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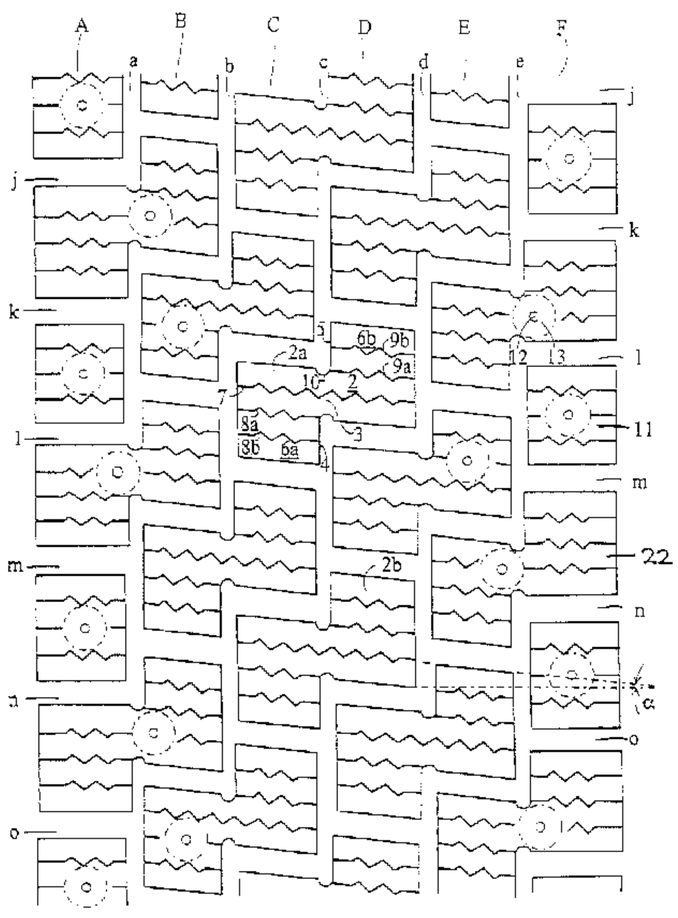
(54) Titre : PNEU D'HIVER POUR VEHICULES, PARTICULIEREMENT UN PNEU D'HIVER ADHERANT POUR CAMIONS LOURDS

(54) Title: WINTER TYRE FOR VEHICLE, PARTICULARLY A TRACTION WINTER TYRE FOR HEAVY TRUCKS



(57) Abrégé/Abstract:
The present invention relates to a winter tyre of a vehicle, the tread (1) whereof being provided with tread pattern blocks (11) and with mainly circumferential (a-e) grooves separating said blocks from each other, and with grooves (j-o) transverse to the circumferential grooves, the rows (A-F) of tread pattern blocks between said circumferential grooves being displaced relative to each other so that the tread pattern blocks adjacent in axial direction of the tyre are overlapping, and said tread pattern blocks being provided with sipes (8a, 9a) opening to the tread and into the tyre with the purpose of increasing the grip of the tread with the road surface. The winter tyre is characterized in that the overlapping and in the axial direction of the tyre adjacent tread pattern blocks are connected in pairs with each other into double tread pattern blocks (2) with a bridge part (3) connecting one end of an adjacent side edge (4) of one tread pattern block and the opposite end of an adjacent side edge (5) of another tread pattern block with each other to form a bridge zone and wing parts (6a, 6b) formed from the connected tread elements (2a, 2b) and extending therefrom in opposite directions, and in that the length of the bridge part (3), when viewed in the axial direction of the tyre, is equivalent to the width of the groove (c) between the connected double tread elements (2a, 2b), that the bridge zone is provided with a long sipe (7) extending from one circumferential outer edge thereof to the opposite outer edge thereof, and that the long sipe (7) is discontinued from the area (13) surrounding the bore (12) for anti-skid studs, if an anti-skid stud with the support area is arranged in the area of the long sipe.

