(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 1 763 618 B1**

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
02.12.2015 Bulletin 2015/49

(21) Application number: **05708433.7**

(22) Date of filing: **22.02.2005**

(51) Int Cl.:
E04G 23/02 *(2006.01)*

(86) International application number:
PCT/GB2005/000655

(87) International publication number:
WO 2005/083200 (09.09.2005 Gazette 2005/36)

(54) **BUILDING APPARATUS AND METHOD**

BAUVORRICHTUNG UND -VERFAHREN

APPAREIL ET PROCEDE DE CONSTRUCTION

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU MC NL PL PT RO SE SI SK TR

(30) Priority: **24.02.2004 GB 0404094**
11.08.2004 GB 0417853

(43) Date of publication of application:
21.03.2007 Bulletin 2007/12

(73) Proprietors:
- **Lundie, Andrew**
  Southwood
  Farnborough, Hants
  GU14 0PH (GB)
- **Duffy, Angela**
  Farnborough, Hants
  GU14 0JN (GB)

(72) Inventor: **Lundie, Andrew**
Farnborough,
Hants, GU14 0PH (GB)

(74) Representative: **Harris, Oliver John Richard et al**
Novagraaf UK
145 Cannon Street
London EC4N 5BP (GB)

(56) References cited:
DE-U1- 20 317 225
GB-A- 2 201 184
GB-A- 2 237 320
GB-A- 2 254 362

Note: Within nine months of the publication of the mention of the grant of the European patent in the European Patent Bulletin, any person may give notice to the European Patent Office of opposition to that patent, in accordance with the Implementing Regulations. Notice of opposition shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European Patent Convention).

EP 1 763 618 B1

Description

Field of the Invention

[0001] The present invention relates to building apparatus and methods, and more specifically to the formation of openings in existing brick walls.

Background of the Invention

[0002] It often happens that an opening, eg for a doorway or a window, has to be formed in an existing brick wall. This requires the removal of the brickwork up to the height of the required opening, with the brickwork above that level remaining undisturbed.

[0003] If the brickwork is simply removed to the required height, it is well known that the brickwork above the opening may well be unstable and liable to collapse. To prevent this, it is conventional to provide support for the brickwork immediately above the opening. This is usually done by inserting a suitable support beam, such as a lintel or an RSJ (rolled steel joist), across the top of the opening.

[0004] However, the brickwork requires temporary support while the opening is being made and before the lintel or RSJ is inserted. The standard method of providing such temporary support is a props and bearers technique. A series of holes are cut along the intended line of the top of the opening, a bearer s inserted through each such hole, and each bearer is supported by a pair of supports, one on each side of the wall; devices known as acrow props are normally used as the supports. Once the temporary support has been put in place, the brickwork beneath it can be removed and the lintel or RSJ put in place.

[0005] ("Acrow Prop" has become the generic name for a screw jack, which is basically an adjustable length scaffold tubes. It normally consists of an outer sleeve and an inner one; the inner sleeve's height is adjusted by the use of pegs, and the outer sleeve has a slot which the peg goes into, a thread and a handle. By setting the correct height, the thread can then be used to adjust the top plate up or down.)

[0006] However, use of conventional acrow props and bearers can lead to a number of difficulties. Holes have to be cut out to insert the substantial bearers, and the wall is also liable to become loose and unstable. Also, the acrow props are awkward and cumbersome, and seriously impede access to the region of the wall being worked on. Furthermore, the acrow props have to be standing on strong and solid ground support.

[0007] A device known as a Strongboy provides an alternative to the above technique. A Strongboy is essentially a tongue adjustably mounted on a prop. If a brick is knocked out of the wall, the tongue can be inserted in the opening and raised to press against the course of bricks above the hole. The tongue is thin enough that instead of knocking out a brick, only the mortar above it need be removed to insert the Strongboy tongue (or if the mortar is weak, the tongue can be knocked into the mortar). It will be clear that the Strongboy suffers from the same disadvantages as the props and bearers technique.

[0008] The general object of the invention is to provide an improved technique for supporting a region of a wall during the construction of an opening in the wall which alleviates or overcomes the problems with the known technique described above.

[0009] GB 2237320 A discloses a temporary lintel which is engaged in a groove in a wall and fastened to the wall by means of through-bolts and expanding bolts. GB 2254362 A discloses a support comprising a pair of plates having a fulcrum and a double threaded screw; the ends of the plates are engaged in a gap in a structure and pivoted about the fulcrum so as to support the structure.

