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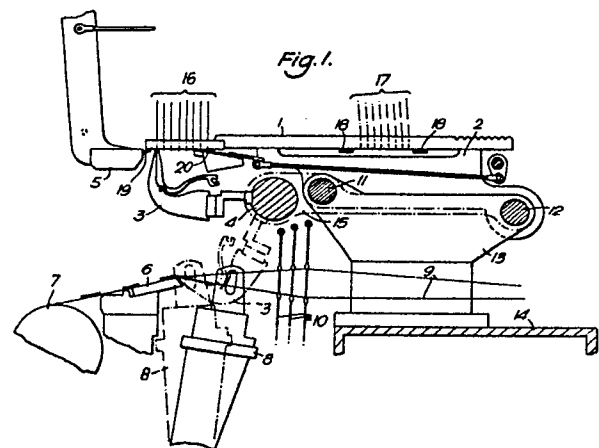
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54 **Gripper-Jacquard axminster carpet loom.**

57 A carpet loom of the gripper-jacquard Axminster type includes a shogging mechanism (21) to shog the grippers (3) and/or the yarn carriers (1) transversely between successive picks of pile yarn. By shogging the grippers (1) transversely between successive picks of pile yarn a different gripper is used in each course for successive picks. Equally, when the yarn carriers (1) are shogged the pile yarns that form each course are not taken from the same yarn carrier (1). Thus, any fault on the grippers (1) or in the yarn in one carrier (1) will not result in a fault on a single course throughout the entire carpet but will, instead, be dispersed between a number of different courses.



Gripper-Jacquard Axminster Carpet Loom

This invention relates to Gripper-Jacquard Axminster carpet looms.

In such carpet looms the pile yarns of the various colours to be used in each course are fed to a separate yarn carrier for each course. The yarn carrier is moved under the control of the jacquard mechanism to present yarn of a particular colour to the gripper. The gripper picks the yarn of the particular colour and pulls a predetermined length of it through the yarn carrier. A knife associated with the jacquard mechanism then cuts the yarn to form an individual tuft. The grippers then rotate to place the tufts of the selected colours at the fell or weaving point. A weft thread is inserted, often by a weft needle, and the chain and stuffer warps shed before another weft thread is inserted to lock the tuft into the backing of the carpet and form it into a generally U-shape as the weft threads are beaten up by the reed. The jacquard meanwhile controls the movement of the yarn carriers so that the yarn of the correct colour for the next pick is in its correct location. The grippers then return to pick the next tuft, and so on. By selecting the pile yarn in this way patterns are formed. Typically gripper jacquard Axminster looms are used for producing carpets with a pattern but, of course, they may also be used for producing plain carpets.

There are two main types of gripper-jacquard Axminster looms. The earliest was developed around 1890 and is referred to as the "vertical type" in which the yarn carriers are mounted upright and moved up and down under the control of the jacquard mechanism. In this vertical type of loom the grippers move through an angle of between 155° and 180° as they move the tufts from the yarn carriers to the weaving point. The other type is so called "horizontal type" in which the yarn carriers are arranged horizontally and are moved backwards and forwards in a horizontal direction under the control of the jacquard mechanism. In this type the grippers only move through an angle of about 90° between the yarn carriers and the weaving point which improves the operating speed of the loom. Also, the yarn carriers are accessible to a weaver standing in front of the loom which is a considerable advantage in practice. The horizontal type of loom is described in detail in our earlier patent specification GB-A-1075082.

Such looms include a large number of yarn carriers and grippers since there are typically six, seven, eight or nine of these to the inch (25 mm) across a loom which is as wide as four metres. Any inaccuracies or defects such as a burr on one of the grippers can cause a defect in the woven carpet. A burr on one of the grippers can tend to

pull the tuft out of the weaving point as the gripper returns for the next pick. This results in the tuft woven into the carpet not being formed as a U-shape with equal length limbs but having one limb longer than the other. This defect is apparent in the finished carpet by the tufts in one particular course being shorter than those in adjacent courses. To remove this defect from the finished carpet the pile is sheared to lower the pile height until all of it is at a height corresponding to the lowest course of tufts. Another fault that can occur results from pile yarn in one or more of the yarn carriers having a different shade either as a result of that yarn having picked up a dye to a different extent or having been dyed in a different dye lot. Again such a fault can result in a distinct line being present in the finished carpet following the course produced from that yarn carrier. Both of these faults are much more visible on a plain carpet or a patterned carpet with an open ground such as one where the pattern consists of a small motif on a plain background.

According to this invention a carpet loom of the gripper-jacquard Axminster type includes a shogging mechanism to shog the grippers and/or the yarn carriers transversely between successive picks of pile yarn.

By shogging the grippers transversely between successive picks of pile yarn a different gripper is used for each course for successive picks. Thus, any fault on the grippers will not result in a fault on a single course throughout the entire carpet but will, instead, be spread between a number of different courses. Typically the grippers shog between five different courses in a predetermined sequence of, for example, five successive picks. By dispersing any fault over a number of different courses in this way it is very much less visible in the finished carpet. Equally, when the yarn carriers are shogged the pile yarns that form each course are not taken from the same yarn carrier and again typically the yarns for each course may be selected from five different yarn carriers in rotation. This again disperses any differently shaded yarn over a number of adjacent courses and, again, makes its presence much less visible in the finished carpet. By shogging both the grippers and the yarn carriers independently a further dispersion of any faults takes place.

Preferably the dispersion of both the grippers and the yarn carriers during shogging is arranged to be the greatest with the smallest physical movement of both. Thus, typically when either are shogged over five courses one individual yarn carrier or gripper may be moved for example three courses to the left, two courses to the right, three courses

to the left, two courses to the right, and then three courses to the right to return it to its starting position.

