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(71) Applicant: **Hünnebeck GmbH**
40885 Ratingen (DE)

(72) Inventor: **KLEHR, Volker**
41748 Viersen (DE)

(74) Representative: **Gille Hrabal**
Brucknerstrasse 20
40593 Düsseldorf (DE)

(54) HOOK FOR MOVING FORMWORK ELEMENTS

(57) The invention concerns a hook for moving formwork elements with an infeed mouth for receiving a frame profile of concrete formwork elements. The hook comprises a rotatably mounted retaining latch. The retaining latch can be moved back and forth between a closing position and a receiving position. In the closing position, a frame profile, which is received by the infeed mouth and thereby hold, cannot leave the infeed mouth of the hook anymore. In the receiving position, a received frame profile can leave the infeed mouth and the hook can thereby be detached from the formwork. The hook comprises an attachment means in order to attach the retaining latch for example with a chain to a crane. The retaining latch can be moved from the receiving position to the closing position by means of loading the attachment means.

It is object of the invention to develop such hook further such that in particular accident risks are minimized.

The problem is solved by a pawl, by which the retaining latch is blocked when the retaining latch is located in the closing position.

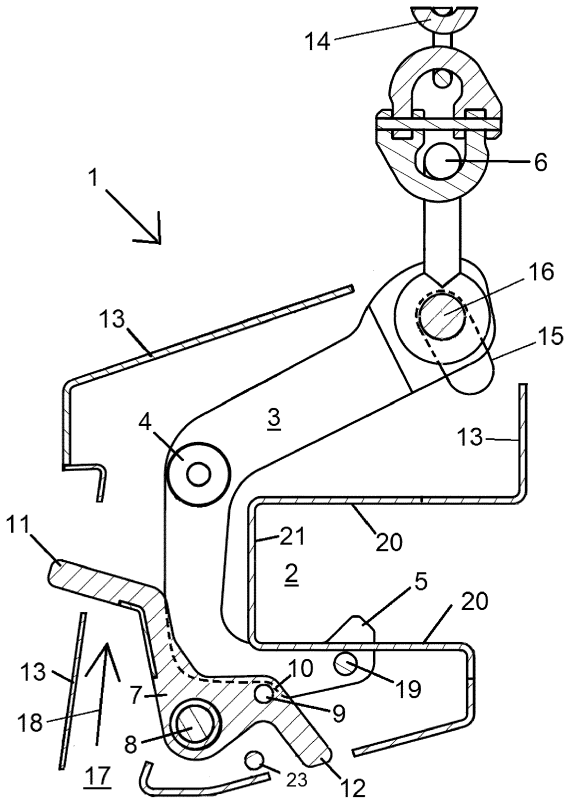

FIG. 1

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Description

[0001] The invention concerns a hook for moving formwork elements with an infeed mouth for receiving a frame profile of concrete formwork elements. The hook comprises a rotatably mounted retaining latch. The retaining latch can be moved back and forth between a closing position and a receiving position. In the closing position, a frame profile, which is received by the infeed mouth and thereby hold, cannot leave the infeed mouth of the hook anymore. In the receiving position, a received frame profile can leave the infeed mouth and the hook can thereby be detached from the formwork. The hook comprises an attachment means in order to attach the retaining latch for example with a chain to a crane. The retaining latch can be moved from the receiving position to the closing position by means of loading the attachment means.

[0002] Hooks of the above mentioned kind are known from the documents DE 31 11 634 A1 as well as WO 2010/124666 A1.

[0003] Formwork elements are known from the document WO 2014/012681 A1. Such formwork elements are used in conjunction with anchoring systems comprising anchor rods for example for the production of concrete walls. Formwork element comprise on the front side a formwork facing and on the back side frame profiles for supporting the formwork facing. Such formwork elements are set up for example by means of a crane, disassembled after the curing of the concrete and subsequently moved on demand. The hook of such kind as mentioned at the beginning serves the attachment of a formwork element to a crane or to another set-up and/or transport device for setting up, disassembling and/or moving.

[0004] It is object of the invention to create a hook that can be operated easily with high safety.

[0005] For solving the problem, a hook comprises the features of the first claim. The subject-matter of the dependent claims concern improved embodiments. Insofar as not indicated differently in the following, the features known from the state of the art that were mentioned in the beginning can be alone or in arbitrary combination be combined with the invention.

