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(54) **System and method for producing a sheet metal strip with notched edge**

(57) A method and system (100) for production of a sheet metal strip (1) with notched edge (2) is disclosed. The system (100) comprises: a mother reel (D1) from which sheet metal (10) is unwound; perforation means (M) that cross the sheet metal (10) transversally to form a plurality of holes (20) distributed along the sheet metal

(10); and cutting means (T) to make a longitudinal cut of the perforated sheet metal in the longitudinal lines passing through the centers of the holes (20) and longitudinal lines in intermediate position with respect to the centers of the holes (20) in such a way to obtain a plurality of sheet metal strips (1) with notched edge (2).

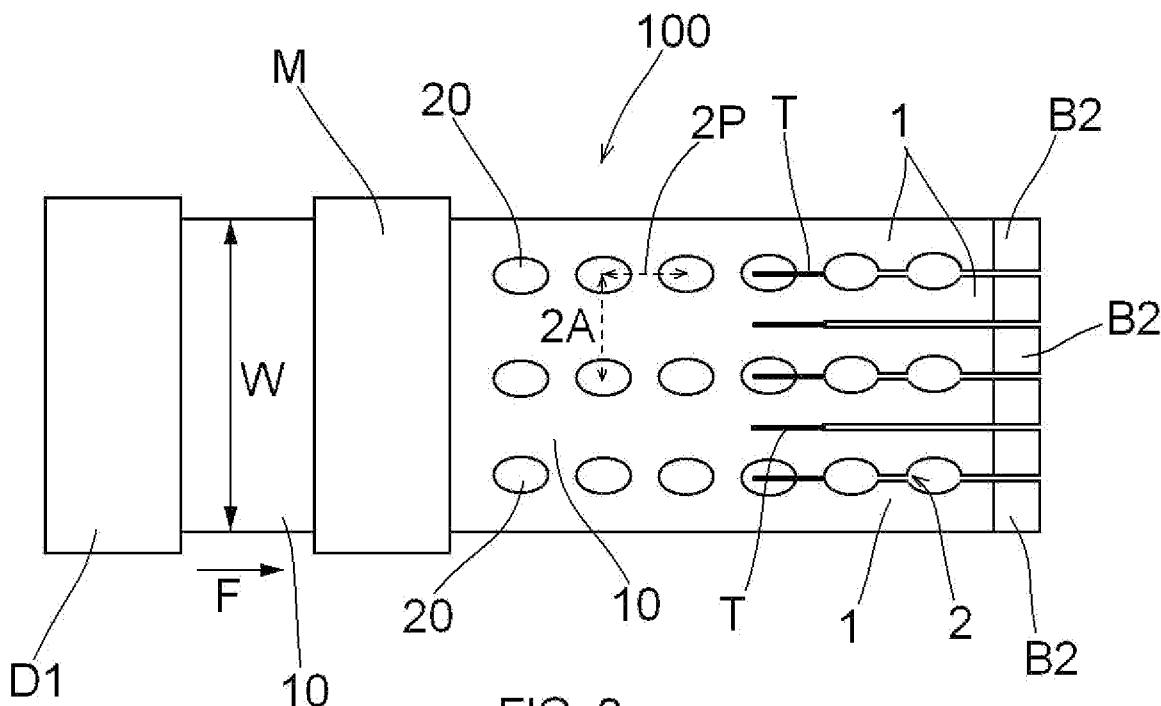


FIG. 3

Description

[0001] The present patent application for industrial invention relates to a system and method for producing a sheet metal strip with notched edge, in particular for realization of gratings and similar.

[0002] Generally, the flooring of mechanical workshops and industrial plants consists in a sheet metal grating both to generate anti-slip surface and allow wastage, such as chips, oil, grease and similar, to fall under said grating, without hindering the operator who works on the grating.

[0003] Said gratings are generally made with sections of sheet metal strips, provided with edge with notches that act as housings for crossed elements or also as anti-slip elements.

[0004] Fig. 1 shows such a type of strip, indicated with numeral (1), which is provided with notching (2) shaped as saw tooth. For instance, the strip (1) can have a width (A) ranging from 30 to 40 mm and a variable pitch (p) of notching of approximately 6 mm.

[0005] Referring to Fig. 2, according to the known art, the strip (1) is made starting from a sheet metal strip (1) with width (A) that is unwound from a mother reel (B1). One edge of the sheet metal is passed under a hammer (M) provided with punch shaped in such a way to obtain notching (2) by shearing the edge of the sheet metal. The hammer (M) makes an alternate movement in the direction of the vertical arrows (V) and the sheet metal makes an indexed forward travel in the direction of the arrow (F). The notched sheet metal (1) is wound in a final reel (B2) ready to be put on the market.