Abstract of Disclosure

The present invention relates to a winter tyre of a vehicle, the tread (1) whereof being provided with tread pattern blocks (11) and with mainly circumferential (a-e) grooves separating said blocks from each other, and with grooves (j-o) transverse to the circumferential grooves, the rows (A-F) of tread pattern blocks between said circumferential grooves being displaced relative to each other so that the tread pattern blocks adjacent in axial direction of the tyre are overlapping, and said tread pattern blocks being provided with sipes (8a, 9a) opening to the tread and into the tyre with the purpose of increasing the grip of the tread with the road surface. The winter tyre is characterized in that the overlapping and in the axial direction of the tyre adjacent tread pattern blocks are connected in pairs with each other into double tread pattern blocks (2) with a bridge part (3) connecting one end of an adjacent side edge (4) of one tread pattern block and the opposite end of an adjacent side edge (5) of another tread pattern block with each other to form a bridge zone and wing parts (6a, 6b) formed from the connected tread elements (2a, 2b) and extending therefrom in opposite directions, and in that the length of the bridge part (3), when viewed in the axial direction of the tyre, is equivalent to the width of the groove (c) between the connected double tread elements (2a, 2b), that the bridge zone is provided with a long sipe (7) extending from one circumferential outer edge thereof to the opposite outer edge thereof, and that the long sipe (7) is discontinued from the area (13) surrounding the bore (12) for anti-skid studs, if an anti-skid stud with the support area is arranged in the area of the long sipe.

Figure 1

Winter tyre for a vehicle, particularly a traction winter tyre for heavy trucks

The present invention concerns a winter tyre for a vehicle, particularly a traction winter tyre for heavy trucks, the tread of which is provided with tread pattern blocks and with mainly circumferential grooves separating said blocks from each other and with grooves transverse to said circumferential grooves, the rows of tread pattern blocks between said circumferential grooves being displaced relative to each other so that adjacent tread pattern blocks in the axial direction of the tyre are overlapping, and which tread pattern blocks comprise sipes opening into the tread 10 and extending into the tyre to increase the grip of the tread with the road surface.

The purpose of the sipes provided in the tread pattern blocks is to increase the grip of the tyres in winter conditions. In the Nordic countries, so-called snow tyres provided with open patterns have been used for improving the grip of the tyres in winter conditions, the surface-groove ratio whereof being small compared with ordinary traction tyres.

A drawback related to said snow tyres lies in that the amount of sipes in the tread cannot be substantially increased without increasing the surface-groove ratio or without reducing the groove depth, both of which decrease the driving properties in snow conditions. If the amount of sipes is increased and the surface-groove ratio and the groove depth are maintained, the stability of the tyre will be impaired and its wear resistance will be degraded.

The objective of the present invention is to increase the amount of sipes without altering the openness of the tread pattern and its groove depth.

According to the present invention, the overlapping adjacent tread pattern blocks in the axial direction of the tyre are connected in pairs into double tread pattern blocks by a bridge part connecting one end of an adjacent side edge of one tread pattern block and the opposite end of an adjacent side edge of another tread pattern block with each other to form a bridge zone and wing parts, which wing parts are formed from the connected tread pattern blocks and are extending from there in opposite directions, that the length of the bridge part when viewed in the axial direction of the tyre is equivalent to the width of the groove between the connected double tread

pattern blocks, that the bridge zone comprises a long sipe extending from one circumferential outer edge thereof to the opposite outer edge thereof, and that the long sipe is discontinued at the area surrounding an anti-skid stud if an anti-skid and its support area are provided in the tread pattern block in the area of the long sipe.

By means of the truck winter tyre of the invention, provided with a double tread pattern block, an improved grip can be achieved on an icy and snowy road, that is, in conditions of packed slippery snow, while the wear resistance of the tyre is excellent and the shape of wear is uniform.

The tyre of the invention works excellently without anti-skid studs, though studs may also be attached thereon. The pattern of the tyre enables an appropriate distribution of studs. An intact cylindrical support area of the tread pattern block is provided around the stud. A sipe entering the support area is discontinued at the border of the support area, whereby a lamella needed to form an intact sipe is replaced by a lamella part forming a discontinued sipe.

The tread of the tyre of the invention may comprise a variable number of tread pattern block rows, the tread pattern blocks adjacent in pairs in said rows are connected into double tread pattern blocks. A winter traction tyre of ordinary size of a heavy truck is preferably provided with six rows of relatively small-sized tread pattern blocks, whereby three overlapping adjacent double tread pattern blocks, or two double tread pattern blocks and two apart blocks, i.e. unconnected blocks, in the shoulder area are formed.

