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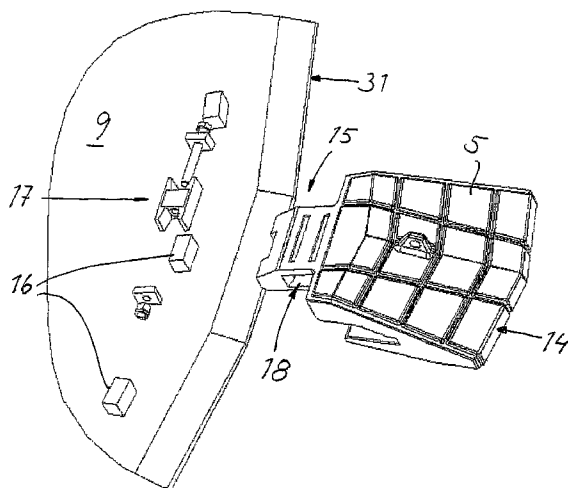
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(54) Title: DEVICE FOR SECURING A LOADER BUCKET TOOTH, A LOADER BUCKET, A SECURING UNIT FOR SECURING A LOADER BUCKET TOOTH AND A LOADER BUCKET TOOTH.



(57) Abstract: A device for securing a loader bucket tooth (2 - 8) to a front edge (31) of a loader bucket (1), wherein a rear upper part (15) of the tooth, in a using position on the bucket, together with a retaining element (16) which is fastened so as to extend from an inside of a bucket plate, forms a seat (32) for receiving a securing unit (17) having two locking elements (19, 20) that are displaceable apart so as to provide a tightening action on the tooth against the front edge, and wherein the locking elements are interconnected over a resilient element 21. The seat (32) is formed in a retaining channel (18) extending essentially in parallel with said bucket plate, and the securing unit (17) includes two wedge-shaped members (24, 25) that are relatively displaceable by means of a tightening means (23) and are positioned between the locking elements (19, 20) so as to co-operate with them for providing said tightening action. The invention also concerns a loader bucket, a securing unit and a loader bucket tooth.

WO 2007/129946 **PCT/SE2007/000368**
DEVICE FOR SECURING A LOADER BUCKET TOOTH, A
LOADER BUCKET, A SECURING UNIT FOR SECURING A
LOADER BUCKET TOOTH AND A LOADER BUCKET TOOTH

FIELD OF THE INVENTION

The invention concerns device in a loading and construction
5 vehicle and in particular a device for securing a loader
bucket tooth according to the preamble of claim 1, a securing
unit according to the preamble of claim 11, a loader bucket
tooth according to the preamble of claim 16, and a loader
bucket.

10

BACKGROUND OF THE INVENTION

From US-A-4 748 754 is previously known an arrangement
according to the preamble of claim 1. The shovel teeth are
fastened to a digging edge by a hook-like projection engaging
15 under the edge and a longer protrusion having engagement means
being fixed to the upper surface of the shovel edge.

For fastening purposes, a securing member is inserted
perpendicular to the shovel upper surface. The securing member
is comprised of shell-like outer parts and an intermediate
20 resiliently compressible layer. A barb element on the securing
member prevents it from sliding out from the pocket. The
previously known arrangement is, however, not completely
reliable for operation in the very demanding environments such
as rock loading sites and mines.

25

AIM AND MOST IMPORTANT FEATURES OF THE INVENTION

It is therefore an aim of this invention to provide a solution
to the problems encountered with the background art and in
particular to present a reliable and yet easily handled
30 solution. This aim is obtained by the features of the
independent claims.

By the seat being formed in a retaining channel extending
essentially in parallel with a bucket bottom plate, the

securing unit will be easily installed as well as protected from loaded material. The influence on the very bucket is also minimized.

5 Providing two wedge-shaped members co-operating with tightening means ensures firm and secure locking of the tooth to the bucket and allows that the desired tightening force of the tooth against the bucket front edge is obtained.

10 By the width of the seat being less than the width of the secure unit, in its unloaded state, secure and accurate positioning of the securing unit is ensured.

