Stamping apparatus, of the flash stamping type, for soap bars, for the production of toiletry soaps, laundry soaps or the like

A stamping apparatus, of the flash stamping type, for soap bars, for the production of toiletry soaps, laundry soaps or the like, comprising a die (3) provided with a plurality of formation cavities (2) and a complementary die (4) that can move on command toward or away from the die (3) to close the formation cavities (2) and stamp a bar of soap that is interposed between the die (3) and the complementary die (4) to open the formation cavities (2) and allow the insertion of a bar of soap between the die (3) and the complementary die (4) or the extraction of the stamped pieces of soap (6) from the formation cavities (2). On the bottom of each one of the formation cavities (2) there is an extraction block (13), which can move on command toward the mouth (2a) of the corresponding formation cavity (2) directed toward the complementary die (4) in order to expel the stamped piece of soap (6). In the apparatus, the extraction blocks (13) are connected to a mechanical actuator (14), which can be actuated to cause the movement of the extraction blocks (13) from an inactive position, in which they are spaced from the mouth (2a) of the corresponding formation cavity inside the corresponding formation cavity (2), to an extraction position, in which they are moved in the direction of the mouth (2a) of the corresponding formation cavity (2) with respect to the inactive position, and vice versa.
The present invention relates to a stamping apparatus, of the flash stamping type, for soap bars, for the production of toiletry soaps, laundry soaps or the like.

Two different methods are currently used in the stamping of soap for the production of toiletry soaps or laundry soaps or the like: the method known as "die box" and the "flash stamping" technique.

The "die box" method uses an apparatus that is composed of an element known as a star, which rotates about an axis and in which there are cavities that are open on the two opposite faces. A precut piece of soap, equal in weight to the desired weight of the stamped piece of soap, is inserted in each one of these cavities, and then two die parts are inserted in said cavity through the two opposite open sides thereof and complete the stamping apparatus. In this manner, the stamping of the precut soap pieces is performed and the stamped soap pieces are extracted from the cavities by removing the two die parts and by inserting, from one side of the cavities, a mechanically actuated pusher.

The stamping apparatuses that operate according to the "die box" method do not have problems during extraction of the stamped pieces of soap from the cavities of the star, since extraction occurs after removing from said cavities the two die parts and by means of a mechanical pusher that is inserted from one side of the cavities and pushes the stamped piece of soap to exit from the opposite side of said cavity.

For this reason, apparatuses that operate according to the "die box" method are used predominantly to stamp pieces of soap that have a very high flat band on their lateral surface, such as for example laundry soaps or the like, and/or particularly sticky soaps.

In contrast with this reliability in the extraction of the stamped pieces of soap from the cavities of the star, apparatuses that operate according to the "die box" method suffer the drawback of having a reduced productivity and of requiring high precision in cutting the pieces of soap to be inserted in the cavities of the star.

The flash stamping method uses an apparatus composed of a die in which there is a plurality of formation cavities and a complementary die, in which complementary stamping cavities are optionally defined, each complementary stamping cavity defining, together with a corresponding formation cavity, the shape of the piece of soap to be stamped. The complementary die can move on command toward or away from the die in order to close the formation cavities and stamp a precut soap bar, with a weight that exceeds by 25%-50% the weight of the stamped soap pieces to be obtained, which is interposed cyclically between the die and the complementary die, or to open the formation cavities so as to allow the insertion of a bar of soap between the die and the complementary die or the extraction of the stamped pieces of soap from the formation cavities. During the closure of the formation cavities, the excess quantity of soap is evacuated externally from the formation cavities and is removed.

In these apparatuses, extraction of the pieces of soap from the formation cavities after stamping is performed by means of pickup elements provided with suckers and is assisted by the presence, on the bottom of each formation cavity, of an extraction block, which is raised in the direction of the mouth of the formation cavity after said cavity has been opened as a consequence of the spacing of the complementary die. The lifting of each extraction block is performed by means of a pneumatic cylinder, connected by means of its stem to the corresponding extraction block. The lifting of each extraction block is contrasted by a spring that returns the corresponding extraction block to the bottom of the formation cavity when the actuation of the pneumatic cylinder ceases.