Summary of the Invention

[0010] According to the present invention there are provided a method and an arrangement as defined in the claims.

[0011] The crux of the present invention lies in applying horizontal forces between adjacent bricks in the course of bricks above the top of the opening. These forces press the bricks together and oppose the tendency of the bricks to fall downwards out of their normal alignment.

[0012] According to one aspect, an embodiment provides a method of forming an opening in an existing brick wall, comprising inserting at least one expandable element in the course of bricks above the top of the intended opening, and expanding the element or elements.

[0013] According to another aspect, an embodiment provides a joint expansion tool element for use in forming an opening in an existing brick wall by insertion between an adjacent pair of bricks, the tool comprising a pair of parallel pressure plates, a cam element between the plates, means for rotating the cam element, and means for latching the cam element.

[0014] In use, a vertical joint between a pair of bricks in the course above the intended opening is cleaned out by removing the existing mortar, and the joint expansion tool is inserted into the gap and operated to exert an expansionary force between the two bricks. This force holds the bricks in position while the courses below are removed and a support beam is inserted. The tool can then be removed and the resulting gap remortared. If the width of the opening is small, only a single tool need be used, positioned roughly above the centre of the intended opening; for larger openings, several tools may be used at suitable intervals across its width.

[0015] It will be noted that the operation of the tool does not require any vertical support forces, and the tool is substantially confined to the course of bricks above the intended opening. Access to the opening is therefore substantially unimpeded. Further, use of the tool does

not cause any vibration or disturbance to the brickwork.

[0016] It will of course be realized that the invention is applicable to walls formed of any brick-like modular elements, such as conventional bricks, breeze blocks, etc.

Detailed description of Preferred Embodiments

[0017] A method of forming an opening in existing brickwork and a joint expansion tool for use in the method will now be described by way of example and with reference to the drawings.

Brief Description of the Drawings

[0018]

Fig. 1 shows the existing method of forming an opening in existing brickwork;
Fig. 2 is an expanded view of the tool;
Fig. 3 shows the tool in the assembled state; and
Fig. 4 shows the use of the present tool.

[0019] Figure 1 shows the existing method of forming an opening in an existing wall 10. Individual holes 11 are made in the wall just above the level of the intended opening, and substantial bearing timbers 12 are inserted through these holes. These bearings are then supported by height adjustable acrow props 13 of heavy steel. The weight of the wall above the proposed opening is therefore distributed to solid ground supports 14. The remainder of the wall can then be removed from the top of the intended opening and a support beam inserted.

[0020] It is obvious that the bearing timbers 12 and acrow props 13 severely restrict access to the opening being formed. Also, this known technique still involves the risk of falling brick and loose structure caused by the cutting of the wall and vibration of the heavy and cumbersome acrow props.

[0021] Fig. 2 is an expanded view of the present tool from the front right above position, and Fig. 3 shows the assembled tool from the front left above position. The tool consists of a pair of pressure plates 20 and 21, a cam rod 22, a pawl 27, a ratchet arm 25, and a front plate 26. Spacer plates 34 are also preferably provided. The various components of the tool are all preferably made from steel coated with bright zinc; these components are all strong, durable, rustproof, and lightweight.

[0022] Pressure plate 20 has a flange 28 to which the front plate 26 is rigidly attached via spacer means 23. The cam rod 22 is rigidly attached to the ratchet arm 25, and is supported in bearings 30 and 31. Manually rotating the ratchet arm anticlockwise from the position shown turns the cam rod anticlockwise to allow the plates 20 and 21 to move together. The reverse (clockwise) movement forces the plates apart. The inner end of the ratchet arm 23 has ratchet teeth 24, which engage with a pin 32 on the pawl 27, which is pivoted at 29; the ratchet action thus holds the plates 20 and 21 in their forced-apart position. The ratchet may be released by manually moving the pin 32, which projects through a slot 33 in the front plate 26, to the left. The pawl 27 may be spring or gravitationally loaded to engage with the ratchet teeth.

[0023] The tool can thus be expanded, ie have the pressure plates 20 and 21 forced apart, and will hold that expanded state until manually released.

[0024] The two pressure plates 20 and 21 are preferably normally engaged together but can be separated for cleaning the tool. This can for example be achieved by providing them with interlocking flanges or by providing a surrounding plastic sleeve. If desired, the tool may be provided with a pair of linked cam rods one above the other. The slot 33 may be enlarged to allow the engagement between the pawl pin 32 and the ratchet teeth 24 to be visible. The ratchet is shown with 3 teeth, but a larger number may be preferable. The size of the plates should match the size of the bricks being supported, ie about 70 mm x 110 mm, though other sizes may be used if appropriate.

