts soon become worn with the consequence that the tip of the blade can rise above the wire resulting in the ruination of the fabric as previously referred to. Furthermore, where a dead end socket is provided, the socket can become clogged with dirt so that the tip of a new blade cannot be correctly located within the socket.

According to one aspect of the present invention, a pile wire blade holder comprises an elongate wire including a blade holding portion at one end arranged to hold a blade with the tip of the blade extending along the wire away from the holding portion, the holding portion being arranged to co-operate with the blade to

limit or prevent movement of the blade in either direction along the wire. Preferably, the holding portion is arranged to co-operate with the blade to limit or prevent movement of the blade in any direction relative to the movement of the wire. A blade can be held within such a holder with the forces tending to move the blade in either direction along the wire being transferred between the holding portion and the blade rather than the tip and the wire. Thus the area of contact between the blade and the pile wire holder can be greatly increased from the area of contact in previous arrangements, for example the area can be increased by between fifteen and twenty times that previously used, with the result that the life of the holder is greatly increased. As the forces which are tending to move the blade along the holder in either direction are transferred by contact between the components at a region other than the tip of the blade, the sharp tip of the blade does not tend to erode itself, and also does not tend to wear away the actual wire and bridge itself. Thus a uniform and repeatable location is provided for the blade by the blade holder. Furthermore the blade holder may be accurate, reliable and ultra lightweight.

The blade holding portion may be milled in order to provide the means whereby the holding portion is arranged to co-operate with the blade, and to provide a slot in the wire within which the tip of the blade is arranged to be located. The milling of the holding portion and wire may permit the holder to have a compact and firm form.

Upon insertion or removal of the blade into the holder, the blade may be slid in from, or out of the end of the holding portion in the opposite direction in which the wire extends. Thus a blade tip may be slid along the wire upon insertion of the blade, and pivotal movement about the blade tip, with its consequential adverse

forces, can be avoided.

5       The blade holding portion may include a projection  
arranged to extend through an opening in the blade, and  
against which the blade is arranged to bear in order to  
limit or prevent movement in either, or any direction  
along the wire. This may further increase the area of  
contact between the blade and the holder from that of  
10 prior proposals. The holding portion may be arranged to  
co-operate with a blade to limit or prevent movement of  
the blade in a direction which would tend to move the tip  
of the blade away from the wire. Thus contact between  
the tip of the blade and the wire in order to prevent or  
15 limit movement of the blade away from the wire may be  
reduced or avoided to decrease the wear which occurs on  
the tip of the blade or on the wire in the region of the  
tip of the blade. The holding portion may be arranged to  
co-operate with the blade to limit or prevent movement of  
20 the tip of the blade away from the wire by providing an  
abutment against which the blade can engage, the abutment  
being located between the projection and the tip of the  
blade. The provision and location of the abutment  
provides a convenient way of limiting or preventing  
25 movement of the blade, and the area of contact of the  
abutment with the blade can be increased from the  
previous area of contact which was used to prevent this  
movement of the blade thus further increasing the life of  
30 the holder.

      The wire may include an abutment or bridge arranged  
to engage with the tip of a blade whereby the tip of the  
blade is prevented from extending above the wire. The  
35 abutment on the wire is particularly useful where the  
wire is of small diameter, as the wire may tend to flex  
during use, especially during cutting and the abutment can  
prevent this flexure from allowing the tip of the blade

to be exposed as a result of this flexure.

5 The blade holder may include a channel or slot of greater height than the substantial part of the wire, the channel being located between the holding portion and that portion of the wire where cutting is arranged to begin to take place, the channel being arranged to receive a portion of the blade. Thus, a blade may be supported by the walls of the channel between the holding  
10 portion and the tip of the blade in order to provide support for the blade in the direction transverse to the blade.

15 According to a further aspect of the present invention a pile wire blade holder comprises an elongate wire including a blade holding portion at one end arranged to hold a blade with the tip of the blade extending along, and within the wire away from the holding portion, the holding portion being arranged to  
20 co-operate with the blade to limit or prevent movement of the blade in either direction along the wire and to limit or prevent movement of the tip of the blade away from the wire, the wire including an abutment against which the tip of a blade may engage whereby movement of the wire  
25 relative to the tip of the blade is prevented or limited.

According to another aspect of the present invention a pile wire blade holder comprises an elongate wire including an enlarged blade holding portion at one  
30 end, the holder being arranged to receive a blade in the holding portion such that the tip of the blade extends along the wire, the holder including an enlarged channel portion located between the holding portion and that portion of the wire where the tip of the blade is  
35 arranged to be located, the blade being arranged to extend through the enlarged channel portion.