[0006] For solving the problem, a hook for moving formwork elements comprises an infeed mouth (infeed orifice) for receiving a frame profile of concrete formwork elements. There is a retaining latch, which can be moved back and forth between a closing position and a receiving position. By moving the retaining latch from the receiving position to the closing position, an infeed section of the infeed mouth is constricted for holding a frame profile. Thereby, the frame profile being received in the infeed mouth cannot leave the infeed mouth anymore. There is an attachment means for an attachment of the retaining latch. By means of the attachment means, the retaining latch can for example be connected to a chain of a crane. The attachment means comprises in a preferred embodiment a chain. The retaining latch is moved from the receiving position to the closing position by means of loading (applying a load to) the infeed mouth and a therewith accompanying load on the attachment means. The preferably provided chain of the hook can be grasped manually in order induce by hand a sufficient strong pull in the retaining latch, which brings the retaining latch to the closing position. The infeed mouth is loaded, when the infeed mouth supports a load like a formwork element. There is a pawl for blocking the retaining latch in the closing position when the pawl was moved to its blocking position. The retaining latch cannot leave its closing position when the pawl blocks the retaining latch. The retaining latch can thus not leave its closing position for two different reasons when a load is supported (born) by the hook. Firstly, supporting of the load prevents that the retaining latch can leave its closing position unintentionally (not as intended). At the same time, this is prevented by the pawl. Although providing a pawl does not appear necessary at first view and thus wasted, because already supporting the load prevents that the retaining latch can leave its closing position unintentionally. However, a problem may arise when the load, like usually a formwork element, is put on the ground. Then, the supporting of the load is omitted at least for short time, which holds the retaining latch in its closing position. If the formwork then unintentionally releases from the hook, because the retaining latch unintentionally got to its receiving position, the formwork may fall over. As formwork elements, which are hold, carried and moved by a crane, are very big and heavy, a high safety risk would be involved with such an accident. Fatal accidents could be the consequence. This is avoided by the pawl.

[0007] The force, which has to be spent to bring the retaining latch from the receiving position to the closing position, is preferably adjusted in a way that at least the own weight (tare weight) of the hook has to be overcome. By means of this embodiment, it is achieved that the hook can be hanged up for example to a crane without immediately taking the closing position. Thereby, hooking in of a load is particularly easy.

[0008] In one embodiment, the pawl comprises an end, which reaches out of a housing of the hook when the pawl is located in its blocking position. The end does not reach out of the housing of the hook when the pawl is located in a releasing position, in which the retaining latch is not blocked by the pawl. Thereby, an optical aid is provided, which indicates the position of the pawl in a way that it is clearly recognizable from outside. Preferably, this end is therefore colored, namely particularly green. When the particularly green end reaches out of the housing and is thus visible also from a greater distance, it is thereby indicated that the retaining latch is blocked by the pawl and there is thus no risk of accident arising from the load, which is received by the hook.

[0009] The before mentioned end reaches sidewards out of the housing when the pawl is located in its blocking position. This end may in particular be used to move the pawl from its blocking position to its releasing position by

grasping the end. The sidewards arrangement is particularly suitable and comfortable for such manual operation. Sidewards refers to a sideward wall of the housing when the hook is attached and arranged as intended (according to predefined normal operation) for supporting a load, thus for example attached to a lower end of a chain of a crane.

[0010] In one embodiment, the pawl comprises an end, which reaches out of a housing of the hook when the pawl is located in a releasing position, in which the retaining latch is not blocked by the pawl. The end does not reach out of the housing of the hook when the pawl is located in its blocking position. An optical aid is thereby made available, which indicates the position of the pawl in a way that it is clearly recognizable from outside. Preferably, this end is therefore colored, namely particularly red. When the particularly red end reaches out of the housing and is thus visible also from a greater distance, it is thereby indicated that the retaining latch is not blocked by the pawl and there is thus a risk of accident arising from the load, which is received by the hook.

[0011] The before mentioned particularly red colored the end reaches out of the housing preferably downwards when the pawl is located in its releasing position. The downwards reaching out is of particular advantage, because a reaching out of this end is visible from any location. Because the view of a reaching out end cannot be blocked by a housing wall when the hook is attached as intended for example to the chain of a crane. Downwards reaching out of a housing refers to a lower wall of the housing when the hook is attached and arranged as intended for supporting a load, thus for example attached to a lower end of a chain of a crane. This lower wall is then visible to persons, which are located below the hook.

[0012] If there is an end of the pawl reaching out downwards, it does not reach out of the housing of the hook in the blocking position also especially for the reason that unintentionally release is then not possible.

[0013] In particular preferred is both a red colored end of the pawl and also a green colored end of the pawl. When the green colored end reaches out of the housing, then it is indicated that everything is fine. When the red colored end of the pawl reaches out, then the receiving position is indicated or a not intended latching respectively blockage by the pawl. Instead of green and red, also other colors may be provided. When it is up to the colored or other optical marking, in the first instance it matters that there are differences in order to allow reliable and unproblematic optical recognition of the status. Green and red are however preferred for the reason that these are typical signal colors, which stands for "everything is fine" or "caution" respectively "hazardous".

[0014] Preferably, there is a housing opening, specifically at the bottom side of the housing wall, through which an anchor rod or a flat iron can be pushed through in such a way that the pawl can be moved from its blocking position to its releasing position, when the hook is as intended attached for example to a chain to a crane. No special tool is needed. In particular in the case of formwork elements, there are basically always also anchor rods present.