The yarn carriers can be shogged at any time after the grippers have moved away from them having completed the picking of one tuft and before they re-enter the carriers to pick the next tuft. There is plenty of time for the yarn carriers to shog whilst the tuft from the one pick is being woven into the carpet. The shogging mechanism may shog the grippers either as they move between the yarn carriers and the weaving point or as they return from the weaving point to the yarn carriers. However, only a short time is available during this movement and accordingly it would be necessary to slow down the operation of the loom if the grippers were shogged at this time. The grippers cannot be moved whilst they are holding the tuft at the weaving point and even after they have released the tuft they are usually intercalated with the beating elements of the reed which would prevent them being shogged. Accordingly, it is very much preferred that the grippers are moved by the shogging mechanism whilst they are in engagement with the yarn carriers, during the yarn draw-off and tuft cutting operations. When it is required to shog the yarn carriers differently from the grippers then the yarn carriers are moved independently during the preceding weaving step before then being shogged together with the grippers during the subsequent pick operation. In this way whilst both the grippers and the yarn carriers may be moved transversely between successive picks of pile yarn even though the yarn to form each course may come from its own respective yarn carrier with only the grippers effectively being shogged between each successive pick. In this case the coding of the pattern created by the jacquard mechanism does not need to be modified in any way. However, when the yarn carrier is effectively shogged in position between successive picks then the encoded pattern supplied to it must be modified to take account of the shogging motion of the yarn carriers to take account of the fact that successive picks for each particular course are taken from different yarn carriers. This of course applies whether the jacquard mechanism is controlled by punched jacquard cards or whether it is of the type which is controlled electronically from a stored program.

Preferably the loom includes an end-out detector associated with the yarn carriers which, after the gripper has pulled the yarn for each tuft from its respective yarn carrier and before the knife cuts the yarn to form each tuft, detects that yarn is present extending between each gripper and its respective yarn carrier. In the absence of yarn extending between any of these the end-out detec-

tor stops the operation of the loom. The construction of a typical end-out detector is described in our earlier patent specification GB-A-1572923. Preferably when the loom includes an end-out detector the shogging mechanism is also arranged to move the end-out detector transversely. The detector may be shogged independently from the grippers or yarn carriers but when both the yarn carriers and grippers are moved transversely together the end-out detector moves with them.

Typically the drive for the tuft cutting knives, the end out detector, the rotation of the grippers and their gripping function are all driven from profiled cams via various pivoted links and levers. When the loom includes a shogging mechanism to move transversely either or both of the jacquard mechanism and the grippers the drive mechanisms for these components preferably include long articulated links extending in a direction transverse to the shogging movement. Typically these long links are two or three times longer than the equivalent conventional links so that, the shogging movement does not significantly influence the drives to the various mechanisms.

Preferably the shogging mechanism that is used to drive the grippers and/or the yarn carriers and/or the end out detector also includes profiled cams which are connected to the shaft carrying the grippers or the framework carrying the yarn carriers via a series of pivoted links and levers. The shaft carrying the grippers is preferably mounted in a framework including two guide rails which are arranged to slide transversely with respect to support brackets fixed to the framework of the loom, and the framework carrying the yarn carriers is mounted on bearings arranged to slide along the guide rails.

The present invention may be applied to looms of both the "vertical" and "horizontal" type and with a loom in accordance with this invention as a result of any intrinsic faults in the operation of being disguised by the shogging movement of the grippers and/or the yarn carriers we have found that it is possible to obtain considerably better results particularly when weaving plain carpets or carpets with a pattern including a large open ground and, moreover have found that it is possible to reduce the length of each tuft without reducing the quality of the resulting carpet since less subsequent shearing is required. Since one of the prime costs of any carpet is the quantity of pile yarn used this saving in pile yarn represents a considerable advantage.

A particular example of a carpet loom in accordance with this invention will now be described with reference to the accompanying drawings, in which:-

Figure 1 is a simplified sectional elevation

through the loom;

Figure 2 is a simplified plan showing the shogging mechanism; and,

Figures 3, 4, 5 and 6 are diagrams illustrating the shogging movement of the yarn carriers and grippers.

This example of loom is generally similar to a conventional horizontal type gripper-jacquard Axminster carpet loom and includes a number of yarn carriers 1 mounted on a jacquard base 2, a corresponding number of grippers 3 mounted on a gripper shaft 4, and end out detector 5, a breast comb 6, a take-up roll 7 and reed 8. Chain and stuffer warps 9 are shed through healds 10 and a weft needle (not shown) moves transversely through the shed formed by the healds 10 and inserts the weft thread. The jacquard base 2 is slideably mounted on guide shafts 11 and 12 which are themselves slideably mounted in a support bracket 13 which is rigidly connected to a main frame 14 of the loom. The gripper shaft 4 is mounted in three gripper support brackets 15 which are fixed onto the guide shafts 11 and 12.

Pile yarns 16 of various different colours are fed from a creel (not shown) and held in eight different positions in the yarn carrier 1. The yarn carrier 1 also has selector needles 17 from the jacquard mechanism passing through it. In response to punched cards fed to the jacquard mechanism one of the needles 17 is selected and urged downwards as shown in Figure 1. As guide bars 18 move together they engage the projecting needle 17 and slide the entire yarn carrier 1 to the left or right as shown in Figure 1 until the selected needle 17 is located between the guide bars 18 at their meeting point. Thus, when the leftmost needle 17 is selected the yarn carrier is moved to its rightmost position so that the leftmost pile yarn 16 is gripped by the gripper 3. Conversely, when the rightmost needle 17 is selected the yarn carrier moves leftwards to the maximum extent and the rightmost pile yarn 16 is gripped by the gripper 3.

In operation firstly the jacquard mechanism via the needles 17 moves the yarn carriers 1 so that the appropriate pile yarns 16 are aligned with the picking position of the grippers 3. Then, as the gripper 3 rotates clockwise, as shown in Figure 1, with its jaw opened the gripper enters the base of the gripper unit 1 at the most clockwise position of the gripper 3. The jaw of the gripper 3 is then closed to grip the selected pile yarn 16. The gripper shaft then rotates counterclockwise far enough to pull a length of pile yarn 16 sufficient to form a tuft through the yarn carrier 1. The end-out detector then moves to the right as shown in Figure 1 to engage its sliding detector head 19 with the pulled out length of yarn from each of the yarn carriers 1. In the event that in any position along the length of

the loom no pile yarn 16 is engaged by a gripper 3 the end-out detector stops the loom. However, assuming that all of the grippers have gripped an end of the yarn a knife mounted on the jacquard base severs the pile yarns to form individual tufts. The gripper then continues to rotate in the counterclockwise direction through about 90° into the position shown in chain dotted lines in Figure 1. The weft needle then draws a weft thread through the shed formed by the healds 10 and the chain and stuffer warps 9 to hold the tufts into the fell at the front of the breast comb 6. The healds 10 are then moved to provide a different shed of the chain and stuffer warps and a second weft thread is inserted into the shed formed between them. Meanwhile the grippers have opened to release the individual tufts which, as the second weft thread is inserted are formed into a U-shape and held by the weft threads. The reed then beats to the left as shown in Figure 1 to beat up the weft threads and tufts so that they are tightly held together. Meanwhile the grippers 3 rotate clockwise to return to their picking position shown in solid lines in Figure 1. A take-up roll 7 moves on to take-up the shot of carpet that has just been woven.