[0006] Evidently, the method according to the known art is impaired by some inconveniences. First of all, said method is not versatile, it being impaired by the presence of mother reels (B1) with small dimensions that must respect the width (A) of the strip to be obtained. Moreover, in case of a production change (change of width for the strip or change of notching profile), it is necessary to change reels and hammer, with consequent time losses. Therefore, the known system requires the presence of reels with different dimensions in the warehouse, resulting in high running costs for the warehouse.

[0007] The purpose of the present invention is to eliminate the inconveniences of the known art, by devising a system and method that are versatile and adapted to produce strips with notched edge of different shape and size. Another purpose of the present invention is to devise a system and method that are able to reduce production time, while increasing the productivity of strips with notched edges.

[0008] These purposes are achieved by the present invention with the method and system the characteristics of which are listed respectively in the enclosed independent claims 1 and 7.

[0009] Advantageous embodiments are disclosed in the dependent claims.

[0010] The method for producing a sheet metal strip

with notched edge according to the invention comprises the following steps:

- unwinding of sheet metal from a mother reel,
- perforation of sheet metal to obtain a plurality of holes distributed along the sheet metal, and
- longitudinal cut of the perforated sheet metal in longitudinal lines passing through the centers of the holes and longitudinal lines in intermediate position with respect to the centers of the holes, in such a way to obtain a plurality of sheet metal strips with notched edge.

[0011] The advantages of the method of the invention are evident, since it allows for obtaining a plurality of notched strips from a large sized reel.

[0012] Further characteristics of the invention will appear evident from the detailed description below, which refers to merely illustrative, not limiting embodiments, illustrated in the enclosed drawings, wherein:

Fig. 1 is a front view of a section of notched strip;
Fig. 2 is a perspective diagrammatic view of a system for producing a notched strip according to the known art;

Fig. 3 is a top view of a system for producing a notched strip according to the invention,

Fig. 4 is a top view that shows four possible variants of the holes made on the sheet metal;

Fig. 5 is the same view as Fig. 3, except for it shows a second embodiment of the system of the invention; and

Fig. 6 is a bottom view of the hammer used in the system of Fig. 5.

[0013] Referring to Fig. 3, a system for producing a strip with notched edge according to the invention is disclosed, which is generally indicated with numeral (100).

[0014] The system (100) comprises an unwinding unit in which a large-sized mother reel (D1) is disposed, from which a sheet metal (10) is unwound with width (W) equal to a multiple of the width (A) of the notched strip (1) to be obtained. The sheet metal (10) is passed under a hammer (M) provided with a punch that transversally crosses the sheet metal (10). The punch of the hammer (M) is provided with a plurality of shearing projections adapted to generate a plurality of holes or slots (20) on the sheet metal (10).

[0015] Preferably the holes (20) are equally distributed both in the longitudinal and transversal direction of the strip. The centers of the holes are aligned on parallel lines in longitudinal direction and on parallel lines in transversal direction.

[0016] More exactly, the holes (20) have a pitch in transversal direction equal to $2A$, that is to say the double of the width of the notched strip (1) to be obtained. Instead, the holes (20) have a pitch in longitudinal direction equal to $2p$, that is to say the double of the pitch of the

notching (2) of the notched strip (1). The pitch of the holes is the distance between the centers of the holes.

[0017] To obtain such a distribution of the holes (20), the punch of the hammer (M) must be provided with a plurality of cutting projections equally spaced along at least a transversal line. In fact, the sheet metal (10) makes an indexed forward travel in the direction of the arrow (F). Instead, the hammer (M) makes an alternate movement in vertical direction, synchronized with the movement of the sheet metal (10).

[0018] Downstream the hammer (M) a shearer is provided, with a plurality of cutting blades (T) disposed in mutually parallel position and adapted to make a longitudinal cut of the sheet metal (10). The cutting blades (T) can be circular saws or band saws.

[0019] Although the figure illustrates a cutter in the system where the hammer (M) is provided, it appears evident that the cutter can be provided in a separate system. In the latter case, the sheet metal (10) with holes (20) coming out of the hammer (M) is collected in a large-sized reel and then fed to the cutter. The cutting blades (T) cut the sheet metal (10) in the centers of the holes (20) and in a longitudinal line in intermediate position between the centers of the holes (20). In this way a plurality of notched strips (1) is obtained with notching (2) on one edge of the strip. The number of notched strips (1) is equal to the double of the longitudinal lines of holes (20) obtained in the sheet.

[0020] The notched strips (1) are collected in corresponding final reels (B2) ready to be put on the market.