[0025] Figure 3 shows the present method of supporting brickwork structure above opening by means of using the tool. This method involves inserting the tools 40 in the closed position into carefully cleaned out vertical joints of the brickwork. Once in position, the tools are expanded; this applies lateral force between the brickwork joints, enabling the brickwork to stay straight and rigid. The brickwork in the desired opening is then cut out.

[0026] In more detail, the method involves the following steps. First, each selected brickwork vertical joint in the wall is cleared of all old mortar and any other obstructions. Next, the tools are inserted into the cleared vertical joints of the brickwork, in the closed position. The tools are then expanded, to hold the brickwork straight and rigid. A lintel or RSJ is then inserted and made secure to the brickwork. The tool or tools can then be released and removed, and cleaned for use on the next project. The vertical joints of the brickwork in which the tools were engaged are then filled in with mortar to complete the job.

[0027] For a narrow opening, a single tool can be used, located roughly above the centre of the intended opening. For wider openings, it may be desirable to use several tools, spaced roughly at equal intervals across the intended opening. As shown in Fig. 4, the tools may be placed in several rows of brickwork if desired. For a double skin wall, the appropriate number of tools will be used on each skin.

[0028] If the joints of the brickwork within the wall are wider than the expandable range of the tool, then one or more packing pieces or spacer plates 34 may be required. The packing pieces are placed within the vertical joints of the wall at the same time as the tool (which is of course in the closed position). When the packing pieces are in position, the tool is expanded.

[0029] To minimize the chance of the packing pieces becoming lost, they may be arranged to clip onto the pressure plates, or hinged to them so that they can be folded out to lie against the outer surface of the wall if

not required. Another option is for them to fit and clip into the space between the pressure plates 20 and 21 when not required. For this, the packing piece 34 has a slot 35 to accommodate the cam rod 22. (The flange at the end of the plate 20, with the bearing hole 31, will need to be partially cut away for this.) The packing piece will then project slightly beyond the flange with bearing hole 31 when so stored.

[0030] The expansion of the tool produces a lateral force between the vertical joints of the course of brickwork, making the wall resist changing; it changes flat brickwork courses to the strength of an arch. The tool will support brickwork structure built by a weak composition of sand and lime mortar.

[0031] It is evident that the present tool works above the top of the opening, not in or over the opening as a jack or lifting wedge. It does not restrict access to the proposed working area, so there are no significant restrictions in inserting lintels or RSJ's. The present technique maximizes the workspace and minimizes the tools and materials to be used, and eliminates the use of all heavy and cumbersome acrow props and bearers.

Claims

1. A method of forming an opening in an existing wall (10) formed from modular elements, the modular elements being bricks or the like, comprising:

   inserting at least one expandable element (40) into at least one course of said modular elements;
   expanding the or each expandable element so as to apply a force to the modular elements in the said at least one course;
   and then removing modular elements from below the said at least one course to form the opening;
   characterised in that the force is applied horizontally to press together the modular elements of the said at least one course in a region above the opening sufficiently to prevent the said at least one course in the region above the opening from collapsing when otherwise unsupported, and the said at least one course is used to support the wall above the opening against collapse.

2. A method according to claim 1, wherein the modular elements are bricks, and the at least one expandable element is inserted into the at least one course by removing mortar from a vertical joint between two adjacent bricks and then inserting the expandable element into the vertical joint.

3. A method according to claim 1 or claim 2, wherein a plurality of said expandable elements are used.

4. A method according to claim 3, wherein the expandable elements are inserted into a plurality of said courses.

5. An arrangement comprising:

   a wall (10) formed from modular elements, the modular elements being bricks or the like;
   an opening formed in the wall below at least one course of said modular elements; and
   at least one expandable element (40) arranged in the said at least one course of modular elements and expanded to as to apply a force to the modular elements in the said at least one course;
   characterised in that the or each expandable element is arranged to apply the force horizontally so as to press together the modular elements of the said at least one course in a region above the opening sufficiently to prevent the said at least one course in the region above the opening from collapsing when otherwise unsupported,
   and the wall above the opening is supported against collapse by the said at least one course.

6. An arrangement according to claim 5, wherein the at least one expandable element is configured to be inserted into a vertical joint between two adjacent bricks in a course of bricks.