[0015] In one embodiment, the opening is used to apply the hook in greater height to a load, thus in particular to a formwork respectively formwork element. In order to do so, an end of a common construction zone means such as for example an end of an anchor rod is inserted in the opening. The other end of the common construction zone means is manually moved in a suitable way in order to thereby move the hook suitably to the load or to suitably hold. The opening thus can be of double benefit as it also enables a remote release respectively a remote operation in the described manner.

[0016] Preferably, there is a plurality of support means, by means of which the housing of the hook can be supported against the retaining latch, when the retaining latch is located in its closing position. The housing comprises the infeed mouth. Punctual overloads are thereby avoided when a load is supported by means of the infeed mouth.

[0017] The support means are preferably arranged around the infeed mouth in order to further improve avoiding punctual overloads.

[0018] In one preferred embodiment, the support means comprise: a pin for pivotable mounting the retaining latch wherein the pin is mounted by means of the housing and/or a pin protruding from the retaining latch on which a lower wall of the infeed mouth can be supported and/or at least one oblong hole in a housing wall which can be supported against a protruding pin.

[0019] In one embodiment, there is at least one oblong hole in a housing wall, in which a pin of the retaining latch reaches into in order to thereby enable a rotation of the retaining latch relatively to the infeed mouth. Thereby, it can be achieved in a technically simple manner that the retaining latch is moved from the receiving position to the closing position by supporting (carrying) a load.

[0020] In one embodiment, there is at least one oblong hole in a housing wall, in which a pin of the retaining latch reaches into in order to thereby enable a rotation of the retaining latch relatively to the infeed mouth. It can thereby be achieved in a technically simple manner that the retaining latch is moved from the receiving position to the closing position by supporting a load.

[0021] The infeed mouth is formed at the upper side and at the bottom side by plane and/or parallel running walls. Upper side refers to the upper side of the infeed mouth when the hook is attached as intended for example to a chain of a crane. Bottom side refers to the lower side of the infeed mouth when the hook is attached as intended for example to a chain of a crane.

[0022] The lower wall of the infeed mouth known from the WO 2010/124666 A1, which runs substantially horizontally in an attached condition of the hook, comprises a nose at the free end. This wall is thus not plane within the meaning of the present invention. The infeed mouth is thus not formed by a plane lower wall within the mean-

ing of the present invention. The upper wall known from the WO 2010/124666 A1 runs plane but not parallel to the lower wall. The infeed mouth known from the document is thus not formed by two plane-parallel walls within the meaning of the present invention.

[0023] The plane composition of the lower wall of the infeed mouth facilitates ease of moving a frame profile into the infeed mouth and also out of it especially compared to the lower wall known from the document WO 2010/124666 A1. By means of the lower plane wall, advantages of handling thus arise. Advantageously, also the upper wall is plane in order to not hamper the handling. Having both the lower wall and also the upper wall running in parallel to each other makes it possible to allow receiving and holding a plurality of different dimensioned frame profiles. The solution known from WO 2010/124666 A1 requires compared to that a sufficiently precisely adapted frame profile in order to allow receiving and holding it.

[0024] In an advantageous embodiment, a stud is moved into the infeed mouth for the constriction of a section of the infeed mouth when the retaining latch is moved in its closing position. Preferably, the stud is moved through the lower wall of the infeed mouth into the infeed mouth. By means of the constriction it is prevented that a frame profile, which is arranged in the infeed mouth, can leave the infeed mouth. This is achieved particularly reliable when the stud is moved thought the lower wall into the infeed mouth.

[0025] The pawl is advantageously by a spring biased towards blocking position. Herewith, the safety is advantageously further increased as the pawl is supported by the spring reliably moved to its blocking position as soon as the retaining latch is located in its closing position. The retaining spring is advantageously biased by a spring towards receiving position. Herewith, it is achieved that the retaining latch is moved as intended to its opened position when being released as intended, thus no load being supported any more and the blocking lever (pawl) was moved in its releasing position. This is especially of advantage when the retaining latch is not reachable from the ground but a hook should already be detached from a load.

[0026] The invention furthermore concerns a system comprising a hook and at least two formwork elements with different dimensioned frame profiles, wherein both frame profiles can be received by the infeed mouth (2) and hold therein. Especially the infeed mouth with two plane-parallel lower and upper walls of the infeed mouth makes it possible to allow receiving and holding different frame profiles.

[0027] In the following, the invention is described in more detail based on embodiment examples.

[0028] It shows

Figure 1: a sectional view of a hook in closing position;

Figure 2: three dimensional view of the hook in closing position;

Figure 3: a sectional view of a hook in opened position.

