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System for securing the mobile jaw of a cone or giratory crusher

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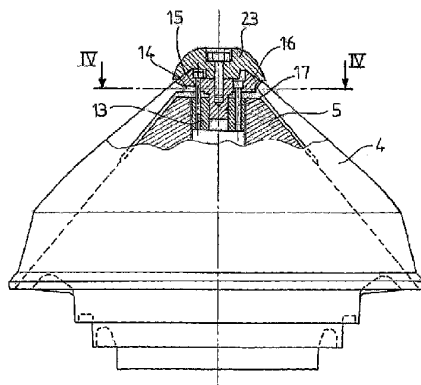
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[Suite sur la page suivante]

(54) Title: SYSTEM FOR FIXING THE MOBILE JAW OF A CONE OR GIRATORY CRUSHER

(54) Titre : SYSTEME DE FIXATION DE LA MACHOIRE MOBILE D'UN BROYEUR A CONE OU GIRATOIRE



(57) Abstract: The invention concerns a system for fixing the mobile jaw on a conical head of a cone or giratory stone crusher, comprising a bowl, with a feed hopper mounted thereon, a fixed truncated jaw mounted coaxially with the bowl, a crushing head mounted on a main shaft coaxial with the fixed jaw and a conical mobile jaw mounted on the head and clamped thereon by means of a locking element integral with the head and pressing on the top of the mobile jaw. Said element (16) has on its outer periphery notches (15) radially oriented outwards and uniformly distributed on said periphery and said mobile jaw (4) has, on its inner periphery, at its openings studs radially oriented inwards, uniformly distributed on said periphery and matching in number said notches (15), the studs penetrating when mounted in said notches so as to secure the locking element (16) and the mobile jaw (4) in rotation when the crusher is operating.

[Suite sur la page suivante]

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- *relative à la qualité d'inventeur (règle 4.17.iv) pour US seulement*

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(57) **Abrégé :** Système de fixation de la mâchoire mobile sur une tête conique d'un broyeur de pierres, à cône ou giratoire, comportant une cuve, surmontée d'une trémie d'alimentation, une mâchoire fixe tronconique montée coaxialement à la cuve, une tête de broyage montée sur un arbre principal coaxial à la mâchoire fixe et une mâchoire mobile conique montée sur la tête et serrée sur elle au moyen d'un élément de blocage solidarisé à la tête et appuyant sur le sommet de la mâchoire mobile. Ledit élément (16), présente sur sa périphérie extérieure des encoches (15) dirigées radialement vers l'extérieur et régulièrement réparties sur ladite périphérie et que la mâchoire mobile (4) présente, sur sa périphérie intérieure, au niveau de son ouverture des tenons dirigés radialement vers l'intérieur, régulièrement répartis sur ladite périphérie et en nombre égal auxdites encoches (15), les tenons pénétrant à l'état monté dans lesdites encoches afin de solidariser l'élément de blocage (16) et la mâchoire mobile (4) en rotation pendant le fonctionnement du broyeur.

SYSTEM FOR SECURING THE MOVABLE JAW OF A CONE OR GIRATORY
CRUSHER

The present invention relates to a system for securing
5 the movable jaw of a cone or gyratory crusher. Cone
crushers and gyratory crushers are adapted for mine or
quarry installations and serve for the reduction of the
size of the granulates and minerals to the dimensions
required for their ultimate use.

10 They comprise a truncated conical crushing bowl, whose
wall supports a fixed jaw, and a conical head bearing the
movable jaw mounted on a shaft coaxial to the bowl. The
geometrical axis of the conical head forms at the summit of
this latter a certain angle with the axis of the principal
15 shaft, which gives to the head, when the eccentric turns, a
nutatory movement. During descent into the bowl, the
materials are progressively crushed so as to reach the
dimension of the smallest space r between the fixed jaw and
the movable jaw, at the level of the base of the head in
20 nutation and located at 2 in Figure 1 showing a cone
crusher.