[0021] Although Fig. 3 illustrates holes (20) with elliptical shape for illustrative purposes, it is evident that the holes of the sheet can have any type of suitable shape.

Fig. 4 shows four variants of the holes of the sheet metal (10), that is to say holes shaped as a diamond (20a), a hexagon (20b), a square (20c) and a circle (20d).

Fig. 5 shows a system (200) according to a second embodiment. In this case, instead of being provided with punches that generate holes by removing material, the hammer (M) is provided with shearing blades (250) (Fig. 6) that make a cut by shearing. The shearing blades (250) of the hammer are suitably shaped to generate directly a notched edge (2) between two strips (1). In this case, cutting blades (T) are provided only in intermediate position with respect to the notched edges (2) of the strip. Clearly, shearing can be obtained by means of male and female sliding knives that produce the same figure.

[0022] Numerous variations and modifications can be made to the present embodiments of the invention by an expert of the field, while still falling within the scope of the invention as claimed in the enclosed claims.

Claims

1. Method for producing a sheet metal strip (1) with notched edge (2) comprising the following steps:
 - unwinding of sheet metal (10) from a mother coil (D1),
 - perforation of sheet metal (10) to obtain a plurality of holes (20) distributed along the sheet metal (10), and
 - longitudinal cut of the perforated sheet metal in longitudinal lines passing through the centers of the holes (20) and longitudinal lines in intermediate position with respect to the centers of the holes (20), in such a way to obtain a plurality of sheet metal strips (1) with notched edge (2).
2. Method as claimed in claim 1, **characterized in that** said holes (20) are aligned along parallel longitudinal lines passing through the centers of the holes.
3. Method as claimed in claim 1 or 2, **characterized in that** said holes (20) are aligned along parallel transversal lines passing through the centers of the holes.
4. Method as claimed in claim 3, **characterized in that** the distance between two parallel transversal lines passing through the centers of the holes is equal to the double of the width (A) of said notched strips (1).
5. Method as claimed in any one of the above claims, **characterized in that** said holes (20, 20a, 20b, 20c, 2d) have any one of the following shapes: elliptical, rhomboidal, pentagonal, square, and circular.
6. Method as claimed in any one of the above claims, **characterized in that** it comprises a winding pitch of the notched strips obtained in corresponding final reels (B2).
7. System (100) for producing a sheet metal strip (1) with notched edge (2) comprising:
 - a mother reel (D1) from which a sheet metal (10) is unwound;
 - perforation means (M) that transversally cross the sheet metal (10) to form a plurality of holes (20) distributed on the sheet metal (10); and
 - cutting means (T) to make a longitudinal cut of the perforated sheet metal in longitudinal lines passing through the centers of the holes (20) and longitudinal lines in intermediate position with respect to the centers of the holes (20), in such a way to obtain a plurality of sheet metal strips (1) with notched edge (2).
8. System (100) as claimed in claim 7, **characterized**

in that said perforation means (M) comprise a hammer that makes alternate movements in vertical direction and comprises a plurality of cutting projections adapted to generate said holes (20).

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9. System (100) as claimed in claim 8, **characterized in that** it comprises actuation means of the sheet metal adapted to generate indexed movement of the sheet metal (10) and synchronization means adapted to synchronize the alternate movement of said hammer (M) with the indexed movement of said sheet metal (10). 10
10. System (100) as claimed in any one of claims 7 to 9, **characterized in that** said cutting means (T) comprise a plurality of circular or band saws in mutually parallel position. 15
11. System (100) as claimed in any one of claims 7 to 10, **characterized in that** it comprises a plurality of reels (B2) where said notched strips (1) are wound. 20
12. Method for producing a sheet metal strip (1) with notched edge (2) comprising the following steps: 25
 - unwinding of sheet metal (10) from a mother coil (D1),
 - shearing of the sheet metal (10) along longitudinal lines, in such a way to obtain corresponding notched edges (2) that extend longitudinally, and 30
 - longitudinal cut of the sheet metal in longitudinal lines in intermediate position with respect to the notched edges (2), in such a way to obtain a plurality of sheet metal strips (1) with notched edge (2). 35
13. System (200) for producing a sheet metal strip (1) with notched edge (2) comprising: 40
 - a mother reel (D1) from which a sheet metal (10) is unwound;
 - shearing means (M') to form a plurality of longitudinal shearing lines that represent the notched edges (2) of the strips; and 45
 - cutting means (T) to make a longitudinal cut of the sheet metal in longitudinal lines in intermediate position with respect to the notched edges (2), in such a way to obtain a plurality of sheet metal strips (1) with notched edge (2). 50
14. System (200) as claimed in claim 13, **characterized in that** said shearing means (M') are male and female sliding knives that reproduce the same figure. 55