Apparatuses that operate according to the "flash stamping" method ensure higher productivity and greater management simplicity, since they do not require particular precision as regards the dimensions of the bar of soap to be stamped that is fed to the die and ensure better formation of the stamped pieces of soap and high precision in their dimensions and in their weight. In contrast with these advantages, these apparatuses suffer the drawback that they cannot be used to stamp sticky soaps and/or soaps with a very high lateral flat band, such as for example laundry soaps or the like, due to the low effectiveness of the extraction blocks in expelling the stamped pieces of soap from the formation cavities.

The use of pneumatically actuated extraction blocks with a short stroke is in fact often insufficient to extract pieces of soap having a high lateral band from the formation cavities to an extent sufficient to achieve removal thereof by the pickup elements provided with suckers.

The aim of the present invention is to solve the problems described above, by providing a stamping apparatus, of the flash stamping type, for soap bars, for the production of toiletry soaps, laundry soaps or the like, that is capable of stamping without problems pieces of soap that have a high lateral band and/or are particularly sticky.

Within this aim, an object of the invention is to provide an apparatus that is capable of performing the correct extraction of the pieces of soap from the formation cavities, protecting their integrity.

Another object of the invention is to provide an apparatus that offers various possibilities of adjustment, so that it can be used for a wide range of products.

A further object of the invention is to provide an apparatus that can be used for the stamping of pieces of soap that currently can be performed only with the "die box" method, so as to allow a reduction of the production costs of these articles.

Another object of the invention is to provide an apparatus that ensures high reliability in operation with reduced maintenance interventions.
This aim, as well as these and other objects that will become better apparent hereinafter, are achieved by a stamping apparatus, of the flash stamping type, for soap bars, for the production of toiletry soaps, laundry soaps or the like, comprising a die provided with a plurality of formation cavities and a complementary die that can move on command toward or away from said die to close said formation cavities and stamp a bar of soap that is interposed between said die and said complementary die or to open said formation cavities and allow the insertion of a bar of soap between said die and said complementary die or the extraction of the stamped pieces of soap from said formation cavities; on the bottom of each one of said formation cavities there being an extraction block, which can move on command toward the mouth of the corresponding formation cavity directed toward said complementary die in order to expel the stamped piece of soap, characterized in that the extraction blocks are connected to a mechanical actuator, which can be actuated to cause the movement of said extraction blocks from an inactive position, in which they are spaced from the mouth of the corresponding formation cavity inside the corresponding formation cavity, to an extraction position, in which they are moved in the direction of the mouth of the corresponding formation cavity with respect to said inactive position, and vice versa.

Further characteristics and advantages of the invention will become better apparent from the description of preferred but not exclusive embodiments of the apparatus according to the invention, illustrated by way of nonlimiting example in the accompanying drawings, wherein:

Figures 1 to 9 are views of the apparatus according to the invention in a first embodiment, more particularly:

Figure 1 is a schematic sectional view of the apparatus according to the invention, taken along a vertical plane, with the complementary die mated with the die and with the extraction blocks in the inactive position;

Figure 2 is a sectional view of Figure 1, taken along the line II-II;

Figure 3 is a schematic sectional view of the apparatus according to the invention, taken along a vertical plane, with the complementary die spaced from the die and with the extraction blocks in the extraction position;

Figure 4 is a sectional view of Figure 1, taken along the line IV-IV;

Figure 5 is a front elevation view of the apparatus according to the invention, more particularly designated by the reference numeral 1, comprises a die 3, in which there is a plurality of formation cavities 2, and a complementary die 4, which can move on command toward or away from the die 3 in order to close the formation cavities 2 and stamp a bar of soap that in each instance is interposed between the die 3 and the complementary die 4 or in order to open the formation cavities 2 so as to allow the insertion of a bar of soap between the die 3 and the complementary die 4 or allow the extraction, from the formation cavities 2, of the stamped pieces of soap 6.

