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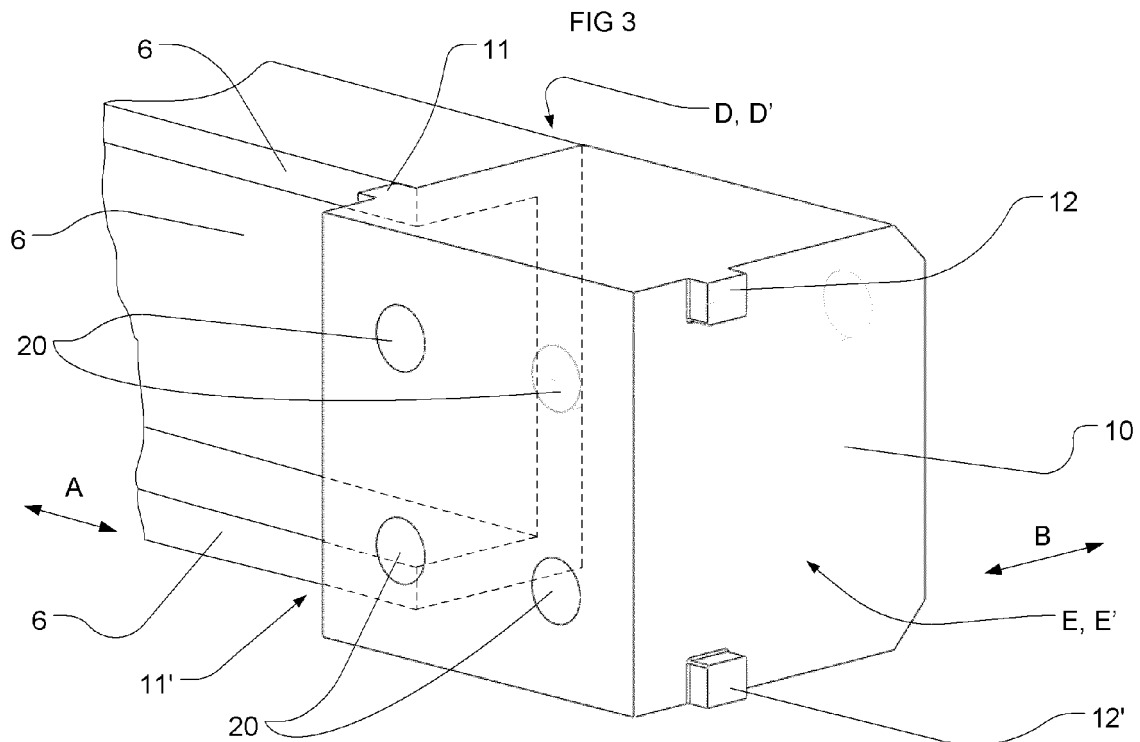
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(54) **Securing device in a jaw crusher**

(57) The invention relates to a toggle plate seat retainer (10) for securing a toggle plate seat (6) to a jaw crusher (1). The toggle plate seat retainer is a detachable stop engaging the toggle plate seat to keep it securely in

place in the jaw crusher. The toggle plate seat retainer (10) is turnable from a first secure engagement (D, D') of the toggle plate seat (6) to a second secure engagement (E, E') of the toggle plate seat in the jaw crusher (1).



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Description

Technical Field of the Invention

[0001] The present invention relates to securing devices in the form of retainers for toggle seats in a jaw crusher used for crushing, and can be suitably used in the construction and mining industries.

Background Art

[0002] When crushing of hard material, e.g. stone blocks or ore blocks, different types of crushers may be used. One example of such crushers is jaw crushers of which a typical jaw crusher includes a stationary jaw and a movable jaw spaced to define a crushing chamber in between. Material to be crushed is fed into the crushing chamber and is crushed by the face of each of the jaws as the movable jaw is moved repeatedly toward and away from the stationary jaw.

[0003] The crusher jaws experience tremendous forces, wear, and vibrations during crushing. To prevent parts of the jaw crusher from breaking when overloaded due to oversized material being uncrushable, there must be some kind of safety arrangement to stop or inactivate the movable crusher jaw when the crushing load becomes too high. Known safety arrangements comprise a toggle beam and a toggle or toggle plate between the toggle beam and the movable jaw, and a toggle seat between the toggle plate and each of the toggle beam and movable jaw for seating the toggle plate against the toggle beam and the movable jaw. The toggle plate works as a mechanical fuse that breaks if the movable jaw is subjected to too high loads, commonly too high shock loads, so that this jaw goes into an idle mode instead of breaking and/or transferring the too high loads to other parts of the crusher incurring breakdowns of essential crusher parts.

[0004] The toggle plate of the known safety arrangements is movably arranged in the toggle seat, which is detachably secured to the toggle beam by detachable retainers also working as stops for the toggle plate when it moves in its lateral direction, so that the toggle plate does not slide out of the toggle seat sideways during operation of the jaw crusher. The retainers are subjected to wear from the moving toggle plate rubbing against them and worn out retainers have to be replaced.

Summary of the Invention

[0005] It is an object of the invention to provide a detachable retainer for toggle plates in jaw crushers, which solves, or at least lessens, the problems mentioned above.

[0006] It is an object of the invention to provide a jaw crusher with at least one reusable toggle plate seat retainer enabling the use of the same retainer at least twice before it is fully worn out and has to be finally replaced

by a new retainer for detachably securing the toggle plate seat in the toggle beam.

[0007] Another object of the invention is to provide a toggle plate seat retainer that reduces the number of times such a retainer must be replaced by enabling each retainer to be turned about its centre axis at least once before it is replaced, whereby a partly worn out portion of each retainer is taken out of holding action with the seat and another not yet worn out part of the same retainer instead comes into holding action with the toggle plate seat without having to move each retainer laterally, i.e. each retainer is only moved along its centre axis and then turned at least once or two or three or more times about its centre axis eliminating the need of any movement of each retainer laterally, i.e. each retainer does not have to be moved linearly in a direction being substantially perpendicular to its centre axis besides being rotated about its centre axis.