If a tyre includes an odd number of tread element rows, for instance five or seven, overlapping adjacent double tread pattern blocks and one single tread element are comprised in each axial row, alternately in one shoulder area, and alternately in the other shoulder area. This does not bear any significance as to the amount of sipes in the tread pattern blocks.

Both the single pattern blocks of the shoulder area and the pattern block of the double pattern block which is in the shoulder area are advantageously rectangular tread pattern blocks, the circumferential edges of which are parallel to the direction of rotation and the transversal edges of which are parallel to the axis of the tyre. The tread pattern blocks of the middle area of the tread form advantageously a small angle with the tyre axis so that

the transversal edges thereof form an angle of about 0 to 10°, preferably about 7°, to the axis, while the circumferential edges are parallel to the direction of rotation.

A double tread pattern block comprises preferably four short sipes extending across both wing parts of the tread pattern block, and one long sipe, extending over the bridge zone and, therefore, being longer by the length of the bridge part than two short sipes together. The inner sipes of the wing parts are preferably positioned in the immediate proximity of the bridge zone. For reasons of manufacturing a tread pattern block, the side edges of the bridge part are curved inwards, which aids embedding the inner lamellas in the mould.

Since the spaces between the sipes in a double tread pattern block are advantageously mutually equal and since the inner sipes of the wing parts are located in the immediate proximity of the bridge zone, the width of the bridge part is equal to two sipe spaces.

The tyre of the invention and the tread thereof are manufactured in a manner obvious to a person skilled in the state of art. The sipes are achieved with lamellas of the shape corresponding to the shape of the sipes, which are embedded in the mould.

The winter tyre of the invention and the lamella used for manufacturing the same are described below by an embodiment, reference being made to the accompanying figures, in which

Figure 1 presents the tread of a winter tyre of the invention in top view;

Figure 2 presents approximately in one-to-one size a lamella used for producing the winter tyre of the invention for making a sipe in a bridge zone, in top view and as seen when embedded in rubber mass;

Figure 3 presents the lamella of Figure 2 in vertical view prior to being crinkled and with the edge forming the tread turned upwards;

Figure 4 presents approximately in one-to-one size a lamella used for producing the winter tyre of the invention for forming a sipe of the wing part of a double tread pattern block, in top view and as seen when embedded in rubber mass;

Figure 5 presents the lamella of Figure 4 in vertical view prior to being crinkled and with the edge forming the tread turned upwards and when fitted into a wing part in the middle zone of the tread, and

Figure 6 presents the lamella of Figure 4 in vertical view prior to being crinkled and with the edge forming the tread turned upwards and when fitted into a wing part located in a the shoulder area of the tread.

Figure 1 presents the tread 1 of a traction wheel for a heavy truck. The vertical direction of the figure is the same as the circumferential direction of the tyre and the horizontal direction of the figure is the same as the axial direction of the tyre. The tread is provided with six circumferential tread pattern block rows A-F, each outermost row A and F of which are located in the shoulder area of the tyre. Between the circumferential tread pattern block rows A-F, circumferential grooves a-e are located. The adjacent tread pattern blocks, such as 2a and 2b, of two adjacent tread pattern block rows, such as C and D, are connected into a double tread pattern block 2. The connection is carried out by means of a bridge part 3, which connects the upper part of the one inner or side edge 4 and the lower part of the other inner edge 5 (also referred to as an "adjacent side edge") of the adjacent tread pattern blocks 2a and 2b. The length of the bridge part 3 is equivalent to the width of the circumferential groove c between the tread elements or pattern blocks 2a and 2b to be connected. The bridge zone of the double tread pattern block 2 thus formed comprises the upper part of the one tread element 2a and the lower part of the other tread element 2b and the bridge part 3. The free parts of the tread elements 2a and 2b protrude from the bridge zone and form wing parts 6a and 6b in opposite directions.