The cone crusher according to Figure 1, comprises a
supply hopper 8 located above the opening 1 of a crushing
chamber or bowl 3. The crushing head 5 is supported by a
25 shaft 10 above a bearing for this latter, with its
geometric axis forming, thanks to an eccentric 12, an axis
 α with the axis of the shaft so as to have a nutatory
movement when the eccentric 12 turns. The fixed jaw 11 is
fixed below the opening 1, in the upper part of the bowl 3.

30 The movable jaw 4 is mounted on the head 5 and rests
in its lower portion on the head 5, whilst it is gripped at
its upper portion on the head by a screw 6, by means of a

ring 7. This gripping is effected by a component of the gripping force of the screw 6 directed along the generatrix of the cone of the movable jaw 4.

In the course of the crushing operation, the pieces
5 which wear down the most quickly are the jaws and particularly this movable jaw 4. Because of this, the latter must be periodically changed after wear. Thus, when the material to be crushed is constituted by pure silica, the lifetime of the jaw 4 cannot exceed several tens of
10 hours. On the other hand, when it is a matter of limestone, this lifetime can extend to several years.

To this end, it is fixed immovably on the head by means of the screw 6. This gripping of the screw 6 requires a very high force so as to avoid the jaw knocking
15 against the head. To grip it, there is generally used a key on which the operator taps with a sledgehammer. Moreover, in the course of operation, the movable jaw 4 has the tendency to turn on the head but, with this movement, it drives the screw 6 which self locks while holding the
20 jaw. The self locking of the screw ensures that disassembly also requires the application of a very high force. So as to facilitate disassembly, a ring 7 is interposed between the screw head and the upper edge of the movable jaw. For disassembly, this ring is cut with a
25 blowtorch and removed with a suitable tool, which frees the screw but which can then turn freely.

So as to facilitate assembly and disassembly of the jaw, according to French patent application No. 02 09256, the securement system comprises a blocking element, whose
30 diameter is at least equal to that of the summit of the cone of the movable jaw, which is provided with holes spaced about its periphery, into which are threaded screws

which screw into tappings located in the head or are pre-secured with this latter.

5 According to one embodiment of the cone crusher disclosed in that application, the blocking element is constituted by two parts, by a blocking plate provided with holes distributed about its periphery, and a blocking stud located therebelow, screwed into an axial tapping in the head and secured in rotation with said plate, the gripping taking place by means of screws passing through the holes
10 of the plate and locking into the tappings provided in the blocking stud.

15 With further respect to that application, in the case of a gyratory crusher, the blocking element is constituted by a blocking ring provided with holes distributed about its periphery; a blocking nut, screwed on the shaft above the head and secured in rotation with said blocking ring, the gripping taking place by means of screws passing through the holes of the blocking ring and screwing into the tappings provided in said blocking nut.

20 The solution according to that mentioned application is quite suitable to facilitate assembly and disassembly of the movable head. However, strong gripping is still necessary to prevent the jaw from turning relative to the blocking plate or relative to the gripping nut (gyratory
25 crusher). There must accordingly be found a solution to the problem of securing in rotation the plate (or the nut) and the jaw.

30 To solve this problem, the present invention provides a system for securing the movable jaw on a conical head of a conical or gyratory stone crusher, comprising a bowl, surmounted by a hopper for supplying material to be crushed, a fixed truncated conical jaw mounted coaxially of the bowl, a crushing head mounted on a principal shaft

coaxial to the fixed jaw, whose geometric axis makes an acute angle with that of the drive shaft so as to communicate to the head a nutatory movement when the eccentric turns, and a conical movable jaw having a circular opening at its summit, mounted on the head and gripped on the latter by means of a blocking element secured to the head and bearing on the summit of the movable jaw,

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wherein the element has on its external periphery notches directed radially outwardly and regularly spaced about said periphery, and that the movable jaw has on its internal periphery at the level of its opening, lugs directed radially inwardly, regularly spaced about said periphery and in number equal to said notches, the lugs penetrating in the assembled condition into said notches so as to secure the blocking element and the movable jaw in rotation during operation of the crusher.

20
According to the invention, the number of lugs and notches is preferably equal to four. It can however be fewer or more, given that the number of notches is at least equal to the number of lugs.

25
Throughout the description and claims of this specification, the word "comprise" and variations of the word, such as "comprising" and "comprises", is not intended to exclude other additives, components, integers or steps.