[0008] Yet another object of the invention is to provide a toggle assembly that reduces the number of times each of its toggle plate seat retainers must be replaced by enabling each retainer to be turned at least once before it is replaced, whereby a worn out portion of each retainer is taken out of holding action with the seat while another part of the same retainer not yet worn out instead comes into holding action with the toggle plate seat.

[0009] It is also an object of the invention to provide a toggle plate seat retainer that secures the toggle plate seat sideways, i.e. laterally, but, at the same time, also secures the toggle plate seat crosswise, i.e. across the longitudinal direction of the toggle plate seat or along/in parallel with the cross sectional plane or sectional area of the toggle plate seat, so that the toggle plate seat does not slide out of the toggle beam sideways and/or towards the movable crusher jaw, which retainer, at the same time, also secures the toggle or toggle plate sideways/laterally so that the toggle or toggle plate does not slide out of the toggle plate seat sideways.

[0010] These objects are achieved by means of a toggle plate seat retainer, a toggle assembly and a jaw crusher, as claimed in the associated independent claims, preferred variants thereof being defined in the associated dependent claims.

[0011] The toggle plate seat retainer according to the independent retainer claim makes it possible to increase the use time or life time of the toggle plate seat retainer by reducing the number of times the retainer must be replaced after being worn out.

[0012] The toggle plate seat retainer according to the independent retainer claim also makes it possible to reuse it as this retainer is reversible, i.e. the retainer can be turned at least once from a first secure holding action with the toggle plate seat into a second secure holding action with the toggle plate seat before the retainer is fully worn out and must be replaced by a new retainer.

[0013] The toggle plate seat retainer according to the independent retainer claim also makes it possible to secure the toggle or toggle plate sideways/laterally and the

toggle plate seat longitudinally but also crosswise, i.e. across the longitudinal direction of the toggle plate seat and the toggle beam or along/in parallel with the cross sectional plane or sectional area of the toggle plate seat or toggle beam, in at least two holding positions for the retainer, i.e. in the first secure holding position of the toggle plate seat and the second secure holding position of the toggle plate seat, by enabling use of one and the same retainer in at least these two positions eliminating the need of additional means for at least each of these two holding positions before the retainer is fully worn out and must be replaced by a new retainer. However, the toggle or toggle plate is also securing the toggle plate seat in place and the toggle plate seat retainer works as a complementing securing device of the toggle plate seat in the crusher safeguarding the attachment of the toggle plate seat if the toggle plate for any reason is not able to secure the toggle plate seat by itself, i.e. when the toggle plate breaks.

[0014] The toggle assembly according to the independent assembly claim makes it possible to decrease the man hours required for replacing worn out toggle plate retainers as the effort of replacing and the number of times the retainers must be replaced are decreased.

[0015] The toggle assembly according to the independent assembly claim also makes it possible to simplify the effort and work steps when handling the toggle plate seat and its retainers and decrease the man hours required for this as it is not necessary to remove the retainer completely when worn out. This is due to the fact that only one part or side or end of the retainer is first worn out in the first holding position of the retainer, and then, the retainer is only loosened somewhat from the first holding position until it is possible to turn the retainer about its centre axis so that its other not yet worn out part comes into the second holding position and secure it in place in this second holding position. This makes it easy to just manually hold the toggle plate seat in place during this turning, rotating, and/or indexing step about the centre axis of the retainer without having to move the retainer laterally until the retainer is secured again, i.e. in its second holding position without the need of additional means for holding the toggle plate seat in place during the loosening and fastening of retainers.

[0016] The jaw crusher according to the independent crusher claim of course inherits resulting advantages produced by the above toggle plate seat retainer and/or the above toggle or toggle plate assembly.

[0017] In some embodiments/aspects, the toggle plate seat retainer comprises protrusions adapted for the first secure holding action of the toggle plate seat and adapted for the second secure holding action of the toggle plate seat in the jaw crusher. Thereby, the toggle plate seat retainer is reusable, which decreases the number of times retainers must be replaced by a new retainer.

[0018] In some embodiments/aspects, the toggle plate seat retainer protrusions adapted for the first secure holding action of the toggle plate seat and toggle plate seat

retainer protrusions adapted for the second secure holding action of the toggle plate seat extend in different directions outwards from the envelope surface around the circumference of the toggle plate seat retainer. Thereby, the toggle plate seat retainer is turnable about its own centre axis without having to move each retainer laterally or in a direction deviating from its centre axis from at least one position of secure holding action of the toggle plate seat into at least one other secure holding position of the toggle plate seat, which increases the life time of one and the same retainer before it must be replaced completely by a new retainer.

[0019] In some embodiments/aspects, the toggle plate seat retainer comprises protrusions, which protrusions are arranged on the toggle plate seat retainer in relation to each other, whereby, when the toggle plate seat retainer is turned or rotated from the first secure holding action to the second secure holding action of the toggle plate seat, protrusions are taken out of the first holding position with the toggle plate seat and other protrusions comes into holding action with the toggle plate seat in the second secure holding position. Thereby, the toggle plate seat retainer simplifies the turning of it about its own centre axis without having to move each retainer laterally or in a direction deviating from its centre axis from one position of secure holding action with the toggle plate seat into another secure holding action with the toggle plate seat, which decreases the effort of replacing retainers completely by new retainers.

[0020] In some embodiments/aspects, the toggle plate seat retainer protrusions are arranged discontinuously around the circumference of the toggle plate seat retainer. Similarly, this also increases re-use of the toggle plate seat retainer by decreasing the number of retainers that must be refused but also replaced by new retainers.

[0021] In some embodiments/aspects, the toggle plate seat retainer protrusions are arranged continuously around the circumference of the toggle plate seat retainer. Thereby, the re-use of the toggle plate seat retainer is further improved, since the retainer and its protrusions then is turnable or indexable in smaller steps or angles or even continuously turnable around its circumference and about its own centre axis without having to move each retainer laterally or in a direction deviating from its centre axis from one secure holding action with the toggle plate seat to another secure holding position increasing the number of times the retainer may be turned from one secure holding position to another tremendously.