There is room in the bridge zone for a long sipe 7 extending across the entire zone, said groove being longer by the length of the bridge part 3 than the width of the tread pattern blocks 2a, 2b. Each of the wings parts 6a and 6b of the double tread pattern block 2 is provided with two sipes 8a, 9a, and 8b, 9b, the inner sipes 8a and 9a being located in the immediate proximity of the bridge zone 3. As is known in the art, the sipes extend from one edge of a tread element to the opposite edge and open into adjacent grooves a-e. Most advantageously, the sipes are mutually parallel and parallel with the axially directed edges of the tread pattern block. The sipes 7, 8a, 8b, 9a and 9b of the double tread pattern

block 2 are located at the same distance from each other and preferably also at the same distance from the axially directed edges of the tread pattern block.

In the double tread pattern block 2 thus formed, the amount of sipes has been successfully increased while the surface-groove ratio, that is, the surface of the tread pattern blocks in relation to the circumferential grooves and the grooves transverse to said grooves is mainly unchanged. The distribution of sipes in the tread pattern block is advantageous and makes the tread stable.

The edges 10 of the bridge part 3 are curved inwards. This facilitates the embedding of lamellae used for forming the inner sipes 8a and 9a in the mould.

Owing to the configuration of the double tread pattern block 2, being primarily of the shape of a double L, the tread pattern blocks adjacent in the axial direction of the tyre are overlapping in the circumferential direction in relation to each other, and the axial grooves j-o of the tread are stepped in shape. In the circumferential direction the double tread pattern blocks 2 are preferably at a distance from each other which corresponds to the distance between the sipes. A regularly repeated pattern is thus formed in the tread of the tyre.

In the shoulder areas of the tyre, in areas A and F, there are alternately the pattern block 2a and 2b respectively, on the shoulder area side of the double pattern block 2, and alternately a single, i.e. an unbound tread pattern block 11. All tread pattern blocks of the shoulder areas A and F, both the bound tread elements 2a and the unbound tread elements 11 are preferably rectilinear in shape. All double tread pattern blocks of the middle area B-E of the tread are diamond-shaped so that the axial edges form α small angle a to the circumferential edges. The angle α is of the order 0°-10°, preferably 6°-7°. A small inclination smothers the noise being generated.

The tread as in Figure 1 is provided with marks 12 for anti-skid studs being spread over the shoulder area A and F and over the adjacent rows of tread pattern blocks rows B and E. The spreading of the marks 12 is good and is a guarantee of an efficient operation and uniform wear of the studs. A mark is surrounded by an intact part of the tread element, a cylindrical support area 13. The sipes may not extend to the support area 13. Therefore,

all lamellas, which form sipes and which would extend to the support areas of the anti-skid studs, are cut so that they do not extend beyond the border of the support area.

In Figure 2, a lamella 17 is presented for forming a sipe 7 extending across the bridge zone. The sipe shape formed by the lamella 17 in the tread is shown in the figure. The straight edge of the lamella, being here spread to be planar, forms the groove 7 visible in the tread. The opposite edge having indentations makes the tread pattern block solid. The holes 19 in the upper edge are venting holes.

Figure 4 presents a lamella 18, 21 used for forming the sipes of the unbound tread pattern blocks 11 and of the wing parts 2a, 2b of double tread pattern blocks. The configuration of the sipe is identical in said parts of the tread. The lamella 18, 21 is, however, formed in the manner determined by the location, as shown in Figures 5 and 6. The lamella 18 of Figure 5 is used for forming the sipes 8a, 8b, 9a, 9b of the wing parts 2a, 2b of the middle area of the tread and the lamella 21 of Figure 6 is used for forming the corresponding sipes of the unbound tread pattern blocks 11 and of the bound tread pattern blocks 22 of the shoulder area. The manufacturing of lamellas, tyre moulds and tyres in moulds conforms to conventional technology.

The embodiment discloses a six-row tyre. It is obvious that the number of tread pattern blocks can be varied while still maintaining the idea of the invention. The dimensions of a tyre define primarily the number of tread element rows. Also the number, shape and mutual location of the sipes can be varied within the scope of Claim 1.

The tyres of the invention are intended for use as traction wheels in heavy trucks, but it is obvious that they may also be used for less demanding needs. When worn, they are useful for instance in summer driving.