Apart from the mounting of the gripper shaft 4 and jacquard base 2 the loom and the above description of its operation are conventional. However, as shown most clearly in Figure 2 the loom in accordance with this invention includes a shogging mechanism 21 which moves the jacquard base 2 and with it the yarn carriers 1, the gripper shaft 4 and with it the grippers 3 and the end-out detector 5 transversely, that is to the left and right as shown in Figure 2. The shogging mechanism 21 includes three profiled cams 22, 23 and 24 which move the jacquard base 2, the gripper shaft 4 and the end-out detector 5, respectively. The shogging mechanism includes cam followers which ride on the cams 22, 23 and 24 which are linked via pivoted links 25, 26 and 27 to the jacquard base 2, the guide shafts 11 and 12 and the end-out detector 5, respectively. The shogging mechanism 21 enables the jacquard base 2, and with it the yarn carriers 1, the grippers 3 and the end-out detector 5 all to be shogged independently, or together depending upon the profile of the cams 22, 23, and 24, in between successive picks of the grippers 3 from the yarn carriers 1.

There are essentially four different ways in which the shogging mechanism 21 can be used to drive the loom and these will be described with reference to Figures 3, 4, 5 and 6. These diagrams illustrate the position of the different yarn carriers which can be used to provide tufts of yarn for course number 1 and course number 552 of the carpet, illustrate the position of the end-out detector 5 to detect end-out in course number 1 and the

position of the grippers 3 which can be used to provide a tuft for course 1 and illustrate how they change position during operation of the shogging mechanism 21.

Firstly, consider the case where the yarn carriers 1 and the jacquard base 2 only are shogged and the grippers 3 and the end-out detector 5 remain in position. This is shown in Figure 3. Number 3 gripper always supplies the tufts for course number 1, and the yarn carriers 1 that can be gripped by the number 3 gripper are numbered 1, 2, 3, 4 and 5. Assume that the starting point is where yarn carrier 3 is aligned with course 1 as shown at the top of Figure 3. Whilst the gripper 3 is down at the weaving point intercalated between the elements of the reed 8, the shogging mechanism 21 moves the jacquard base two courses to the left (as shown in Figure 2 and Figure 3) to align yarn carrier 5 with course 1 and number 3 gripper. The grippers then move clockwise to engage their jaws with their respective yarn carriers 1. Gripper number 3 engages yarn carrier number 5. Thus, the tuft for the first shot of the loom is taken from yarn carrier number 5. As the grippers 3 move counterclockwise away from the gripper units 1 the jacquard base 2 is then shogged to the right by three courses to bring carrier unit number 2 into line with course 1. Thus, the tuft for the second shot is picked by gripper number 3 from yarn carrier number 2. Whilst the tuft for the second shot is being woven into the carpet the jacquard base 2 is then moved to the left by two courses to bring yarn carrier number 4 into line with course number 1 so that the tuft for the third shot of the loom is taken from yarn carrier number 4 by gripper number 3. The jacquard base 2 is then moved to the right by three courses to bring yarn carrier number 1 into line with gripper number 3 so that the tuft for the fourth shot of the loom is taken from yarn carrier number 1. After this the jacquard base 2 is moved to the left by two courses to return it to its starting position with yarn carrier number 3 aligned with gripper number 3 so that the tuft for the fifth shot of weft is taken by gripper number 3 from yarn carrier number 3. This sequence is then repeated for each subsequent five shots.

In the second arrangement illustrated by the diagram in Figure 4 both the yarn carriers 1 and the grippers 3 move together. To achieve this the cams 22 and 23 have a similar profile. In this example the end-out detector 5 shogs differently from the grippers 3 and yarn carrier 1 always moving so that it is associated with the gripper and yarn carrier pair that form course number 1 in the next picking operation. Thus, with this arrangement throughout grippers numbered 1 to 5 are permanently aligned with yarn carriers numbered 1 to 5 and shog together.

At the start of the cycle of operations both gripper and yarn carriage number 3 are aligned with course number 1. The detector is then shogged by being moved to the right as shown in Figure 4 by two courses to align it with yarn carrier and gripper pair number 5. Then, as the grippers engage the yarn carrier to pick the yarn the grippers and yarn carriers move to the left (as shown in Figures 2 and 4) by two courses to move yarn carrier and gripper number 5 until they are aligned with course number 1. The tuft for the first shot is then picked and cut and moved down to the weaving point. Then, the cam 24 moves the end-out detector 5 to the left by three courses to align the end-out detector 5 with the number 2 pair of gripper and yarn carriers. Then, as soon as the grippers have again entered the yarn carriers 1 the gripper and yarn carrier assembly is moved to the right by three courses to bring number 2 yarn carrier and gripper pair into line with course number 1. The pick for the second shot is then made and as the tuft is taken down to the weaving point the end-out detector 5 is moved to the right by two courses so that it is aligned with gripper and yarn carrier number 4. After the grippers and yarn carriers have again come into contact the gripper and yarn carrier assembly is moved to the left by two courses to bring number 4 gripper and yarn carrier pair into alignment with course number 1. The number 4 gripper then picks the yarns for the third shot. After this the end-out detector moves to the left by three courses to align itself with number 1 yarn carrier and gripper pair. After the grippers have engaged their corresponding yarn carriers the yarn carriers and grippers are moved to the right by three courses to align the number 1 gripper and yarn carrier pair with the first course. The tuft for the fourth shot is then picked. Finally, the end out detector is moved to the right by two courses to align it with number 3 gripper and yarn carrier pair. After the grippers have engaged their corresponding yarn carriers the grippers and yarn carriers are then moved to the left by two courses to align number 3 gripper and yarn carrier pair with course number 1 so that the tuft for the fifth shot is taken from number 3 yarn carrier. Again the process is repeated for subsequent shots.