By the seat being quadrangular and being partially limited by abutment surfaces, a kind of snap-in function is obtained when positioning the securing unit through the channel into the seat.

15 Further features and advantages are achieved in respect of the additional independent and dependent claims, which will be apparent from the following description of embodiments.

BRIEF DESCRIPTION OF DRAWINGS

20 The invention will be described in greater detail with reference to the annexed drawings wherein:

Fig. 1 shows a loader bucket with teeth according to the invention,

25 Fig. 2 shows a loader bucket tooth in a process of being applied to a front edge of a loader bucket,

Fig. 3 shows a securing unit in an active position with parts of a tooth in phantom for better visualization,

Fig. 4 shows a securing unit in greater detail, and

30 Fig. 5 shows a side view of a loader bucket tooth according to the invention.

DESCRIPTION OF EMBODIMENT

The loader bucket 1 in Fig. 1 is intended for loading abrasive material such as rock fragments, ore etc. At its front bottom edge the bucket 1 is provided with a set of teeth 2 - 8 covering the entire front edge with side teeth 2, 8, straight middle teeth 3, 4, 6, 7 and a slightly pointed centre tooth 5. All teeth have the same arrangement for securing them to the bucket.

Teeth are applied to the front edge of the loader bucket bottom plate 9 and in the shown embodiment there are side edges 12 and 13 that comprise forward extensions of loader bucket side plates 10 and 11 respectively. In a modified embodiment, teeth corresponding to the teeth 2 - 8 might be positioned also on the side edges 12 and 13 respectively.

The loader bucket 1 is attached to a loader vehicle over attachment means that are per se previously known and therefore not further described here.

In Fig 2, the centre tooth 5 is shown with a frontal edge 14 and a rear upper part 15, which is provided with a retaining channel 18 for a securing unit 17. The securing unit is adapted to secure the tooth 5 to a front edge 31 of the bucket by providing a tightening action against a retaining element 16 which is fastened by e.g. welding and projects upwardly from the plate including the front edge 31.

In Fig. 3, the securing unit 17 is shown positioned with one side against a surface of the retaining element 16 and the other side against two spaced apart side members being parts of the rear upper part of the tooth.

A seat 32 for accommodating the securing unit 17 is comprised of recesses in the retaining channel 18 in such a way that four abutment surfaces 26 securely hold the securing unit 17 in place. The securing unit is pressed into the seat 32 inside the retaining channel 18 via an opening 27 which is

outwardly widening (inwardly contracting) so as to facilitate insertion of the securing unit.

In the applied position, in use of the arrangement, the force $2F$ is transmitted to the retaining element 16, whereas
5 the forces F are transmitted to each of two spaced apart load accepting side members of the tooth.

Fig. 4 shows the securing unit 17 in more detail. In particular it includes two locking elements 19 and 20 which are interconnected over a rubber block 21. Wedge-shaped
10 members 24 and 25 are positioned between the locking elements 19 and 20 so as to have inclined surfaces co-operating with inclined surfaces on each of the locking elements.

A tightening means 23 which is comprised of screw and nut means extends through holes in the wedge shaped members 24 and
15 25 and through a hole 22 in the rubber block 21. Tightening of the screw and nut means 23 results in repositioning the wedge shaped members 24 and 25 in such a way that the locking elements 19 and 20 are urged apart in order to achieve a
20 tightening action to elements positioned on the outside of the locking elements 19 and 20.

It should be noticed, that when positioning the securing unit 17 into the retaining channel 18, either the wedge-shaped members 24 and 25 and the tightening means are removed. That way only the unit including the locking elements 19 and 20 and
25 the rubber block 21 is pressed into the seat 32 in the retaining channel 18. After that the wedge-shaped members 24 and 25 and the tightening means will be positioned.

It is also possible to position the securing unit 17 with the wedge-shaped members spread so far apart that the locking
30 elements are free to be pressed together so as to be able to pass through the most restricted portion of the retaining channel 18.