More particularly, in the illustrated embodiment, the die 3 is fixed to a fixed frame 7, which supports it, and the formation cavities 2 are open upwardly.

On the side of the complementary die 4 that is directed toward the die 3, for each formation cavity 2 there is a corresponding complementary cavity 8, which, once the complementary die 4 has been mated with the die 3, defines, in cooperation with the corresponding formation cavity 2, the "shape" of each piece of soap 6 to be stamped.

In the first embodiment being described, as well
As in the second embodiment that will be described hereinafter, the “shape” of each piece of soap 6 to be obtained is composed almost entirely by the formation cavity 2, defined within the die 3, and only to a small extent by the corresponding complementary cavity 8 defined in the complementary die 4, but the extension of the formation cavities 2 in the die 3 and of the complementary cavities 8 in the complementary die 4 can vary depending on the shape of the pieces of soap 6 to be obtained or on the type of soap to be stamped or on other production requirements.

According to the invention, the extraction blocks 13 are actuated by a single mechanical actuator 14.

0031] In greater detail, the mechanical actuator 14 comprises a servomotor 19 with a gearmotor, the output shaft 20 of which is connected to a linkage composed of a rod 21 and a crank 22. The rod 21 is fixed to a shaft 23 that acts on the slider 17.

0032] Conveniently, safety means are interposed between the supporting bar 15 and the mechanical actuator 14 and are adapted to prevent the transition of the extraction blocks 13 from the inactive position to the extraction position in the presence of hindrances to the extraction of the stamped pieces of soap 6, for example due to an accidental alteration of the operating cycle of the apparatus.

0033] Said safety means are constituted by elastic elements that are interposed between the slider 17 and the shaft 23. In greater detail, the shaft 23 passes through a hole 24 that has a vertical axis and is defined in a plate 25 of the slider 17, and said elastic elements are constituted by springs 26, which are interposed between a shoulder 27 of the shaft 23 and a shoulder 28 of the plate 25. If a hindrance prevents the lifting of the supporting bar 15 and therefore of the plate 25, the shaft 23 can slide upwardly along the hole 24 without producing any lifting of the slider 17, since the springs 26 yield elastically.

0034] It is possible to also provide additional safety refinements, such as for example an electronic device capable of detecting the increase in torque required by the servomotor 19 and of stopping immediately the operation of the apparatus if a preset torque value is exceeded.

0035] Advantageously, the compartment 16 has, on its side walls, discharge openings 36 for any soap that might penetrate below the extraction blocks 13 and the supporting bar 15.

0036] In this manner, high reliability in operation with reduced maintenance interventions is achieved.

0037] Conveniently, first means for cooling the die 3 are provided. The first cooling means comprise ducts 29 that are defined in the walls of the die 3 that delimit laterally the formation cavities 2. The ducts 29 are connected to inlet-outlet connectors 30, which can be connected, in a per se known manner, to a circuit for supplying a cooling liquid.

0038] Advantageously, second means for cooling the extraction blocks 13 are provided.

0039] The second cooling means comprise ducts 31 that are defined in the extraction blocks 13 and are connected to ducts 32 that are defined in the supporting bar 15 and in turn are connected to ducts 33 defined in the slider 17 and provided with inlet-outlet connectors 34 that can be connected to a circuit for supplying a cooling liquid.

0040] Advantageously, the second cooling means are independent of the first cooling means so as to allow to manage the cooling of the extraction blocks 13 independ-
The complementary die 4 also can be provided with corresponding cooling means, constituted likewise by ducts 35 that are extended in the body of the complementary die 4 and can be connected to a circuit for supplying a cooling liquid.

The servomotor 19 can be connected to an actuation and control element that supervises the operation of the soap stamping apparatus. Such actuation and control element can be programmed so as to actuate the servomotor 19 with a rule of motion that is correlated to the various steps of stamping with parameters that can be changed depending on the type of pieces of soap to be stamped. In particular, the actuation and control element, by way of a variation of the actuation of the mechanical actuator 14, can vary the stroke of the extraction blocks 13 in relation to the height of the lateral band 6a of the pieces of soap to be stamped and therefore to their final weight. Furthermore, again by varying the actuation of the mechanical actuator 14 by way of the actuation and control element, it is possible to vary the phase of actuation of the extraction blocks 13 with respect to preceding and/or subsequent steps of the entire stamping cycle.