In addition to shogging the yarn carriers 1 and grippers 3 together they may also be shogged independently. This arrangement is shown in Figure 5. Starting with an initial position where yarn carrier number 2, gripper number 1 and the end-out detector are all aligned with course number 1 then, whilst the grippers 3 are in their lowermost position the end-out detector 5 is moved to the right by three courses so that it is aligned with course number 4. Simultaneously the jacquard base 2 is moved to the left by one course to move

the number 5 yarn carrier into alignment with the end-out detector and with number 4 gripper. The grippers are then lifted to associate gripper number 5 with yarn carrier number 4 and the grippers and yarn carriers moved to the left by three courses to bring number five yarn carrier and number 4 gripper into alignment with course number 1. Thus, in course number 1 the tuft for the first shot is laid by gripper number 4 and taken from yarn carrier number 5. As the grippers 3 move downwards the end-out detector 5 is moved two courses to the left and the jacquard base 2 moved one course to the right so that the end-out detector is aligned with number 2 yarn carrier. As the grippers then lift upwards and engage the yarn carriers once again the combined yarn carriers and grippers are moved to the right by two courses to bring number 2 gripper and number 2 yarn carrier into alignment with course number 1. The tuft that is woven in the second shot is therefore placed into course number 1 by the number 2 gripper and taken from the number 2 yarn carrier. As the grippers move downwards the end-out detector is moved three spaces to the right to be aligned with number 5 gripper and the jacquard base 2 is moved one course to the right to align carrier number 4 with gripper number 5. As the grippers then re-enter the yarn carriers the combined grippers and carriers are moved to the left by three courses to align gripper number 5 and yarn carrier number 4 with course number 1. The tuft for the third shot is thus laid in course number 1 by the gripper number 5 and taken from yarn carrier number 4. The end-out detector is then moved two courses to the left and the jacquard base 2 moved two courses to the right. This aligns the number 1 yarn carrier with the number 3 gripper. As the gripper again enters the yarn carrier the combined grippers and yarn carriers are moved two spaces to the right to align the number 1 yarn carrier and number 3 gripper with course number 1. Thus the tuft for the fourth shot is taken from yarn carrier number 1 by gripper number 3. Finally, the yarn carriers are moved five courses to the left and the end-out detector moved two courses to the left to align yarn carrier number 3 with gripper number 1. After the grippers have re-entered their yarn carriers both assemblies are moved two courses to the right to align gripper number 1 and yarn carrier number 3 with course number 1 so that the tuft for the fifth shot is taken from yarn carrier number 3 by gripper number 1. Again the sequence is repeated for each subsequent five shots.

In the example shown in Figure 6 the end-out detector moves together with the jacquard base 2 and thus both the cams 22 and 24 are the same. The net effect of the movements to be described is that only the grippers 3 are shogged and the yarn to be laid in course number 1 is always taken from

yarn carrier number 3. However, as will now be described, the end-out detector 5, and the yarn carriers 1 are moved as well as the grippers 3 but are returned to be in alignment with course number 1 before the yarn is picked by the grippers.

Thus, starting with gripper number 4, end-out detector 5 and yarn carrier number 3 aligned with course number 1, the jacquard base 2 and end-out detector 5 are moved two courses to the left as shown in Figure 6 so that they are aligned with gripper number 2 whilst the grippers are in their lowermost position. The grippers are then lifted to enter the yarn carriers and then the grippers and yarn carriers moved together two spaces to the right to align yarn carrier number 3 and gripper number 2 with course number 1. Gripper number 2 then picks the yarn from carrier number 3 for the first shot. As the grippers move down the yarn carriers and end out detector are moved three courses to the right to align yarn carrier number 3 with gripper number 5. The grippers then move upwards into engagement with the yarn carriers and both the grippers and yarn carriers are moved three courses to the left to bring gripper number 5 into alignment with course number 1. Gripper number 5 then takes the yarn from gripper number 3 for the second shot. The yarn carriers and end-out detector are then moved two courses to the left to align yarn carrier number 3 with gripper number 3. After the grippers have re-entered the yarn carriers the grippers and yarn carriers are moved two courses to the right to align gripper number 3 and yarn carrier number 3 with course number 1. The tufts of the third shot are then taken by gripper number 3 from yarn carrier number 3. The yarn carriers and end-out detector are then moved two courses to the left to align yarn carrier number 3 with gripper number 1. After the grippers have re-entered the yarn carriers the grippers and yarn carriers are moved two courses to the right to bring gripper number 1 into alignment with course number 1. The tuft for the fourth shot is therefore taken by gripper number 1 from yarn carrier number 3. The yarn carriers and end-out detector are then moved three courses to the right to align yarn carrier number 3 with gripper number 4. After the grippers have again moved upwards to re-enter the yarn carriers the grippers and yarn carriers are moved together three courses to the left to bring yarn carrier 3 and gripper number 4 into alignment with course number 1. The tuft for shot number 5 is then taken by gripper number 4 from yarn carrier number 3. Again the process is repeated for each subsequent five shots.

Claims

1. A carpet loom of the gripper-jacquard Axminster type characterized by a shogging mechanism (21) to shog the grippers (3) and/or the yarn carriers (1) transversely between successive picks of pile yarn (16).

bearings arranged to slide along the guide rails (11,12).

2. A carpet loom according to claim 1, in which both the grippers (3) and the yarn carriers (1) are shogged independently.

3. A carpet loom according to claim 1 or 2, in which the dispersion of both the grippers (3) and the yarn carriers (1) during shogging is arranged to be the greatest with the smallest physical movement of both.

4. A carpet loom according to claim 3, in which the yarn carriers (1) or grippers (3) are shogged over five courses and each individual yarn carrier (1) or gripper (3) is moved in turn three courses to the left, two courses to the right, three courses to the left, two courses to the right, and then three courses to the right to return it to its starting position.