Fig. 5 shows the centre tooth 5 in a side view showing the rear upper part 15 with the retaining channel 18 and a bucket edge receiving groove 30 for receiving the front edge of the bucket. The tooth 5 has a hook like projection 29 which in operation engages under the plate forming the front edge of the bucket.

Grooves are provided longitudinally and transversely on the upper and front sides of the tooth 5, for facilitating the sliding movement of the tooth through the material to be loaded.

The invention can be modified within the scope of the following claims. The securing unit can be modified such that only one of the locking elements has inclined surfaces so as to co-operate with wedge shaped members having an inclined surface on one side only.

The rubber block 21 in Fig. 4 can be exchanged for other resilient elements, including spring acting metallic elements, and can be free with respect of the locking elements.

It is also within the scope of the invention to have a wedge-action in the opposite direction to what is shown, such that increased distance between the wedge shaped members gives the spacing apart of the locking elements.

The teeth can be shaped differently, for example such that the teeth of the bucket are spaced apart as is normal with respect of digging buckets.

The shape of the retaining channel and the seat for the securing unit can be different, for example without the abutment surfaces even if the solution with at least two abutment surfaces is preferred. The retaining channel does not have to be outwardly widening.

The invention has been shown in the figures and been described above with the main part of the retaining channel in the bucket tooth and a retaining element on the bucket. Also

the inverted solution is, however, within the frame of the invention, i.e. e.g. a solution wherein on the bucket is fixed a sleeve-shaped retaining housing with a receiving channel for a hook-shaped portion with a retaining element on the rear part
5 of the tooth. The seat will in that case include i.a. sidewardly positioned abutment surfaces on the retaining housing which is fixed (preferably welded) to the bucket.

Claims:

1. Device for securing a loader bucket tooth (2 - 8) to a front edge (31) of a loader bucket (1), wherein a rear upper part (15) of the tooth, in a using position of the bucket, together with a retaining element (16) which is fastened so as to extend from an inside of a bucket plate, forms a seat (32) for receiving a securing unit (17) having two locking elements (19, 20) that are displaceable apart so as to provide a tightening action on the tooth against the front edge, and wherein the locking elements are interconnected over a resilient element (21),

characterized in

- that the seat (32) is formed in a retaining channel (18) extending essentially in parallel with said bucket plate, and
- that the securing unit (17) includes two wedge-shaped members (24, 25) that are relatively displaceable by means of tightening means (23) and are positioned between the locking elements (19, 20) so as to co-operate with them for providing said tightening action.

2. Device according to claim 1, **characterized in** that the resilient element (21) is one from the group: a block of rubber or rubber-like material, a metal spring.

3. Device according to claim 1 or 2, **characterized in** that the width of the seat (32) is less than the width of the securing unit (17) in an unloaded state as seen in a direction of said tightening action.

4. Device according to claim 3, **characterized in** that the seat is generally quadrangular and is partially limited, in the

channel direction, by abutment surfaces (26) at at least two of its corners.

5 5. Device according to claim 4, **characterized in** that the areas of the corners of the seat are part of the rear upper part of the tooth.

6. Device according to any of the claims 1 - 5, **characterized in** that said tightening means is a screw and a nut means.

10 7. Device according to any of the claims 1 - 6, **characterized in** that each one of the two wedge-shaped members (24, 25) has two inclined surfaces co-operating with correspondingly inclined surfaces on each one of the locking elements (19, 20).

15 8. Device according to any of the claims 1 - 7, **characterized in** that the securing unit (17) includes the two locking elements, the resilient element, the two wedge-shaped members and the tightening means is one integral unit which is insertable into the channel (18).

20 9. Device according to any of the claims 1 - 7, **characterized in** that the channel has outwardly widening openings (27) to facilitate insertion of the securing unit.