[0022] In some embodiments/aspects, the toggle plate seat retainer comprises protrusions projecting outwards from the envelope surface around the circumference of the toggle plate seat retainer for the secure holding action with the toggle plate seat in directions being the same for protrusions adapted for the first secure holding position of the toggle plate seat but which directions form an angle α between the protrusions adapted for the first secure holding position of the toggle plate seat and protrusions adapted for the second secure holding position of

the toggle plate seat. Hence, the handling of each retainer when turning it about its own centre axis without having to move each retainer laterally or in a direction deviating from its centre axis is simplified, since the different positions for the retainer when securing the toggle plate seat in place are easily noticed by the operator as they are more distinctly defined.

[0023] In some embodiments/aspects, the protrusions adapted for the first secure holding action of the toggle plate seat and protrusions adapted for the second secure holding action of the toggle plate seat extend in opposite directions outwards from the envelope surface around the circumference of the toggle plate seat retainer. Thereby, the handling of the retainer when turning it about its own centre axis without having to move each retainer laterally or in a direction deviating from its centre axis is further simplified as the different positions for the retainer when securing the toggle plate seat in place are even more easily noticed by the operator as they are more distinctly defined.

[0024] In some embodiments/aspects, the toggle plate seat retainer protrusions are integrated in the toggle plate seat retainer. Hence, the toggle plate seat retainer is easily manufactured in one piece by for example casting and easily handled as no separate parts must be assembled to make up the whole retainer.

[0025] In some embodiments/aspects, the protrusions are separate/discrete parts of the toggle plate seat retainer. Thereby, the discontinuously arranged protrusions form a cantilever effect where the need for securing and support of the toggle plate and/or the toggle plate seat is the largest but does not extend at areas where the need of securing and support is smaller, which increases the ability for the retainer to withstand any increased crushing forces or unwanted movements of the toggle plate and/or toggle plate seat while optimizing the location and the amount of material used for the secure holding and support of the toggle plate and/or toggle plate seat.

[0026] The effect of the invention is that inventive toggle plate seat retainers are multifunctional and reusable, i.e. by securing both the toggle plate sideways and the toggle plate seat sideways but also longitudinally and decreasing the need of replacement of worn out retainer by means of one and the same retainer, whereby also the total life time of toggle plate retainers is increased and the maintenance and replacement of retainers are simplified while also reducing the number of refused retainers due to the decreased need of replacement of worn out retainers.

Brief Description of the Drawings

[0027] The invention will be described in more detail with reference to the appended drawings, which show examples of presently preferred embodiments of the invention.

Figs. 1 and 2 shows a jaw crusher in two different enlargements with jaws comprising a toggle assembly according to the invention,

Fig. 3 is a perspective view of parts of the toggle assembly in Figs. 1 and 2 showing the principle of detachably securing one end of toggle plate and toggle plate seats by means of toggle plate seat retainers in one way of detachably attaching it to one end of a toggle beam,

Fig. 4 is a top view showing the arrangement of Fig 3, Fig. 5 is a top view showing only the retainer according to the invention,

Fig. 6 is a side view also showing only the retainer according to Fig. 5 with other shapes of surrounding surfaces,

Fig 7 is a top view showing only the retainer according to the invention, and

Fig 8 is a top view showing only the retainer of Fig 7 for a better understanding of how the retainer is shaped.

Detailed Description of the Invention

[0028] A jaw crusher 1 is shown in Figs. 1 to 2. The jaw crusher 1 comprises jaw plates and a moving jaw 3 and a stationary jaw 3', each jaw provided with at least one jaw plate. The jaw plates are securely and detachably retained against each jaw 3, 3'.

[0029] The jaw crusher 1 of Figs. 1 and 2 has a frame 40, which comprises a frame portion with rotary drive means for repeatedly moving the movable jaw 3' (shown to the right in Fig. 1 and to the left in Fig. 2) toward and away from the stationary jaw 3 (shown to the left in Fig. 1). The jaw crusher 1 have its stationary jaw 3 and its movable jaw 3' spaced to define a crushing chamber/gap 30 in between the jaws, the crushing chamber having an inlet of material to be crushed. These parts of a jaw crusher 1 and their function are readily known by a skilled person and will not be explained in more detail.

[0030] The jaw crusher 1 of Figs. 1 and 2 comprises a safety arrangement shown in Fig. 2 comprising a toggle assembly 2, a toggle beam 4 and a toggle or toggle plate 5 between the toggle beam and the movable jaw 3', and a toggle seat or toggle plate seat 6 between the toggle plate and each of the toggle beam 4 and movable jaw 3' for seating the toggle plate against the toggle beam and the movable jaw. The toggle plate is adapted to work as a mechanical fuse that breaks if the movable jaw 3' is subjected to too high loads, frequently too high shock loads, so that this jaw 3' goes into an idle mode instead of breaking and/or transferring the too high loads to other parts of the crusher 1, e.g. the toggle beam 4, the toggle plate seat 6, or the crusher frame 40, incurring breakdowns of essential crusher parts.

[0031] The toggle plate 5 of the safety arrangement is movably/tiltably arranged in the toggle plate seat 6. The toggle plate seat is detachably secured to the toggle beam 4 by detachable retainers 10 also working as stops

for the toggle plate 5 when it moves in its lateral direction, so that the toggle plate 5 does not slide out of the toggle plate seat 6 sideways during operation of the jaw crusher. Each toggle plate seat retainer 10 is detachably attached to the associated end of the toggle beam 4 by fastening means 20, 21, e.g. in the form of screws and/or bolts 21 passing straight through holes 20 in the retainer along a centre axis C threaded directly onto threaded holes (not shown) in the toggle beam 4 as shown in Fig. 2.

[0032] In Figs. 3 and 4, the toggle plate seat 6 and the toggle plate seat retainer 10 are shown for clarifying the principle and function of the retainer as both a lateral and longitudinal stop, i.e. sideways in relation to both the toggle plate 5 and the toggle plate seat 6 (directional arrow A to the left in Fig 3), but also works as a stop for the toggle plate seat crosswise, i.e. across the longitudinal direction of the toggle plate seat or along/in parallel with the cross sectional plane or sectional area of the toggle plate seat (directional arrow B to the right in Fig 3), according to the invention when securing the toggle plate seat and for clarifying the structure of the retainer. However, Figs. 5 to 8 show only the toggle plate seat retainer 10 in different views and versions or embodiments. The toggle plate 5 also hinders the toggle plate seat 6 from coming loose or falling down from the toggle beam 4 as long as the toggle plate works as a movable anvil abutting against the toggle plate seat from below, but the toggle plate seat retainer 10 works as a main or primary stop for hindering the toggle plate seat from coming loose, e.g. by falling down from the toggle beam if the toggle plate 5 is not able to achieve this due to breaking, which mechanical fuse/break function is the main or primary object for the toggle plate 5 if the movable jaw 3' is subjected to too large crushing forces.