5. A carpet loom according to any one of the preceding claims, in which the grippers (3) are moved by the shogging mechanism (21) whilst they are in engagement with the yarn carriers (1), during yarn draw-off and tuft cutting operations.

6. A carpet loom according to any one of the preceding claims, in which the yarn carriers (1) are shogged independently after the grippers (3) have moved away from them having completed the picking of one tuft and before the grippers (1) re-enter the yarn carriers (1) to pick the next tuft.

7. A carpet loom according to any one of the preceding claims, which also includes an end-out detector (5) associated with the yarn carriers (1), and in which the shogging mechanism (21) is arranged to move the end-out detector (5) transversely.

8. A carpet loom according to claim 8, in which when both the yarn carriers (1) and grippers (3) are moved transversely together, the end-out detector moves (5) with them.

9. A carpet loom according to any one of the preceding claims, in which the shogging mechanism (21) that is used to drive the grippers (3) and/or the yarn carriers (1) and/or the end out detector (5) includes profiled cams (22,23,24) which are connected to a shaft (4) carrying the grippers (3) or a framework (2) carrying the yarn carriers (1) or the end out detector (5) via a series of pivoted links and levers (25,26,27).

10. A carpet loom according to claim 9, in which the shaft (4) carrying the grippers (3) is mounted in a framework (15) including two guide rails (11,12) which are arranged to slide transversely with respect to support brackets (13) fixed to a framework (14) of the loom, and the framework (2) carrying the yarn carriers (1) is mounted on

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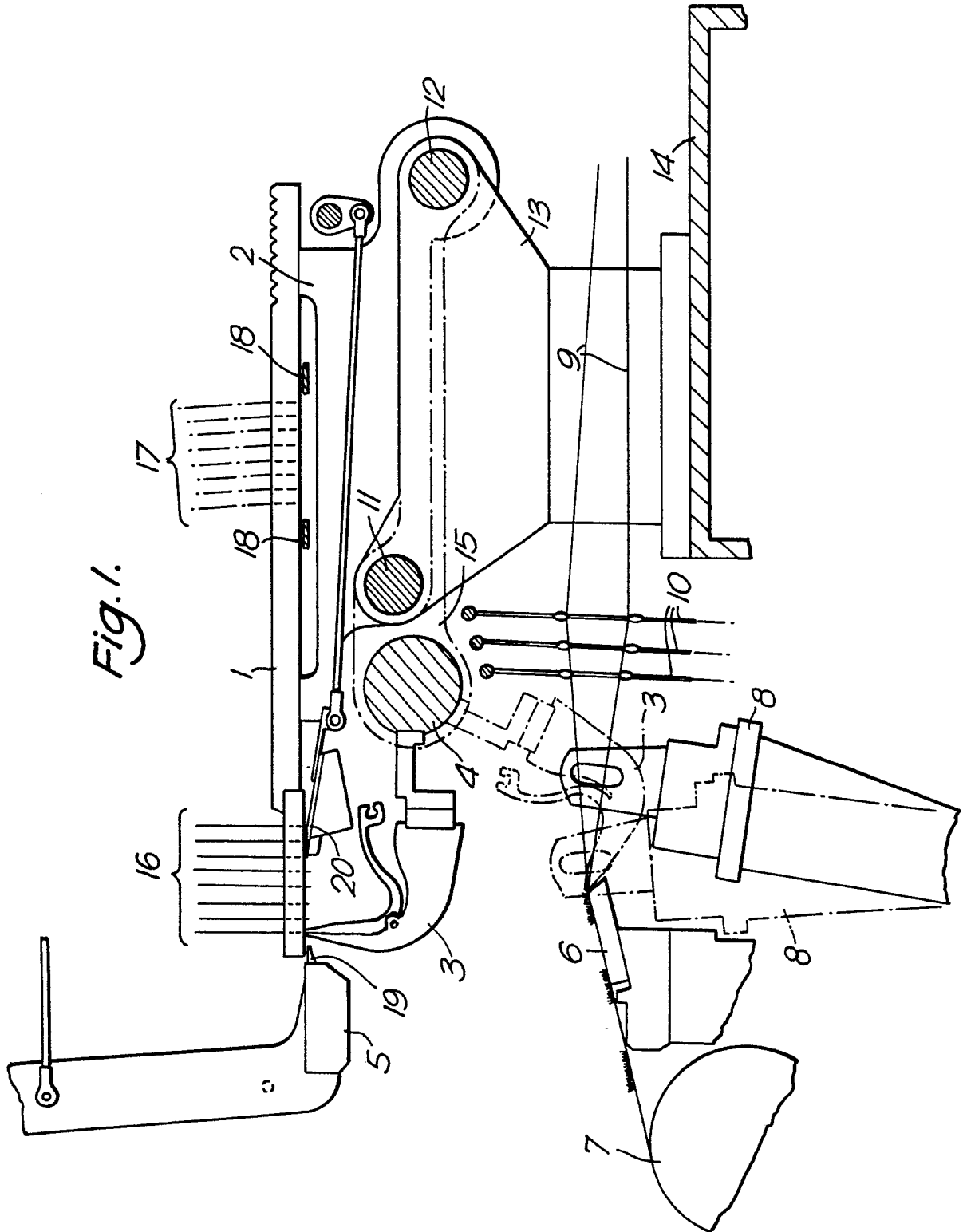


Fig. 2.