7. An arrangement according to claim 5 or claim 6, wherein a plurality of said expandable elements are used.

8. An arrangement according to claim 7, wherein the expandable elements are inserted into a plurality of said courses.

Patentansprüche

1. Verfahren zum Bilden einer Öffnung in einer aus modularen Elementen wie Ziegelsteinen oder dergleichen geformten, vorhandenen Wand (10), aufweisend:

   Einsetzen mindestens eines Spreizelements (40) in mindestens einer Reihe der modularen Elemente;
   Spreizen des oder jedes Spreizelements derart, dass eine Kraft auf die modularen Elemente in der mindestens einen Reihe aufgebracht wird;
   danach Entfernen modularer Elemente von unterhalb der mindestens einen Reihe zum Bilden der Öffnung;
   dadurch gekennzeichnet, dass die Kraft waagrecht aufgebracht wird, um die modularen

Elemente der mindestens einen Reihe in dem Bereich oberhalb der Öffnung ausreichend zusammenzudrücken, um ein Zusammenfallen der mindestens einen Reihe in dem Bereich oberhalb der Öffnung, wenn andernfalls nicht abgestützt, zu verhindern, und dass die mindestens eine Reihe zum Abstützen der Wand oberhalb der Öffnung gegen ein Zusammenfallen benutzt wird.

2. Verfahren nach Anspruch 1, wobei die modularen Elementen Ziegelsteine sind und das mindestens eine Spreizelement in die mindestens eine Reihe durch Entfernen von Mörtel von einer senkrechten Fuge zwischen zwei aneinander grenzenden Ziegelsteinen und anschließendes Einsetzen des Spreizelements in die senkrechte Fuge eingesetzt wird.

3. Verfahren nach Anspruch 1 oder 2, wobei mehrere Spreizelemente benutzt werden.

4. Verfahren nach Anspruch 3, wobei die Spreizelemente in mehreren Reihen eingesetzt werden.

5. Anordnung, aufweisend:

eine Wand (10), gebildet aus modularen Elementen, wobei die modularen Elemente Ziegelsteine oder dergleichen sind;
eine Öffnung, geformt in der Wand unterhalb mindestens einer Reihe der modularen Elemente; und
mindestens ein Spreizelement (40), angeordnet in der mindestens einen Reihe von modularen Elementen und gespreizt, um eine Kraft an den modularen Elementen in der mindestens einen Reihe aufzubringen;
dadurch gekennzeichnet, dass das oder jedes Spreizelement angeordnet ist, um die Kraft waagrecht aufzubringen, um die modularen Elementen in der mindestens einen Reihe in einem Bereich oberhalb der Öffnung ausreichend zusammenzudrücken, um ein Zusammenfallen der mindestens einen Reihe in dem Bereich oberhalb der Öffnung, wenn andernfalls nicht abgestützt, zu verhindern,
und dass die Wand oberhalb der Öffnung durch die mindestens eine Reihe gegen ein Zusammenfallen abgestützt ist.

6. Anordnung nach Anspruch 5, wobei das mindestens eine Spreizelement konfiguriert ist, um in einer senkrechten Fuge zwischen zwei aneinander grenzenden Ziegelsteinen in einer Reihe von Ziegelsteinen eingesetzt zu werden.

7. Anordnung nach Anspruch 5 oder 6, wobei mehrere Spreizelemente benutzt werden.

8. Anordnung nach Anspruch 7, wobei mehrere Spreizelemente in mehreren Reihen eingesetzt werden.

Revendications

1. Procédé permettant de former une ouverture dans un mur existant (10) formé à partir d'éléments modulaires, les éléments modulaires étant des briques ou similaires, comportant :

l'étape consistant à insérer au moins un élément extensible (40) dans au moins un cours desdits éléments modulaires ;
l'étape consistant à faire s'étendre le ou chaque élément extensible de manière à exercer une forme sur les éléments modulaires dans ledit au moins un cours ;
et puis l'étape consistant à retirer des éléments modulaires par en dessous dudit au moins un cours pour former l'ouverture ;
caractérisé en ce que la force est exercée à l'horizontale pour comprimer suffisamment ensemble les éléments modulaires dudit au moins un cours dans une région située au-dessus de l'ouverture pour empêcher ledit au moins un cours dans la région située au-dessus de l'ouverture de s'affaisser alors qu'il est autrement non supporté, et ledit au moins un cours est utilisé pour supporter le mur situé au-dessus de l'ouverture contre tout affaissement.