Claims

1. A traction winter tire for heavy trucks being provided with rows of tread pattern blocks and mainly circumferential grooves and transverse grooves separating said pattern blocks from each other, the circumferential rows of tread pattern blocks are displaced relative to each other so that the tread pattern blocks adjacent in axial direction of the tyre are overlapping, said tread pattern blocks comprising sipes opening to the tread and extending into the tyre for enhancing the grip of the tread with the road surface wherein the overlapping and axially adjacent tread pattern blocks are connected in pairs into double tread pattern blocks by a bridge part connecting one end of a side edge of one tread pattern block and the opposed end of an adjacent side edge of the other tread pattern block with each other to form a bridge zone and wing parts, the double tread blocks adjacent each other in circumferential direction being overlapping in axial direction which overlapping relationship results in that the tread blocks in the shoulder area of the tyre are, alternatively, a tread block of a double tread block and an unbound single tread block, the wing parts of the double tread blocks being formed from the connected tread pattern blocks and extending in opposite directions from the bridge zone, wherein the length of the bridge part viewed in the axial direction of the tyre is equivalent to the width of the groove between the circumferential rows of pattern blocks, the bridge zone comprising a long sipe extending from one circumferential outer edge thereof to the opposite outer edge thereof, and the long sipe being discontinued at the area surrounding a mark for an anti-skid stud if an anti-skid stud mark and its support area are formed in the tread pattern block in the area of a long sipe.

2. Winter tyre according to claim 1, characterized in that both wing parts of the double tread pattern blocks are provided with sipes.

3. The tyre of claim 2, wherein the sipes are generally parallel to the long sipe.

4. Winter tyre according to any one of claims 1, 2 or 3, characterized in that both wing parts of the double tread pattern block are provided with sipes which extend from one outer edge of a wing part to its opposite outer edge.

5. Winter tyre according to any one of claims 1-4, characterized in that both wing parts of the double tread pattern block are provided with sipes and that the space between all adjacent sipes is equal.

6. Winter tyre according to any one of claims 1-5, characterized in that the innermost sipe of both wing parts of a double tread pattern block is located in the immediate proximity of the bridge zone.

7. Winter tyre according to any one of claims 1-6, characterized in that the outer edges of the bridge part are curved inwards.

8. Winter tyre according to any one of claims 1-7, characterized in that the double tread pattern block is symmetrical in relation to the longitudinal centreline of the bridge zone, with the exception of the mark for an anti-skid stud and its support area, if a mark and its support area are provided in the tread pattern block.

9. Winter tyre according to any one of claims 1-8, characterized in that the sipes are mutually identical in shape and that they are straight in the ends when seen in top view and Z-shaped or undulated in configuration in the portion between the ends.

10. Winter tyre according to any one of claims 1-9, characterized in that the sipes are parallel to each other and to longitudinal direction of the bridge zone of the double tread pattern blocks.

11. Winter tyre according to any one of claims 1-9, characterized in that the sipes and the parallel edges of the double tread pattern blocks from a small angle (α) with the axis of the tyre, the angle being in the range 0° to 10°.