The invention may be carried into practice in various ways, but various embodiment thereof will now be described by way of example and with reference to the accompanying drawings in which:-

5        Figure 1 is a perspective view of a first embodiment of a pile wire blade holder and a blade showing a portion of the holder including the region thereof arranged to receive the blade;

10       Figure 2 is a section through lines II-II of Figure 1 showing a blade mounted on the holder, and

15       Figure 3 is a perspective view similar to Figure 1 of a further embodiment.

As shown in Figure 1, a pile wire blade holder includes a holding portion 10 arranged to receive and locate a blade 20 on the holder, and a wire 12 extending from the holding portion, only a part of which is shown.

The holding portion includes a recess, for example a milled recess 14 having a circular stud 16 of approximately 2 mm diameter projecting from the centre of the recess. Alternatively the recess may be now 25 coined in order to form the stud. In an alternative arrangement (not shown) the stud 16 may be located further forwards, on the edge of the recess to lessen the chance of dirt becoming trapped between the blade and the recess. As shown in Figure 2, the stud 16 is arranged to 30 extend through a hole 18 in the blade 20. The blade 20 is arranged to extend through a milled opening 22 at the end of the holding portion, and within a slot 24 running along the wire 12. The tip of the blade is arranged to 35 be wholly located within the slot under a bridge 26 located towards the end of the slot.

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In use, the pile wire blade holder moves across the loom, forwards on insertion and backwards on withdrawal or cutting stroke, with approximately three insertions per minute, depending upon the number of wires in the set (usually around 20). Each withdrawal and insertion (i.e. two movements of the wire and therefore four attempted inertia movements of the blade within the holder) take only 0.25 to 1.2 seconds, depending on loom width and speed, and speeds in the industry are generally increasing. Accordingly, at the beginning and end of each movement the momentum of the blade tends to attempt to move the blade in one direction or the other along the holder. Similarly the tip of the blade will tend to move up and down relative to the slot. Additional movement or flexure of the wire also tends to occur, particularly where the wire is extremely thin, for instance in moquette or epengle production the wire which governs the loop size may be as small as 1 mm in diameter, and rarely above 2.7 x 1.2 mm rectangular section.

All forces tending to cause the blade to move relative to the holder are transferred at the holding portion 10. The stud 16 engages with the matching hole 18 in the blade over a substantial area to prevent or limit movement of the blade along either direction of the blade holder. The stud 16 also prevents that portion of the blade from moving up or down. In one embodiment (not shown) pivotal movement of the blade about the stud towards the wire is prevented by the bottom of the blade abutting the base 28 of the holding portion and the bottom of the slot 24; pivotal movement in the opposite direction is prevented or limited by abutment of the top of the blade with the top surface 30 of the opening. In the illustrated embodiment, the holder includes a pair of parallel guides 36 which are accurately located above and below the stud in order to prevent or severely restrict

pivotal movement of the blade about the stud. Accordingly, it can be seen that there is a considerable area of contact between the blade and the holder in order to resist movement of the blade relative to the holder in all directions, and thus wear between the two is dramatically reduced giving the blade holder a longer life.

Should the wire tend to flex downwardly in its traverse across the loom then the bridge 26 will engage with the tip 34 of the blade to prevent it from appearing above the slot 24. In certain embodiments, the bridge may be optional and the omission of the bridge may be possible in certain sizes of wire and in certain circumstances.

In order to insert a blade into the holder, the tip of the blade is pushed in from the end of the holder into and through the milled opening 22 until the hole 18 passes over the stud 16 and the blade clicks into the position shown in Figure 2, under its natural flexure. In that position, the end of the blade which fits over the stud is held out of alignment with the extent of the slot 24 in order that the side 38 of the blade is pressed against the recess 14 surrounding the stud. The biasing of the blade against the recess serves to hold the blade more firmly and help prevent dirt from becoming trapped between the blade and the recess. If desired the recess can be inclined (as shown) away from the direction in which the slot extends in order that the blade can contact the complete area of the recess. In order to be able to remove the blade, the portion of the holding portion between the stud 16 and the opening 22 is completely open so that the hole 18 can be pushed off the stud and the blade slid rearwardly. To allow the blade to be deflected and moved rearwardly in order to remove the blade, an additional hole 32 is provided in

the blade.

The angle of the cutting blade relative to the extent of the wire may be of any angle suitable for various cutting conditions for instance for man-made fibre applications, the angle is generally between 5° and 20°.

In an alternative embodiment (not shown) the side walls of the opening 22 are extended at a height in excess of the body of the wire along the wire so that only a small amount of the blade projects above the wire at the cutting point thus giving further support to the blade in the direction transverse to the wire, this being especially important on very fine wires where strength is limited.