10. Loader bucket, **characterized in** that it includes a device according to any of the claims 1 - 9.

30 11. Securing unit (17) for securing a loader bucket tooth (2 - 8) to a front edge of a loader bucket (1), wherein a rear upper part of the tooth, in a using position of the bucket, together with a retaining element which is fastened so as to

extend from an inside of a bucket plate, forms a retaining channel (18) for receiving the securing unit (17) which has two locking elements that are displaceable apart so as to provide a tightening action on the tooth against the front edge, and wherein the locking elements are interconnected over a resilient element (21),

characterized in

- that the securing unit includes two wedge-shaped members (24, 25) that are relatively displaceable by means of tightening means (23) and are positioned between the locking elements so as to co-operate with them for providing said tightening action.

12. Unit according to claim 11, **characterized in** that the resilient element (21) is one from the group: a block of rubber or rubber-like material, a metal spring.

13. Unit according to claim 11 or 12, **characterized in** that the tightening means (23) is a screw and a nut means.

14. Unit according to any of the claims 11 - 13, **characterized in** that each one of the two wedge-shaped members has two inclined surfaces co-operating with correspondingly inclined surfaces on each one of the locking elements.

15. Unit according to any of the claims 11 - 14, **characterized in** that the securing unit (17) includes the two locking elements, the resilient element, the two wedge shaped members and the tightening means is one integral unit which is insertable into the channel.

16. Loader bucket tooth (2 - 8) for securing to a front edge of a loader bucket (1), wherein a rear upper part of the

tooth, in a using position on the bucket, together with a retaining element which is fastened so as to extend from an inside of a bucket plate, forms a seat (32) for receiving a securing unit (17) having two locking elements that are
5 displaceable apart so as to provide a tightening action on the tooth against the front edge, **characterized in**

- that the seat (32) is formed in a retaining channel (18) extending essentially in parallel with said bucket plate, and
- that the width of the seat (32) is less than the width of
10 the securing unit (17) in an unloaded state as seen in a direction of said tightening action.

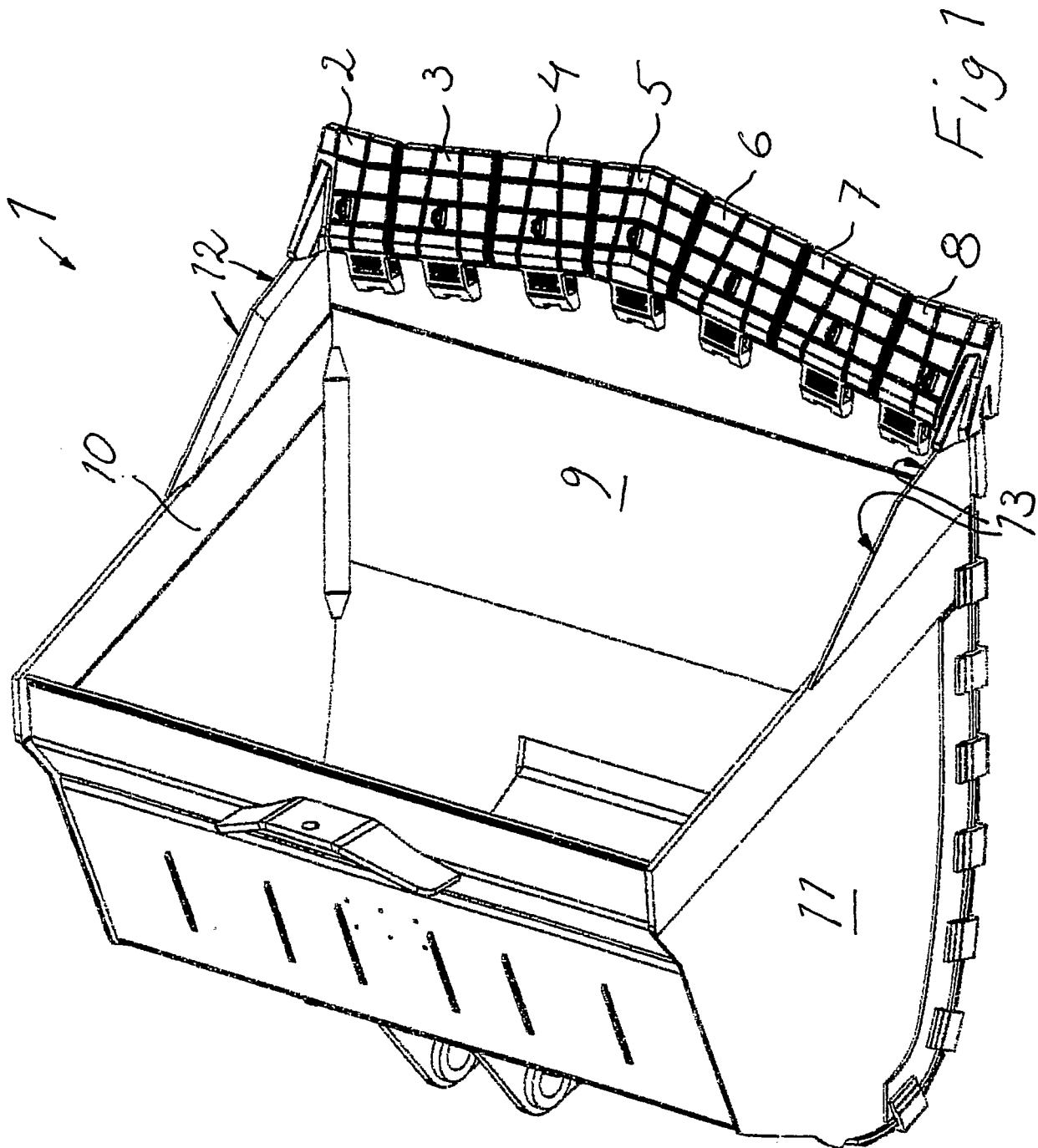
17. Tooth according to claim 16, **characterized in** that the seat (32) is generally quadrangular and is partially limited,
15 in the channel direction, by abutment surfaces (26) at at least two of its corners.