[0033] In Fig. 8, different angles α around the circumference and in the plane of the figure, which plane is in parallel with the plane of the top surface of the retainer 10 and the longitudinal direction of the toggle plate seat 6 but is in Fig 2 shown perpendicular to the toggle plate 5, i.e. the plane of the toggle plate (Figs. 1 and 2 shows in principle a still or standstill of the operation of the crusher 1). Due to the fact that the toggle plate 5 moves in response to the movable crusher jaw 3', i.e. by tilting inside the toggle plate seat 6, the plane of the top surface of the retainer 10, or in fact the retainer top surface, is not always perpendicular to the plane of the toggle plate depending on the movement of the toggle plate 5. The retainer top surface and the toggle plate will be angled in relation to each other with varying angles around 90° , even though the varying angles do not differ to a large extent during the operation of the crusher 1. The toggle plate seat 6 and the toggle plate seat retainer 10 are fixed in relation to each other compared to the toggle plate tilting in relation to them during the crusher operation.

[0034] The toggle plate seat retainer 10 is a detachable stop engaging the toggle plate seat 6 to keep it securely in place in the jaw crusher 1. The toggle plate seat retainer is turnable, in other words, reversible or rotatable or piv-

otable or indexable around its centre axis C shown in Figs 7 and 8 making it reusable, from a first secure engagement of the toggle plate seat 6 to a second secure engagement of the toggle plate seat in the jaw crusher 1 without having to move each retainer laterally or in a direction deviating from its centre axis. This is achieved by the retainer 10 in that it comprises protrusions 11, 11', 12, 12'. The protrusions are adapted for the first secure engagement of the toggle plate seat 6 and the second secure engagement of the toggle plate seat in the jaw crusher 1. Each of the protrusions project or extend outwards from the envelope surface around the circumference of the toggle plate seat retainer 10 with a projecting length P as shown in Fig. 4. The projecting protrusion length P is normally not worn down during the operation of the jaw crusher 1 by the movement of the toggle plate 5 and the toggle plate seat 6 or any material hitting the protrusions. However, as the toggle plate 5 moves inside the toggle plate seat 6, the toggle plate 5 rubs against each of the centre or middle surfaces of the toggle plate seat retainers 10 between their protrusions 11, 11', 12, 12' at both ends of the toggle plate seat 6 and wears down each of the toggle plate seat retainers 10 at these surfaces shown as the decreased projecting length W in Fig. 4 with varying measures, i.e. wearing down depths.

[0035] Hence, one first end or surface of each retainer 10 is denoted D for a first retainer at one end of seat 6 and D' for a second retainer at the other end of the seat with protrusions 12, 12' and a second end or surface opposite the first end or surface D or D' of the first and second retainer, respectively, is denoted E for the first retainer and E' for the second retainer 10 with protrusions 11, 11'. This means that one retainer 10 at one end of the toggle plate seat 6 comprises at least opposite surfaces D and E while another retainer 10 at the other end of the toggle plate seat 6 comprises corresponding but not the same at least opposite surfaces D' and E' and further surfaces denoted with the same numerals in Fig. 7.

[0036] The protrusions 11, 11', 12, 12' of the retainer 10 are arranged at a height h measured from the top surface of the retainer and a height H measured from the bottom surface of the retainer as shown in Fig. 6. The height H depends on the height of the toggle plate seat 6 as the bottom surface of each projecting protrusion is adapted to engage or at least hold the toggle plate seat in place from above as seen in Figs. 3 and 6 (Fig. 6 does not show the toggle plate seat itself but this engagement from above is clearly understood when viewing also Fig. 3). The height h depends on the size of each projecting protrusion 11, 11', 12, 12', i.e. more specifically, their height along the centre axis C of the retainer 10. In Fig. 4, the protrusions are placed above and engage the toggle plate seat standing edges, i.e. the ends of the legs of the U-shaped cross section of the toggle plate seat, from above for holding the seat 6 in place in the toggle beam 4. The cross section of the seat 6 is seen with dotted lines in Fig. 3 (the toggle beam is not shown in

Fig. 3).

[0037] The toggle plate seat retainer protrusions 11, 11' are adapted for the first secure engagement of the toggle plate seat 6 and toggle plate seat retainer protrusions 12, 12' are adapted for the second secure engagement of the toggle plate seat and extend in different directions outwards from the envelope surface of the toggle plate seat retainer 10. The retainer protrusions 11, 11', 12, 12' are arranged on the toggle plate seat retainer in relation to each other, whereby, when the toggle plate seat retainer is turned from the first secure engagement of the toggle plate seat each retainer end D, D' facing and engaging the toggle plate seat 6 to the second secure engagement of the toggle plate seat having each retainer end E, E' facing and engaging the toggle plate seat 6, protrusions 11, 11' are taken out of the first engagement with the toggle plate seat and other protrusions 12, 12' engage the toggle plate seat in the second secure engagement.

[0038] The toggle plate seat retainer 10 may have the protrusions 11, 11', 12, 12' arranged discontinuously around its circumference as shown in Figs. 2 to 4 and in Figs. 7 and 8. These protrusions 11, 11', 12, 12' may otherwise be arranged continuously around the circumference of the toggle plate seat retainer as shown in Figs. 5 and 6. The protrusions may be arranged discontinuously or continuously around retainers with square or rectangular cross sections as shown in the Figs. 2 to 8 but also be arranged in the similar way around retainers with oval or rounded, circular cross sections, e.g. solid shapes formed by revolution such as a cylinder with protrusions or a protruding edge along its circumference similar to Fig. 6, or irregular or unsymmetrical cross sections as long as they secure the seat 6 sufficiently.