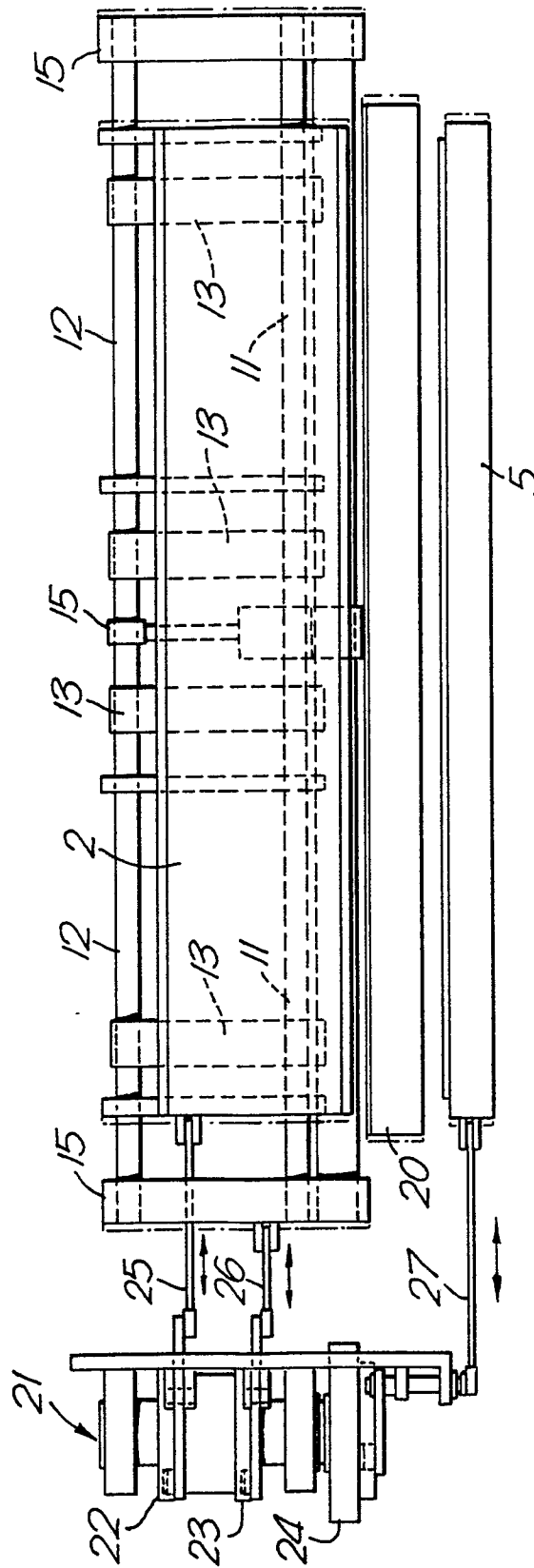


Fig. 3.

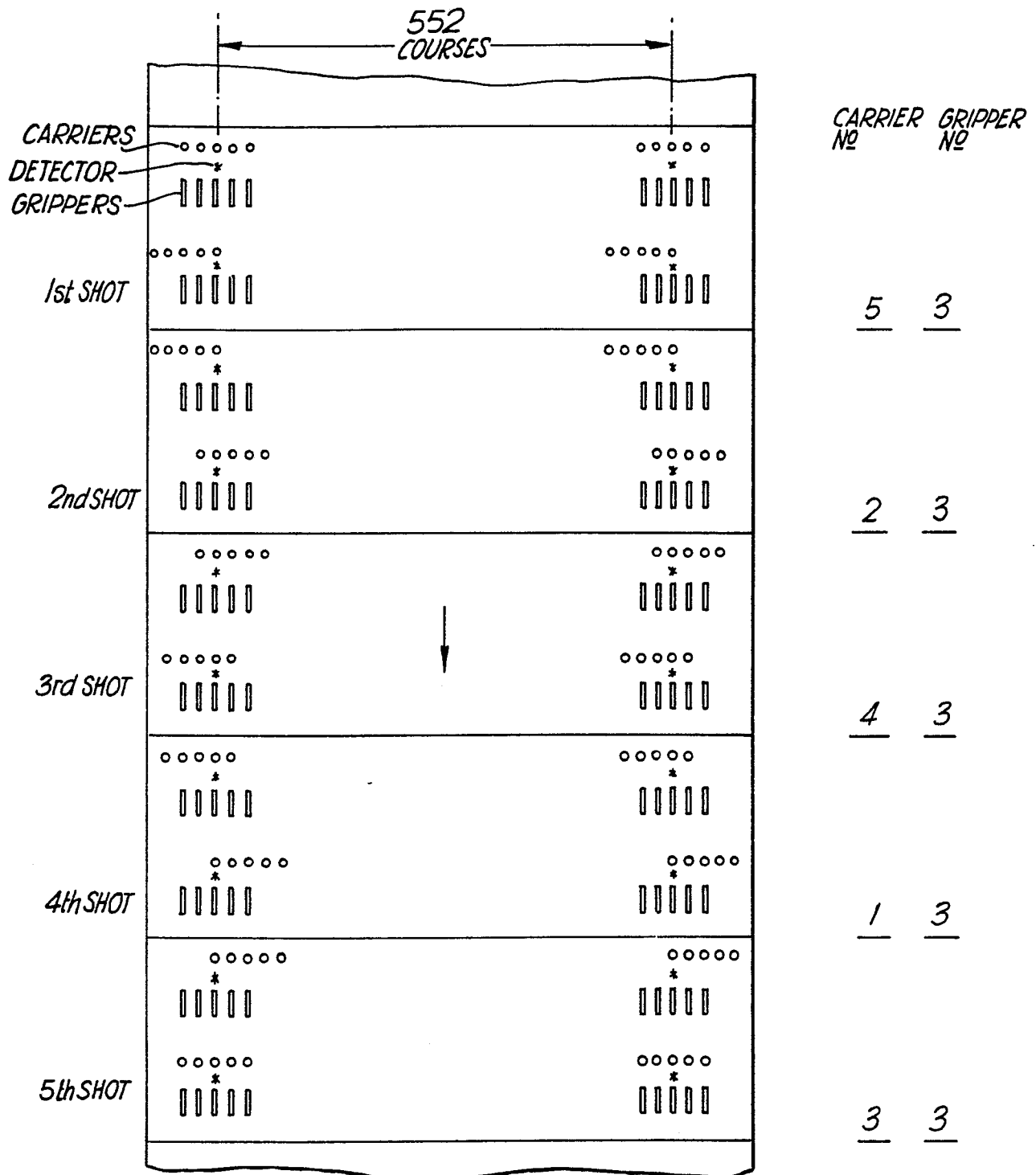


Fig. 4.