In Figure 3, like parts to those shown in Figure 1 have been given the same reference numeral.

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The difference between the embodiment shown in Figure 3 and that of Figure 1 lies in the shape of the stud and the corresponding opening in the blade. In Figure 3, the stud 16A includes opposed upper and lower faces 38, an arcuate forward face 40 and a straight rear face 42. The blade is shaped so that it is a close fit over the stud. The co-operation of the blade with the stud, in addition to preventing relative to and fro movement between the blade and holder also helps prevent relative pivotal movement.

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CLAIMS

1. A pile wire blade holder comprising an elongate wire including a holding portion at one end arranged to receive a blade with the tip of the blade extending along the wire away from the holding portion characterised in  
5 that the holding portion (10) is arranged to cooperate with the blade (11) to limit or prevent movement of the blade in either direction along the wire (12).
2. A blade holder as claimed in Claim 1 in which the  
10 holding portion is arranged to cooperate with the blade to limit or prevent pivotal movement of the blade relative to the wire.
3. A blade holder as claimed in Claim 1 or 2 in which  
15 the holding portion includes a projection (16) arranged to extend through an opening (18) in the blade.
4. A blade holder as claimed in Claim 3 in which the region of the projection which is arranged to extend  
20 through the opening in the blade, and the opening in the blade are adapted to cooperate with each other to help prevent relative to and fro movement in the direction in which the wire extends, and relative pivotal movement.
- 25 5. A blade holder as claimed in Claim 3 or 4 in which the projection is formed by coining.
6. A blade holder as claimed in any of Claims 3 to 5 in which the side of the blade is arranged to be biased  
30 into contact with the holding portion under the natural flexure in the blade.
7. A blade holder as claimed in any preceding claim in  
35 which, in order to insert or remove the blade from the

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holding portion, the blade may be slid in from, or out of the end of the holding portion located on the opposite side of the holding portion from that which the wire extends from.

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8. A blade holder as claimed in any preceding claim including a blade received in the holding portion with the tip of the blade extending along the wire away from the holding portion.