The second embodiment of the apparatus according to the invention, shown in Figures 10 to 18 and designated generally by the reference numeral 101, differs from the first embodiment in that it is also provided with adjustment means 150 in order to vary the useful volume of the formation cavities 2 with the extraction blocks 13 in the inactive position and therefore to vary the volume of the pieces of soap 6 to be stamped.

The elements of the apparatus 101 in the second embodiment that correspond to elements already described with reference to the apparatus 1 in the first embodiment have been designated by the same reference numerals.

Conveniently, the adjustment means 150 for varying the useful volume of the formation cavities 2 comprise means for varying the distance of the extraction blocks 13 from the mouth 2a of the corresponding formation cavity 2 when they are in the inactive position, i.e., before stamping the soap bar interposed between the die 3 and the complementary die 4.

In this second embodiment, the vertical guiding shafts 118, along which the slider 17 slides, instead of being fixed to the frame 7, are fixed, by way of their lower end, to a lower beam 151 and define, by way of their upper end, a resting element for the supporting bar 15. There are additional guiding shafts 152, which are parallel to the guiding shafts 118 and again define, by means of their upper end, a resting element for the supporting bar 15 and are again fixed to the lower beam 151 but do not support the slider 17. The guiding shafts 118, 152 are supported, so that they can slide along their axes, by guiding bushes 153, which are integral with the frame 7. The upper end of the guiding shafts 118, 152 is provided with a contrast block 154, against which the supporting bar 15 rests.

The mechanical actuator 14 or the servomotor 19 with gearmotor and corresponding output shaft 20 are mounted on the lower beam 151.

The lower beam 151 is provided with bushings 155 within which an eccentric portion 156 of an actuation shaft 157 engages which is supported, so that it can rotate about its own axis, by the frame 7. The actuation shaft 157 is connected, by means of a transmission 158 of a known type, for example a worm screw-helical gear transmission, to an actuation handwheel 159, by means of which it is possible to cause the rotation of the actuation shaft 157 and therefore the axial movement of the guiding shafts 118, 152 along the guiding bushes 153 with respect to the frame 7. The axial movement of the guiding shafts 118, 152 produces the movement of the supporting bar 15 and therefore varies the distance of the extraction blocks 13 from the mouth 2a of the corresponding formation cavity 2 when the extraction blocks 13 are in their inactive position.

In this manner, by means of the actuation handwheel 159, it is possible to vary the volume of the formation cavities 2 when the extraction blocks 13 are in the inactive position and it is therefore possible to vary the volume and consequently, for an equal density, the weight of the pieces of soap 6 to be produced.

It should be noted that since the servomotor 19 with gearmotor and corresponding output shaft 20 are mounted on the lower beam 151, the variation of the position of the supporting bar 15 produced by acting on the actuation handwheel 159, i.e., by moving the guiding shafts 118, 152, does not change the method of actuation of the extraction blocks 13.

Thanks to this fact, it is possible to vary the volume of the pieces of soap 6 to be stamped without having to modify the rule of motion according to which the extraction blocks 13 are actuated.

Operation of the apparatus according to the invention is as follows.

With the complementary die 4 spaced from the die 3 and with the extraction blocks 13 in the inactive position, a bar of soap is placed so as to face the mouth 2a of the formation cavities 2.

The complementary die 4 is then moved toward the die 3 until it mates with it, closing the formation cavities 2. The closing of the formation cavities 2 produces the evacuation of the excess soap, which is removed along the ducts and/or chutes 9 arranged laterally to the mouths 2a of the formation cavities 2.

The closure of the formation cavities 2 achieves the stamping of the pieces of soap, as shown in Figures 10 to 18.
1.2, 11, 12, 15 and 16.