12. The tyre of claim 11 wherein the angle is about 7°.

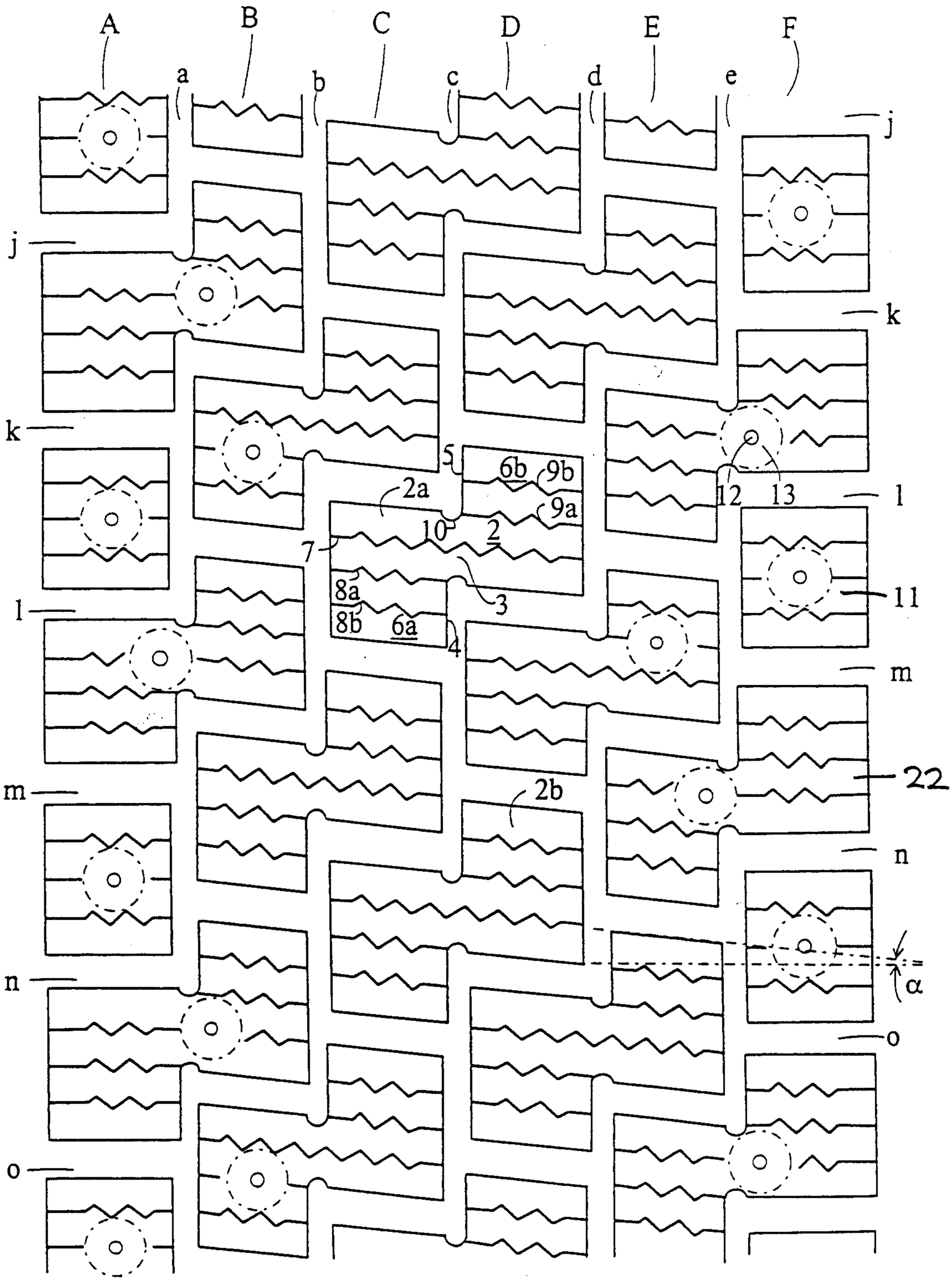

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Fig. 1

Fig. 2

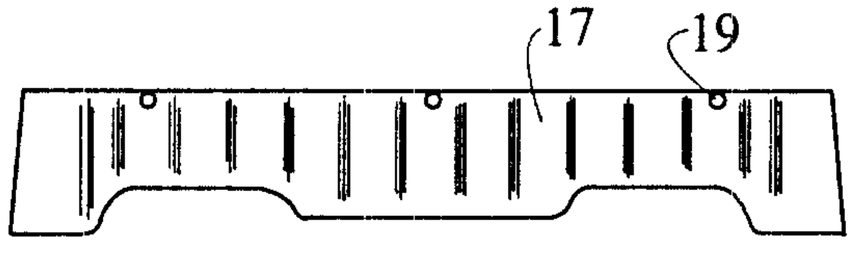