[0039] The protrusions 11, 11', 12, 12' projecting outwards from the envelope surface around the circumference of the toggle plate seat retainer 10 extend in directions being the same for the protrusions 11, 11' adapted for the first secure engagement of the toggle plate seat but which directions form the angle α between these protrusions 11, 11' and the protrusions 12, 12' adapted for the second secure engagement of the toggle plate seat 6. The angle α between the protrusions 11, 11' adapted for the first secure engagement of the toggle plate seat 6 and the protrusions 12, 12' adapted for the second secure engagement of the toggle plate seat may be any angle between 0° and 360° around the outer circumference of the retainer, e.g. if the protrusions are continuous. However, the angle α is preferably between 0° and 355° or preferably between 45° and 315° or between 90° and 270° as shown in Figs. 7 and 8 or between 135° and 225° or is preferably 180° as shown in Figs. 2, 3, and 4. Hence, with the latter angle, the protrusions 11, 11' adapted for the first secure engagement of the toggle plate seat and the protrusions 12, 12' adapted for the second secure engagement of the toggle plate seat 6 extend in opposite directions outwards from the envelope surface around the circumference of the toggle plate seat retainer 10.

[0040] Moreover, each of the protrusions 11, 11', 12, 12' may be arranged at a distance from each other along the envelope surface along the circumference of the toggle plate seat retainer 10. The toggle plate seat retainer has preferably a square cross section and the protrusions are arranged at the corner areas of the square cross section as shown in Figs. 2, 3, 4, 7 and 8. The protrusions 11, 11', 12, 12' are preferably integrated in the toggle plate seat retainer 10 but may, in some aspects, be separate, discrete parts of the toggle plate seat retainer. The lengths in Fig. 4 are not shown to scale, but only for clarification of the wearing down effect.

[0041] The toggle beam assembly 2 comprises the toggle beam 4 and at least one toggle plate seat 6 and at least two toggle plate seat retainers 10, i.e. one toggle plate seat retainer 10 being turnable about its own centre axis without having to move each retainer laterally or in a direction deviating too much from its centre axis, if not necessary, at each end of the toggle plate seat 6, being adapted for detachable attachment to the toggle beam and detachable engagement of the toggle plate seat to secure the toggle plate seat to the toggle beam. The jaw crusher 1 comprises at least one toggle beam assembly 2 and at least one toggle plate 5.

[0042] The number of retainer protrusions 11, 11', 12, 12' depends on the size of the retainer 10 and may be between one (if continuous), two, three, four and more, but is preferably four, i.e. one pair 11, 11' and one pair 12, 12' for retainers having them discontinuously arranged around its circumference. However, the number and shapes and arrangement of these protrusions are adapted to the shape and size of the specific toggle plate seat 6, which may vary depending on the size of the crusher 1, but the principle of providing a reusable retainer 10 by making it turnable is the same for any crusher. In the retainer shown in Figs. 2 to 4 and in Figs. 7 and 8, each of its protrusions may be seen as a separate and projecting element being at least partly or fully aligned with and a prolongation of the wall element forming the legs of the U-shaped toggle plate seat 6 in the longitudinal direction of the retainer 10 along its centre axis C.

[0043] Moreover, in the embodiment of Figs. 2 to 4, each retainer 10 is turned from the first position with its end/ surface D, D' with its protrusions 11, 11' securing the toggle plate seat 6 when the wear down length W has become too deep at that first side/end D, D' of the retainer to the second position with its end/ surface E, E' with its other protrusions 12, 12' securing the toggle plate seat 6 where no wear has occurred yet. Then, when the wear down length W has become too deep at that latter/ second side/end E, E' of each retainer at the second position with its other protrusions 12, 12' securing the toggle plate seat 6, the whole retainer 10 is replaced by a new not yet wear down retainer. Furthermore, the positions with respective surface/end D, D' and E, E' may of course be interchanged as the wearing down occurs at both ends of the toggle plate seat 6 (not only at one end as explained above), due to the fact that one retainer

10 with surface D and opposite surface E is placed at one end of the seat 6 and the other retainer 10 with surface D' and opposite surface E' is placed at the other end of the seat 6, but the wearing down at each end does not have to occur in exactly the same way or subject each retainer 10 for exactly the same amount of wear and/or at the same time as the toggle plate 5 may rub against the retainers one at a time and with varying frequency and force depending on the movement of the toggle plate 5 in response to the operation of the jaw crusher 1.

- 1 jaw crusher
- 2 toggle assembly
- 3 stationary crusher jaw
- 3' movable crusher jaw
- 4 toggle beam
- 5 toggle or toggle plate
- 6 toggle plate seat
- 10 toggle plate seat retainer
- 11 first protrusions
- 11' first protrusions
- 12 second protrusions
- 12' second protrusions
- 20 fastening means for the retainer
- 30 crusher chamber
- 40 crusher frame
- A arrow indicating the sideways direction of the toggle plate and the longitudinal direction of the toggle plate seat
- B arrow indicating the crosswise direction of the toggle plate seat
- C centre axis of the toggle plate seat retainer
- D, D' first end/surface of retainer securing the toggle plate seat
- E, E' second end/surface of retainer securing the toggle plate seat
- h height/distance from top of retainer to top of protrusions
- H height/distance from bottom of retainer to bottom of protrusions
- P projection length of protrusions
- W worn down thickness/surface of the toggle plate seat retainer
- α angle indicating the different directions of projection for the protrusions 11, 11', 12, 12'

Claims

1. A toggle plate seat retainer (10) for securing a toggle plate seat (6) to a jaw crusher (1), the toggle plate seat retainer being a detachable stop engaging the toggle plate seat to keep it securely in place in the jaw crusher,
characterised in that
the toggle plate seat retainer (10) is turnable from a first secure engagement (D, D') of the toggle plate seat (6) to a second secure engagement (E, E') of

the toggle plate seat in the jaw crusher (1).