[0056] The complementary die 4 is then disengaged and moved away from the die 3 and pickup elements, of a known type and not shown for the sake of simplicity, provided for example with suckers that can engage the side of the stamped pieces of soap 6 that is opposite with respect to the side that rests against the extraction blocks 13, are arranged so as to face the mouth 2a of the formation cavities 2.

[0057] By way of the actuation of the mechanical actuator 14, the extraction blocks 13 are moved into the extraction position, causing the at least partial extraction of the stamped pieces of soap 6 through the mouths 2a of the formation cavities 2 in the direction of the pickup elements, as shown in Figures 3, 4, 13, 14, 17 and 18.

[0058] The pieces of soap are then taken by the pickup elements and moved away from the apparatus.

[0059] By way of the actuation of the servomotor 19, the extraction blocks 13 are returned to the inactive position and another bar of soap to be stamped is arranged so as to face the mouths of the formation cavities 2.

[0060] It should be noted that if required, the stroke of the extraction blocks 13 can be such as to extract almost entirely the stamped pieces of soap 6 from the formation cavities 2, so as to minimize the force that the pickup elements must apply in order to remove the stamped pieces of soap 6 from the die 3 and to minimize the stroke required by the pickup elements to extract the stamped pieces of soap 6.

[0061] Thanks to this fact, the apparatus according to the invention allows to perform stamping with the flash stamping method of pieces of soap that have a very high lateral band 6a and/or are particularly sticky, with fully satisfactory results in terms of quality.

[0062] Furthermore, thanks to the fact that the passage of the extraction blocks 13 from the extraction position to the inactive position is caused by the mechanical actuator 14, it is possible to have a force, which acts on the extraction blocks 13 in this step, that is sufficient to exclude the possibility of imprecise placements of the extraction blocks 13.

[0063] When one wishes to change the size, i.e., the volume of the pieces of soap to be stamped, one acts on the actuation handwheel 159, while the extraction blocks 13 are in the inactive position, so as to produce the movement of the supporting bar 15 and therefore of the extraction blocks 13 within the corresponding formation cavity 2, as explained above, reducing the volume of the formation cavities 2, as is evident from the comparison between Figures 11 to 14, which relate to the stamping of thicker pieces of soap 6, and Figures 15 to 18, which refer to the stamping of thinner pieces of soap 6, or vice versa.

[0064] In practice it has been found that the apparatus according to the invention achieves fully the intended aim and objects, since it allows to stamp with the flash stamping method types of soap that until today could be stamped only with the "die box" stamping method, in particular soaps with a very high lateral band and particularly sticky soaps.

[0065] Another advantage of the apparatus according to the invention is that it allows to adjust the stroke of the extraction blocks and their phase with respect to preceding or subsequent steps of the entire stamping cycle.

[0066] A further advantage of the apparatus according to the invention, in the second embodiment, is that it allows to vary the volume of the pieces of soap to be stamped without having to act on the rule of motion with which the extraction blocks are actuated.

[0067] The apparatus thus conceived is susceptible of numerous modifications and variations, all of which are within the scope of the appended claims; all the details may further be replaced with other technically equivalent elements.

[0068] In practice, the materials used, as well as the dimensions, may be any according to requirements and to the state of the art.

[0069] The disclosures in Italian Patent Application no. MI2014A000115, from which this application claims priority, are incorporated herein by reference.

[0070] Where technical features mentioned in any claim are followed by reference signs, those reference signs have been included for the sole purpose of increasing the intelligibility of the claims and accordingly such reference signs do not have any limiting effect on the interpretation of each element identified by way of example by such reference signs.