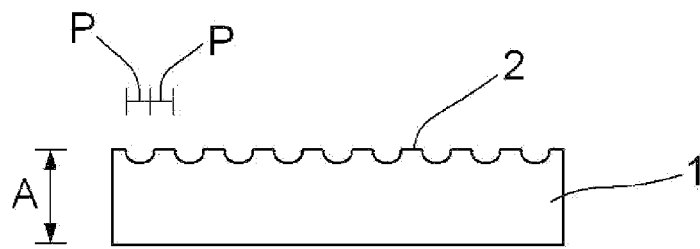


FIG. 1

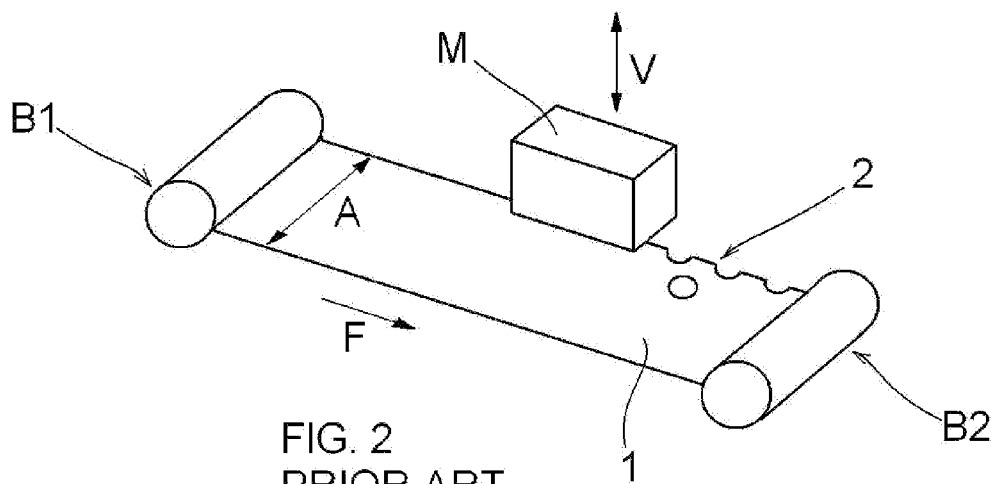


FIG. 2
PRIOR ART

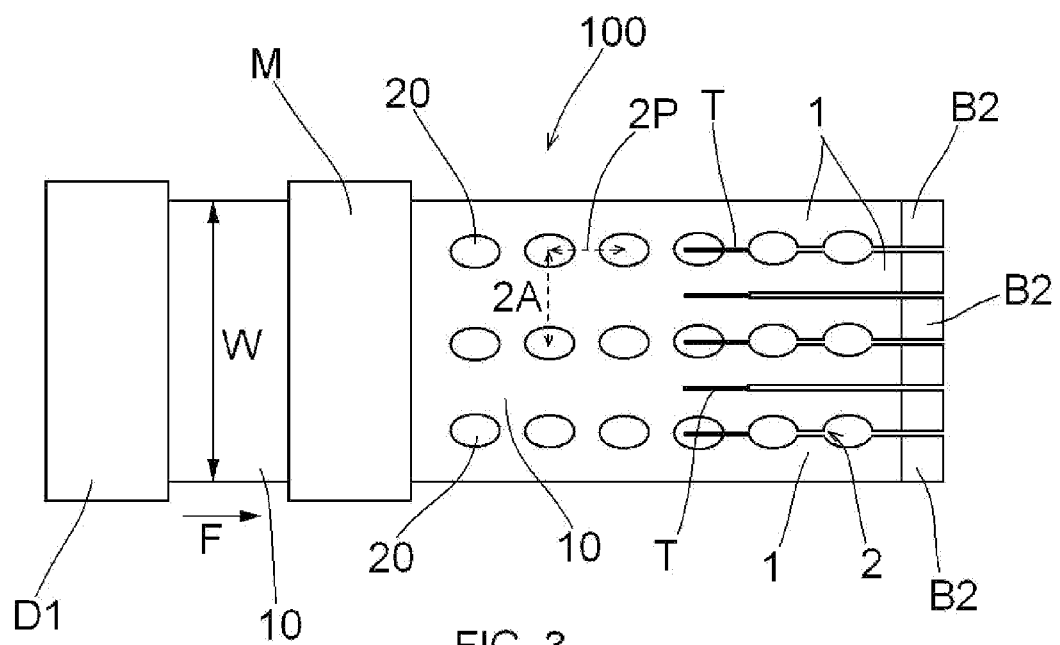