30
The discussion of documents, acts, materials, devices, articles and the like is included in this specification solely for the purpose of providing a context for the present invention. It is not suggested or represented that any or all of these matters formed part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed before the priority date of each claim of this application.

The invention will be better understood from a non-limiting embodiment described hereafter and shown in the accompanying drawings, in which are shown:

5 Figure 1: A schematic cross-section of a cone crusher according to the prior art;

Figure 2: A top perspective view of the movable jaw according to the present invention;

10 Figure 3: A schematic cross-section of the securement of the moveable jaw of a cone crusher according to the invention;

Figure 4: A cross-sectional view on the line IV-IV of Figure 3.

15 As shown in Figure 3, the movable jaw 4 is disposed on the conical head 5 and conventionally rests, as shown in Figure 1, on the lower wide portion of the conical head. Its gripping in this position takes place by means of a blocking element constituted by a screw in two parts, a blocking plate 16 whose diameter is at least equal to the external diameter, at its upper portion, of the cone formed
20 by the jaw 4 and a screw-threaded lug 13 secured to the plate by screws 17.

A protective cap 23 for the heads of the screw 17 is also provided on the blocking plate and simply fixed on this latter with a screw.

As is indicated above for the prior art, the rotation
5 of the jaw 4, during operation relative to the head 5, produces a self-gripping of the piece 16, 13 and thus permits holding a suitable gripping despite wear of the jaw.

However, in operation, when the jaw 4 slides on the
10 head despite substantial gripping, it also slides relative to the blocking plate 16 in its rotation. This latter then only partially transmits the rotational couple to the lug 13 by the screws 17.

To ensure securement of the jaw 4 and the blocking
15 plate 16, the lugs 14 are provided on the internal periphery of the jaw 4 at the level of its upper opening. Notches 15 are of corresponding shape and equal number are provided on the periphery of the blocking plate 16. Notches and lugs are regularly spaced about said
20 peripheries so as to engage with each other.

In this way, during operation of the crusher, a rotation of the jaw 4 gives rise to a rotation of the blocking element 16 and a self-gripping of the couple constituted by the blocking plate 16 and the lug 13, hence
25 a self-gripping of the jaw 4 on the head 5.

The same system of lugs and notches can be applied to the gyratory crusher, to secure the gripping lug and the jaw together.

Figure 4 shows a cross-section of the system at the
30 level of the opening of the cone forming the jaw 4. In the illustrated example, four lugs and four notches are

provided. But there could be provided a lesser or a larger number of lugs and notches.

The claims defining the invention are as follows:

1. A system for securing the movable jaw on a conical head of a conical or gyratory stone crusher, comprising a bowl, surmounted by a hopper for supplying material to be crushed, a fixed truncated conical jaw mounted coaxially of the bowl, a crushing head mounted on a principal shaft coaxial to the fixed jaw, whose geometric axis makes an acute angle with that of the drive shaft so as to communicate to the head a nutatory movement when the eccentric turns, and a conical movable jaw having a circular opening at its summit, mounted on the head and gripped on the latter by means of a blocking element secured to the head and bearing on the summit of the movable jaw,

wherein the element has on its external periphery notches directed radially outwardly and regularly spaced about said periphery, and that the movable jaw has on its internal periphery at the level of its opening, lugs directed radially inwardly, regularly spaced about said periphery and in number equal to said notches, the lugs penetrating in the assembled condition into said notches so as to secure the blocking element and the movable jaw in rotation during operation of the crusher.