[0029] The Figure 1 shows in a sectional view a hook 1 for moving formwork elements with an infeed mouth 2 for receiving a frame profile of formwork elements. The hook 1 comprises a retaining latch 3, which is rotatably mounted by means of pin 4. These are two pins, which are connected at opposing sidewalls of the housing and which mount a bearing shell for leg springs. The retaining latch 3 can be rotated back and forth between a closing position and a receiving position. In the closing position as shown in Figure 1 a stud 5 of the retaining latch 3 that is connected to an arm is reaching though a lower wall 20 into the infeed mouth 2 and thereby constricts an infeed section of the infeed mouth 2. A frame profile that is provided for that, which was brought in the infeed mouth 2, can then not leave the infeed mouth 2 of the hook 1 any more due to the constriction. This is prevented by the stud 5 when the stud 5 as shown in Figure 1 reaches through an opening in the lower housing wall 20 into the infeed mouth 2.

[0030] In the receiving position, a received framework profile can leave the infeed mouth 2 and the hook 1 can thus be detached from the corresponding formwork element. The retaining latch 3 comprises an attachment means 6 at an end of a second arm in form of a grommet, which can be connected to a chain 14 of a crane. When the hook 1 with a formwork element being hold by the hook 1 is lifted by means of chain 14 (as indicated in Figure 1 by upwards directed chain 14), the retaining latch 3 is loaded. By means of the loading, a torque (moment of force) is induced in the retaining latch 3, specifically in such a way that the retaining latch 3 can be rotated from its receiving position in its closing position, thus in the case of Figure 1 counterclockwise about the axis 4.

[0031] The hook 1 comprises a pawl 7 with two sidewalls, which are pivotable mounted by means of a pin 8. In the Figure 1, the front sidewall of the pawl 7 is shown and in the Figure 3 the back sidewall.

[0032] The pawl 7 being formed by two sidewalls is biased by means of a spring 24 (see Figure 3) in direction of closing position. Due to the bias, a torque is induced in the pawl 7, so that the pawl 7 can be moved from its released position, thus its releasing position, to its closing position, specifically in the case of Figure 1 counterclockwise about the pin 8. The closing position is shown in the Figure 1. The hook 1 is closed. A pin 9 protruding from an arm of the pawl 7 is then located in a bulge 10 of the retaining latch 3, whereby it is prevented that the retaining latch 3 can be rotated from its closing position to the receiving position about the pin 4.

[0033] The pawl 7 has two arms with a green colored end 11 and a red colored end 12. The end of the one arm

11 as well as the end of the other arm 12 are thus marked differently. When the pawl 7 is located in its closing position, the green colored end 11 of the one arm reaches sidewards out of the housing 13 of the hook 1 when the hook is attached as intended to a chain 14 of a crane as shown. The other red colored end 12 of the other arm then does not reach out of the housing 13. When the pawl 7 is located in its releasing position, the red colored end 12 reaches (as shown in the Figure 3) downwards out of the housing 13. The green colored end 11 then does not reach out of the housing 13. When the green colored end reaches out of the housing 13, then it can be based on it optically recognized also from greater distance that the retaining latch 3 is located in its closing position and the pawl 7 blocks the retaining latch such that the retaining latch 3 cannot leave its closing position. When the pawl 7 is located in its released position, the retaining latch 3 is not blocked. This can also be recognized from greater distant and especially also from the ground by means of the red colored end 12, which then reaches downwards out of the housing 13. This end cannot be covered by the housing 13.

[0034] When the pawl 7 is located in its blocking position, the green colored end 11 can then be manually grasped and swiveled. Thereby, the pawl 7 can be moved from its blocking position to its released position. Subsequent to that, the retaining latch 3 can be rotated to its receiving position. At the bottom side of the housing 13, there is a housing opening 17, which is dimensioned such that an anchor rod or a flat iron can be pushed through this opening 17. As indicated by an arrow 18, the opening 17 leads to the bottom side of the green colored end 11. When an anchor rod, a lath or a flat iron is pushed though the opening 17, the anchor rod or the flat iron can be pushed against the bottom side 11 of the green colored end 11 in order to thereby swivel the pawl 7 from its blocking position towards releasing position. Furthermore, the housing opening 17 enables a remote operation respectively remote release by means of an anchor rod, a lath or the like. The opening 17 is adjacent to the back wall of the hook 1 and thus arranged at a sufficiently protected location such that also for this reason an unintentionally release can be avoided. The back side is the side, which faces the infeed mouth (lies opposite to it).

[0035] Two opposing sidewalls of the hook housing 13 comprises each an oblong hole 15. An end of a pin 16 reaches into each oblong hole 15. The pin 16 leads though the retaining latch 3 and is arranged neighboring to the attachment means 6.

[0036] The oblong hole 15 limits the rotational movement of the retaining latch 3. When the retaining latch 3 is located in its closing position, the pin 16 abuts against the other end of the oblong hole 15, whereby the rotation is limited in the other direction.

[0037] A pin 23 is connected to the two opposing sides of the housing 13, which serves as stop for the red colored end 12. By means of the pin 23, the swiveling of the pawl 7 can thus be limited towards releasing position. Alternatively or additionally, this pin 23 serves the holding of a leg of the biased spring, which allows moving the pawl 7 into the blocking position by means of spring force.