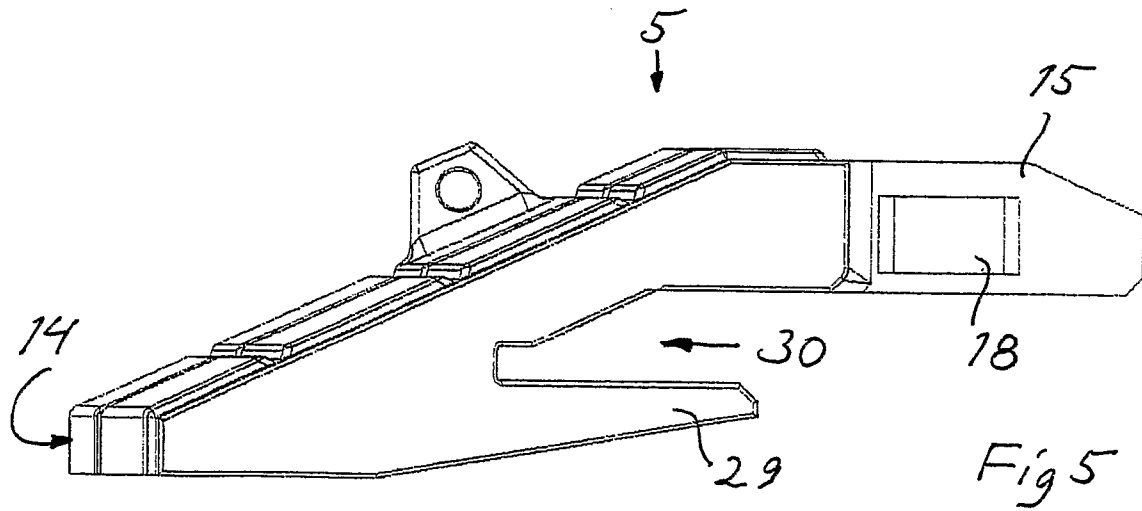
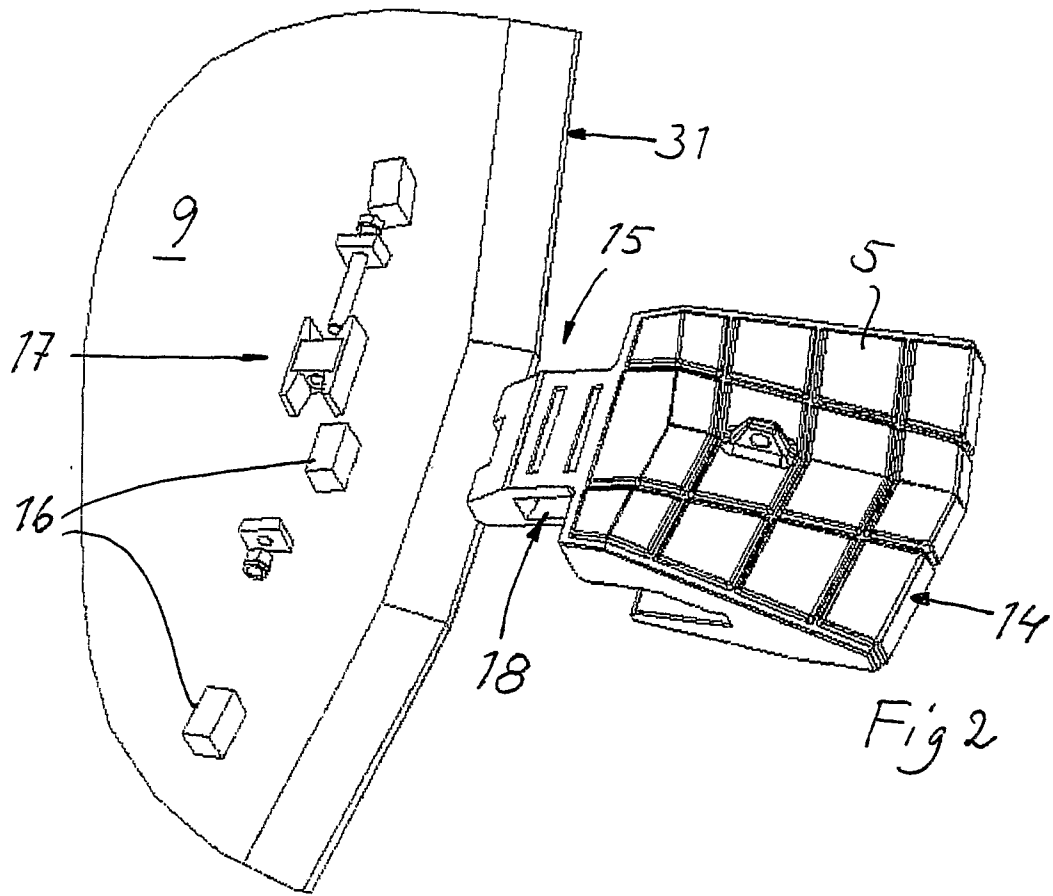
18. Tooth according to claim 16, **characterized in** that the areas of the corners of the seat are part of the rear upper
20 part of the tooth.