2. Procédé selon la revendication 1, dans lequel les éléments modulaires sont des briques, et ledit au moins un élément extensible est inséré dans ledit au moins un cours en retirant du mortier d'un joint vertical entre deux briques adjacentes et puis en insérant l'élément extensible dans le joint vertical.

3. Procédé selon la revendication 1 ou la revendication 2, dans lequel une pluralité desdits éléments extensibles sont utilisés.

4. Procédé selon la revendication 3, dans lequel les éléments extensibles sont insérés dans une pluralité desdits cours.

5. Agencement comportant :

un mur (10) formé à partir d'éléments modulaires, les éléments modulaires étant des briques ou similaires ;
une ouverture formée dans le mur en dessous d'au moins un cours desdits éléments modulaires ; et
au moins un élément extensible (40) agencé dans ledit au moins un cours d'éléments modulaires et étendu de manière à exercer une force

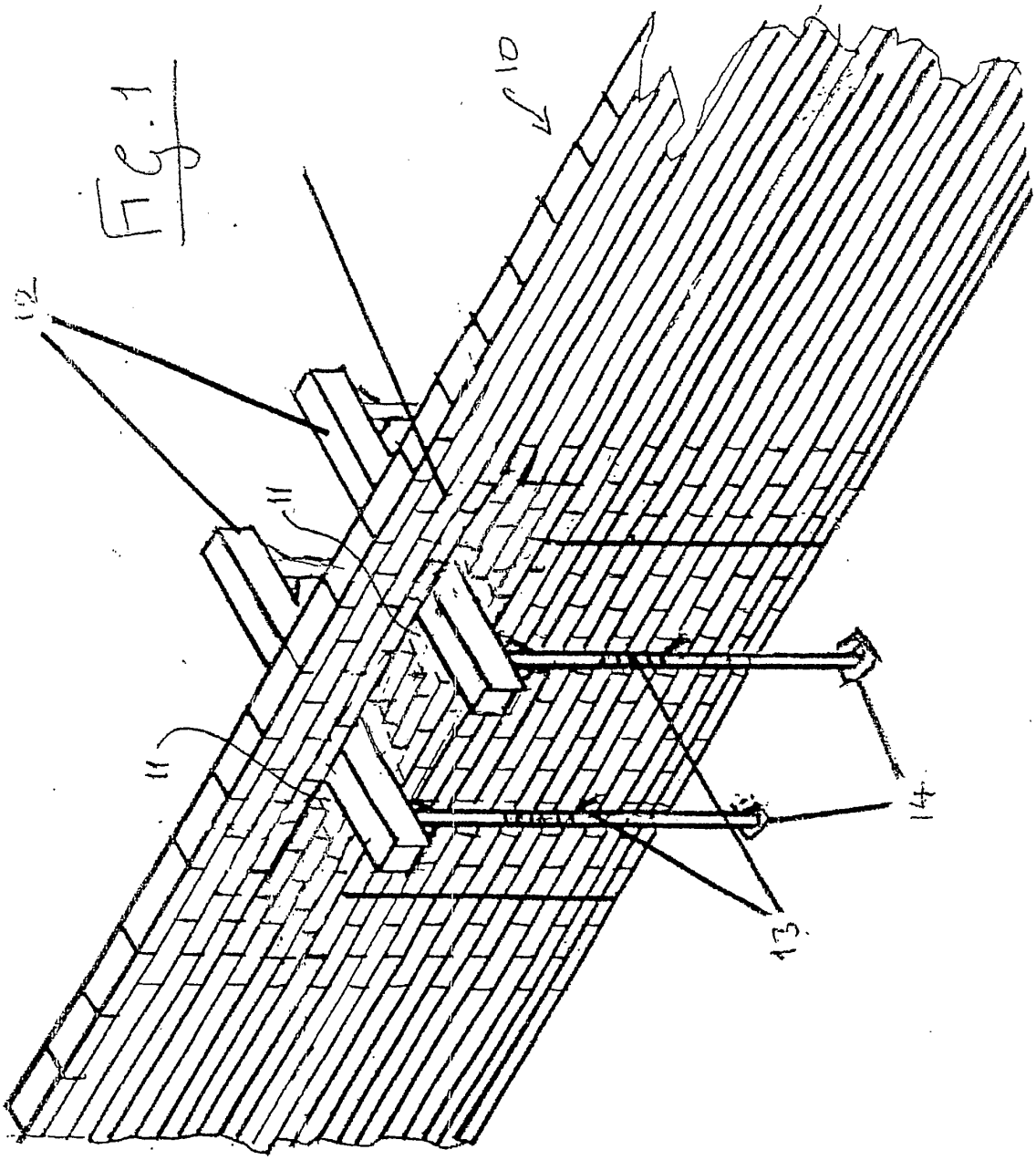
sur les éléments modulaires dans ledit au moins un cours ;
caractérisé en ce que le ou chaque élément extensible est agencé pour exercer la force à l'horizontale de manière à comprimer suffisamment ensemble les éléments modulaires dudit au moins un cours dans une région située au-dessus de l'ouverture pour empêcher ledit au moins un cours dans la région située au-dessus de l'ouverture de s'affaisser alors qu'il est autrement non supporté,
et le mur situé au-dessus de l'ouverture est supporté contre tout affaissement par ledit au moins un cours.