Fig. 3

Fig. 4

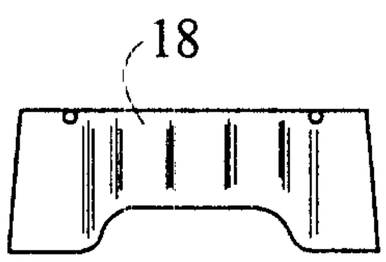


Fig. 5

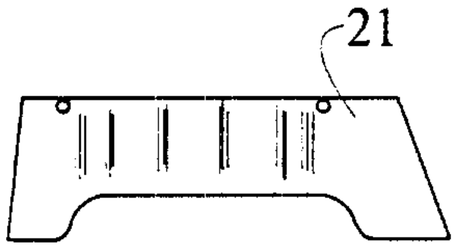
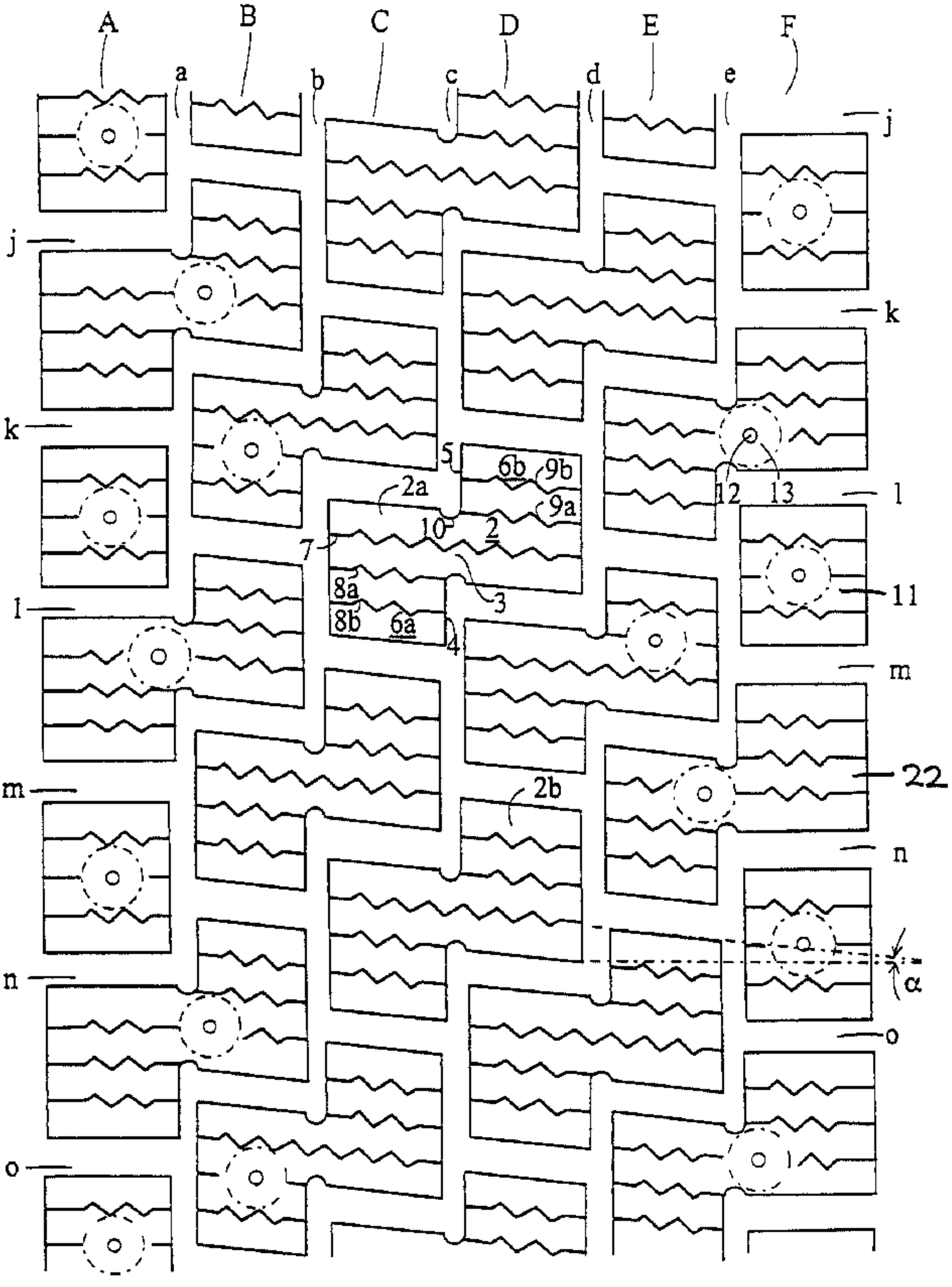


Fig. 6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