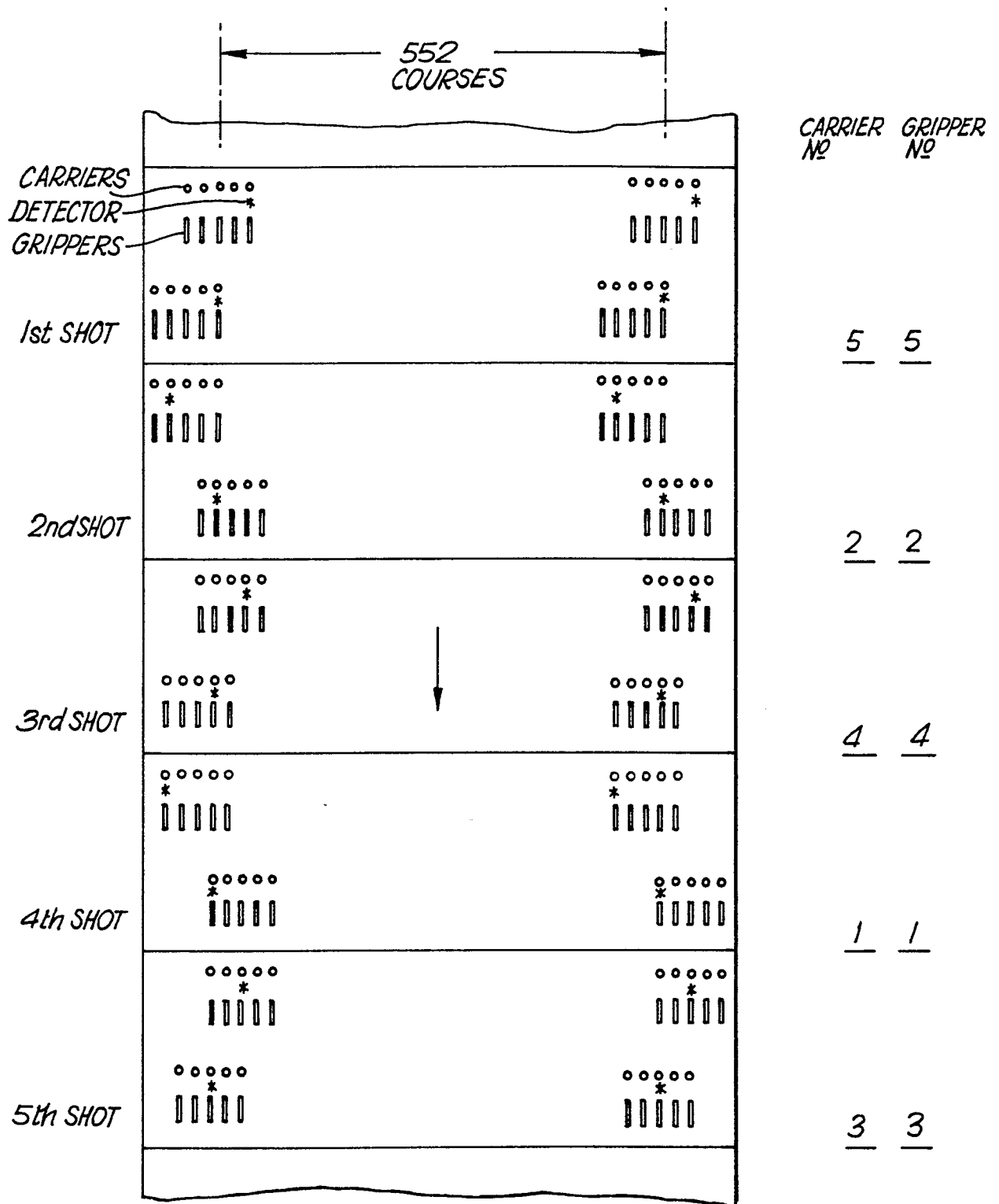


Fig. 5.