2. A toggle plate seat retainer (10) according to claim 1, wherein the toggle plate seat retainer (10) comprises protrusions (11, 11', 12, 12') adapted for the first secure engagement (D, D') of the toggle plate seat (6) and adapted for the second secure engagement (E, E') of the toggle plate seat in the jaw crusher (1).
3. A toggle plate seat retainer (10) according to claim 2, wherein toggle plate seat retainer protrusions (11, 11') adapted for the first secure engagement (D, D') of the toggle plate seat and toggle plate seat retainer protrusions (12, 12') adapted for the second secure engagement (E, E') of the toggle plate seat (6) extend in different directions outwards from the envelope surface around the circumference of the toggle plate seat retainer.
4. A toggle plate seat retainer (10) according to claim 1, 2 or 3, wherein the toggle plate seat retainer (10) comprises protrusions (11, 11', 12, 12') for engagement of the toggle plate seat (6), which protrusions are arranged on the toggle plate seat retainer in relation to each other, whereby, when the toggle plate seat retainer is turned from the first secure engagement (D, D') of the toggle plate seat to the second secure engagement (E, E') of the toggle plate seat, protrusions (11, 11') are taken out of the first engagement with the toggle plate seat and other protrusions (12, 12') engage the toggle plate seat in the second secure engagement.
5. A toggle plate seat retainer (10) according to any of the claims 2 to 4, wherein the protrusions (11, 11', 12, 12') are arranged discontinuously around the circumference of the toggle plate seat retainer (10).
6. A toggle plate seat retainer (10) according to claim 1 or 2, wherein the protrusions (11, 11', 12, 12') are arranged continuously around the circumference of the toggle plate seat retainer (10).
7. A toggle plate seat retainer (10) according to any of the claims 1 to 5, wherein the toggle plate seat retainer (10) comprises protrusions (11, 11', 12, 12') projecting outwards from the envelope surface around the circumference of the toggle plate seat retainer for the secure engagement (D, D', E, E') with the toggle plate seat (6) in directions being the same for protrusions (11, 11') adapted for the first secure engagement (D, D') of the toggle plate seat but which directions form an angle (α) between the protrusions (11, 11') adapted for the first secure engagement of the toggle plate seat and protrusions (12, 12') adapted for the second secure engagement (E, E') of the toggle plate seat.

8. A toggle plate seat retainer (10) according to claim 7, wherein the angle (α) between the protrusions (11, 11') adapted for the first secure engagement (D, D') of the toggle plate seat (6) and the protrusions (12, 12') adapted for the second secure engagement (E, E') of the toggle plate seat is between 0° and 355° or is between 45° and 315° or is between 90° and 270° or is between 135° and 225° or is 180°. 5

9. A toggle plate seat retainer (10) according to any of the claims 2 to 5 or claims 7 to 8, wherein each of the protrusions (11, 11', 12, 12') is arranged at a distance from each other along the envelope surface around the circumference of the toggle plate seat retainer (10). 10
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10. A toggle plate seat retainer (10) according to any of the claims 3 to 7, wherein protrusions (11, 11') adapted for the first secure engagement (D, D') of the toggle plate seat and protrusions (12, 12') adapted for the second secure engagement (E, E') of the toggle plate seat (6) extend in opposite directions outwards from the envelope surface around the circumference of the toggle plate seat retainer. 20
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11. A toggle plate seat retainer (10) according to any of the claims 3 to 7, wherein the toggle plate seat retainer (10) comprises a square cross section and the protrusions (11, 11', 12, 12') are arranged at the corner areas of the square cross section. 30

12. A toggle plate seat retainer (10) according to any of the claims 2 to 11, wherein the protrusions (11, 11', 12, 12') are integrated in the toggle plate seat retainer (10). 35

13. A toggle plate seat retainer (10) according to any of the claims 2 to 11, wherein the protrusions (11, 11', 12, 12') are discrete parts of the toggle plate seat retainer (10). 40

14. A toggle beam assembly (2) comprising a toggle beam (4) and at least one toggle plate seat (6) being adapted for detachable attachment to the toggle beam and at least one toggle plate seat retainer being adapted for detachable attachment to the toggle beam and detachable engagement of the toggle plate seat to secure the toggle plate seat to the toggle beam according to any of the preceding claims. 45
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15. A jaw crusher (1) comprising at least one toggle beam assembly (2) according to claim 14 and at least one toggle plate (5). 55