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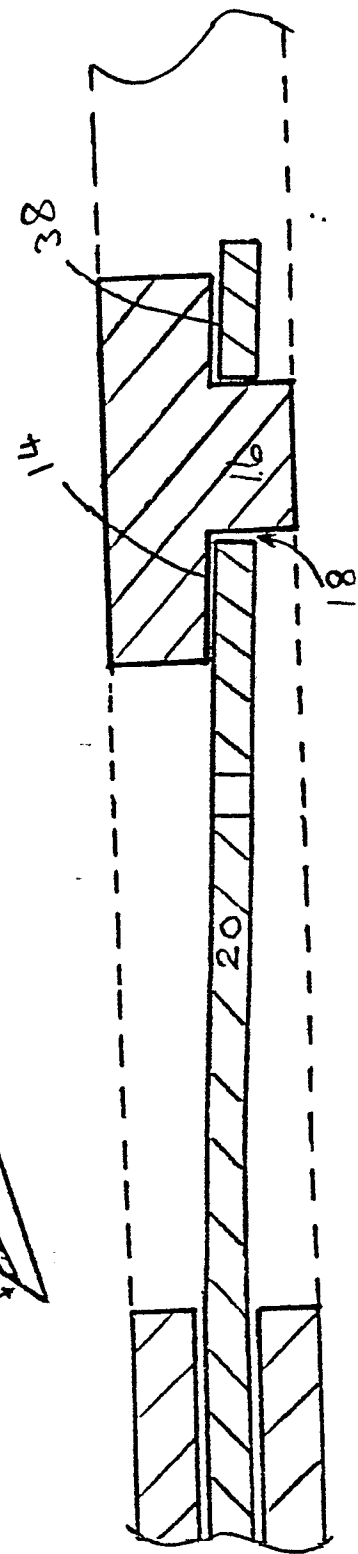
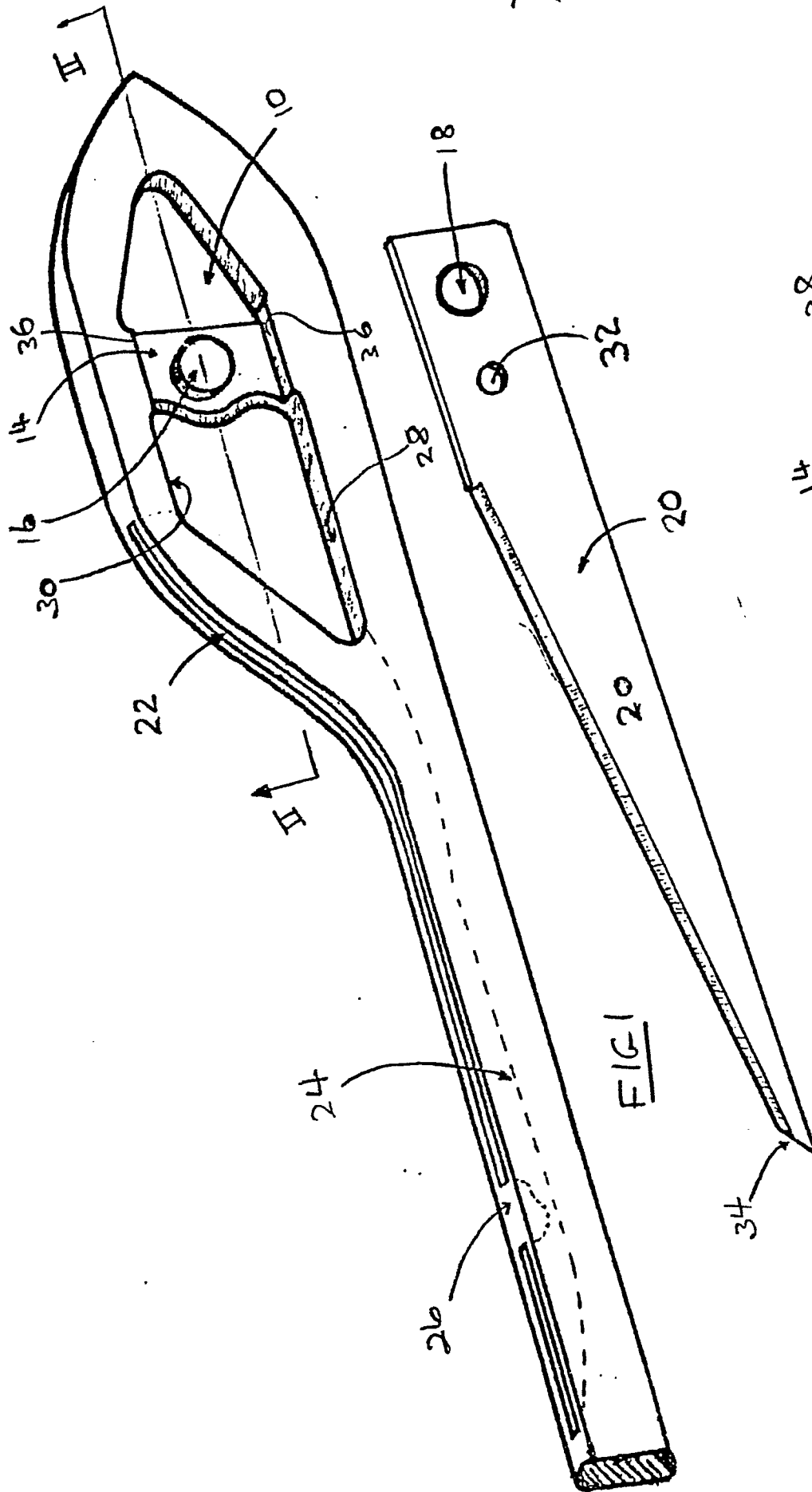
9. A blade adapted to be received in the holding portion of a pile wire blade holder as claimed in any preceding claim.

