Abstract:

There is provided a concave for a rotary combine which includes a body having a plurality of curved frame sections connected in parallel side by side relation. Each of the curved frame section has having ends and sides. The body has an entry end and an exit end. Each of the curved frame sections has a face with an upstanding crop processing profile. For the curved frame sections at the entry end of the body the crop processing profile is a threshing profile having an orientation extending between the sides. For the curved frame sections at the exit end of the body the crop processing profile is a separation profile of sine wave vanes having an orientation extending toward the ends and having apertures positioned between the vanes to permit passage of grain.
ABSTRACT OF THE DISCLOSURE

There is provided a concave for a rotary combine which includes a body having a plurality of curved frame sections connected in parallel side by side relation. Each of the curved frame section has having ends and sides. The body has an entry end and an exit end. Each of the curved frame sections has a face with an upstanding crop processing profile. For the curved frame sections at the entry end of the body the crop processing profile is a threshing profile having an orientation extending between the sides. For the curved frame sections at the exit end of the body the crop processing profile is a separation profile of sine wave vanes having an orientation extending toward the ends and having apertures positioned between the vanes to permit passage of grain.
TITLE
[0001] Concave For A Rotary Combine

FIELD
5 [0002] There is described a concave for a rotary combine.

BACKGROUND
[0003] A rotary combine has one or more stationary portions referred to as a "con cave" and a rotating portion referred to as a "rotor" or "beater" in the form of revolving tine separators or raspers. The tine separators of the beater penetrate and comb a crop mat which rests against the concave helping release grain that is trapped in the straw. There will hereinafter be described an improved concave structure.

SUMMARY
15 [0004] There is provided a concave for a rotary combine which includes a body having a plurality of curved frame sections connected in parallel side by side relation. Each of the curved frame section has having ends and sides. The body has an entry end and an exit end. Each of the curved frame sections has a face with an upstanding crop processing profile. For the curved frame sections at the entry end of the body the crop processing profile is a threshing profile having an orientation extending between the sides. For the curved frame sections at the exit end of the body the crop processing profile is a separation profile of sine wave vanes having an orientation extending toward the ends and having apertures positioned between the vanes to permit passage of grain.

25 [0005] The concave described above has been determined to provide a number of advantages over prior art concave structures. Some concave structures have crop processing profiles that do not effectively separate grain from straw. This results in financial loss as grain passes through the combine exiting with the straw. The sine wave vane separation profile has been found to be very effective in achieving separation of the grain from the straw. It functions like a sine wave to move the crop back and forth "shaking" the crop to achieve separation. Some concave structures use very aggressive crop processing profiles, which achieve desired separation but in the process of doing so cut the straw to such an extent that the straw can no longer be properly formed into bales. The sine wave vane separation
profile has been found to achieve the desired separation without limiting the length of the straw.

[0006] One of the advantages of the sine wave or sine wave profile, is that one may experiment with the amplitude and frequency of the sine wave profile, in combination with the aperture size and layout to adapt the profile to various types of crops.

[0007] While the proportion of threshing profile to separation profile may vary with application, for most applications it is preferred that a ratio be achieved where for a first third of the body the curved frame sections have the threshing profile and for a second two thirds of the body the curved frame sections have the separation profile. There is a variety of known threshing profiles that can be used, such as bars extending between the sides of the concave sections.

[0008] In order to allow the flexibility to alter the proportions of the threshing profiles and the separation profiles, it is preferred that a modular approach be used. In accordance with this aspect of the invention, each curved frame section has a plurality of pockets and each of the pockets has a first coupling. The face with the upstanding crop processing profile is positioned on a plurality of tiles. Each of the plurality of tiles has a second coupling configured to be secured with removable fasteners to the first coupling thereby securing each tile in one of the plurality of pockets of one of the curved frame sections.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] These and other features will become more apparent from the following description in which reference is made to the appended drawings, the drawings are for the purpose of illustration only and are not intended to be in any way limiting, wherein:

[0010] **FIG. 1** is a perspective view of a concave for a rotary combine comprised of a plurality of concave sections.

[0011] **FIG. 2** is a top plan view of one of the concave section illustrated in FIG. 1.

[0012] **FIG. 3** is a perspective view of a tile insert with a threshing profile used in the concave sections illustrated in FIG. 1.
[0013] **FIG. 4** is a top plan view of a tile insert with a separation profile used in the concave sections illustrated in **FIG 1**.

**DETAILED DESCRIPTION**

[0014] A concave for a rotary combine generally identified by reference numeral 10, will now be described with reference to **FIG. 1** through **4**.

Structure and Relationship of Parts:

[0015] Referring to **FIG. 1**, a concave 10 for a rotary combine includes a body 12 with a plurality of curved frame sections A through G connected in parallel side by side relation. In the embodiment shown, seven curved frame sections A through G are connected in parallel side by side relation, however it will be understood that a different number of curved frame sections may be used. Referring to **FIG. 3** and **4**, each curved section A through G has ends 14 and sides 16 and, referring to **FIG. 1**, body 12 has an entry end 18 and an exit end 20. Referring to **FIG. 3** and **4**, each of curved frame sections, A through G, has a face 22 with an upstanding crop processing profile. Referring to **FIG. 3**, an entry end 18 of body, crop processing profile 24 of curved frame sections A and B is a threshing profile 26 with an orientation extending between the sides 16. A variety of different threshing profiles 26 may be used, however it is preferred that threshing profile 26 have bars 28 that extend between sides 16. Referring to **FIG. 4**, at exit end 20 of body 12, crop processing profile 24 of curved frame section C through G is a separation profile 30 with sine wave vanes 32. Sine wave vanes 32 have an orientation extending toward the ends 14 and have apertures 34 positioned between vanes 32 to permit passage of grain.