[0038] A protruding pin 19 is mounted at the arm with the stud 5 of the retaining latch 3. The pin 19 supports (leans) against the housing 13 when the retaining latch 3 was moved to its closing position. The pin 19 thereby contributes to limiting the rotational movement of the retaining latch 3 towards closing position.

[0039] The infeed mouth 2 is formed by two plane-parallel walls 20 from above and below. The base of the infeed mouth 2 is bordered by a wall 21.

[0040] When the pawl 7 was moved to its releasing position and the retaining latch 3 was moved to its receiving position, the bulge 10 supports (leans) on the axis 8 of the pawl 7. This supporting (leaning) limits on the one hand the rotation of the retaining latch 3 beyond its receiving position.

[0041] The retaining latch 3 is furthermore biased by a not shown spring towards opening position.

[0042] In the retaining position, the housing 13 supports on several points on the retaining latch, whereby punctual overloads of the housing 13 are avoided and whereby the housing becomes particularly stable. A first support is carried out by the oblong hole 15, which abuts with one end on the pin 16 of the retaining latch 16 during supporting (carrying) a load, wherein the load is then hold in the infeed mouth 2. A second support is carried out by the pin 4, which is mounted by means of the sidewalls 22 of the housing 13 as can be seen from Figure 2. Furthermore, there is a support of the lower wall 20 of the infeed mouth 2 by means of the pin 19 of the retaining latch 3. Thus, three different supports are arranged around the infeed mouth in order to avoid punctual overloads.

[0043] The housing walls 13, 20, 21 and 22 are welded together. Thereby, in conjunction with the before mentioned support measures, such a stable housing is obtained that the hook 1 - as tests have shown - allows free falling from 3 meters height on a ground made of concrete without losing its functional ities.

[0044] In all, a hook for moving formwork elements is thus made available, which functions in a very reliable manner, which can be handled simply and manifold manners, and which is sufficiently secured in such a way that accident risks are minimized.

[0045] The both sidewalls of the pawl 7 are connected to each other by a plurality of pins 16 and 19. As these pins are provided for other reasons as already described, these pins 16 and 19 cover several functions, which keeps the number of parts low.

[0046] The Figure 2 shows a side view of the hook 1 on the sidewalls 22 of the housing 13. There are two opposing sidewalls 22, which both comprise an oblong hole 15, in which the pin 16 reaches into. The oblong holes 15 allows a rotation of the retaining latch 3 relatively to the housing 13, 22 and thus relatively to the infeed mouth 2, which is formed by the housing walls 20, 21.

[0047] The Figure 3 shows the hook 1 in the opened position, specifically compared to Figure 1 with a changed plane of the sectional view. In the Figure 3, the back sidewall of the pawl 7 is shown. Both sidewalls of the pawl are arranged towards both sides of the retaining latch 3.

[0048] As indicated by the hanging down chain 13, there is no load attached to hook 1, whereby the opened position of the hook is enabled. The stud 5 does then not reach out of the housing 20, which is at the same time part of the infeed mouth 2.

Claims

1. Hook (1) for moving formwork elements with an infeed mouth (2) for receiving a frame profile of concrete formwork elements, with a retaining latch (3), which can be moved back and forth between a closing position and a receiving position and which constricts an infeed section of the infeed mouth (2) for holding a frame profile by means of moving from the receiving position to the closing position, with an attachment means (6) for an attachment of the retaining latch, wherein the retaining latch (3) can be moved from the receiving position to the closing position by means of loading the infeed mouth (2), **characterized by** a pawl (7) for blocking the retaining latch (3) in the closing position when the pawl (7) was moved to its blocking position.

2. Hook according to the preceding claim, **characterized in that** the pawl (7) comprises an end (11), which reaches out of a housing (13) of the hook (1) when the pawl (7) is located in its blocking position, and which does not reach out of the housing (13) of the hook (1) when the pawl (7) is located in a releasing position, in which the retaining latch is not blocked by the pawl.

3. Hook according to the preceding claim, **characterized in that** the end (11) reaches sidewards out of the housing when the pawl (7) is located in its blocking position.

4. Hook according to one of the preceding claims, **characterized in that** the pawl (7) comprises an end (12), which reaches out of a housing (13) of the hook (1) when the pawl (7) is located in a releasing position, in which the retaining latch is not blocked by the pawl, and which does not reach out of the housing (13) of the hook (1) when the pawl (7) is located in its blocking position.

5. Hook according to the preceding claim, **characterized in that** the end (12) reaches downwards out of the housing when the pawl (7) is located in its releasing position.

6. Hook according to one of the preceding claims, **characterized in that** at least one end (11) of the pawl (7) can be manually grasped and swiveled in order to thereby move the pawl (7) from its blocking position to its releasing position.

7. Hook according to one of the preceding claims, **characterized by** a housing opening (17), through which an anchor rod or a lath can be pushed through in such a way that the pawl can be moved from its blocking position to a releasing position, wherein the pawl (7) being in the releasing position does not block the retaining latch.