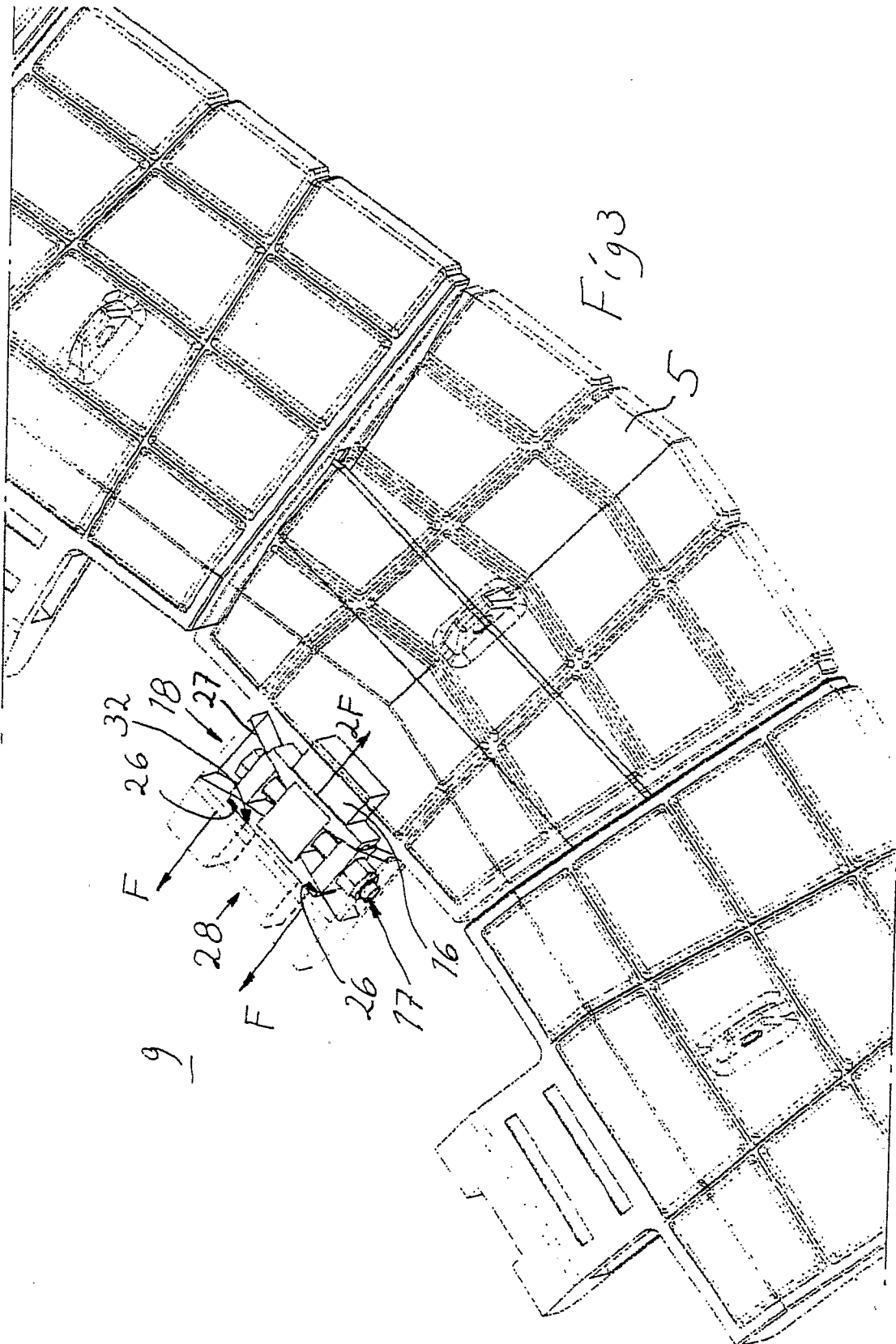
19. Tooth according to any of the claims 16 - 19, **characterized in** that the channel has outwardly widening openings (27) to facilitate insertion of the securing unit.
25