[0016] The threshing profile 26 strikes the incoming crop and in doing so dislodges the grain from the straw. The grain and straw continue through the machine intermingled. The sine wave vanes 32 have been found to be very effective in achieving separation of grain from straw. It functions like a sine wave to move the crop back and forth, "shaking" the straw to achieve separation of the grain without chopping or otherwise limiting the length of the straw.

The amplitude and frequency of the sine wave vanes 32, along with aperture 34 size adapt the profile 30 to various types of crops with differing sizes of grain.
[0017] Referring to FIG. 1, it is preferred that the first third of body 12 has curved frame sections A and B with the threshing profile 26 and the remaining two thirds of body 12 has curved frame sections C through G with a separation profile 30. It will, however, be understood that threshing profile 26 and separation profile 30 may occupy different proportions of body 12.

[0018] In order to allow the flexibility to alter the proportions of threshing profiles 26 and separation profiles 32, it is preferred that a modular approach be used. Each curved frame section A through G has a plurality of pockets 36 and each of pockets 36 has a first coupling 38. Referring to FIG. 3, tiles 42 with a threshing profile 26 and, referring to FIG. 4, tiles 44 with a separation profile 32 are provided to create the desired crop processing profile 24 along curved frame sections A through G. Dividers 46 provide proper spacing and positioning of tiles 42 and 44 on curved frame sections A through G. Referring to FIG. 3 and 4, each of the plurality of tiles 42 and 44 has a second coupling 40 configured to be secured with removable fasteners, not shown, to first coupling 38 thereby securing each tile 42 and 44 in one of the plurality of pockets 36 of one of curved frame sections A through G. Referring to FIG. 2, dividers 46 are used to anchor tiles 42 and 44, shown in FIG. 3 and 4, within body 12. Removable fasteners pass through dividers 46 to hold tiles 42 and 44 in body 12.

Operation:

[0019] Referring to FIG. 1, curved frame sections A through G are positioned in parallel spaced relation. The number of curved frame sections may be increased or decreased to lengthen or shorten body 12 and lengthen or shorten the threshing and separation stages in a rotary combine. In the present embodiment, curved sections A and B have threshing profile which are used to dislodge grain from straw before it reaches curved sections C through G which have separation profiles which separate the grain from straw. Referring to FIG. 4, sine wave vanes 32 move the crop back and forth, “shaking” the straw crop to achieve separation of the grain without limiting the length of the straw. The amplitude and frequency of the sine wave vanes 32, may be selected to be particularly suited to various types of crops. Separated grain falls through apertures 34 where it is collected while straw continues to exit end 20 of
body 12. It will be understood that different proportions of body 12 may have threshing profile 26 and separation profile 30. Where modular tiles are used, the proportion of threshing profile 26 to separation profile 30 may be easily altered by attaching and removing tiles with the appropriate crop processing profile. Referring to FIG. 3 and 4, second coupling 40 on tiles are secured with removable fasteners to first coupling 38, shown in FIG. 1.

[0020] In this patent document, the word “comprising” is used in its non-limiting sense to mean that items following the word are included, but items not specifically mentioned are not excluded. A reference to an element by the indefinite article “a” does not exclude the possibility that more than one of the element is present, unless the context clearly requires that there be one and only one of the elements.

[0021] The scope of the claims should not be limited by the illustrated embodiments set forth as examples, but should be given the broadest interpretation consistent with a purposive construction of the claims in view of the description as a whole.
What is Claimed is:

1. A concave for a rotary combine, comprising:
   a body comprised of a plurality of curved frame sections connected in parallel side by side relation, each curved frame section having ends and sides, the body having an entry end and an exit end; and each of the curved frame sections having a face with an upstanding crop processing profile, for the curved frame sections at the entry end of the body the crop processing profile is a threshing profile having an orientation extending between the sides and for the curved frame sections at the exit end of the body the crop processing profile is a separation profile comprised of sine wave vanes having an orientation extending toward the ends and having apertures positioned between the vanes to permit passage of grain.

2. The concave of Claim 1, wherein for a first third of the body the curved frame sections have the threshing profile and for a second two thirds of the body the curbed frame sections have the separation profile.

3. The concave of Claim 1 and 2, wherein the threshing profile is comprised of bars extending between the sides.

4. The concave of Claim 1, wherein each curved frame section has a plurality of pockets and each of the pockets has a first coupling, and the face with the upstanding crop processing profile is positioned on a plurality of tiles, each of the plurality of tiles a second coupling configured to be secured with removable fasteners to the first coupling thereby securing each tile in one of the plurality of pockets of one of the curved frame sections.