8. Hook according to one of the preceding claims, **characterized by** a plurality of support means, by means of which the housing (13, 22) can be supported with the infeed mouth (2) against the retaining latch, wherein the support means are arranged preferably around the infeed mouth (2).

9. Hook according to the preceding claim, **characterized in that** the support means comprise: at least one pin (4) for pivotable mounting the retaining latch (3), wherein the pin (4) is mounted by the housing (13, 22), and/or a pin (19) protruding from the retaining latch (3), on which a lower wall (20) of the infeed mouth (2) can be supported, and/or at least one oblong hole (15) in a housing wall (22), which can be supported against a protruding pin (16).

10. Hook according to one of the preceding claims, **characterized by** at least one oblong hole (15) in a housing wall (22), in which a pin (16) of the retaining latch (3) reaches into in order to thereby enable a rotation of the retaining latch (3) relatively to the infeed mouth (2).

11. Hook according to one of the preceding claims, **characterized in that** the infeed mouth (2) is formed at the upper side or bottom side by plane and/or parallel running walls (20).

12. Hook according to one of the preceding claims, **characterized in that** a stud (5) is moved into the infeed mouth for the constriction when the retaining latch (3) is moved in its closing position.

13. Hook according to one of the preceding claims, **characterized in that** the pawl (7) is biased towards blocking position by a spring and/or the retaining latch (3) is biased towards receiving position by a spring.

14. System comprising a hook and at least two formwork elements with different dimensioned frame profiles, wherein both frame profiles can be received by the infeed mouth (2) and hold therein.