6. Agencement selon la revendication 5, dans lequel ledit au moins un élément extensible est configuré pour être inséré dans un joint vertical entre deux briques adjacentes dans un cours de briques.

7. Agencement selon la revendication 5 ou la revendication 6, dans lequel une pluralité desdits éléments extensibles sont utilisés.

8. Agencement selon la revendication 7, dans lequel les éléments extensibles sont insérés dans une pluralité desdits cours.

Fig.1



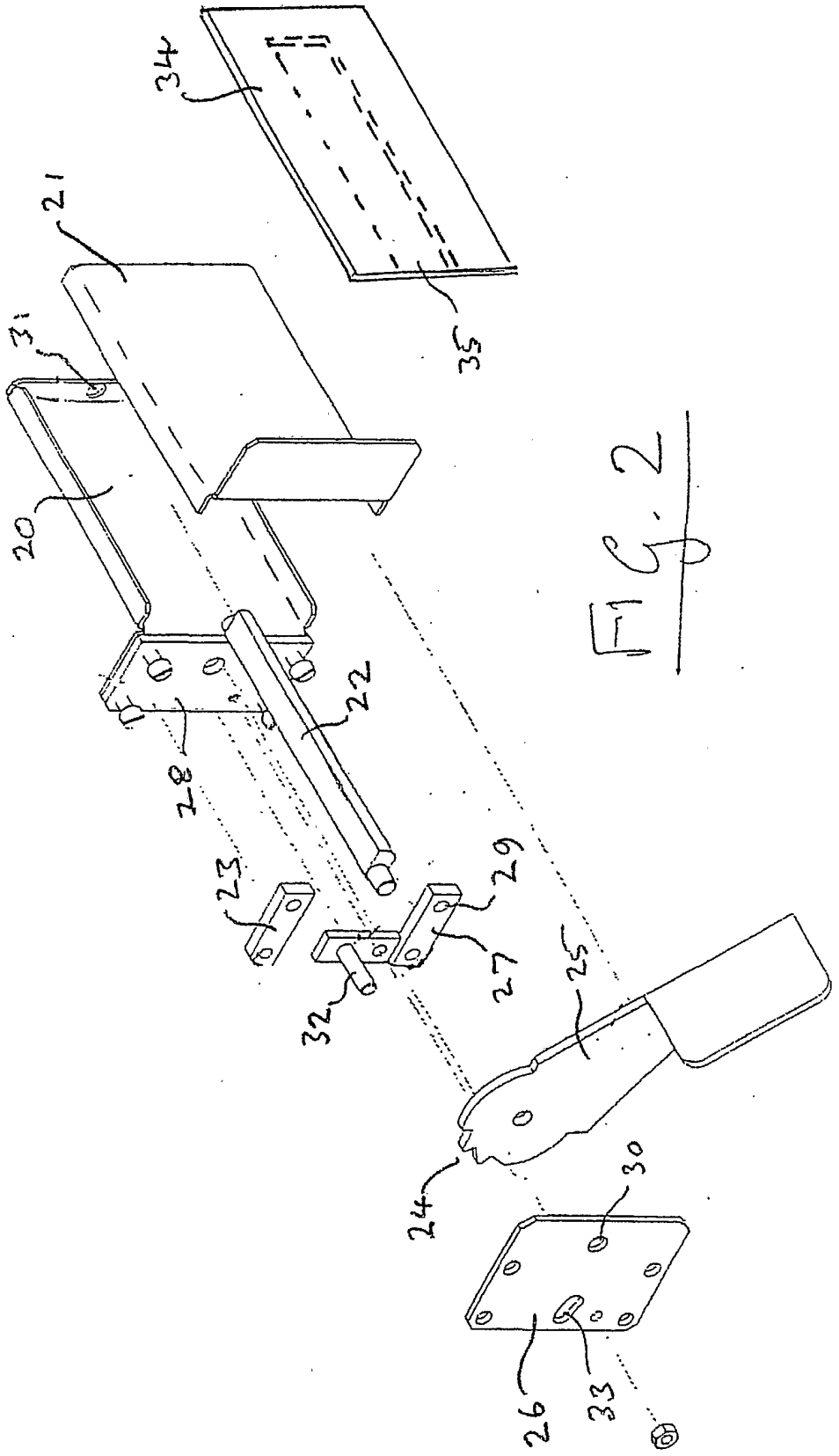


FIG. 2

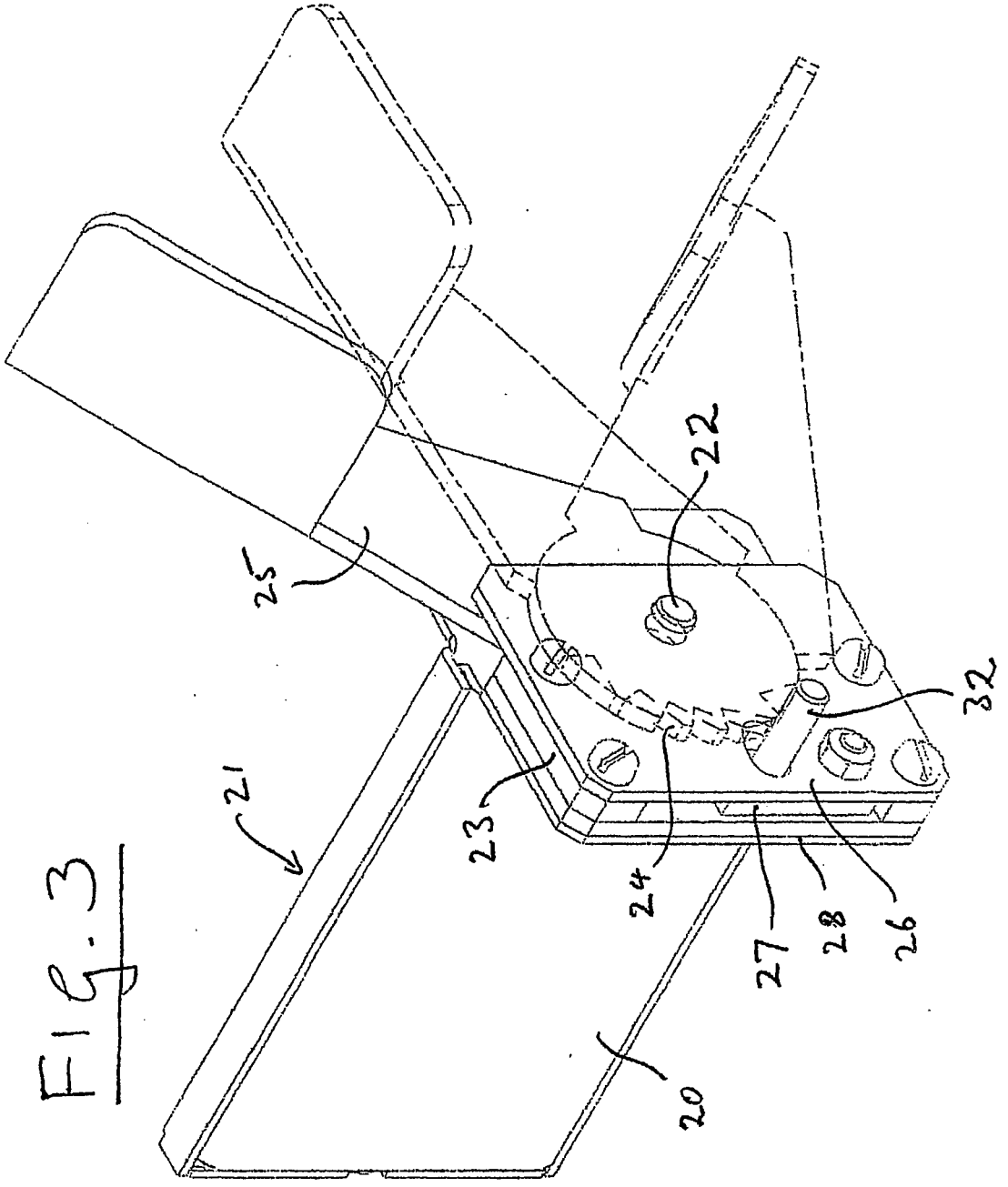


FIG. 3

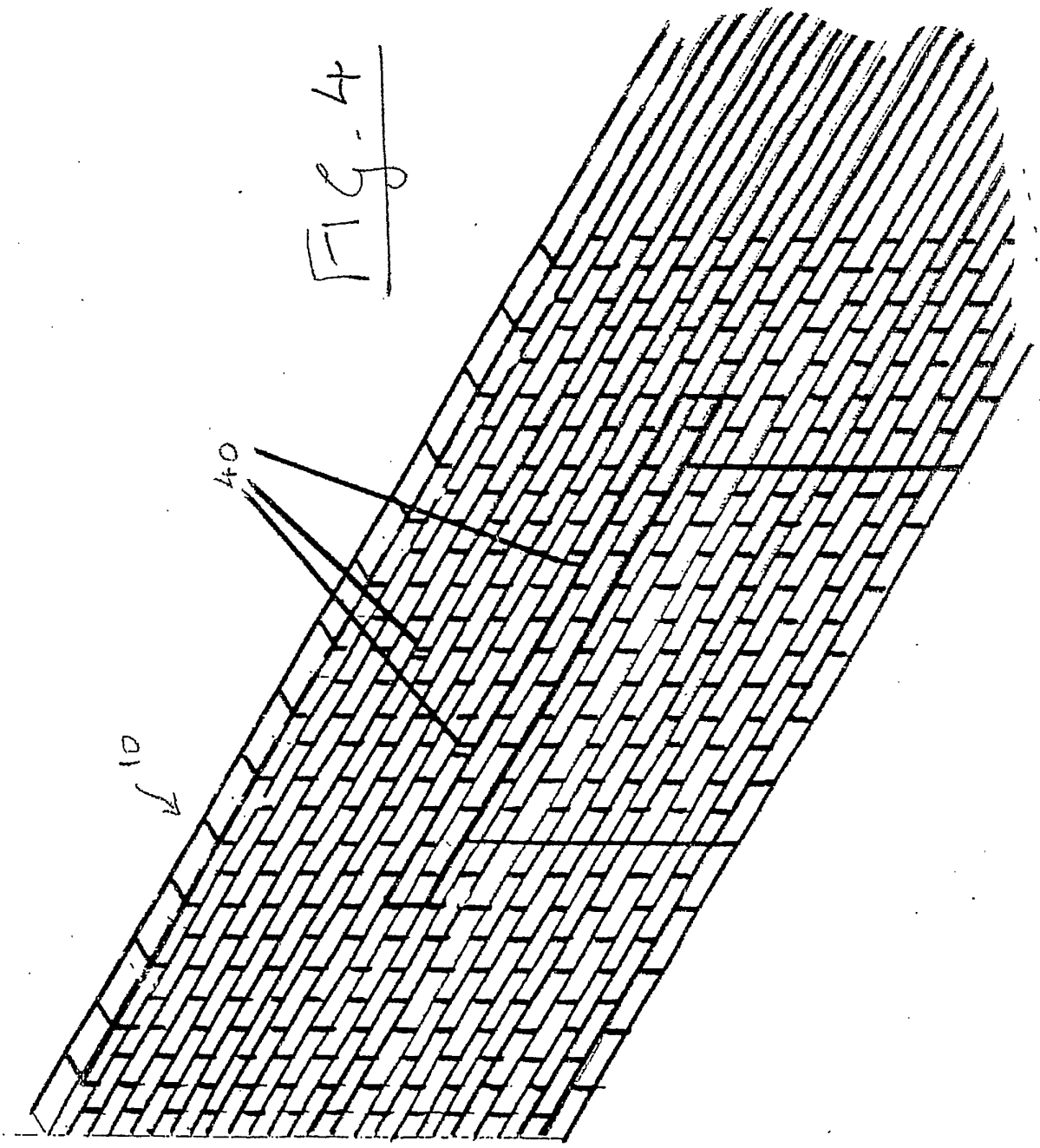


Fig. 4

REFERENCES CITED IN THE DESCRIPTION

This list of references cited by the applicant is for the reader's convenience only. It does not form part of the European patent document. Even though great care has been taken in compiling the references, errors or omissions cannot be excluded and the EPO disclaims all liability in this regard.

Patent documents cited in the description

- GB 2237320 A **[0009]**
- GB 2254362 A **[0009]**