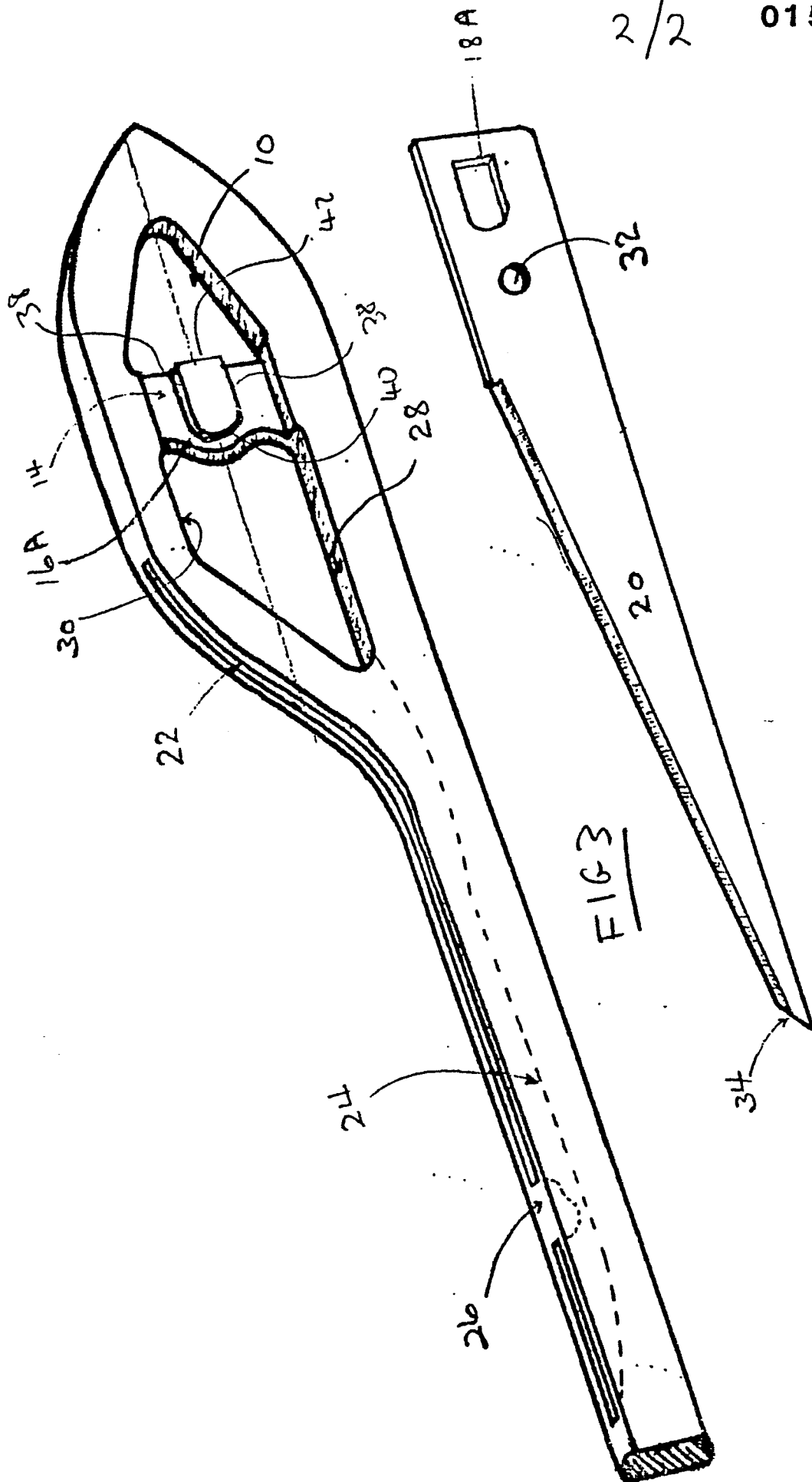
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10. A blade adapted to be received in the holding portion of a pile wire blade holder, the blade including a non circular projection through which a projection on the holding portion is arranged to extend and cooperate whereby relative movement between the blade and wire is

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limited or prevented.







European Patent  
Office

# EUROPEAN SEARCH REPORT

**0159124**  
Application number

EP 85 30 1481

| DOCUMENTS CONSIDERED TO BE RELEVANT                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                               |                                                |                                               |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|------------------------------------------------|-----------------------------------------------|
| Category                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 | Citation of document with indication, where appropriate, of relevant passages | Relevant to claim                              | CLASSIFICATION OF THE APPLICATION (Int. Cl.4) |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | DE-A- 624 754 (RÜTTGERS)<br><br>* The whole document *                        | 1-4, 6,<br>8-10                                | D 03 D 39/14                                  |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | DE-B-1 164 338 (NEILL)<br>* Figure 1; column 3, lines 40-48 *                 | 7                                              |                                               |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | DE-C- 659 113 (SCHLEMPER)                                                     |                                                |                                               |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                               |                                                | TECHNICAL FIELDS SEARCHED (Int. Cl.4)         |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                               |                                                | D 03 D                                        |
| The present search report has been drawn up for all claims                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |                                                                               |                                                |                                               |
| Place of search<br>THE HAGUE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                               | Date of completion of the search<br>11-06-1985 | Examiner<br>BOUTELEGIER C.H.H.                |
| <p><b>CATEGORY OF CITED DOCUMENTS</b></p> <p>X : particularly relevant if taken alone<br/>Y : particularly relevant if combined with another document of the same category<br/>A : technological background<br/>O : non-written disclosure<br/>P : intermediate document</p> <p>T : theory or principle underlying the invention<br/>E : earlier patent document, but published on, or after the filing date<br/>D : document cited in the application<br/>L : document cited for other reasons<br/>&amp; : member of the same patent family, corresponding document</p> |                                                                               |                                                |                                               |