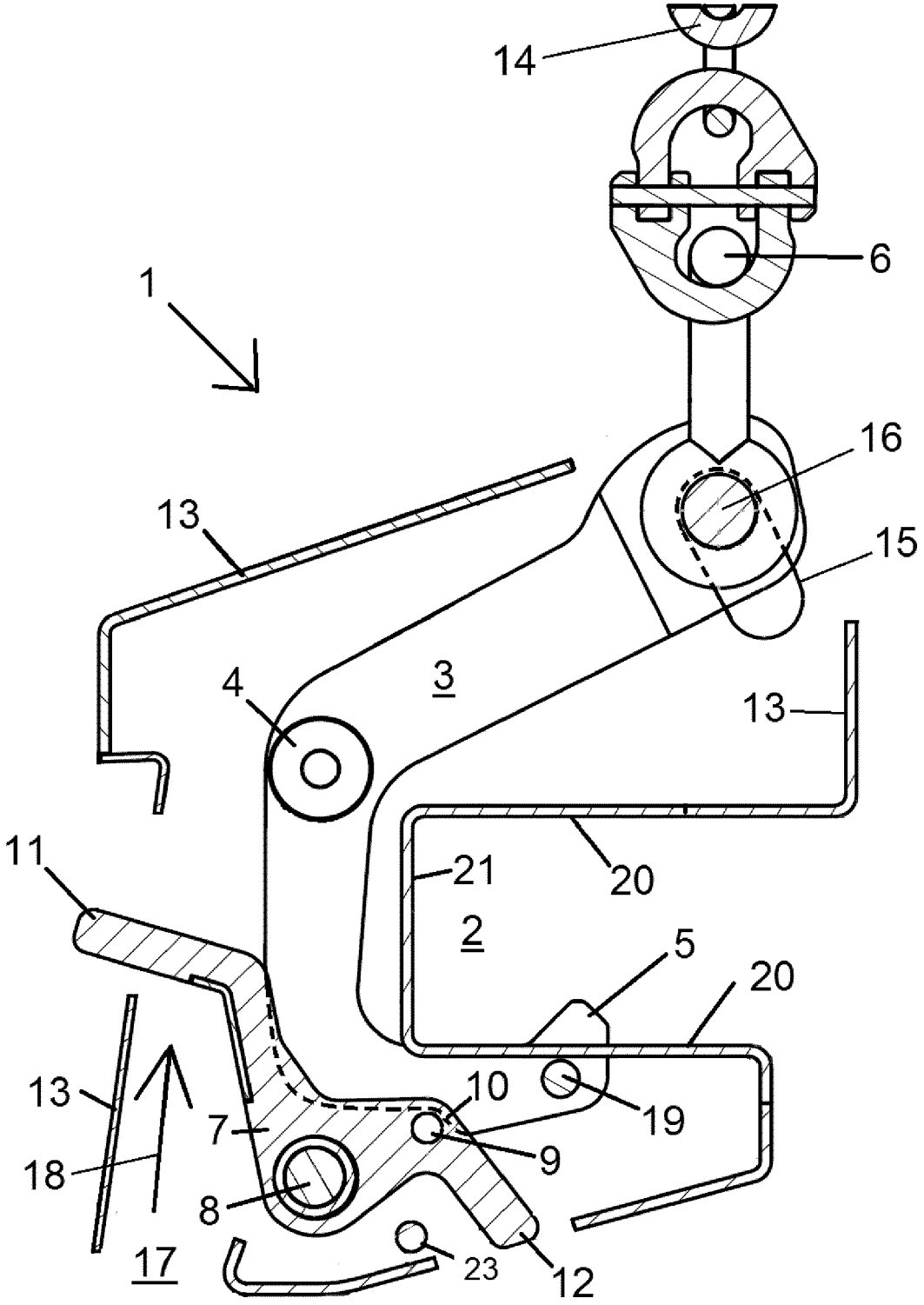

FIG. 1

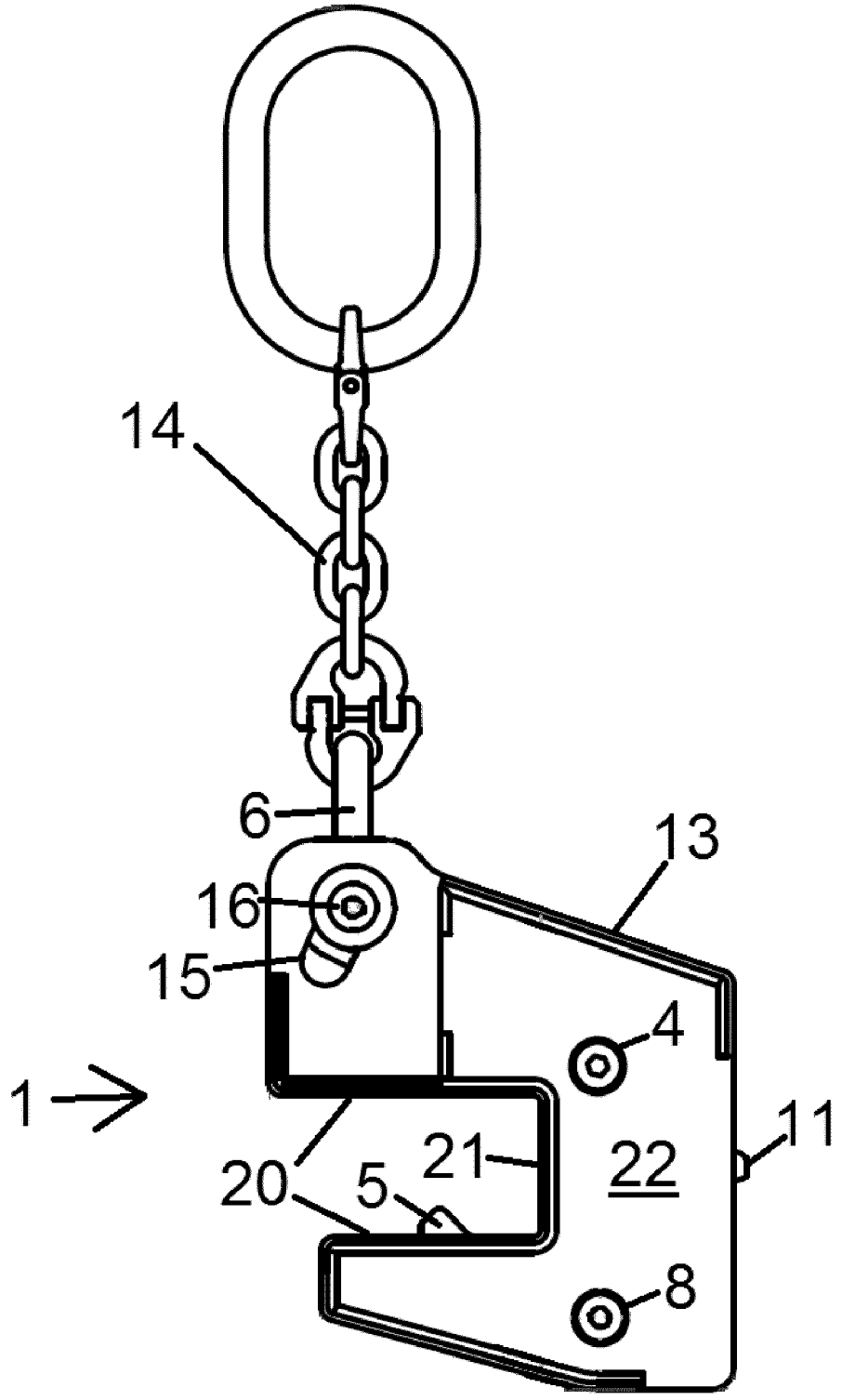

FIG. 2

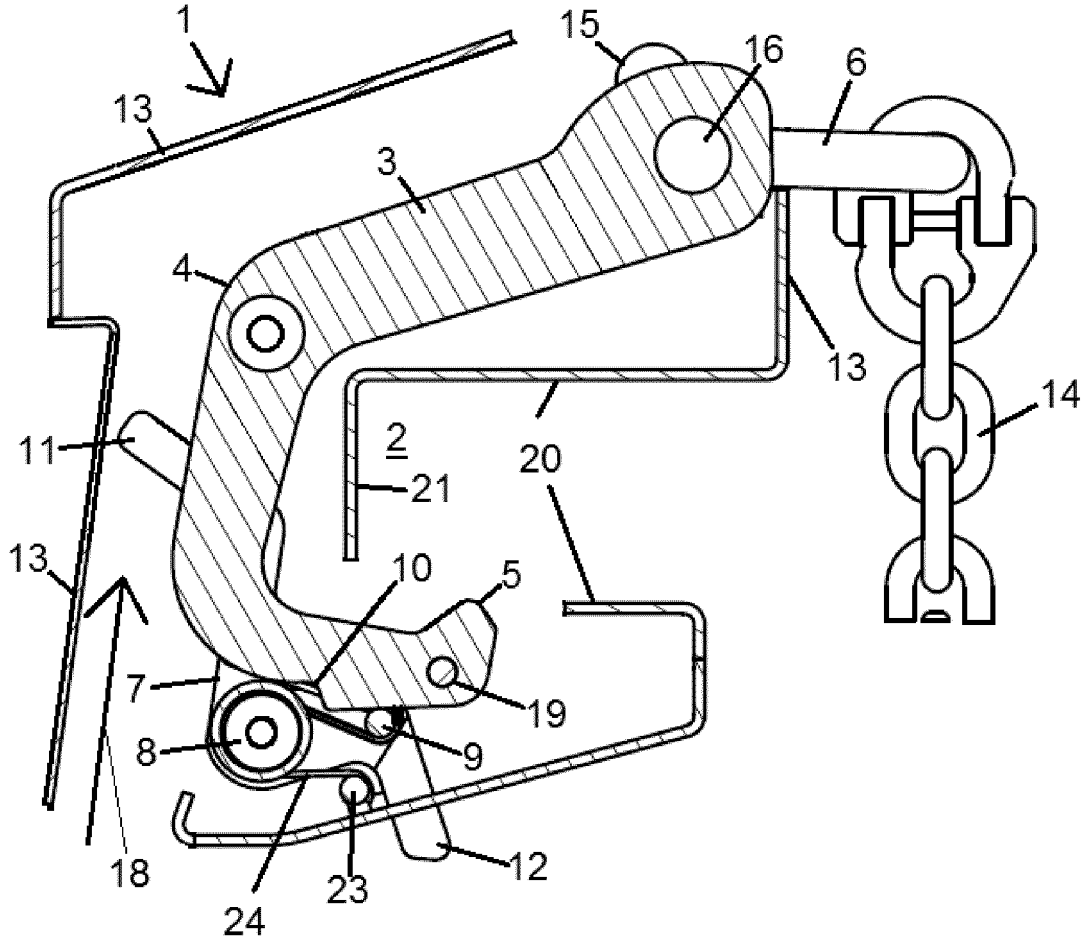

FIG. 3

Europäisches Patentamt
European Patent Office
Office européen des brevets

EUROPEAN SEARCH REPORT

Application Number
EP 17 15 9376

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	ES 2 265 211 A1 (ENCOFRADOS J ALSINA SA [ES]) 1 February 2007 (2007-02-01)	1,6-14	INV.
A	* column 3, line 16 - column 4, line 38; figures 1-5 *	2-5	E04G19/00 B66C1/36 B66C1/24

X	FR 2 343 687 A1 (STAS SOC TECH ACCESS SPEC [FR]) 7 October 1977 (1977-10-07)	1,4-9, 11-13	
A	* page 2, line 27 - page 4, line 14; figures 1,6,7 *	2,3,10, 14	

X	US 5 292 163 A (MATSUYAMA SUMIKO [JP]) 8 March 1994 (1994-03-08)	1-3,6-9, 11-13	
A	* column 5, line 49 - column 6, line 18; figures 2,5 *	4,5,10, 14	

X	AT 4 850 U1 (DOKA IND GMBH [AT]) 27 December 2001 (2001-12-27)	14	
A	* figures 1-2 *	1-13	

TECHNICAL FIELDS SEARCHED (IPC)

E04G
B66C

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	18 May 2017	Manera, Marco

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
A : technological background
O : non-written disclosure
P : intermediate document

T : theory or principle underlying the invention
E : earlier patent document, but published on, or after the filing date
D : document cited in the application
L : document cited for other reasons

& : member of the same patent family, corresponding document

EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 17 15 9376

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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18-05-2017

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
ES 2265211 A1	01-02-2007	NONE	
FR 2343687 A1	07-10-1977	NONE	
US 5292163 A	08-03-1994	JP 2833674 B2	09-12-1998
		JP H0539188 A	19-02-1993
		US 5292163 A	08-03-1994
AT 4850 U1	27-12-2001	NONE	

EPO FORM P0459

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REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- DE 3111634 A1 **[0002]**
- WO 2010124666 A1 **[0002] [0022] [0023]**
- WO 2014012681 A1 **[0003]**