FIG 1

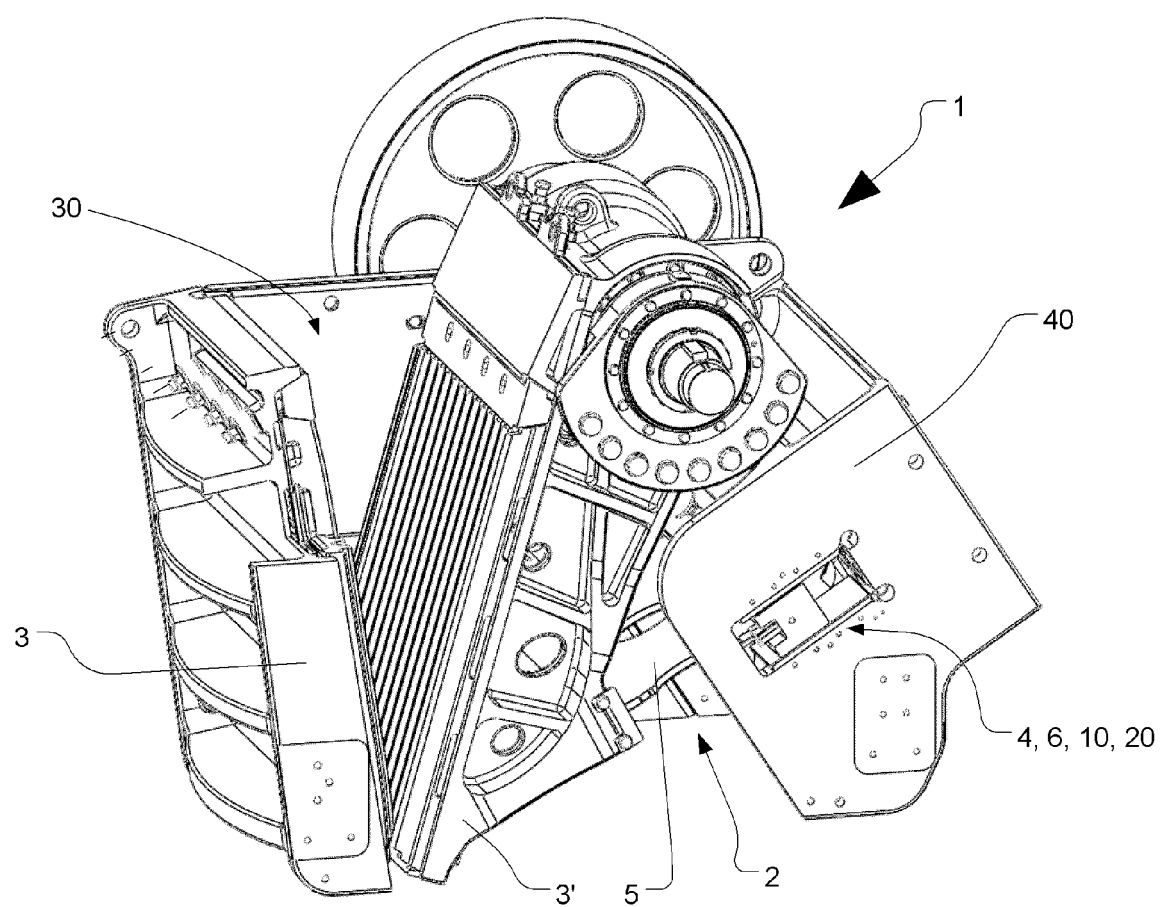
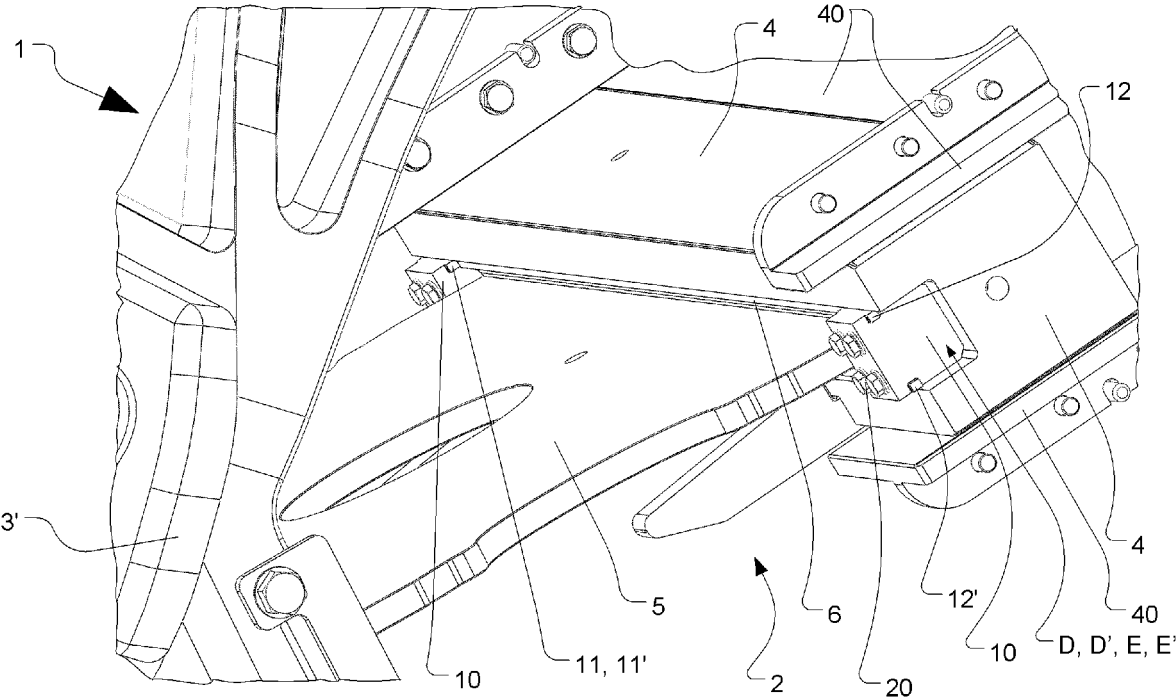
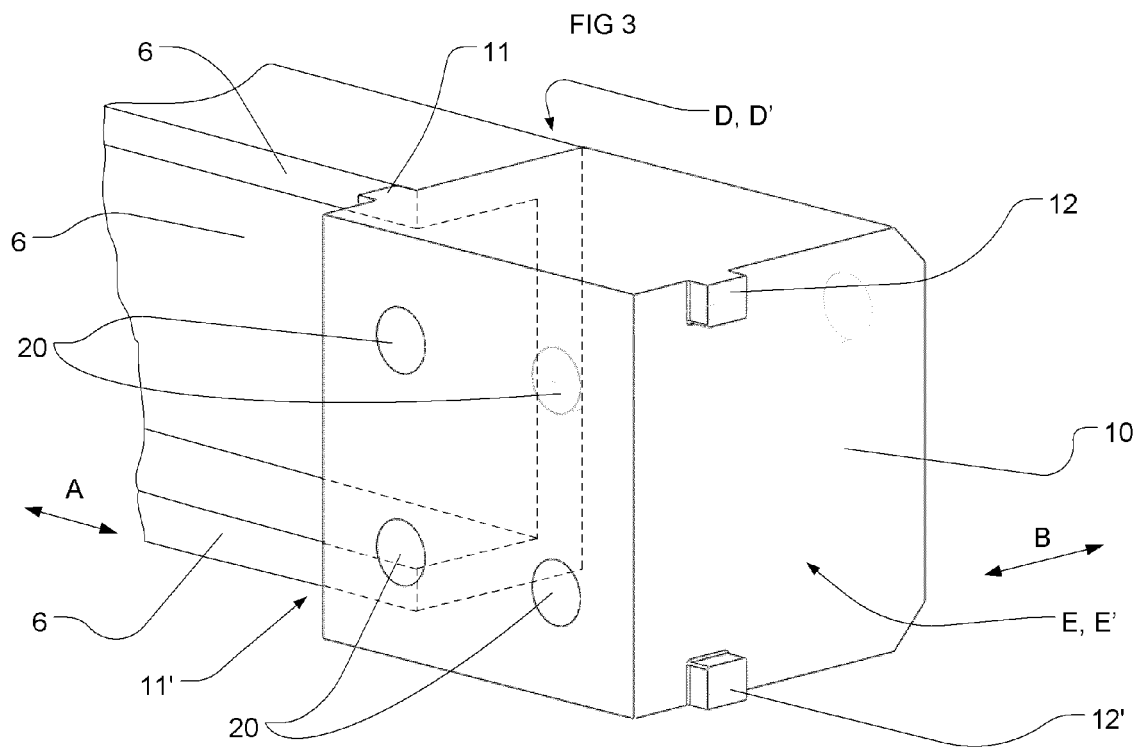
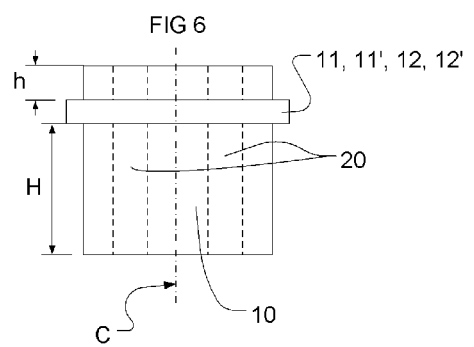
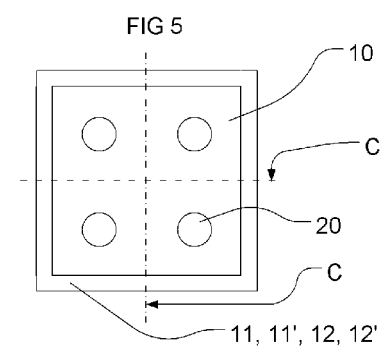
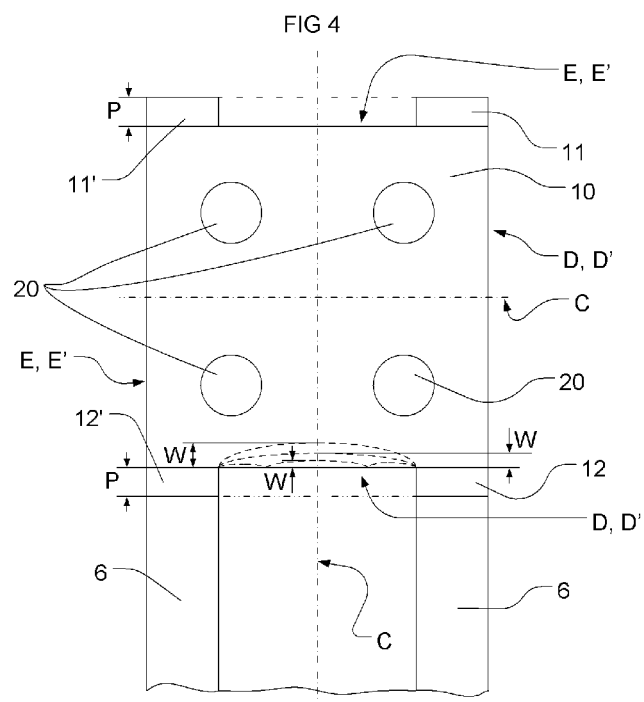
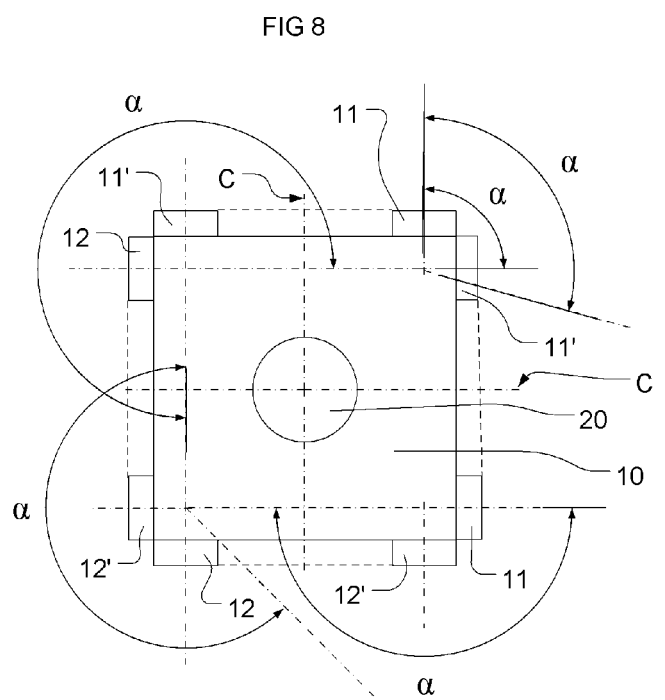
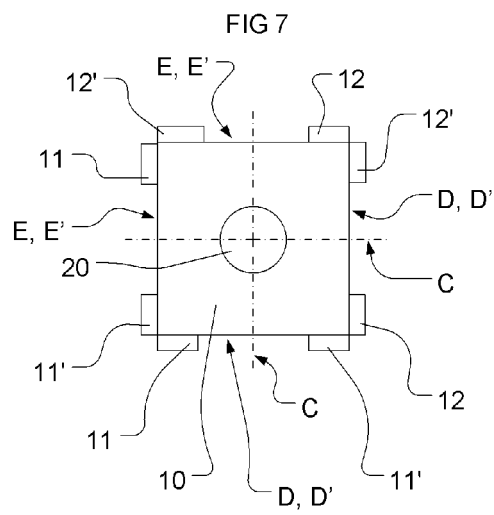


FIG 2











EUROPEAN SEARCH REPORT

Application Number
EP 12 16 4358

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	GB 934 197 A (PEGSON LTD) 14 August 1963 (1963-08-14)	1,14,15	INV. B02C1/02
A	* page 4, lines 26-42; figures * -----	2-13	
A	US 2 960 276 A (ROUBAL ALEXANDER J) 15 November 1960 (1960-11-15) * column 3, lines 53-74; figures 1-2 *	1,14,15	
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			B02C
Place of search Munich		Date of completion of the search 28 September 2012	Examiner Flodström, Benny
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			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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The members are as contained in the European Patent Office EDP file on
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28-09-2012

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