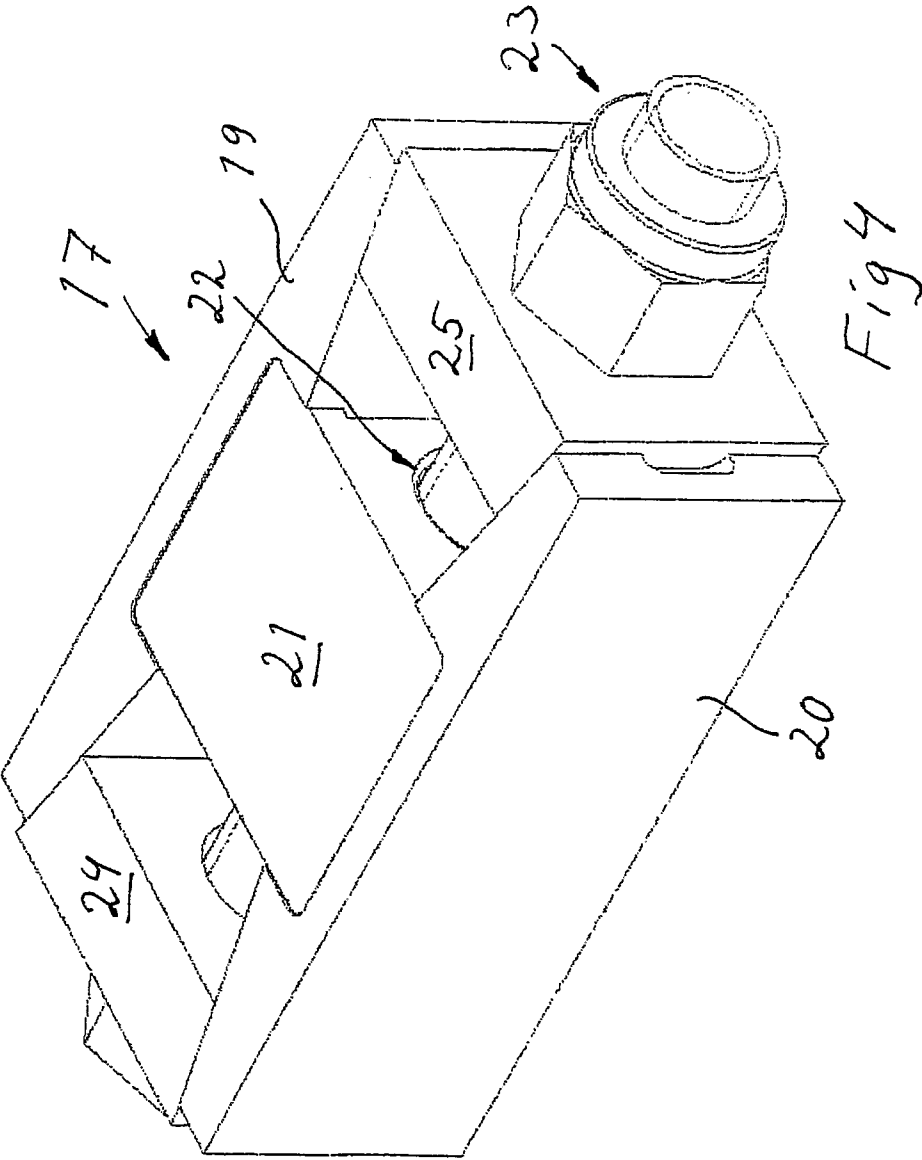
20. Tooth according to any of the claims 16 - 19, **characterized in** that the rear upper part of the tooth has a rearward directed opening (28) from the seat, said opening having dimensions allowing passage of the retaining element
30 when sliding the tooth rearwardly over the bottom front edge of the bucket.