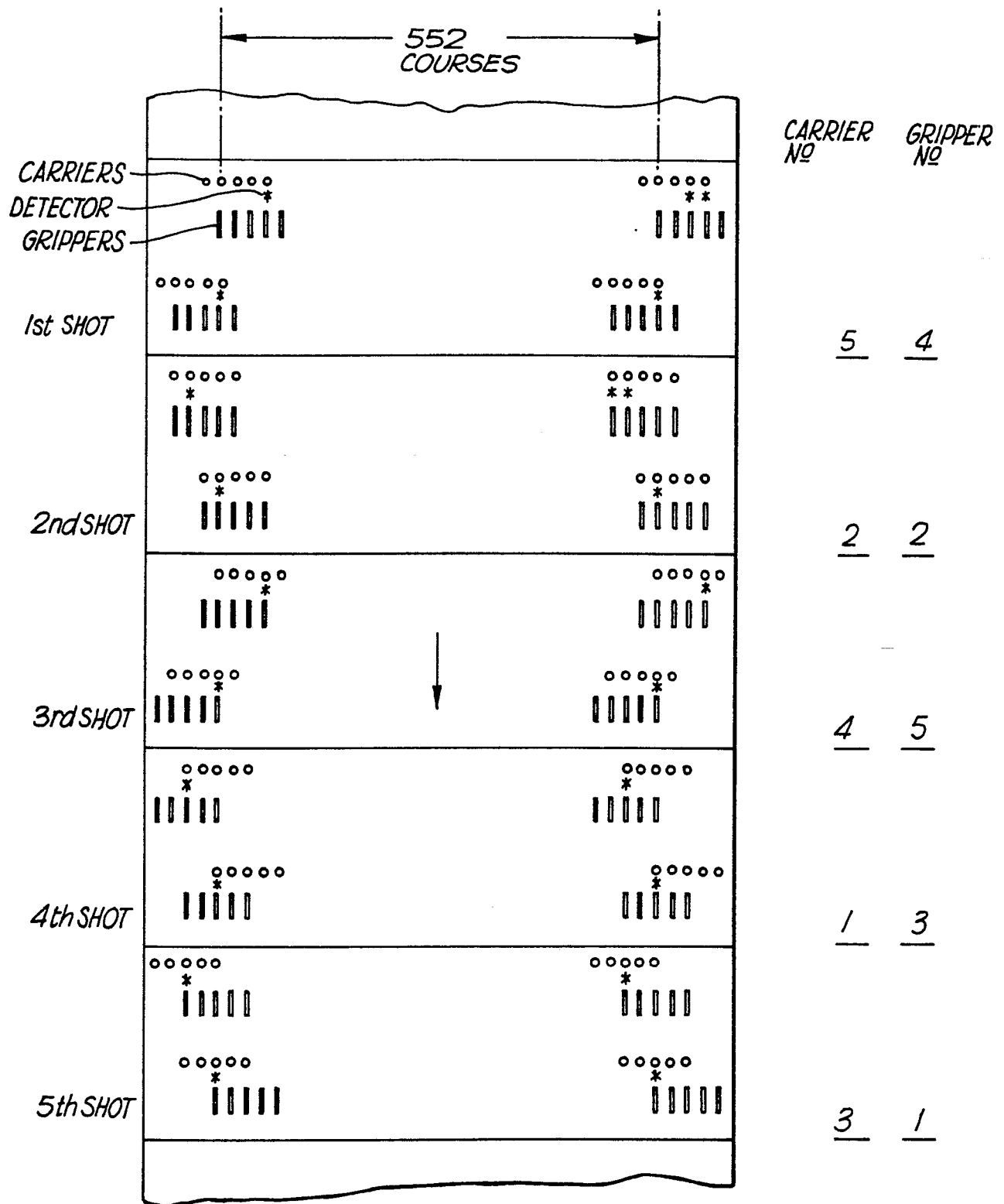
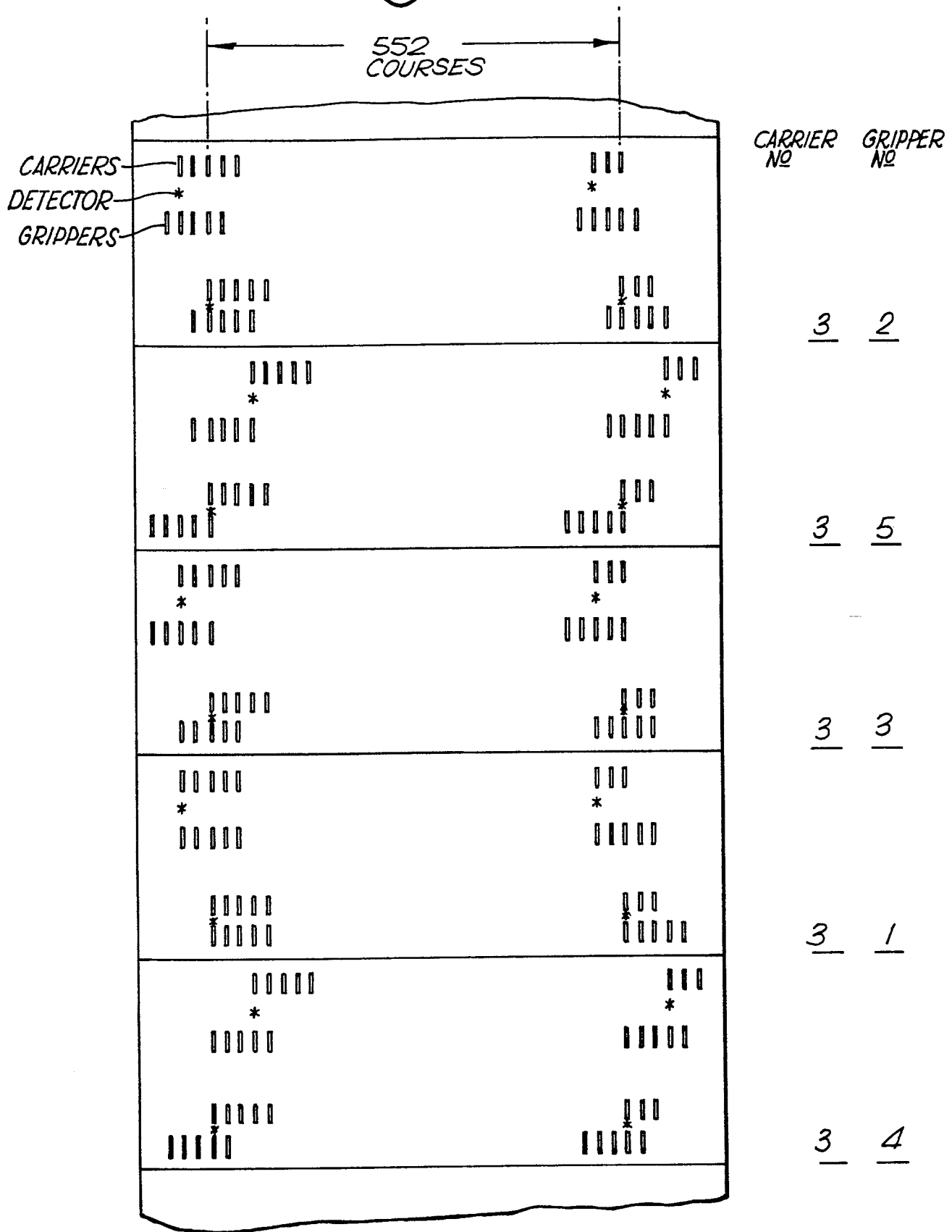


Fig. 6.





EP 90 30 0599

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
A	WO-A-8504197 (FABRICATION CENTER) * page 3, lines 11 - 23; figures 1, 2 * ---	1	D03D39/08 D05C15/18
A	DE-A-3300283 (SPENCER WRIGHT) * figure 1 * ---	1, 9	
A	DE-A-2755868 (PICKERING) * page 4, lines 1 - 8 * ---	1, 2	
A	US-A-4416205 (J. SCHWARTZ) * column 1, lines 55 - 61; figures 1-7 * ---	1	
A	US-A-3964407 (G. INGRAM ET AL) * abstract; figure 1 * ---	9, 10	
A	GB-A-2198459 (CROWTHERS CARPETS) * page 3, lines 22 - 25; figures 1, 2 * ---	7	
D,A	GB-A-1572923 (LOWE JOWETT) -----	7	
			TECHNICAL FIELDS SEARCHED (Int. Cl.5)
			D03D D05C
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 10 MAY 1990	Examiner REBIERE J. L.
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