FIG. 3

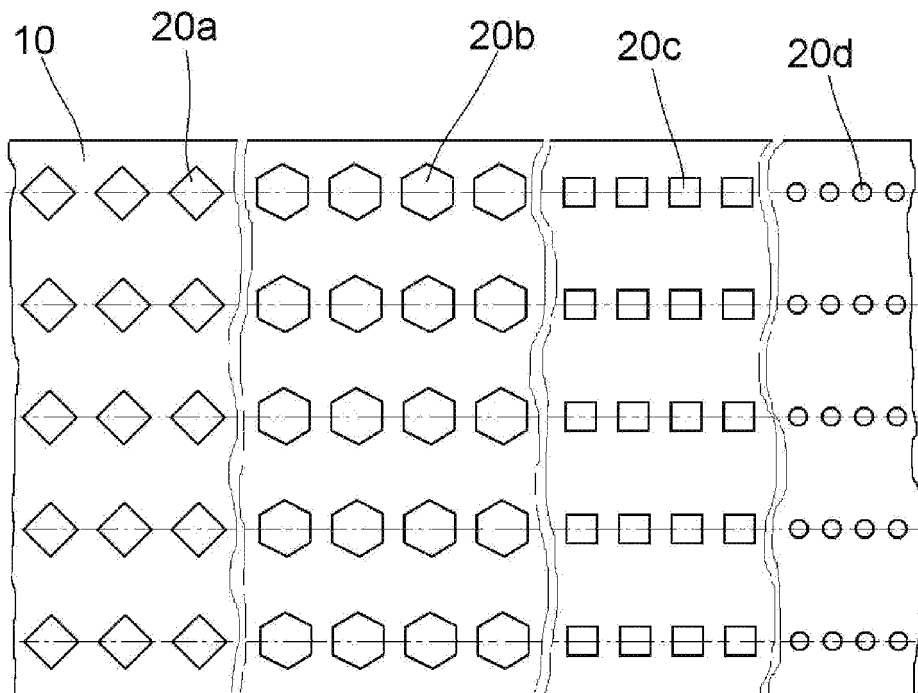


FIG. 4

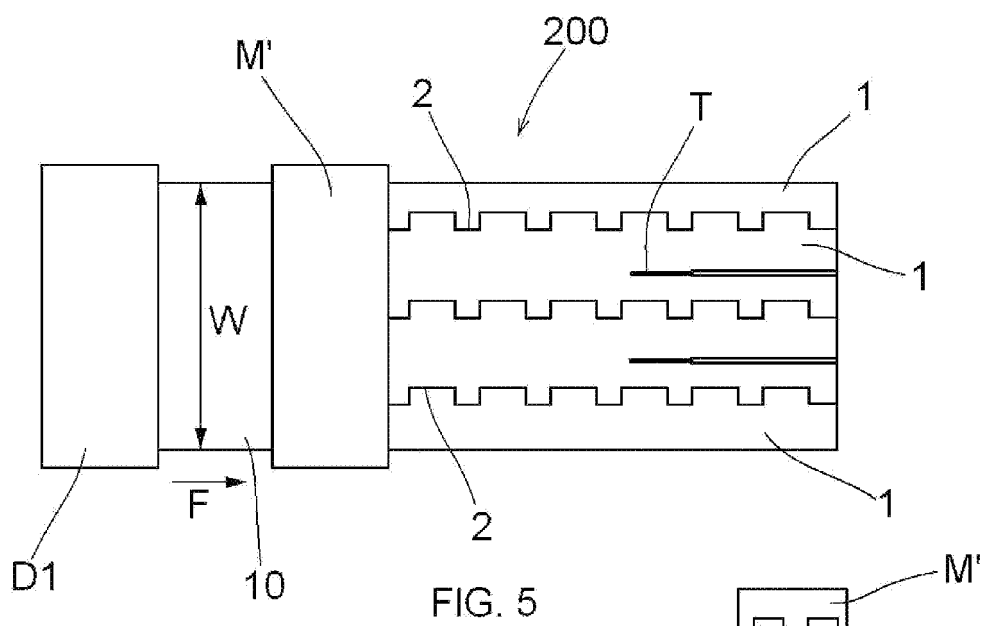


FIG. 5

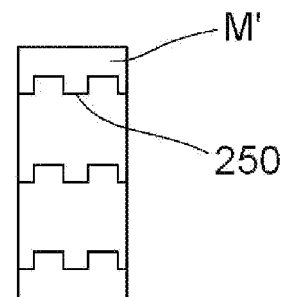


FIG. 6