2. A system for securing the movable jaw according to claim 1, wherein the number of lugs and notches is equal to four.

3. A system substantially as herein described with reference to any one of the accompanying figures 2 to 4.

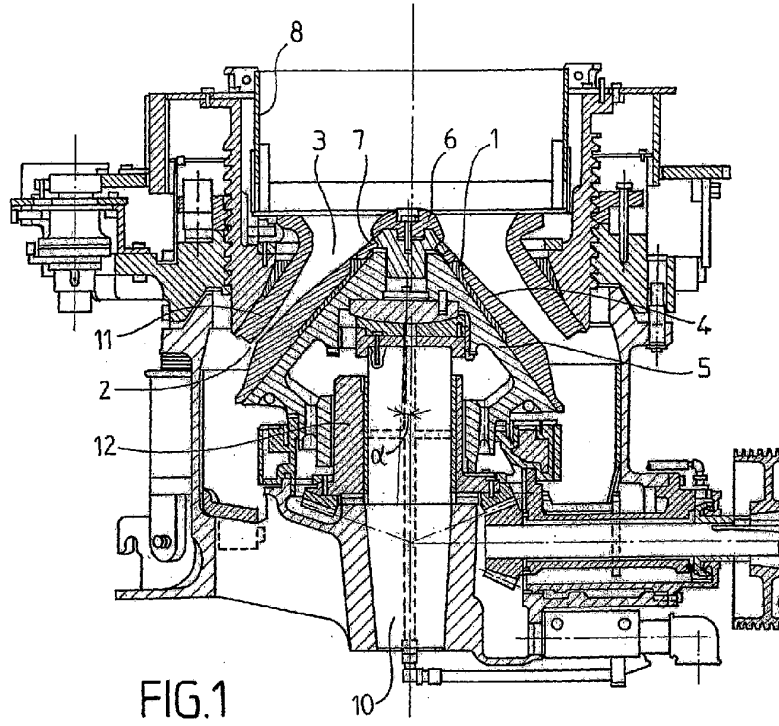


FIG.1

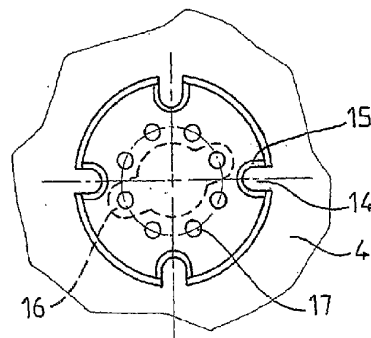


FIG.4

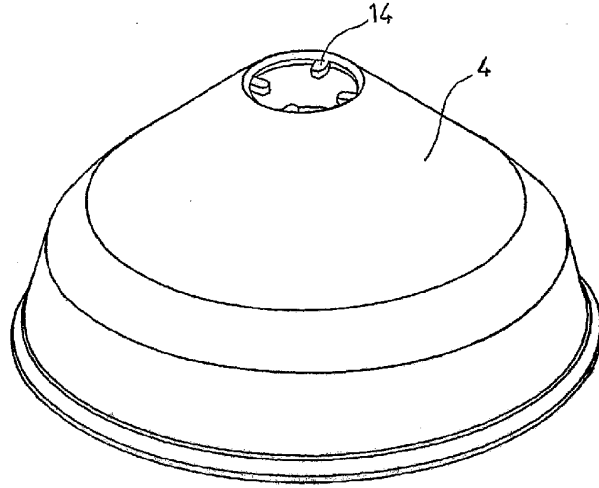


FIG. 2

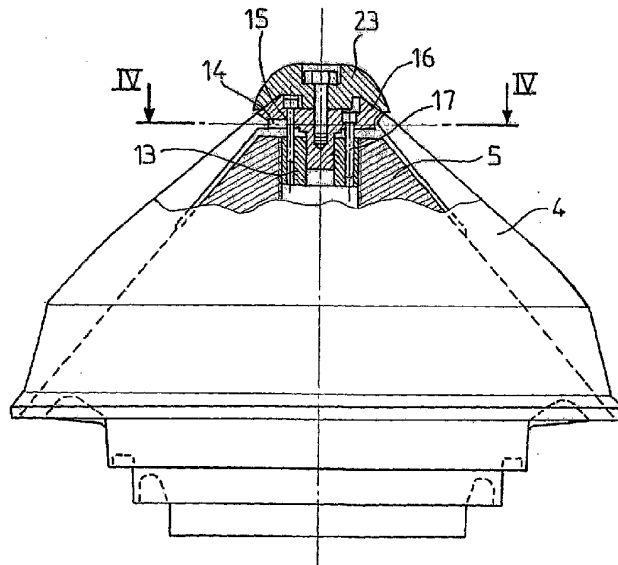


FIG. 3