21. Tooth according to any of the claims 16 - 20,
characterized in a hook-like projection (29) extending
rearward for engaging under the bucket front edge.









INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2007/000368

A. CLASSIFICATION OF SUBJECT MATTER

IPC: see extra sheet

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC: E02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-INTERNAL, WPI DATA, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4748754 A (SCHWAPPACH), 7 June 1988 (07.06.1988), figures 1,2, abstract --	1-21
A	WO 9501481 A1 (KEECH CASTINGS AUSTRALIA PTY. LTD), 12 January 1995 (12.01.1995), figures 1-3, abstract --	11-15
A	FR 2175120 A (AKTIEBOLAGET BOFORS), 19 October 1973 (19.10.1973), figures 1,2 --	1-21
A	US 5778571 A (PASQUALINI ET AL), 14 July 1998 (14.07.1998), figures 31,32, abstract --	1-10,16-21

☒ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

9 August 2007

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE2007/000368

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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A	FR 2815059 A1 (PASQUALINI C ET AL), 12 April 2002 (12.04.2002), figures 4,6,7, abstract --	1-21
A	WO 03080946 A1 (SHARK ABRASION SYSTEMSPTY LTD), 2 October 2003 (02.10.2003), figures 3-8, abstract -- -----	1-21

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Cited literature, if any, will be enclosed in paper form.

INTERNATIONAL SEARCH REPORT
Information on patent family members

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