Claims

1. A stamping apparatus, of the flash stamping type, for soap bars, for the production of toiletry soaps, laundry soaps or the like, comprising a die 3 provided with a plurality of formation cavities (2) and a complementary die (4) that can move on command toward or away from said die 3 to close said formation cavities (2) and stamp a bar of soap that is interposed between said die 3 and said complementary die (4) or to open said formation cavities (2) and allow the insertion of a bar of soap between said die 3 and said complementary die (4) or the extraction of the stamped pieces of soap (6) from said formation cavities (2); on the bottom of each one of said formation cavities (2) there being an extraction block (13), which can move on command toward the mouth (2a) of the corresponding formation cavity (2) directed toward said complementary die (4) in order to expel the stamped piece of soap (6), characterized in that the extraction blocks (13) are connected to a mechanical actuator (14), which can be actuated to cause the movement of said extraction blocks (13) from an inactive position, in which they are spaced from the mouth (2a) of the corresponding formation cavity inside the corresponding formation cavity (2), to an extraction position, in which they are moved in...
the direction of the mouth (2a) of the corresponding formation cavity (2) with respect to said inactive position, and vice versa.

2. The apparatus according to claim 1, characterized in that each extraction block (13) occupies at least 50% of the surface of the bottom of the corresponding formation cavity (2).

3. The apparatus according to claims 1 and 2, characterized in that each extraction block (13) occupies substantially all of the surface of the bottom of the corresponding formation cavity (2).

4. The apparatus according to one or more of the preceding claims, characterized in that said extraction blocks (13) are fixed, by means of their opposite side with respect to the mouth (2a) of the corresponding formation cavity (2), to a supporting bar (15) that is accommodated in a compartment (16) defined in said die (3), said supporting bar (15) being connected kinematically to said mechanical actuator (14).

5. The apparatus according to one or more of the preceding claims, characterized in that said mechanical actuator (14) comprises a servomotor (19) that is connected to said supporting bar (15) by means of a rod (21) and crank (22) linkage.

6. The apparatus according to one or more of the preceding claims, characterized in that safety means adapted to prevent the passage of said extraction blocks (13) from said inactive position to said extraction position in the presence of hindrances to the extraction of the stamped pieces of soap (6) are interposed between said supporting bar (15) and said mechanical actuator (14).

7. The apparatus according to one or more of the preceding claims, characterized in that said compartment (16) is provided with discharge openings (36) for the evacuation of soap.

8. The apparatus according to one or more of the preceding claims, characterized in that it comprises first means (29, 30) for cooling said die (3).

9. The apparatus according to one or more of the preceding claims, characterized in that it comprises second means (31, 32, 33) for cooling said extraction blocks (13).

10. The apparatus according to one or more of the preceding claims, characterized in that said second cooling means comprise ducts (31, 32) for circulating a cooling fluid, which are defined in said extraction blocks (13) and in said supporting bar (15).

11. The apparatus according to one or more of the preceding claims, characterized in that said second cooling means comprise ducts (31, 32) for circulating a cooling fluid, which are defined in said extraction blocks (13) and in said supporting bar (15).

12. The apparatus according to one or more of the preceding claims, characterized in that said mechanical actuator (14) is connected functionally to a control and actuation element that supervises the operation of the apparatus, said control and actuation element being adapted to actuate said mechanical actuator (14) according to preset programs.

13. The apparatus according to one or more of the preceding claims, characterized in that said control and actuation element is adapted to vary, by means of a variation of the actuation of said mechanical actuator (14), the stroke and/or the phase of actuation of said extraction blocks (13).

14. The apparatus according to one or more of the preceding claims, characterized in that it comprises adjustment means (150) for varying the useful volume of the formation cavities (2) with said extraction blocks (13) in said inactive position.

15. The apparatus according to one or more of the preceding claims, characterized in that said adjustment means (150) comprise means for varying the distance of the extraction blocks (13), in said inactive position, from the mouth (2a) of the corresponding formation cavity (2).

16. The apparatus according to one or more of the preceding claims, characterized in that said mechanical actuator (14) can be actuated independently of said adjustment means (150).
**DOCUMENTS CONSIDERED TO BE RELEVANT**

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The present search report has been drawn up for all claims.

Place of search: The Hague  25 June 2015  Examiner: Baradat, Jean-Luc

**CATEGORY OF CITED DOCUMENTS**

- T: theory or principle underlying the invention
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For more details about this annex: see Official Journal of the European Patent Office, No. 12/82
REFERENCES CITED IN THE DESCRIPTION

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